Using PEDI-CAT to Assess Functional Capabilities in CLN3 (Batten) Disease

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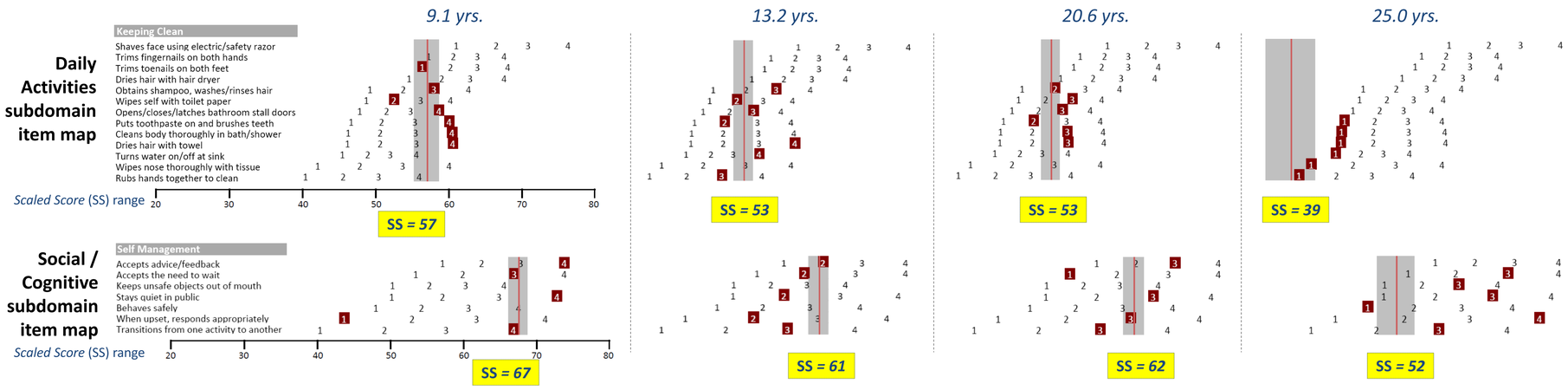
Background and Study Aims:

- CLN3 disease is an autosomal recessive lysosomal storage disease (LSD) with childhood-onset. Symptoms include vision loss, motor decline, dementia, and seizures.
- The Pediatric Evaluation of Disability Inventory – Computer Adaptive Test (PEDI-CAT) evaluates functional capacity in young persons (approx. age 1-21 years).
- The aims of the present study were to (1) Evaluate parent-reported PEDI-CAT ratings of functional abilities in CLN3 disease, and (2) Examine associations between PEDI-CAT parent ratings and a clinician-based capability assessment from the Unified Batten Disease Rating Scale (UBDRS).

Methods:

- Parents of 6 children and young adults with genetically confirmed CLN3 disease completed the PEDI-CAT. Assessments were completed in-person at the 2017 annual meeting of the Batten Disease Support and Research Association (BDSRA) or administered via a phone interview within 2-3 months after the meeting.
- All parents gave permission for their child's participation in this study; a waiver of assent was granted for children <18 and a consent waiver was granted for adults with CLN3 disease because of limited capacity due to dementia.
- All research activities were conducted through a research protocol approved by the University of Rochester Research Subjects Review Board (RSRB00020390).

PEDI-CAT Item Maps Demonstrate Decreasing Functional Capability Associated with Disease



The red box shows the score for each administered item. The red vertical line indicates the Scaled Score for the entire domain; the grey shaded area indicates the Standard Error band. Item scores are ranked as: 1 = Unable; 2 = Hard; 3 = A little hard; 4 = Easy. Items are organized from more to less difficult functional tasks and abilities, moving from the top to bottom of each item map. Items with scores distributed farther to the left reflect tasks and abilities that are easier to perform.

Fit Scores

Higher fit scores (>2.00) suggests 'misfitting' response pattern (unexpected pattern of scores)

Fit Scores

	Daily Activities	Mobility	Soc. / Cog.	Resp.
mean	-0.53	-1.53	-1.66	-0.73
sd	0.91	1.25	0.86	2.82
min	-1.59	-3.34	-2.67	-6.18
max	0.91	0.30	-0.46	1.54

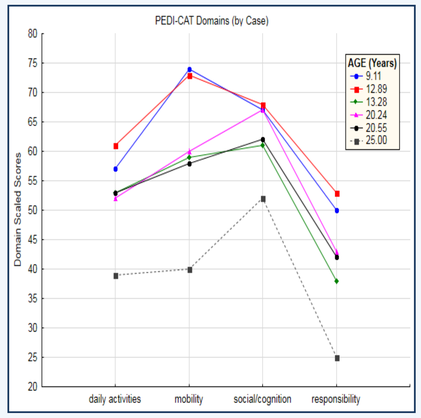
Age-Based Performance

Floor effects seen by early teen years, in age-adjusted scores

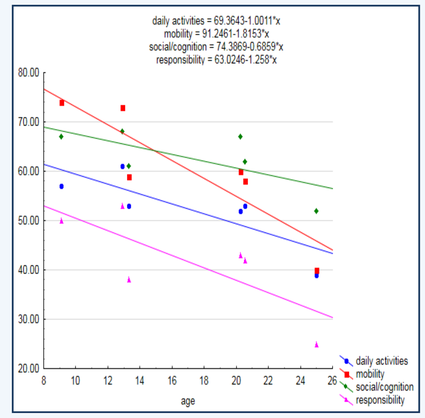
Age-Adjusted Domain T Scores m=50, sd=10; avg. range: 30-70)

Age (years)	Daily Activities	Mobility	Soc. / Cog.	Resp.
9.1	26	58	30	42
12.9	33	46	32	42
13.3	<10	<10	<10	<10
20.2	<10	<10	<10	<10
20.6	<10	<10	<10	<10
25.0	<10	<10	<10	<10

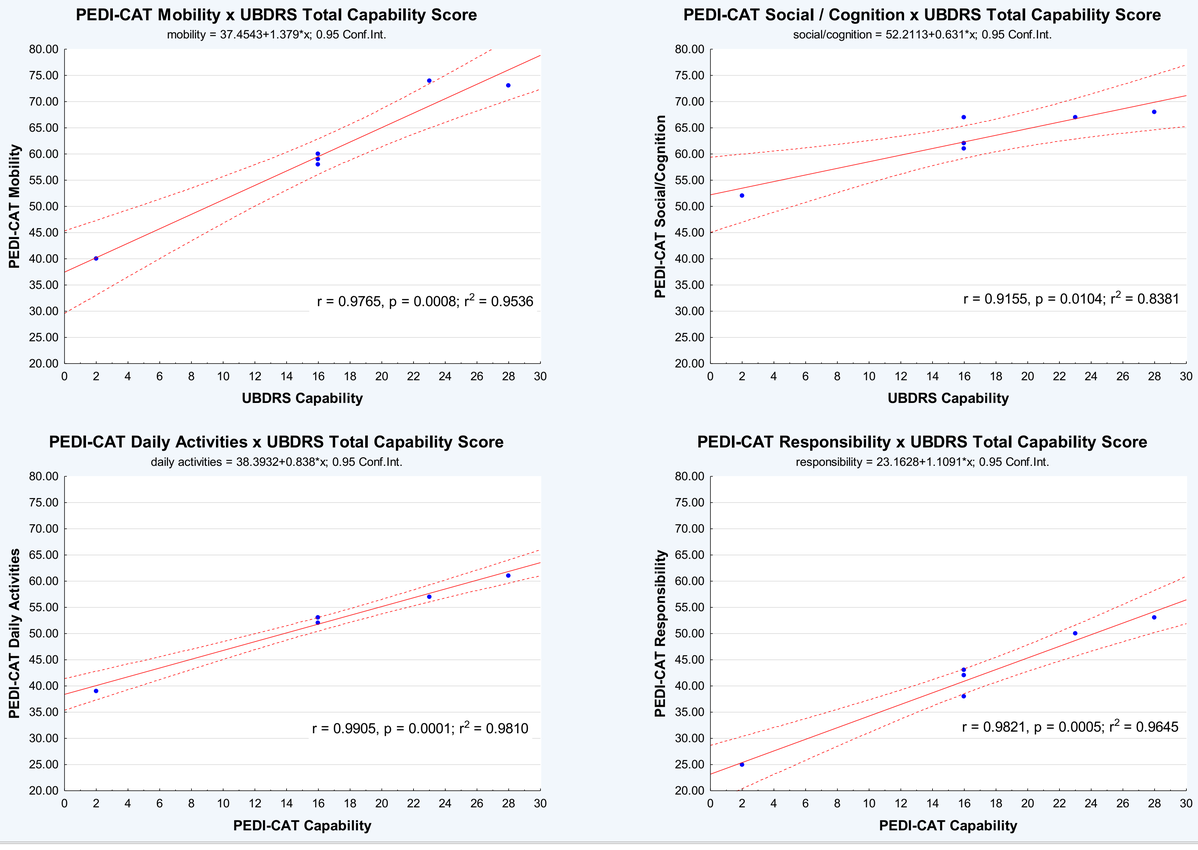
PEDI-CAT Domain Scaled Scores Pattern is Similar Across Subjects



PEDI-CAT Domain Scaled Scores Decrease in Association with Older Age



All 4 PEDI-CAT Domains Correlate with UBDRS Capability Score



Conclusions

- Floor effects are seen on the PEDI-CAT T scores at a moderate level of disease severity, among children and young adults with CLN3 disease. This suggests that age-adjusted scores have limited utility for evaluating meaningful changes in adaptive function over time, in this disease population.
- Item-level scores and Standard Scores (which are not age-adjusted) show a pattern of decreasing functional capacity with increasing age. It is unclear whether item content in some PEDI-CAT domains is fully relevant to characterizing disease phenotype and progression in CLN3 disease. Interestingly, an earlier non-CAT version of PEDI was adapted for another lysosomal storage disease (Pompe-PEDI; see Henly et al., *Pediatr Rehabil*, 2003 Apr-Jun;6(2):77-84) to best capture all aspects of disease impact on functional capacity. A similar item-level analysis approach may be needed for CLN3 disease.
- Despite these limitations, the PEDI-CAT provided good initial external validation of the UBDRS Total Capability Score.

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