COMPARING MOVEMENT DEVELOPMENT IN CHILDREN WITH CP ENROLLED IN TRANSDISCIPLINARY CONDUCTIVE EDUCATION TO CHILDREN WITH CP RECEIVING TRADITIONAL THERAPY IN THE USA

Roberta OShea, PT, PhD
roshea@govst.edu
Peter Pidcoe,PT, DPT, PhD

Background

• Conductive Education (CE) has proven effective in increasing participation and self actualization for children with CP (Schenkner,2006).

• To date however, investigations on the impact of CE on motor skill development have yet to reveal any difference between CE and other intensive therapy programs.

• This research demonstrates improvement in children's functional skills, specifically hand to mouth activity, sit to stand activity, and ambulation while they were enrolled in a CE program.

Design

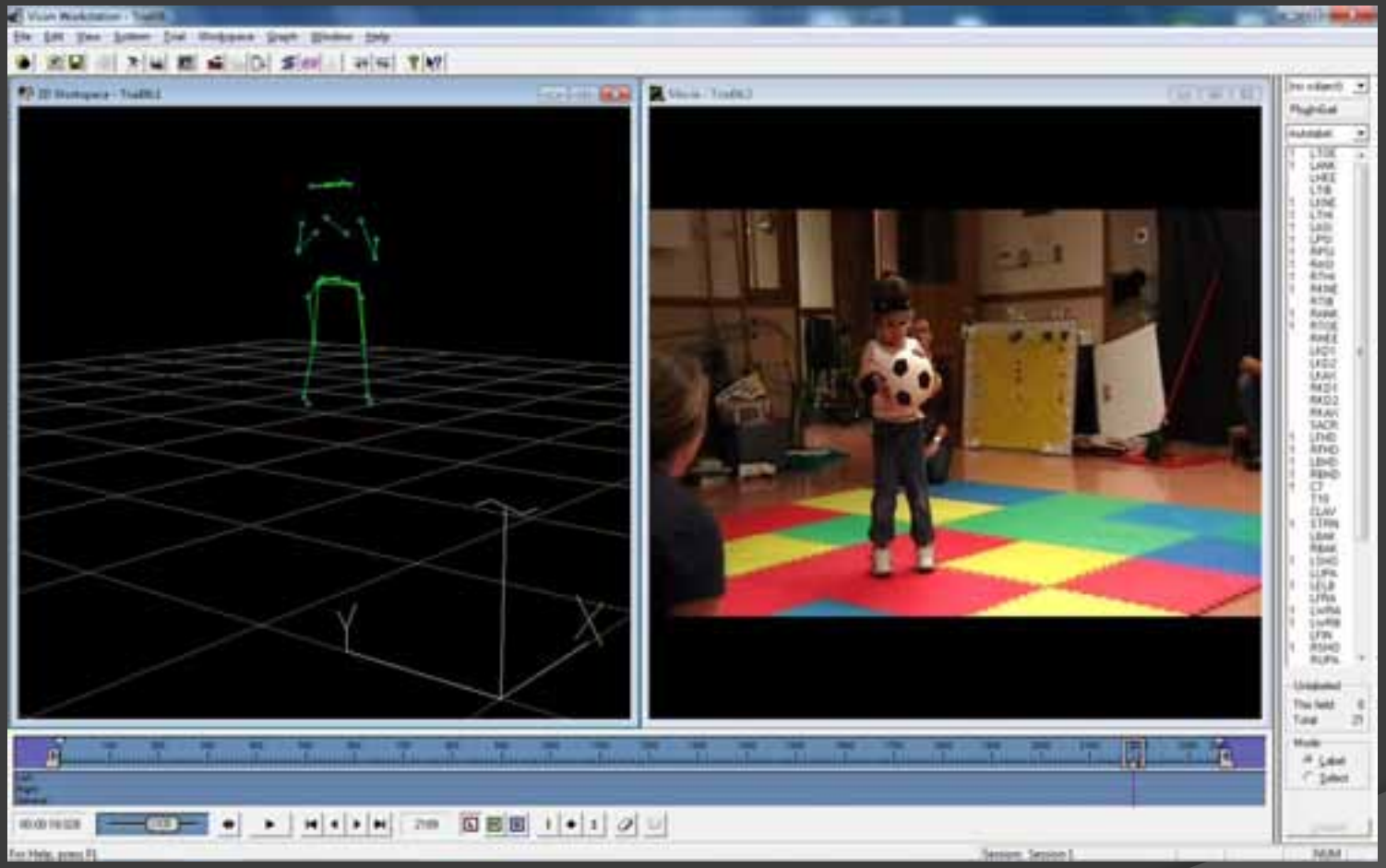
• Using a case series design, 10 children with CP GMFCS levels III, IV, and V enrolled in Transdisciplinary CE (TCE) participated in once a month data capture over the course of a year.

3 children with CP GMFCS levels I and III, acted as a control group. These children were not enrolled in TCE but received standard therapy school services.They participated in data capture 2 times over a 9 month period for comparison

• Objective data were collected via motion capture during the performance of functional activities and compared to like movements in typically developing children and children with CP but no CE intervention.

Methods

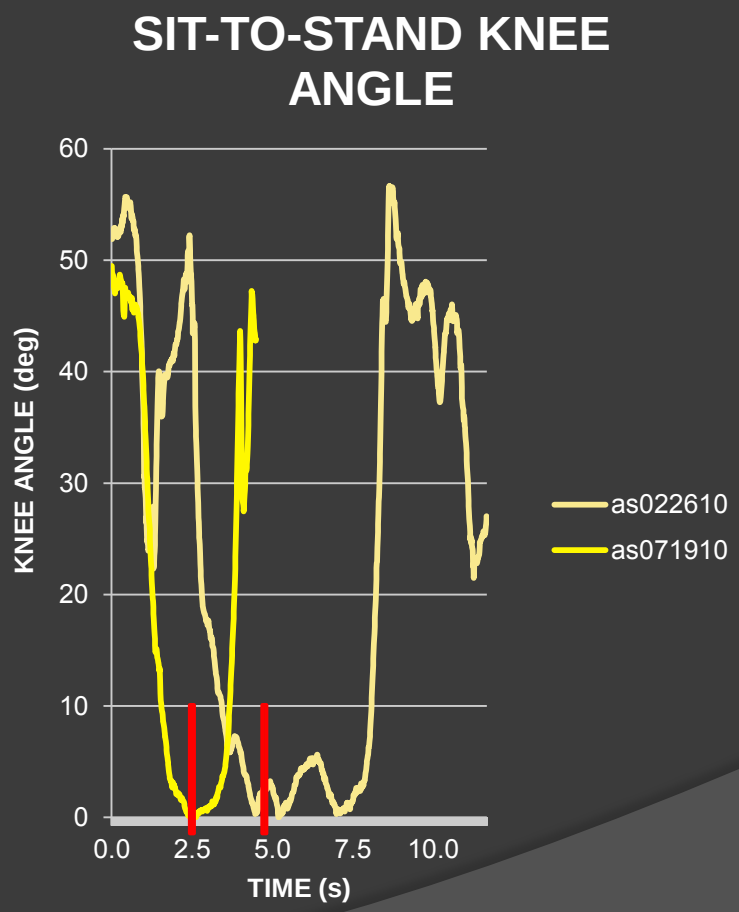
- Vicon 8i – 120Hz – 6 camera
- Marker placement (26 markers total)
- Data collection
  - Static stand : 5 repetitions
  - Sit-to-stand: 5 repetitions
  - knee-to-mouth: 5 repetitions
  - Ambulation: 30 feet with AD of their choice
- Data imported into Motion Monitor software for processing



SIT-to-STAND

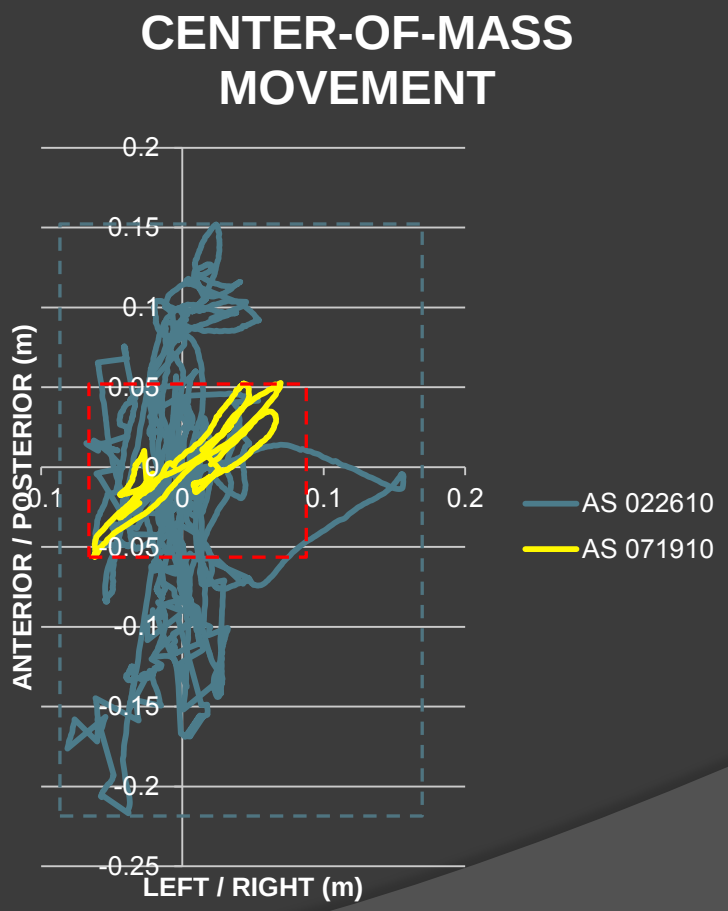
Results

- Knee angle vs. time and COM movements were compared over time for 5 consecutive activities.
- There was a 47% improvement in time to full extension after 5 months of CE.
- Note – normal sit-to-stand time = 1s.



Results

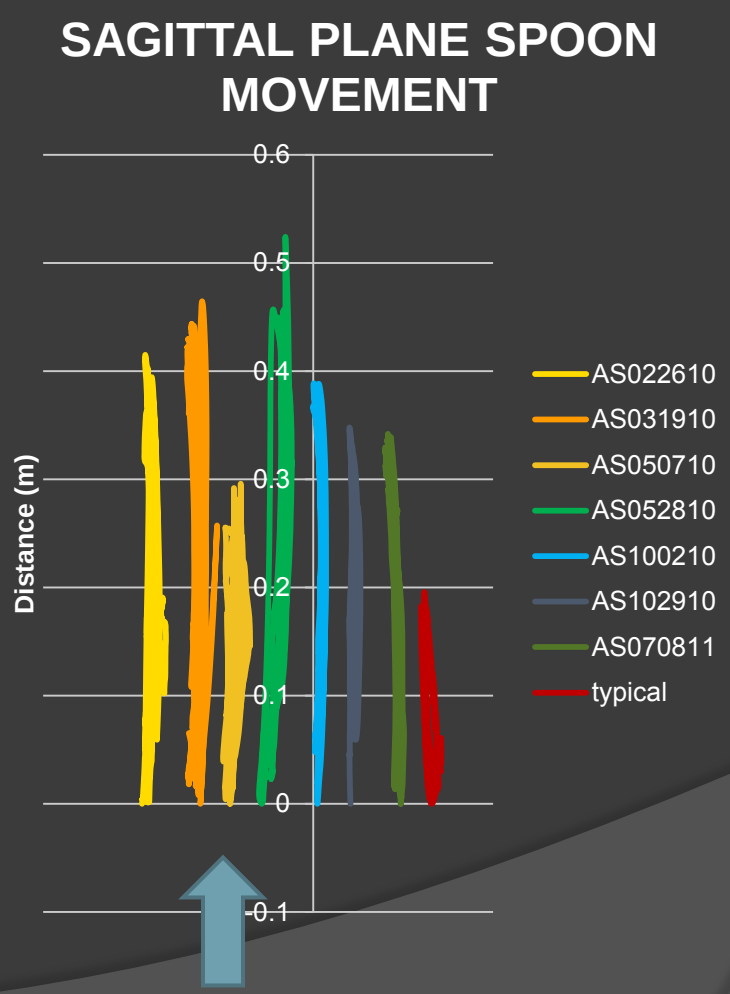
- COM excursion during the task decreased
  - 43% in a left/right direction
  - 70% in an anterior/posterior direction.
- Demonstrating improved control.



Hand-to-mouth

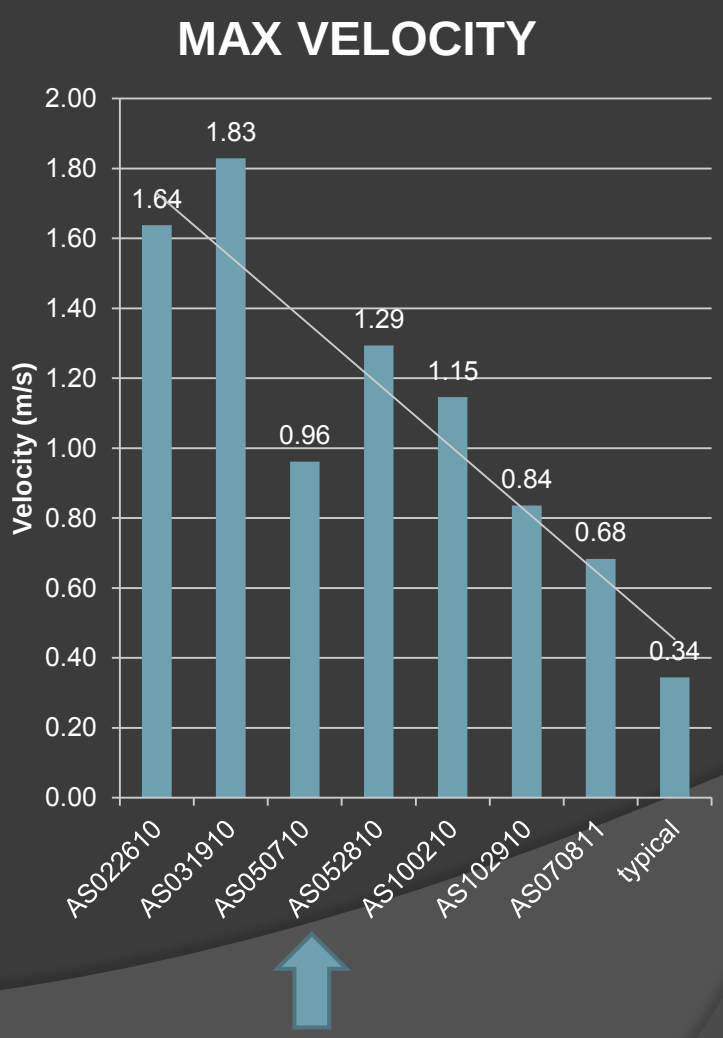
Results

- These data provide a qualitative look at sagittal plane movement in a temporal format from earliest to last data collection.
  - Subject data are compared to a typical child instructed to perform the same task.
  - The movement patterns appear to become “smoother” with time.
- Observed a marked decrease in cyclic trajectory deviation which suggests improved control.



Results

- Since the movement distance (from knee-to-mouth) remained constant), these data suggest a shift from more ballistic movements to more controlled movements since the peak velocity is decreasing.

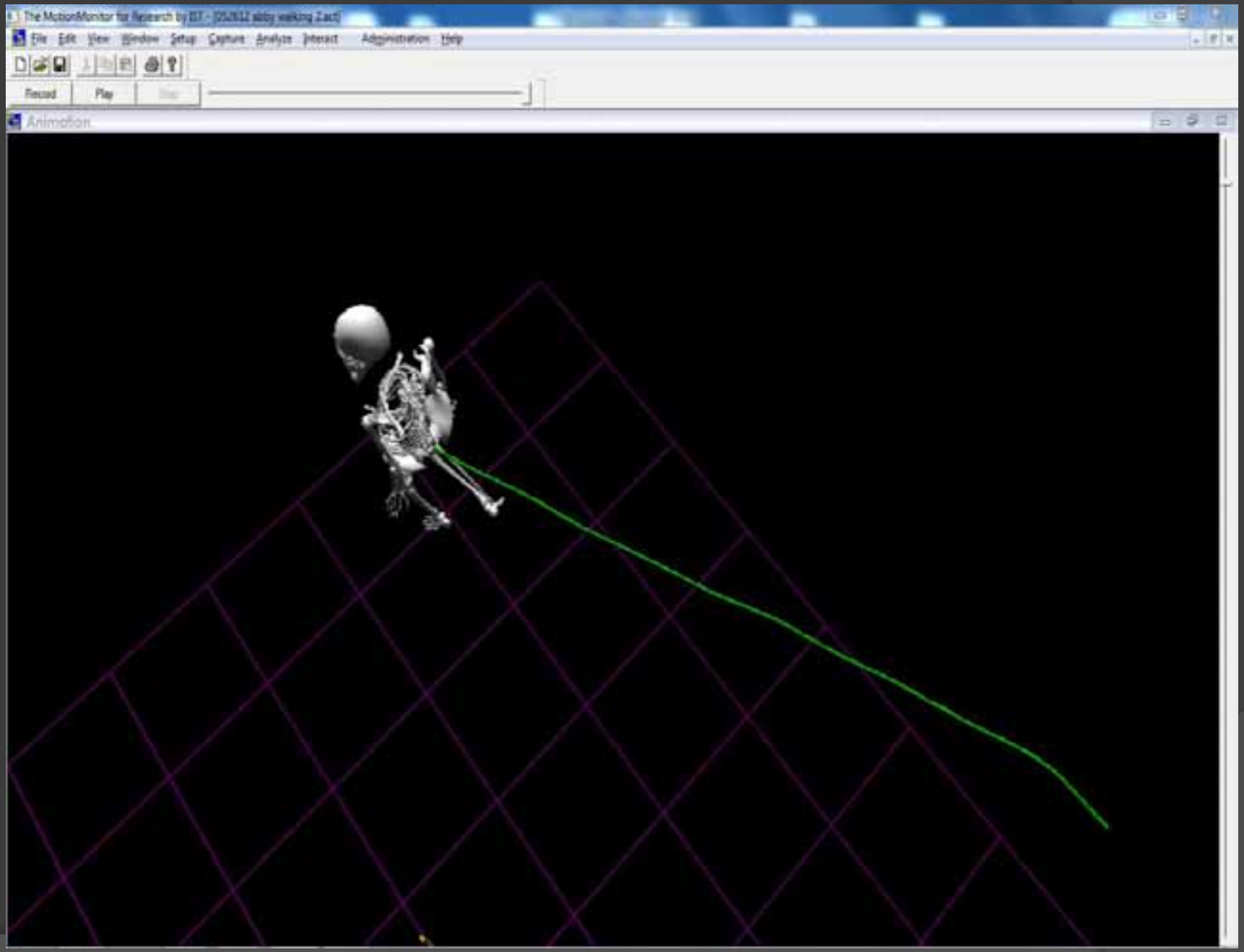


AMBULATION

AMBULATION

Results
Kinematic metrics were compared for each activity.

Ambulation – The following slide illustrates the COM movement for a child at the beginning and end of a 19 month intervention.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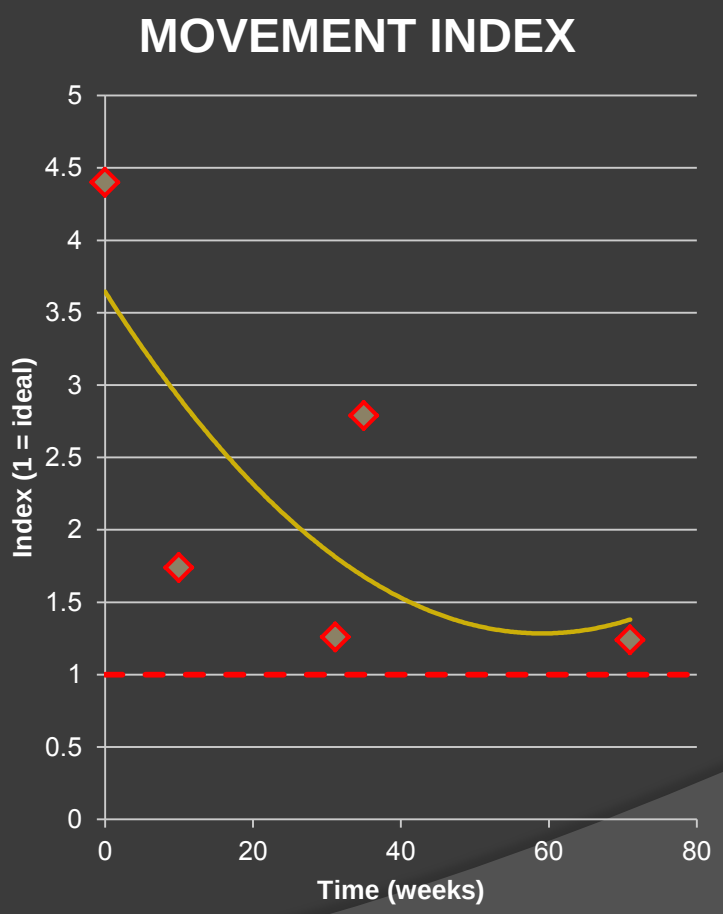
Animation

Results

- Movement index =COM total distance traveled / linear distance
- An index value of 1 = “ideal”. Values > 1 represent non-forward movement.
- Children in TCE demonstrated a decrease in MI from 4.5 to 1.25.
- Children in control group had MI of 3.



Conclusion

- Children enrolled in TCE demonstrate *increase speed and control* when performing sit-to-stand and hand-to-mouth activities.
- They also demonstrate *normalization of movement patterns* when ambulating. Children in not in CE did not show this improvement.
- The results suggest that TCE provides an opportunity for the child to become *more independent* in specific functional activities.
- Kinematic improvements indicate that *joint alignment and motion are more typical*. – This may reduce atypical joint surface wear and the potential for arthritis and pain as the child develops into an adult.

Summary

- Children with less involved impairments (GMFCS I, II) will make progress with community based activities and weekly hour long therapy sessions.
- Children with significant motor impairments (GMFCS III, IV, V) require intensive multidimensional services and intervention in order to make similar and better motor progress as their less involved peers.
- If not enrolled in intensive functionally based services, children with severe CP risk not developing to their potential.

CE makes a difference in maximizing potential for children with moderate or severe motor impairments