

Feasibility of the 'Upsee' as a new community mobility device and its impact on gross motor function in young children with Cerebral Palsy (Gross Motor Function Classification System level II-IV)

Caroline Mitson[*], Melissa Walk-Ley, Amanda Wallace, Cinzia Conigliaro. *Corresponding author: caroline.watkins1@nhs.net

Background: The Upsee is a mobility device where a child is secured into a harness and attached to an adult for standing and walking activities (Firefly, 2014b, figure 1). Children with motor impairment including CP may show an interest in standing and stepping at a young age and frequently receive adult assistance, or use equipment to enable this (Paleg and Livingstone, 2015). The Upsee has anecdotal evidence of supporting children for these upright activities (Firefly, 2014a, Firefly, 2016). This study aimed to evaluate the feasibility of using the Upsee intensively in young children with CP, through parental feedback and measuring changes in gross motor function.

Method: A single centre, observational cohort research design. Children with CP (Gross Motor Function Classification System (GMFCS) level II-IV; age 1 to 5 years), and one named parent per child were invited to participate. Participant's trialled the Upsee at an intensity of one hour per day, six days per week for two weeks. Upsee use and outcomes were measured by pre and post GMFM-66 assessments, a non-validated diary record and a non-validated follow up questionnaire.



Figure 1: Upsee device.
(Reproduced by kind permission of Clare Greer, Firefly by Leckey).

Results:

- Five children (GMFCS level III (n=2), level IV (n=3)), with a mean age of 3.63 (SD:0.49) years were successfully recruited with a named parent (table 1).
- Mean Upsee use was 4.7 (SD:2.3) hours over the study period (figure 2, table 2 & 3).
- Diary records showed participant activity (walking 64%, standing 20%) and location of Upsee use (inside home 54%, outside 23%).
- Semi-structured questionnaire results (table 4) and subjective parental feedback (diary and questionnaire) was generally positive for Upsee use, activity and participation in the Upsee.
- There was no statistically significant change in motor function measured by GMFM-66 (P=1) but one participant showed a 'Minimal Clinically Important Difference' (Wang and Yang, 2006) in gross motor function over the two weeks of Upsee use (table 5).

Table 1. Demographic data of the child participants.

Participant	Diagnosis	GMFCS	Age (yrs)	Gender	Weight (Kg)	Other diagnoses	SAROMM	FMS
1	BS-CP	IV	3.81	F	15.0	Nil	57	C/1/1
2	BS-CP	III	4.15	F	14.0	Visual impairment	35	C/1/1
3	CA-CP	IV	3.33	F	15.5	Nil	26	1/1/1
4	BS-CP	III	3.93	M	15.0	Nil	21	C/2/1
5	DA-CP	IV	2.93	M	14.0	Reflux / Gastrostomy	43	1/1/1

Key: BS-CP (bilateral spastic CP). CA-CP (choreoathetoid CP). DA-CP (dystonic athetoid CP). FMS (Functional Mobility Scale) 5m/50m/500m. SAROMM (Spinal Alignment and Range of Motion Measure).

Table 2: Upsee intervention.

Participant	Upsee use (total days)	Upsee use (total mins)
1	10	215
2	10	445
3	5	135
4	3	90
5	8	155
Mean (SD):	7 (3)	208 (140)

Figure 2: Upsee intervention.

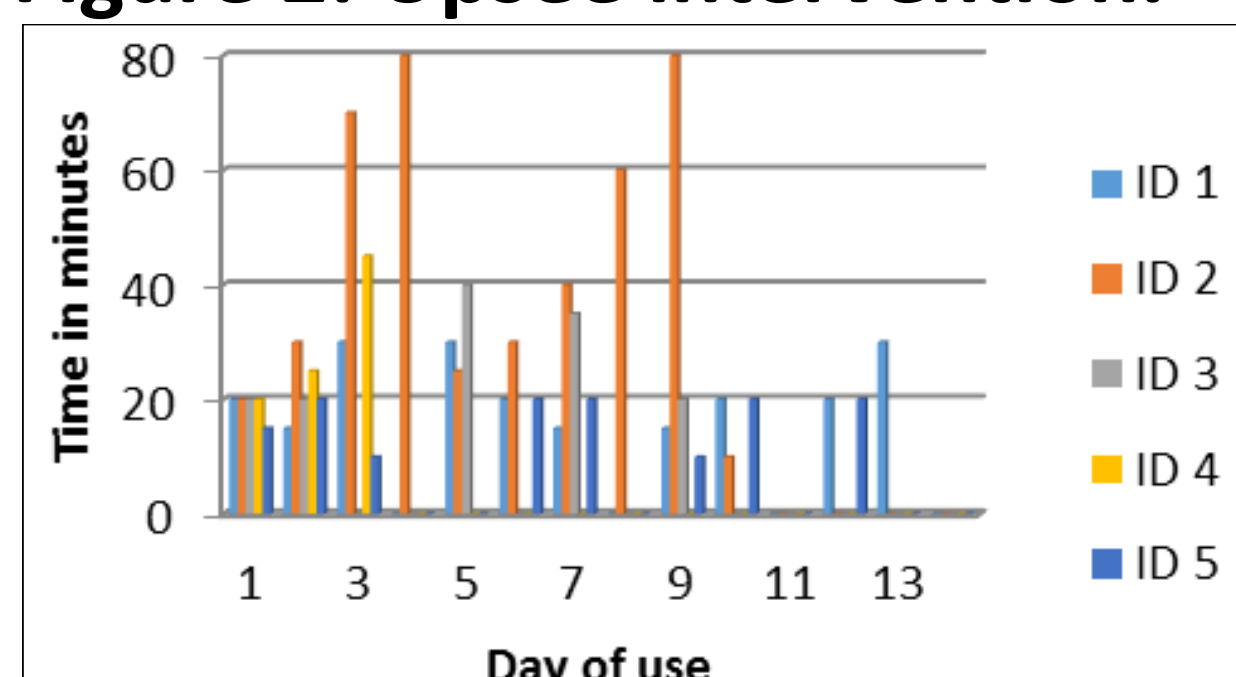


Table 3: Upsee non-use and reported difficulties (Upsee diary).

Participant	Day and reason of non-use / Reported difficulties	
1	Day 4 & 8: Family out and child tired on return home. Day 11: Mother tired. Day 14: Rest day.	- -
2	Day 11 - 12: Heat Day 13: Rest day Day 14: Return day	Day 1: Child's Upsee. Day 3, 4 & 9: Tiredness. Day 5: Very difficult. Day 10: Heat
3	Day 2-4, 6, 8, 10-14: Sick	-
4	Day 4-14: Refused.	-
5	Day 4, 5, 8 & 11: Illness / fussy Day 13-14: -	Day 3, 6, 7, 9 & 12: Child fussy / tired / fidgety.

Key: - (No record made in diary).

Table 4: Results from Questionnaire (1- 5b).

Participant	1	2	3	4	5
Upsee question					
1a. Adult fitting	Easy	V. Easy	Easy	Easy	Difficult
1b. Child fitting	Neither	V. easy	Easy	Easy	Difficult
1c. Connecting adult & child	Easy	Easy	Easy	Easy	Easy
1d. Adult comfort	V. Comfortable	Neither	Comfortable	Comfortable	Comfortable
1e. Child comfort	Comfortable	V. Comfortable	Comfortable	Uncomfortable	Comfortable
2a. Std & stepping: Satisfaction	V. enjoyable	V. enjoyable	Enjoyable	Unpleasant	Enjoyable
2b. Std & stepping: Ability	Much easier	Much easier	Easier	Same	Much easier
2c. Std & stepping: Physical assistance	Same	Much less	Slightly less	Slightly more	Much less
3a. Accessing home activities	Much more	Slightly more	Same	-	Much more
3b. Accessing community activities	Much more	Much more	-	Slightly more	Much more
4a. Lightweight & transportable	S. agree	S. agree	Agree	Agree	S. agree
4b. More upright & steps with improved posture	S. agree	S. agree	Agree	Neither	Agree
4c. Experience pain	Agree	S. disagree	Disagree	S. agree	S. disagree
4d. Experience fatigue or tiredness	Neither	Neither	Neither	Disagree	Disagree
4e. Less independent	Agree	S. disagree	Disagree	Disagree	Disagree
5a. Requested Upsee use	About right	About right	Too much	About right	About right
5b. Recommend to another family	Yes	Yes	Yes	Yes	Yes

Key: Std (standing). S (strongly). (unfavourable response). V (very). - (no response).

Table 5: Results of GMFM-66 assessments.

Participant	GMFM-66 Baseline	Baseline 95% CI	GMFM-66 Post	Post 95% CI	GMFM-66 Difference
1	40.2	37.8-42.6	43.4	41.4-45.5	3.20*
2	33.9	30.6-37.2	33.9	30.6-37.2	.00
3	26.0	22.1-29.9	25.3	21.5-29.1	-.70
4	47.5	45.4-49.6	47.9	45.7-50.1	.40
5	24.7	20.7-28.6	24.0	0.7-27.9	-.70

Key: CI (Confidence Interval). *(Minimal Clinically Important Difference (Wang and Yang, 2006)).

Conclusion: The Upsee could be used in young children with CP, and families provided positive feedback to stand and walk in the Upsee for activity and participation in a community setting. This study was not powered to find functional effects from Upsee use over a two week period but one participant was noted to have motor improvement.

Recommendations: The Upsee may be feasible for use in young children with CP as a community mobility device but further research is required to clarify this and its comparison to other walking devices.

References: FIREFLY 2014a. Case Study Report. <http://www.fireflyfriends.com/special-needs-blog/specific/upsee-case-study-report> Accessed 07/03/16. FIREFLY 2014b. Upsee by firefly. <http://www.fireflyfriends.com/upsee> Accessed 07/03/16. FIREFLY 2016. Upsee by Firefly. <http://www.fireflyfriends.com/therapists/case-histories/upsee> Accessed: 07/03/16. PALEG, G. & LIVINGSTONE, R. 2015. Outcomes of gait trainer use in home and school settings for children with motor impairments: A systematic review. *Clinical Rehabilitation*, 29, 1077-1091. WANG, H. Y. & YANG, Y. H. 2006. Evaluating the responsiveness of 2 versions of the gross motor function measure for children with cerebral palsy. *Archives of Physical Medicine and Rehabilitation*, 87, 51-6.