

The KidWalk Standing Mobility System
A Research and Development Perspective
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The KidWalk

The KidWalk is a dynamic standing mobility system that was designed at the former Rehabilitation Engineering Center at Stanford through a research and development grant funded through the U.S. Department of Education (Pr/Award #H133G99010301) (Wright-Ott, Escobar, R. 2006). The design of the KidWalk is the culmination of several years of development and contributions from physical and occupational therapists, engineers, educators, care providers and most importantly from over 150 children with physical disabilities (Figure 1).



Figure 1: The KidWalk Standing Mobility System for hands free mobility.

Hands Free Mobility for Exploration

Just as the typically developing child learns to walk by 15 months of age, and travels more than 39 football fields in a day, the mobility impaired child should also have a means for self-initiated mobility to access the environment by physically interacting and exploring, particularly indoors where we spend 80% of our day. Children develop their sensory motor, cognitive, visual perceptual, spatial learning and motor domains, especially reach and grasp, through self-initiated mobility and interaction. (Damiano, D.L. 2006; Everand, L. 1997; Berger, S.E. Adolph, K.E. 2008; Campos, 2000; Raine et al 2002; Uchiyama et al 2008; Clearfield 2004). Several studies have concluded that self-initiated mobility has a positive impact on development; particularly in the areas of problem solving and spatial cognition and that the lack of mobility will have a negative impact on development. (Berenthal, B. 1984; Butler, C. 1986; Campos, J. 2000; Foreman, N. 1994; Foreman, N. 1990).

The design of the KidWalk supports the premise that mobility should be a means for a child to access and explore the environment to provide developmental and learning opportunities. It is designed with minimal hardware in front of the user to enable the child to get close to objects and people to encourage upper extremity and fine motor development during play and interaction with others (Figures 2, 3).



Figure 2: A student walks to the kitchen to get his lunch from the refrigerator.



Figure 3: Minimal hardware allows students to get close to objects and people.

Unlike walkers or gait trainers that require the individual to hold onto the unit for support and to “steer” it, the KidWalk is steered by the user’s pelvis, leaving the hands free for achieving developmental activities like reaching, pointing, touching, playing tag or hide and seek, catching and throwing a ball, opening and closing drawers and pushing, pulling or carrying objects (Figure 4).



Figure 4: A preschooler discovers a toy car to push while standing and moving in her support walker, the KidWalk.

Maneuverability Across Environments

The KidWalk is designed to overcome maneuverability limitations commonly found in walkers or gait trainers. The original research and development grant was authored by an occupational therapist who found that most of the support walkers could be maneuvered only on smooth flat surfaces and in large spaces, thereby limiting access across environments such as indoors over carpet and outdoors over uneven surfaces. The KidWalk is uniquely designed with a large mid-wheel and a front anti-tip rather than a caster wheel. This design allows the user to move efficiently indoors over thresholds and carpeted surfaces as well as outdoors over uneven surfaces (Figure 5). The large wheel can also be used to assist in maneuvering the KidWalk (Figure 6). One child in the research project quickly learned to hold the wheel of the KidWalk with one hand while he opened the refrigerator with his other hand, then reached for his snack, backed up and carried it to the table independently.



Figure 5: The KidWalk is designed with large mid-wheels and front anti-tips rather than casters which allows the child to walk more efficiently indoors over carpeted surfaces and outdoors over uneven surfaces.



Figure 6: The large tires can be reached by the child for assistance in maneuvering the KidWalk and mid-wheel placement allows the child to turn around in place, reducing the turning radius.

Maneuverability tests during the research project found that the KidWalk, with a 20" tire, was more than twice as easy for children to move over a carpeted surface and threshold than walkers with 3" casters (Figure 7).

Moving Straight over Carpet		
Walker Type	Tire Dia.	Lbs. Pull
KidWalk	20"	3
CP all swivel	5"	4.5
MW	6"/10"	4.7
W	6"	4.7
RP all swivel	5"	5.1
WJ	5 5/8"	5.3
P all swivel 3 in row	3"	7.0
CP all swivel	3"	7.2
RP all swivel	3"	7.3
A all swivel 3 in row	3"	7.9

Figure 7: The KidWalk with 20" wheels requires only 3 pounds of pull to move straight over carpet. The smaller the wheel on a support walker, the more difficult it is to move over carpeted surfaces and thresholds.

Designed for Therapeutic Intervention

The KidWalk is designed with features that support a user's therapeutic goals, particularly for those with cerebral palsy. A unique patented feature allows for weight shift during ambulation and a swivel self-centering seat encourages reciprocal leg movements for a more natural gait. (Figure 8). The spring board design of the positioning unit allows for vertical movement which naturally occurs during ambulation. These features make it ideal for a therapist to work on therapeutic goals while the child stands in the KidWalk prior to over the ground ambulation and to achieve developmental skills such as running and jumping.



Figure 8: A weight shift mechanism and a swivel seat encourage a more natural gait. (View of the seat and pelvic unit where the child stands and faces forward.)

Placement of the large mid-wheel at the body's vector allows the user to rotate around the body's axis to change direction by rotating the pelvis and trunk over the legs, a more desirable movement. This also reduces the turning radius making the KidWalk highly maneuverable in tight spaces. In contrast, other support walkers require the user to move the legs out to the sides in exaggerated movements in order to turn.

Several options on the KidWalk are available to encourage leg alignment during ambulation. These include leg wraps, extended hip guides and an extended seat. Leg wraps are made from a dynamic fabric and are wrapped around the child's thighs then stretched and fastened to the upright posts of the KidWalk (Figure 9). This assists children who have tight hip flexors and those who find it difficult to extend their legs, particularly after sitting in a wheelchair for long periods of time. The leg wraps are also helpful for children who move their feet too far in front of the pelvis during ambulation and for providing positive sensory feedback and awareness of leg position during ambulation. Longer, extended hip pads are an option for guiding the legs proximally at the hip and pelvis if the child tends to abduct or walk with a wide base (Figure 10). The use of an extended seat which extends further down the thigh area to maintain leg alignment is ideal for children who ambulate with hip adduction or scissoring of the legs.



Figure 9: To assist in maintaining leg alignment and reduce hip flexion during ambulation, this child is using dynamic leg wraps (black strap at thigh) fastened around each leg to the back mast.



Figure 10: Extended hip pads (blue arrow) provide alignment to minimize a wide base gait. Extended seat (yellow arrow) reduces scissoring/adduction of legs.

KidWalk Features Accommodate Functional Changes

The KidWalk can be quickly and efficiently adjusted for growth and to accommodate developmental gains and physical changes. A child may initially require full support of the body by using the pelvic, upper body supports and headrest. As the child progresses and head control improves, the headrest can be removed. The trunk supports can be lowered as the child gains more control and balance in the upper body. Some children may progress and no longer need the upper body support which can be easily removed, allowing the child to reach forward or bend down to pick up something on the floor (Figure 11).



Figure 11: (A) shows the full body support. (B & C) shows the KidWalk without the trunk and head supports which are easily removed, allowing the child to bend forward.

Accessing Physical Education and Recess in the School Environment

The KidWalk's spring board suspension system provides upward movement during ambulation with minimal hardware in front of the legs to provide access to activities such as those encountered at recess and in physical education like jumping, running, chasing, kicking and catching a ball. These activities are particularly important for children who spend their day sitting in a wheelchair. Studies have demonstrated that academic performance is positively influenced by participating in physical exercise throughout the day. Dee, a 7-year-old student with cerebral palsy uses a powered wheelchair at school but has no means for independent physical activity. Dee is in full inclusion, and is now able to access the same activities as her peers in physical education class and at recess using her support walker. She can participate in activities like running, jumping, chasing, throwing, catching or kicking a ball, playing tag or

playing games like the Hokey Pokey or dancing. One of her Individualized Education Plan goals includes access to physical education and recess (Figure 12).



Figures 12: Dee uses her KidWalk during recess to carry and share her toy with peers, play a modified game of bowling and to draw on the playground using a chalk toy attached to her walker.

Children who spend their days lying on the floor, being positioned in stationary equipment, or being pushed in a stroller or wheelchair will be disadvantaged compared to peers who have achieved upright, self-initiated mobility in a support walker. The Bridge School has supported the use of hands free walkers within the curriculum for each student during the past 7 years. Studies have demonstrated that children who seek stimulation in their environment at a young age demonstrate increased cognitive, scholastic, and neuropsychological test performance at 11 years (Damiano 2006) and that "Young children who can physically explore their environment, engage socially with other children, and verbally interact with adults, create for themselves an enriched, stimulating, varied, and challenging environment."

The KidWalk is available through www.primeengineering.com

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