Author Response
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We thank Dr Keshner and Dr Scholz for their insightful commentaries and encouragement for our work. We feel, however, that their common point of criticism (ie, the apparent lack of a theoretical framework for the Gross Motor Performance Measure [GMPM]) is mistaken. Both commentators expressed concern that the items for the GMPM were chosen without the benefit of a basic science theory of motor control. In their critiques, they promote the primacy of “hypothesico-deductive” theory, which is the foundation of most basic science approaches. This is not, however, the only type of theory.1

Many valid clinical measures have used “inductive-grounded” theory, developed from experience with a phenomenon, as the basis of measurement. Grounded theory uses reflection on one’s experience to note patterns that can be developed into systematic measures.2 Our approach to item development and test administration in the GMPM is based on two grounded-theory assumptions. First, children with cerebral palsy perform motor activities with a recognizable pattern, which is not random in nature. Second, clinical therapists can visually perceive and interpret these children’s movement patterns in a consistent fashion. We believe that these assumptions are being adequately tested in our development and validation studies.

The commentators’ concerns about an apparent lack of theory in the GMPM illustrate a fundamental difference between the approaches to measurement taken in basic science and clinical epidemiology. In basic science measures, predictive hypotheses about test items are constructed from theory and then tested in controlled situations. The source of initial theory, however, must come from observations of phenomena in the natural world. Clinical epidemiology measures utilize a more eclectic method of clinical observation, theory, research, and expert opinion to generate items.3 Predictive hypotheses are demonstrated on the basis of clinical tests of validity. Our article illustrates the demonstration of GMPM face validity through therapist nominal group process meetings and Q-sort procedures. The GMPM content validity is demonstrated through the Delphi consensus with a panel of experts. Tests of construct and concurrent validity depend on actual testing of the instrument with a particular population. As we have noted, results of these studies will be available in the near future. A clinical epidemiology approach to measurement does not reject theory. It does, however, reject the use of theory without validating evidence.4 Validation of the GMPM in various populations and for various purposes will determine the measure’s ultimate usefulness.

We contend that a comprehensive theory of motor control applicable to individuals with cerebral palsy does not yet exist for the generation of test items. Perhaps this is why the commentators did not suggest such a theory or offer alternate items. Scholz suggests that Dynamic Pattern Theory may have applicability to some types of motor dysfunction. Cerebral palsy,
however, is an extremely heterogeneous condition. To assume that a single theory of motor control will be able to provide a comprehensive descriptive framework for evaluation of change in individuals with cerebral palsy has been noted to be a naive belief.5

Our approach to the development of the GMPM follows from two realities in physical therapy research. First, there is a vital need to have responsive clinical measures available for use. Second, there is a lack of comprehensive basic science theories of motor dysfunction applicable to individuals with cerebral palsy. We cannot wait for the evolution of complete theories before proceeding with treatment evaluation. Thus, we decided to use an empirical experiential basis rather than a theoretical experimental basis, for the development of the GMPM.

Physical Therapy has recently published Standards for Tests and Measurements in Physical Therapy Practice.6 We contend that the development of the GMPM follows these Standards adequately. The Standards note that the sources of test items should be identified. We specify that GMPM items, or attributes of performance, were derived from a literature review of instruments and the clinical observations of Rood, the Bobaths, and Bly. The Standards also note that the theoretical basis of the measure should be addressed. Discussion of our grounded-theory/epidemiology approach to the GMPM in this response should help to clarify this issue.

Other clinical researchers appear to support our approach. Many of the performance attributes that we have empirically identified (eg, alignment, stability, weight shift) are similar to those noted to be important for the early diagnosis of cerebral palsy.7 Harris states, “Attempts should be made to behaviorally define these movements for consistency in visual analysis rather than to infer their underlying cause.”89 Again, this statement does not reject theory, but acknowledges that preliminary observational studies and instruments are of primary importance for clinical research at this time.

We suggest that clinical and basic science researchers combine their efforts to define and understand the relevant variables in movement dysfunction. We hope that the relationships revealed among the attributes in our validation study will promote further hypothesis testing and development of theory. We also invite researchers to test the appropriateness of these attributes from a basic science perspective, and we would be pleased to share the results of our studies with them.

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