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Introduction

Preschool children are at a stage in their lives when they are developing and refining fundamental movement skills, which are the basis of future movement skill capabilities¹. The development of these fundamental motor skills is essential for achieving school readiness as well as for facilitating a child's progression through school³.

Every child requires many opportunities for vigorous physical activity and participation in a variety of different movement experiences in order to achieve his/her optimal growth and development. Many child development experts are concerned that many children do not have sufficiently active lifestyles and as a result are not developing critical body balance and coordination skills. The suggestion has been made that this lack of balance and coordination has contributed to an increase in the rate playground injuries⁴.

Balance is an essential motor ability. It refers to the ability of the child to maintain control (equilibrium) in either a static or dynamic environment. Balance control is a critical ability because it is required for sitting, walking, running or just generally moving about without falling down². The development of balance is enhanced through practise⁴, which is why balance activities should be included in all early childhood programmes. If a child has any balance deficits, many tasks become very difficult to perform. Good balance is essential for good posture and preventing a child from fatiguing too quickly³. Therefore it is essential that children are encouraged to improve their balance through physically active play.

Another critical ability that should be developed in early childhood is laterality. Once a child's balance improves, he/she becomes more aware that there are two sides to the body (right and left) and that these sides can be moved either together or independently. Laterality is formally defined as the internal awareness that there are two sides of the body and that these sides are different². This allows a child to use the one side or both sides of the body for a desired movement, either together or doing opposite tasks. Development of laterality is also important for school because it has an impact on academic success². Improved bilateral coordination (the coordination of the two sides of the body) follows the discovery of laterality, and is vital for improved motor skill performance because almost all motor skills require the two sides of the body to move in a coordinated fashion.

Coordination is also considered to be an ability that is essential for early childhood development. It is defined as the ability of child to get the parts of the body to work together in an ordered efficient way to achieve the desired movement outcome or

goal. Coordination is essential for successful goal achievement in any setting in which movement is involved.

When looking for toys that will encourage the development of critical abilities on children during their pre-school years, the criteria of providing vigorous physical activity as well as contributing to improvements in balance, laterality and coordination should be considered. Among the many toys designed to promote positive development through play is a special kind of push-bike called the Y-bike. The Y-bike has been specially designed with the development of balance in mind. One of the many unique features of the Y-bike is that the back wheels are next to each other. This makes the bike less stable, but not unsafe. The instability of the Y-bike encourages the child to develop good balance while experiencing the fun of play. Once a child's balance gets better on a flat surface, obstacles and different surfaces can be explored on the Y-bike. The child will sometimes push the bike using both feet at the same time, and at other times by alternating the right and the left pushing action (laterality and coordination). Recent research completed at Stellenbosch University found that children between ages 2½ to 3½ loved playing on the Y-bike and were content to "drive" their bikes around the playground for up to 15 minutes, suggesting the Y-bike is an effective way to promote physically active play.

Method of the Research

Nineteen children from a preschool in the Stellenbosch area took part in this study. The teachers at the school identified these children. There were two age groups of children, the younger age-group of 7 children ranged between 2½ - 3 years old. The older age group of 12 children ranged from 3 - 3 ½ years old. The children all were tested prior to their supervised play sessions on the Y-bikes. The test included the following items:

- Dynamic balance
 - Each child was required to walk on their tip-toes on a green line as far as possible (maximum 2 meters) without stepping off the line. The distance of correct walking was recorded.
 - Static balance
 - Each child was required to stand with their hands on their hips, while lifting one foot off the ground for as long as possible. Both feet were tested. The number of seconds spent balancing on each leg was recorded.
 - Dynamic balance and leg coordination
 - Each child was required to jump as far as they could, using a two-foot take off and landing with both feet. The distance jumped was recorded.
 - Upper body strength and coordination
 - From a standing position each child was required to throw a medium sized ball as far as possible. The distance the ball travelled was recorded.
 - Bilateral coordination (only for the 3 - 3 ½ year old group)
 - Each child was required to stand split step, with their arm and leg on the same side of their body forward and the other arm and leg
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backward. The child was then required to jump and switch the foot and arm positions while in the air, prior to landing. The number of times that they could perform this correctly was recorded.

Following the pre-tests, the children played on the Y-bikes, under supervision, for 15 minutes per day, 2x per week for 4 weeks. The children were organised into three play groups (6, 6, and 7 children per group) so that each child could spend the entire play period on his/her own Y-bike. This means that each child played for a total of approximately two hours. The play area of play consisted of a small patch of grass and a sloping cement path. After the final plays session, all of the children were post-tested using the same test items.

Results for the 2 ½ to 3 year old children

The following data is a report of changes in the average scores for the younger children when pre-test to post-test performances are compared (see Figures 1 and 2). The children all achieved improvements in their dynamic balance, leg coordination and static balance.

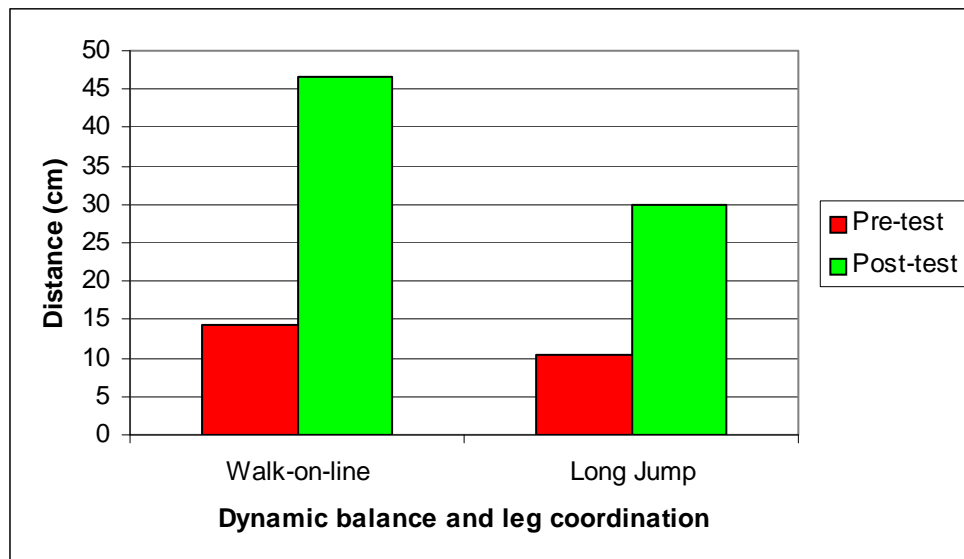


Figure 1. Improvements in the dynamic balance and leg coordination of the 2 ½ - 3 year old children.

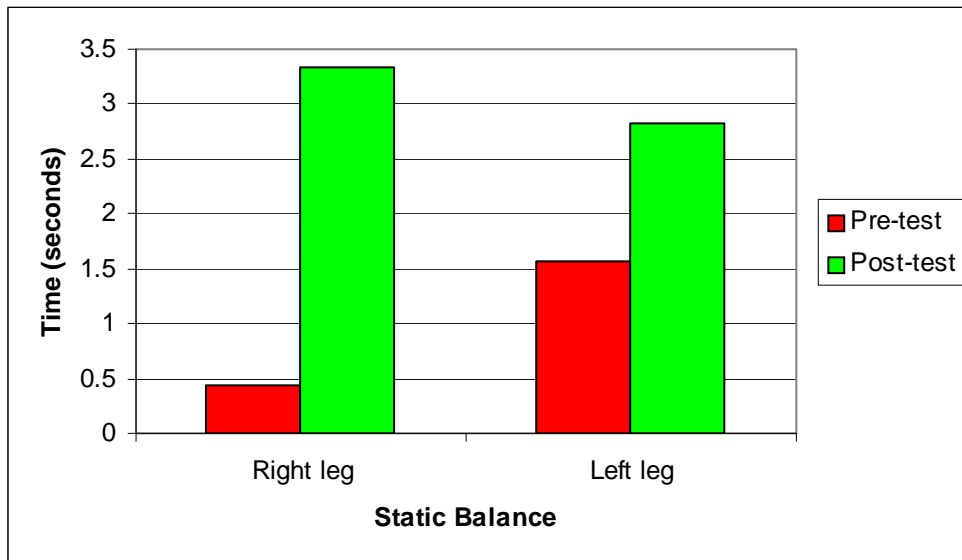


Figure 2. Improvements in the static balance of the children on either the right or left legs of the 2 ½ - 3 year old children.

It can be seen in Figure 3 that the children did achieve a slight gain in their upper body strength and coordination performance, but not enough to consider in to be an improvement.

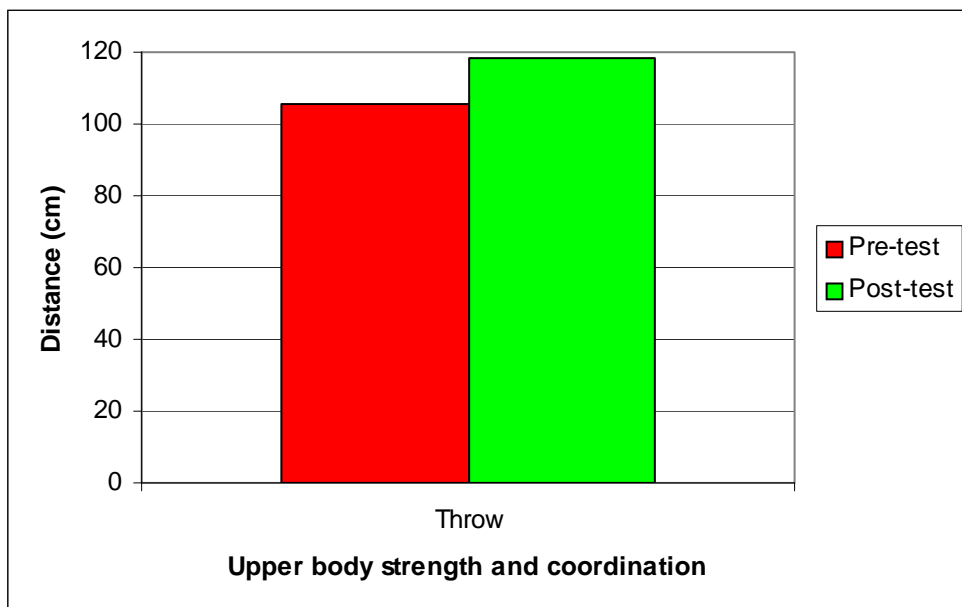


Figure 3. Improvements in the upper body strength and coordination of the 2 ½ - 3 year old children.

Figure 4 indicates the percentage of improvement achieved by the children for each motor ability, following their play sessions on their Y-bikes. There was a substantial improvement in static balance on the right leg (almost 700%), which is encouraging because the scores had been much lower on the right leg than the left leg on the pre-test. The only motor ability that did not improve significantly was the upper body strength and coordination of the children.

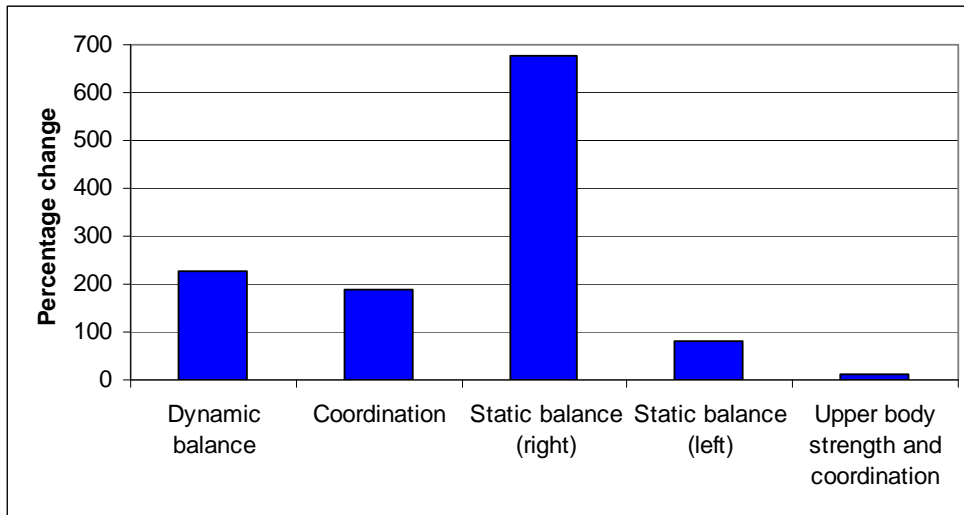


Figure 4. The percentage improvement in motor abilities for the 2 ½ - 3 year old children.

Results for the 3 to 3 ½ year old children

The following data is a report of changes in the average scores for the 3 to 3 ½ year old children when pre-test to post-test performances are compared (see Figures 3 and 4). The children all achieved improvements in their dynamic balance, leg coordination and static balance, although the amount of the improvements was not a great as for the younger children.

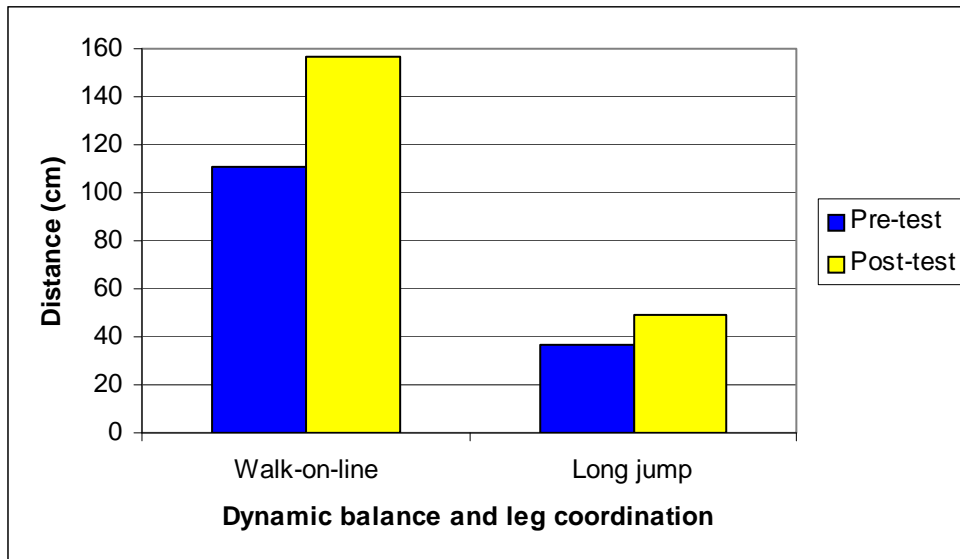


Figure 5. Improvements in the dynamic balance and leg coordination of the 3 - 3 ½ year old children.

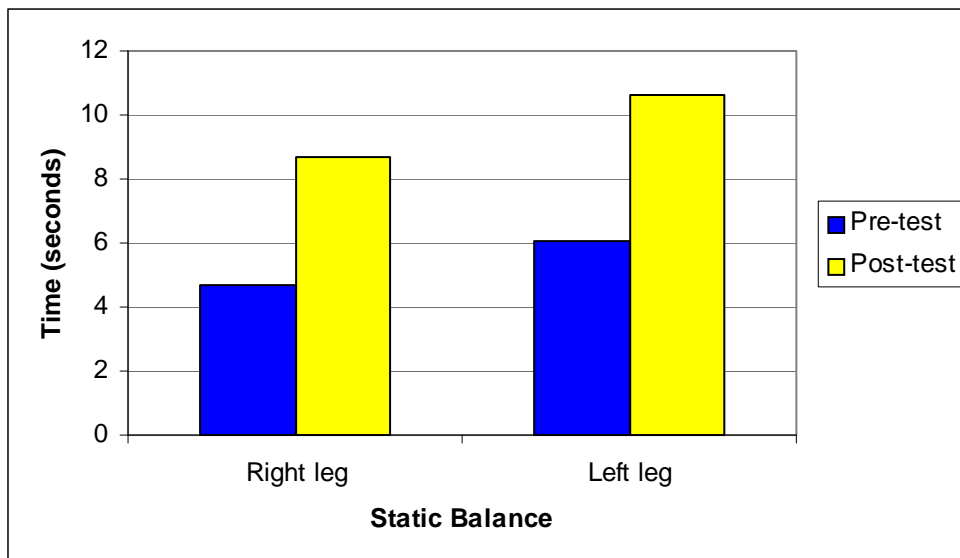


Figure 6. Improvements in the static balance of the children on either the right and left legs of the 3 - 3 ½ year old children.

The results for the 3 – 3 ½ year old children were quite similar as those for the younger children (Figure 7). There was a very slight gain in upper body strength and coordination scores, but not enough to be considered an improvement.

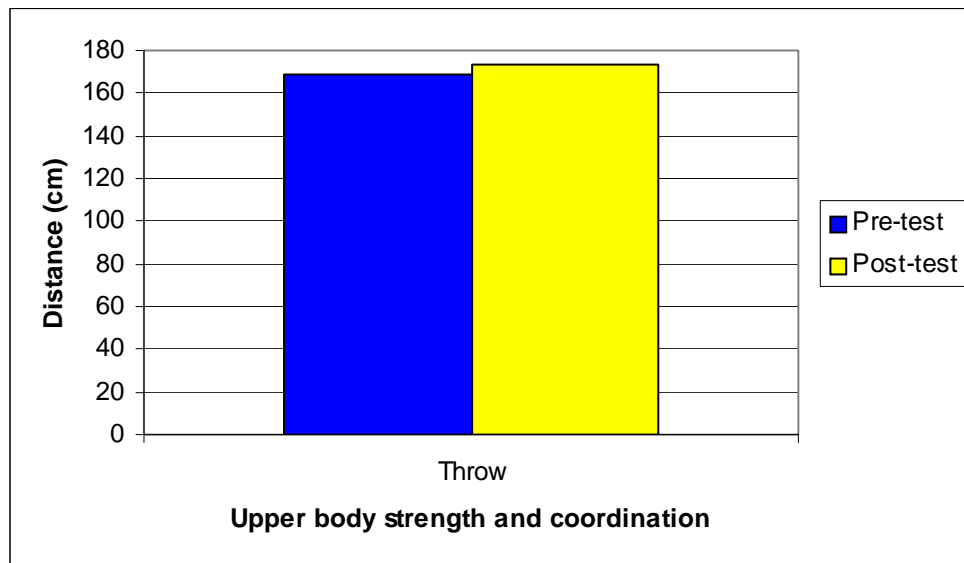


Figure 7. Improvements in the upper body strength and coordination of the 3 - 3 ½ year old children.

The 3 – 3 ½ year olds also attempted a more challenging test of bilateral coordination – the “jump-switch” test in which they had to alternate lead legs as they jump up in the air from a stride position (switching lead legs in the air before landing). The results are presented in Figure 8. The average number of jump switches performed by children showed a remarkable improvement. Many children could not perform the jump-switch at all during the pre-test were able to perform it on the post-test.

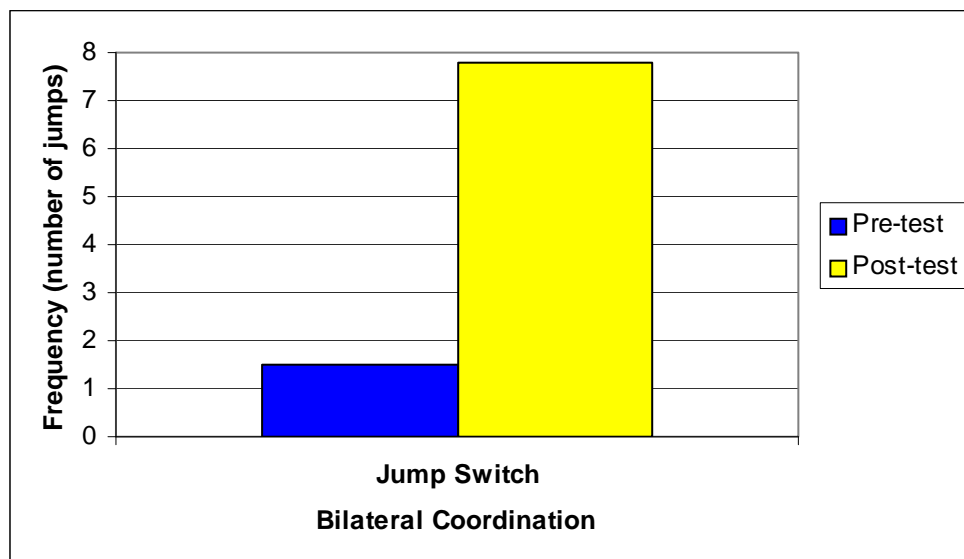


Figure 8. Improvements in the bilateral coordination of the 3 - 3 ½ year old children.

Figure 9 shows the percentage change in all the measured motor abilities of the older age group of children. Bilateral coordination improved the most, while the other variables also showed positive improvements. The exception is upper body strength and coordination, which does not appear to have benefited from the Y-bike play sessions.

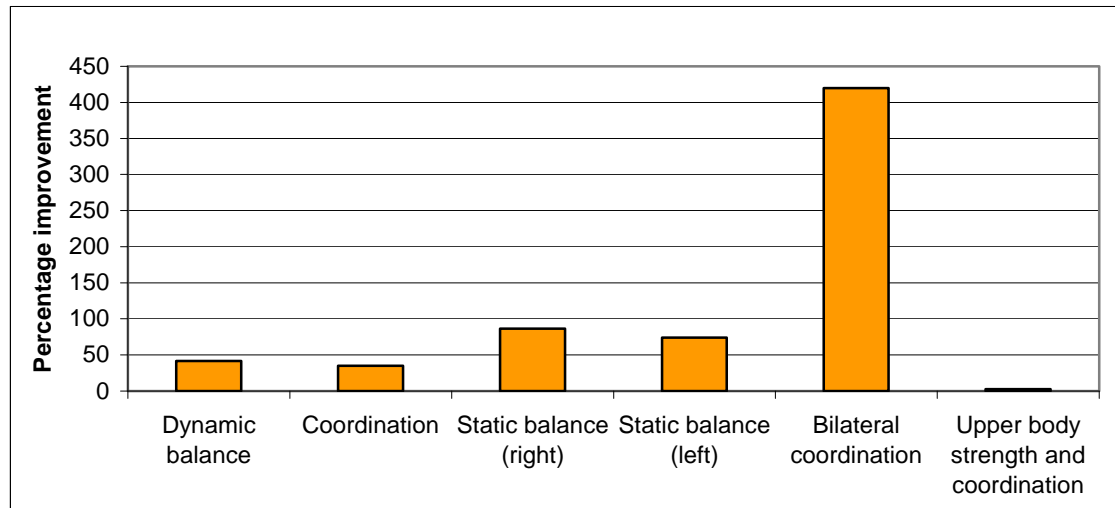


Figure 9. The percentage improvement in motor abilities for the 3 - 3½ year old children.

Discussion

The results indicate that there is a definite improvement in the motor abilities tested, with the exception of upper body strength and coordination. The improvements in the motor skills are much greater in the younger age group, which may indicate that the younger age group had a much larger room for improvement. This may also be because the younger children are at a stage in their lives where skills are developing rapidly, and therefore the Y-bike provided extra practise opportunities to improve these skills. The older age group also showed improvement, although not as much as the younger group, however their initial scores were understandably better than the scores of the younger group.

Supervised play on the Y-bike appears to have provided these children with the opportunity to practise and further develop crucial motor abilities associated with their balance as well as their leg coordination. A possible explanation for the lack of impact on the children's upper body strength and coordination remaining relatively unchanged could be that, although the arms are used in steering and gripping the Y-bike, they are not nearly as involved as the legs while riding the Y-bike.

Motor development follows a relatively predictable timeline, with the various motor abilities skills developing at certain ages. Bilateral coordination is a motor skill that develops later in the pre-school years. For this reason only 3 – 3½ year olds were tested on their bilateral coordination. Their 400% improvement in bilateral coordination indicates that the Y-bike afforded them with the opportunity to develop this ability. .

The time allocated for playing on the Y-bike was intentionally restricted to simulate what many children experience in a crèche environment. The children must share equipment and take turns, which means that their active play time with special pieces of equipment is usually quite limited. If the children were in a small play group and did not have to take turns with the equipment, the results might have been different. It is possible that there would have been great gains, but it is also possible that because the Y-bike is such an attractive toy and riding the Y-bike brings the children obvious enjoyment, some of the children might have “over-done-it” and played to the point where no benefits are achieved.

The Y-bike is a great toy for children to enhance their motor skills, by allowing them the opportunity to practise their gross motor skills and the Y-bike provides a new way to explore their environment. It was apparent to everyone watching the children play that the Y-bikes brought joy to each child. Every minute on the Y-bike was pure bliss, and they never wanted to get off. Even the least confident and timid of the children did not want to stop once they got on their Y-bike.

Although there were great improvements shown by the results, these improvements have to be interpreted with caution, There are factors other than the play on the Y-bike, which could have resulted in the improvements. Over time children develop their motor skills, and therefore over the month between the pre-test and post-test the children might naturally improve in their motor abilities. Children’s motor performance also can be highly variable from day-to-day, and this can cause them to perform differently from day-to-day on any test. It was interesting to notice that after the Y-bike play sessions, the children associated the researchers with the Y-bikes. There became instantly happy whenever they saw the researchers. This positive association could have made the children feel more at ease in the post-test and allowed them to perform better. However, each child did show improvements, so it is unlikely that the improvements were solely due to other variables that can affect performance.

It was also observed that the children’s self-confidence seemed to improve with their play experiences. Although the kinds of play experiences the children were having outside of their crèche could not be controlled, the kinds of improvements in balance and coordination found in this study are well outside of what is expected in a 4-week period. We have concluded that the Y-bike can contribute positively to the motor development of preschool children in terms of their balance and coordination.

References

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