



**Opinion**

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# The Unrealized Potential of the Test of Infant Motor Performance for Measuring Outcomes in Clinical Trials

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**Abbreviations:** NICU: Neonatal Intensive Care Unit; TIMP: Test of Infant Motor Performance; PMA: Postmenstrual Age; CA: Corrected Age

## Opinion

The high-tech practice of the Neonatal Intensive Care Unit (NICU) includes a rapidly developing flow of research to improve survival and outcomes. Many interventions to improve health outcomes have the potential to influence the development of infants' motor skills, including research on feeding, drugs, and supplements; respiratory supports; brain preservation and protection; and surgeries for many types of impairments. Yet few studies measure immediate motor performance outcomes.

Given that no high precision assessments were available for measuring motor development when we began our research on physical therapy interventions for infants in the NICU at risk of poor developmental outcomes, my research group designed and validated the Test of Infant Motor Performance (TIMP) for diagnosis of delayed movement skills and assessment of outcomes of interventions expected to influence motor development [1]. The TIMP is a 42-item test of observed activities and evoked movement responses. Items measure primarily postural control of the head and trunk in a variety of positions and in response to handling similar to that imposed on infants by caregivers. Unlike most developmental assessments, TIMP items were standardized using Rasch psychometric analysis, ensuring that high precision of measurement exists at all levels of ability in infants from 34 weeks postmenstrual age (PMA) through 4 months corrected age (CA) [2]. As a result, repeated assessments demonstrate linear mea-

surements across time, with significant change every two weeks in typically developing infants. We recommend the use of this assessment for any study of intervention that could influence motor development, for better or for worse, in infants at ages for which the test is validated and normed.

As of this writing, the TIMP has been used as an outcome measure in 17 clinical trials comparing untreated control with intervention groups. Interventions provided in 4 different countries by therapists or nurses resulting in effect sizes greater than 1.4 include neurodevelopmental therapy in the NICU to improve postural control and movement in infants born preterm [3,4] and sensorimotor stimulation in the NICU in infants born preterm or following gastrointestinal surgery [5,6]. Studies of interventions to promote improved motor control provided by parents have suffered from poor uptake, attrition, and failure to complete the requested dose of intervention, and, not surprisingly, effect sizes have been much smaller in these studies than in those in which intervention was provided by professionals. Only one study from Thailand resulted in an effect size of 4.83 with implementation of a home exercise program for infants born preterm continued for 4 months following discharge from the NICU [7]. Future research must identify protocols that are more feasible for parents to include in the demands of daily life.

We provide this introduction to the TIMP as an outcome mea-

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The author is a co-developer of the TIMP and a partner in Infant Motor Performance Scales, LLC, the publisher of the TIMP.

sure for use in clinical trials to encourage researchers studying medical and nursing interventions to consider the possible effects on motor development (both positive and negative) of new therapies and to use the TIMP as a short-term outcome measure with high validity and precision. The TIMP has norms for performance of US and Chinese infants and is available in English and 7 other languages. Additional information can be found on the website at <https://thetimp.com> where the Research page provides links to more than 170 articles on validation of the TIMP or using the TIMP in research on a variety of pediatric conditions. Interventions aimed at improving the health of high-risk infants can often be expected to also foster motor development, and the TIMP can provide documentation of such improvement or, alternatively, provide early identification of detrimental side effects.

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