Difficulties in Predicting Developmental Change: A Challenge for Service Providers

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PURPOSE

- One goal of pediatric physical therapy is to optimize outcomes of a condition through effective interventions
- Identification of determinants of change over time (i.e. prognostication) is foundational knowledge to inform the focus of therapy
- We share our experiences about conceptualizing and testing determinants of change in gross motor abilities of young children with CP (CP)

DESCRIPTION

- Our team has described the development² and testing³ of a conceptual model of determinants of gross motor function, and participation in self-care, recreation and leisure, and play of young children with CP
- The model is compatible with current conceptualizations of functioning, disability and health, systems theory, theories of human ecology, and an approach incorporating family-centred care, as well as being based on research literature, clinical expertise, and input from parent collaborators⁵
- The model emphasizes the multisystem complexity of a child with CP and the dynamic interaction between the child and his or her environment
- To test this model, a sample of 429 children with CP, across all GMFCS levels, aged 18 to 60 months (242 boys and 187 girls) was recruited from multiple sites across Canada and the US
- Data were collected on selected primary and secondary impairments, associated health conditions, adaptability, and gross motor function at the beginning of a one-year study
- Data on family ecology and community programs and rehabilitation services were collected 7 months later, and gross motor function was measured again at the end of the year

RESULTS

When tested, although the data were a good fit with the model, it explained only 9% to 13% of the variance in change of motor function over the period of 1 year, in contrast to 50% to 75% of the variance in motor function when the outcome was conceptualized as simply motor function at the end of the year

INTERPRETATION AND SUMMARY OF USE

This surprising finding was not explained by lack of variability in the change scores, averaging 5 points with an interquartile range of 8 points

We speculate that this result is attributable to the complexity, uniqueness and non-linearity of developmental phenomena

Predicting developmental change is difficult; across a range of developmental domains, children development does not occur at a steady pace, but instead progresses in spurts and plateaus over time, with a lack of correspondence in rate of development among trajectories of various domains

Furthermore, a unit of change in a determinant is not necessarily associated with a unit change in outcome. A small incremental change in a determinant, such as muscle strength, can lead to significant motor function advances⁶ and vice versa

It is also possible that developmental change is not a generalizable phenomenon,³ especially for children with CP who demonstrate wider inter-individual variation

References


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Importance to Members

- As have others, we conclude that it is more realistic to pursue investigation of prediction of future function, rather than change in function
- Only family-centred and body structure and function were associated with change in motor function for children in GMFCS level I & II and III; IV and V, respectively
- Therapists are encouraged to consider children from a holistic perspective, recognizing unique features of each child in his or her social context
- The complexities of children with CP suggest that expertise, in addition to evidence, is required to optimize intervention outcomes

References