

LECKEY



MyWay Pedal

Clinical Workbook

Supporting Children

What is MyWay Pedal?

MyWay Pedal is an elliptical trainer accessory which attaches to the size 2 and 3 Leckey MyWay frame and which can strengthen and stretch lower limb muscles, providing an exciting adjunct to physiotherapy.

Children with CP often display 'crouch' gait which can deteriorate as they get older (Bell, 2002). **MyWay Pedal** enables the child to move away from crouch to pedal in an upright extended position, thus working anti-gravity muscles (calves, quads and gluts) which are not utilised through their full range in the flexed position of traditional cycling. Furthermore, the elliptical motion simulates a typical stepping pattern giving a movement which is closer to gait while the child can enjoy true aerobic exercise.

By applying evidence-based principles relevant to muscle strengthening and child-active exercise, **MyWay Pedal** has the potential to address common clinical issues with lack of muscle strength, endurance and control. For more information, see the 'What's the evidence?' section at the end of this Workbook.



WHO COULD BENEFIT FROM USING MYWAY PEDAL?

Children who would benefit from MyWay Pedal include most existing MyWay users who have a sufficient range of movement- check the precautions and contraindications information in the MyWay User Manual for more details.

Specific user groups for MyWay Pedal may include:

- Children with CP GMFCS level II – IV, and some level V, or similar presentations
- Children who are post medical or surgical intervention and need to make functional use of the new range gained, for example following:
 - Botulinum Toxin treatment
 - Lower limb surgery
 - Serial casting
 - SDR surgery



WHAT SPECIFIC CLINICAL ISSUES DOES MYWAY PEDAL ADDRESS?

Muscle weakness specifically anti-gravity muscles

- **MyWay Pedal** promotes hip and knee extension moving the child away from the crouch standing/walking position to an upright, extended posture.
- This results in the user working anti-gravity muscles (calf muscles, quads and hip extensors) through a full range of motion and provides targeted strengthening of these muscles.
- **MyWay Pedal** also facilitates active hamstring lengthening during the downward pedalling action.
- The opportunity to strengthen anti-gravity muscles and actively lengthen antagonist muscles may help reduce the risk of the user developing hip and knee joint deformities.
- Furthermore, the activity achieved using **MyWay Pedal** is directly transferable to functional activity such as standing transfers, stepping and ascending/descending stairs.

Lack of selective control

- Children with CP frequently experience a lack of selective control, having difficulty isolating the movement of one limb from the other. **MyWay Pedal** promotes reciprocal movement away from stereotyped simultaneous lower limb movement as it facilitates an elliptical pedalling motion.


Decreased quality of gait

- Unlike the circular motion of traditional cycling, the elliptical pedalling of **MyWay Pedal** gives an extended stretch of the lower limbs. This occurs as the pedal action involves more length than height and a sensori-motor experience similar to gait.

Asymmetry of posture and movement e.g. hemiplegia, asymmetric diplegia

- **MyWay Pedal** enables active movement of the lower limbs in good alignment, with the pelvis over knees, over ankles. This can reduce scissoring and promote symmetry.


HELPFUL TIP



Calf weakness is thought to contribute to crouch gait (Rodda, 2004). Consider letting the child use **MyWay Pedal** without wearing AFOs. This enables activity and potential strengthening of calves.


Read [Eli's case story](#) to find out how he achieved real functional gains through using **MyWay Pedal**.

HELPFUL TIP



For more advanced users, open sandal straps to prevent pull-up into flexion and encourage push-down into extension.

HELPFUL TIP



For hemiplegia, consider one strap off to target a weaker side [as per constraint therapy, Hoare 2019].



Lacking joint stability

- Muscle imbalance and insufficient co-contraction both compromise joint stability, causing problems with the control of movement, balance and coordination.
- **MyWay Pedal** offers the opportunity to promote co-contraction around unstable joints, thereby improving stability.

Lack of flexibility and break up in sedentary activity (GMFCS IV and V)

- When propelled by an attendant, **MyWay Pedal** can move the child's lower limbs through a range of flexion/extension, described as 'light activity' [Verschuren, 2016].

Lack of fitness

- **MyWay Pedal** allows a user to achieve aerobic activity which may result in improved cardio-respiratory fitness, circulation and stamina levels for the user.



HELPFUL TIP

The child may benefit from adjusting the handle height to enable optimum elbow extension and accurate steering.

HOW DO I USE MYWAY PEDAL?

- The first few uses may be tiring for the child. Build up tolerance as performance improves. You can start with gentle passive movement and progress to child-active pedalling.
- A typical programme, as an adjunct to physiotherapy, would include 3 sessions of 30 minutes per week over 6 weeks.
- Alternatively, use on a weekly/fortnightly basis as part of PE time or a general exercise programme.

HELPFUL TIP

Pedalling backwards may be easier to begin with. This could be useful to give the child success in achieving active pedalling.

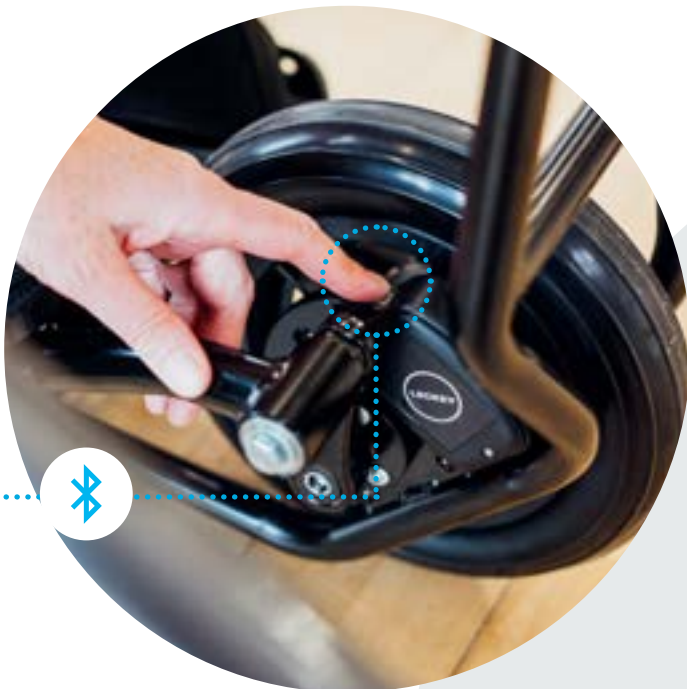


Did you know **MyWay Pedal** can stand up independent of the MyWay frame? This makes it really simple to bring it in from behind and attach it with the user already in the MyWay frame.

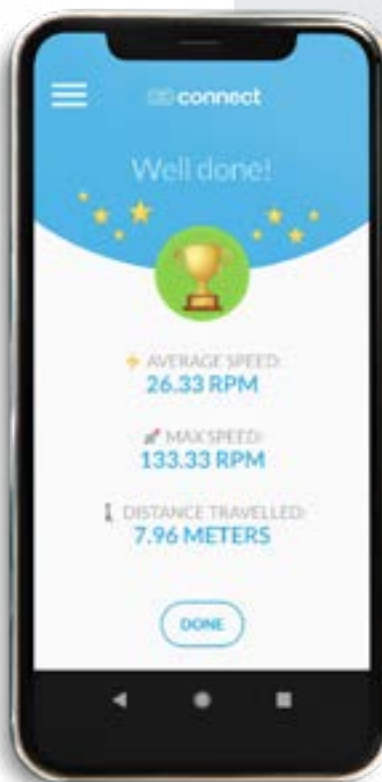
HOW CAN I TRACK PROGRESS AND EFFECTIVENESS?

MyWay Pedal is fitted with a device which captures live data on distance, speed and duration of pedalling. It also stores usage data to review performance and summarise sessions over time. This is displayed via the easy-to-use Leckey Connect app which is available on Android Smartphone, tablet and the Leckey online portal. You can download the Leckey Connect App from the Google Play Store by searching '**Leckey Connect**'.





The Leckey Connect App features a 'Sprint Mode'. This is a session that runs for 30 seconds. Speed and distance data is recorded during the session and is available for review when complete. This mode is excellent for using as a baseline test for assessing a child's progress over time, for example, a 6-week intervention.



GOAL SETTING AND OUTCOME MEASURES

It is also possible to ascertain how effective **MyWay Pedal** is by setting goals with the child and their family and using appropriate outcome measures or records.

Below are some suggestions. Outcome measures and records can be reviewed monthly, termly or annually to monitor progress and provide information for reports at school or clinics.

Goals	Outcome measures
Maintenance of walking ability (speed) using independent walking or assistive walking device	Measure walking speed at set intervals; time taken over set distance or distance covered over set time. Validated test for independent walking: 1-minute walk test [McDowell <i>et al</i> , 2005], 6-minute walking test [Maher <i>et al</i> , 2008]
Prevent or reduce crouch gait	
Maintain /improve active knee extension during swing (active hamstring lengthening)	Use Gait analysis, either 3D gait analysis, 2D video analysis or observational analysis, e.g. Glasgow Index [Tennant <i>et al</i> , 2012]
Maintain/improve symmetry of gait	
Improve range of active/passive knee extension	Measure active range of movement
Improve/maintain functional mobility	Use GMFM [Russell <i>et al</i> 2002]. Timed up and Go test [Williams <i>et al</i> , 2005]
Improve ability to perform standing transfers	Use Goal Attainment Scaling [GAS] goals specific to the child, e.g. ability to rise to stand, assistance required, stepping to transfer and lowering to seating
Improve ability to ascend/descend stairs	Use GAS goals specific to the child, e.g. manual assistance required, rails to either side, leading foot/feet, same step/alternate step foot placement, depth of step and timing
Maintain/improve selective control	Test for selective control [Fowler, 2009]
Achieve aerobic activity and improve fitness level [Verschuren <i>et al</i> , 2016]	Record HR/BR at rest and after use of walker

WHAT'S THE EVIDENCE?

The **evidence for muscle strengthening and child-active exercise** has grown considerably in recent years. A systematic review by Novak *et al* in 2014 highlighted the risk of deterioration without rehabilitation and advocated **a child-active approach to rehabilitation**. Then in 2015 Rowland produced a report on the scope of physical therapy practice in health promotion and fitness for youth with disabilities. Recommendations included:

- **Muscle strengthening** programmes to improve functional mobility and muscular endurance
- Maintain/improve cardio-respiratory health through **aerobic exercise**
- **Anaerobic activity** to build up speed and power



Gillett JG *et al* [2016] conducted a systematic review to determine the impact of strength training on skeletal muscle with a large effect found on muscle cross-sectional area following strength training. They concluded that there is preliminary evidence that **strength training leads to muscle hypertrophy.**

Park EY and Kim WH [2013] performed a meta-analysis of the effect of strengthening interventions in individuals with cerebral palsy. They reported that **'Strengthening interventions are useful for increasing muscle strength in individuals with cerebral palsy,** specifically in youth and children, and optimal exercise consisted of 40- to 50-min sessions performed 3 times per week.'

Verschuren [2016] produced CP specific physical activity and exercise recommendations based on: robust research evidence, expert opinion and extensive clinical evidence. With the health risks greatest for those spending large amounts of sedentary time, interventions to

promote **cardio-respiratory and resistance exercise were recommended.**

In 2017 Van Vulpen conducted a study which indicated that functional high velocity resistance training or **power training could improve muscle strength and walking capacity** of children with CP.

A further State of the Evidence review by Novak *et al* [2019] summarized the best available evidence. They stated that, 'Physical activity is essential for improving health' and listed **fitness training, goal-directed training and strength training as recommended interventions** to manage CP. Novak acknowledged that 'designing and implementing moderate to vigorous exercise programs for children with severe physical disabilities, who have limited movement and move slowly, is complex'.

With the need for a family-centred approach which can provide engaging and evidence-based methods to improve strength and fitness, the **MyWay Pedal** is the ideal addition to therapy programmes.

Meet Eli

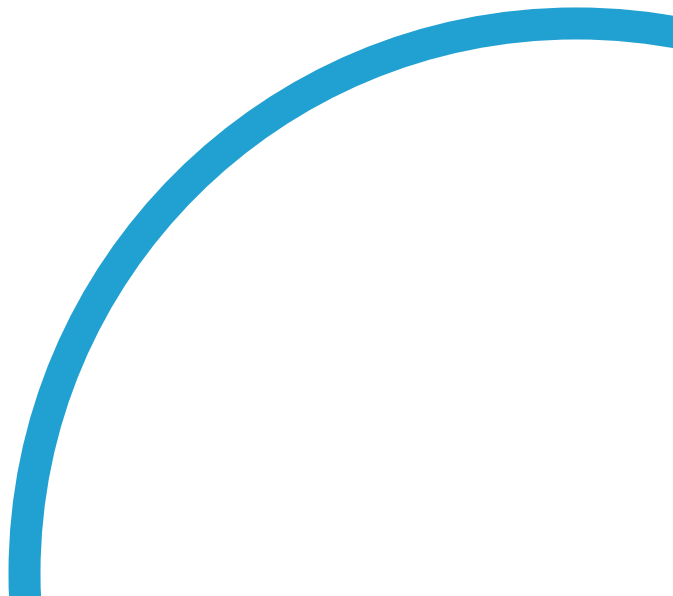
Eli is a happy 7-year-old boy who has cerebral palsy (GMFCS level III). Eli trialled **MyWay Pedal** for 6 weeks as part of our Case Story programme and he achieved real functional gains. You can read Eli's case story [here](#) and watch Eli in action [here](#).



GENERAL REFERENCES

1. J Bell KJ, Ounpuu S, DeLuca PA, Romness MJ. Natural progression of gait in children with cerebral palsy. *Pediatr Orthop*. 2002 Sep-Oct;22[5]:677-82.
2. Verschuren O, Peterson MD, Balemans AC, Hurvitz EA. Exercise and physical activity recommendations for people with cerebral palsy. *Developmental Medicine and Child Neurology* [2016] Aug;58[8]:798-808.
3. Rodda JM, Graham HK, Carson L, Galea MP, Wolfe R. Sagittal gait patterns in spastic diplegia. *J Bone Joint Surg Br*. 2004;86-B: 251–258
4. Hoare BJ, Wallen MA, Thorley MN, Jackman ML, Carey LM, Imms C. Constraint-induced movement therapy in children with unilateral cerebral palsy. *Cochrane Database Syst Rev*. 2019 Apr 1;4:CD004149.
5. Novak I, McIntyre S, Morgan C *et al*. A systematic review of interventions for children with cerebral palsy: state of the evidence. *Developmental Medicine and Child Neurology* 2013 Oct;55[10]:885-910.
6. Novak I. Evidence-based diagnosis, health care, and rehabilitation for children with cerebral palsy. *Journal of child neurology*. 2014, Vol 29[8] 1141-1156
7. Rowland JL, Fragala-Pinkham M, Miles C, O'Neil ME. The Scope of Pediatric Physical Therapy Practice in Health Promotion and Fitness for Youth with Disabilities. *Pediatric Physical Therapy*. 2015, 27: 2-15.
8. Gillett JG, Boyd RN, Carty CP, Barber LA. The impact of strength training on muscle morphology and architecture in children and adolescents with spastic cerebral palsy: a systematic review. *Research in Developmental Disabilities*. 2016: 56;183-196
9. Van Vulpen LF, de Groot S, Rameckers E, Becher JE, Dallmeijer AJ, Improved Walking Capacity and Muscle Strength After Functional Power-Training in Young Children With Cerebral Palsy. *Neurorehabilitation and Neural Repair* 2017: 1-15
10. Novak, I., Morgan, C., Fahey, M. *et al*. State of the Evidence Traffic Lights 2019: Systematic Review of Interventions for Preventing and Treating Children with Cerebral Palsy. *Curr Neurol Neurosci Rep* 20, 3 [2020]. <https://doi.org/10.1007/s11910-020-1022-z>
11. McDowell BC; Kerr C; Parkes J; Cosgrove A, Validity of a 1 minute walk test for children with cerebral palsy *Developmental Medicine & Child Neurology* 2005, 47: 744–748
12. Maher CA, Williams MT, Olds TS [2008] The six minute walk test for children with cerebral palsy. *Int J Rehabil Res* 31:185-188
13. N Tennant, L Wiggins, H Read, B Meadows. The Wee Glasgow Gait Index - A Screening Tool. *Association of Paediatric Chartered Physiotherapists Journal [APCP]* 2012 Vol 3 [2] 39-48
14. Russell DJ, Rosenbaum PL, Avery LM, Lane M [2002] *Gross Motor Function Measure [GMFM-66 & GMFM-88] User's Manual*. London MacKeith Press
15. Williams EN, Carrol SG, Reddihough DS *et al* The Timed 'Up & Go' Test in Children. *Developmental Medicine & Child Neurology* 2005, 47: 518–524
16. Goal Attainment Scaling (GAS) in Rehabilitation: The GAS-Light model Professor Lynne Turner-Stokes DM FRCP, Herbert Dunhill Chair of Rehabilitation, King's College London
17. Fowler EG1, Staudt LA, Greenberg MB, Oppenheim WL. Selective Control Assessment of the Lower Extremity [SCALE]: development, validation, and interrater reliability of a clinical tool for patients with cerebral palsy. *Dev Med Child Neurol*. 2009 Aug;51[8]:607-14.

18. Verschuren O, Peterson MD, Balemans AC, Hurvitz EA. Exercise and physical activity recommendations for people with cerebral palsy. *Developmental Medicine and Child Neurology* (2016) Aug;58(8):798-808.
19. Park EY, Kim WH. Meta-analysis of the effect of strengthening interventions in individuals with cerebral palsy. *Research in Developmental Disabilities* 2014; 35(2): 239-249



To arrange a product demonstration/assessment or for more information, please contact us:

Leckey
19c Ballinderry Road
Lisburn BT28 2SA
Northern Ireland

[+44] 28 9260 0750
hello@leckey.com

leckey.com



LECKEY