Title: The Psychometric Properties of the Brief Pain Inventory for Individuals with Cerebral Palsy

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Introduction: Individuals with cerebral palsy (CP) experience a great deal of chronic pain throughout their lifetime (Ramstad, Jahnsen, Skjeldal & Diseth, 2011). Musculoskeletal and gastrointestinal types of pain are known to be intense and long lasting—especially for those with the most severe physical impairments associated with CP (Barney et al., 2013). This ongoing pain interferes with many aspects of daily living and impacts overall quality of life. Tyler, Jensen, Engel, and Schwartz (2002) found the Brief Pain Inventory (BPI) to be a valid and reliable self-report measure of pain interference in a sample of high functioning adults with CP. We aimed to extend this work by assessing the psychometric properties of the BPI used as a proxy-report measure of pain interference in individuals with varying degrees of cognitive and motor impairment associated with CP.

Method: Participants were 177 individuals with CP (45% male; mean age= 9 years, 11 months; range 2 months – 34 years, 6 months). The majority of the sample was pediatric (<18 years, n=164). CP diagnosis included hemiplegia (n=32), diplegia (n=27), triplegia (n=11), and quadriplegia (n= 105). Gross Motor Function Classification System (GMFCS) levels varied with 67 participants ambulating (levels I-III) and 100 using wheeled mobility (levels IV-V; n=10 unknown). Participants were verbal (n=87) and non-verbal (n=62; n=29 unknown) with mild/moderate (n=55), severe (n=42), and no cognitive impairments (n=32; n=48 unknown). Most parents (n=130, 72%) endorsed that their child had experienced pain in the previous week. For all participants, the BPI was completed by parent proxy report. BPI performance was assessed in comparison to an 11-point numeric rating scale (NRS; n=89) as well as the Dalhousie Pain Interview (DPI; n=88) which documents pain intensity, frequency, and duration via caregiver interview. For 26 participants, the BPI and DPI were reassessed six months following spasticity treatment (intrathecal baclofen [ITB] pump implant) which would be expected to decrease musculoskeletal pain. Cronbach’s alpha was calculated to assess the internal reliability of the BPI.

Results: Cronbach’s alpha for the BPI was .96. All corrected item-total correlations for the 12 items were ≥ .77. BPI total score (r=.56, p<.001) as well as all item-level scores (r≥ .37, p<.001) significantly correlated with the NRS pain score. BPI total score significantly correlated with DPI pain intensity (r=.65, p<.001), pain frequency (r=.25, p=.02), and pain duration (r=.30, p=.006). For the pre/post ITB implant cohort, mean BPI scores significantly decreased from time one (scored 0-10; M=3.08, SD=2.71) to six months following spasticity treatment (M=1.99, SD=2.32; t(26)=2.28, p=.03). Additionally, there were 32 instances (18%) where the BPI detected pain that was missed using the NRS or the DPI.

Discussion: To our knowledge, this is the first report of the psychometric properties of the BPI used as a proxy assessment across different age groups of individuals with CP. The BPI appears to produce reliable and valid scores reflecting pain’s impact on individuals with CP. In some instances, the BPI was more likely to detect the presence of pain (or perhaps more accurately, its effect on function) compared to the NRS or DPI. The BPI scores were statistically significantly decreased following spasticity intervention (ITB pump implant). To our knowledge, this is the first use of the BPI to prospectively document ITB outcomes in CP. Further clinical research related to the use of the BPI is warranted.

References/Citations: