



Infant Movement Motivation Questionnaire: Development of a measure evaluating infant characteristics relating to motor development in the first year of life



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ABSTRACT

This paper highlights the development and testing of the Infant Movement Motivation Questionnaire (IMMQ), an instrument designed to evaluate qualities of infant characteristics that relate specifically to early motor development. The measurement development process included three phases: item generation, pilot testing and evaluation of acceptability and feasibility for parents and exploratory factor analysis. The resultant 27-item questionnaire is designed for completion by parents and contains four factors including Activity, Exploration, Motivation and Adaptability. Overall, the internal consistency of the IMMQ is 0.89 (Cronbach's alpha), with test–retest reliability measured at 0.92 (ICC, with 95% CI 0.83–0.96). Further work could be done to strengthen the individual factors; however it is adequate for use in its full form. The IMMQ can be used for clinical or research purposes, as well as an educational tool for parents.

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1. Introduction

As infants become active participants during the first year of life, the motor repertoire becomes increasingly characterized by complex movements and movement variability that sets the stage for adapting a variety of strategies for moving around in the environment. As such, the first year of life is an ideal time for investigating the influence of various factors on motor outcome. Individual differences and variability are key concepts emphasized within the Dynamic Systems Theory (DST), which proposes that motor development is a multidimensional and emergent phenomenon (Thelen, Kelso, & Fogel, 1987). Development progresses as a complex and transactional process among the various contextual factors, and the DST assists in understanding how multiple components contribute and cooperate to produce behaviour and influence the transition states characteristic of development and what has been considered a readiness to change (Thelen, 1995). As such, an important consideration for clinicians and researchers studying development is identifying which contextual factors, such as infant characteristics, should be evaluated when identifying transition states in development.

The concept of affordances, coined by Gibson, links perception to action, and includes the appropriateness of an action on the surroundings (Gibson, 1988). How an infant learns or perceives the affordances within an environment depends on the innate capabilities and characteristics of infants, such as their exploratory behaviour (Gibson, 1988). This suggests that infant

Abbreviations: DST, Dynamic Systems Theory; IMMQ, Infant Movement Motivation Questionnaire; KMO, Kaiser–Meyer–Olkin Measure of Sampling Adequacy; CTS, Carey Temperament Scale; DMQ, Dimensions of Mastery Questionnaire; ECI, Early Coping Inventory.

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characteristics have the potential to facilitate motor development. Early work investigating exploratory activity has shown links to perceptual and cognitive development (Gibson, 1988). Motivation is thought to underlie movement (von Hofsten, 2004) and links between perception, motivation and movement have been found in studies with children who are blind and have motor developmental delays (Levtzion-Korach, Tennenbaum, Schnitzer, & Ornoy, 2000). These children demonstrate delays in the initiation of movement, suggesting that there is a strong visual component to motivation for movement. In addition, curiosity and creativity might facilitate exploration and interaction with surroundings. Studies investigating play attempt to capture the nature of curiosity and exploration. Theories regarding the functionality of play converge on points of adaptive utility, exploration, and the fact that movement and play are pleasurable (Stagnitti, 2004), with strong links between movement and motivation (von Hofsten, 2004).

Ultimately, there is much to be understood about the potential role that infant characteristics have on early motor development. Although researchers have alluded to its importance (Bradley, 1994; Shonkoff & Meisels, 2000), the majority of studies do not address contextual factors. The importance of contextual factors has been emphasized in the model of health identified in the International Classification of Functioning, Disability and Health (ICF; World Health Organization, 2001). Further, the study of such contextual factors, which include aspects of the environment and personal factors, has already formed a cornerstone in developmental psychology, with demonstrable links between temperament and social and cognitive development (Zentner & Bates, 2008). The role of environmental factors on motor development is now gaining attention (Abbott & Bartlett, 1999; Doralp & Bartlett, 2013; Rodrigues & Gabbard, 2005), yet research on the role of infant characteristics, specifically in relation to motor development, is lacking in the literature. Infant temperament has also shown links to physical development, with different temperament categories relating to infants' weight and length characteristics (Gong, Ji, & Shan, 2013; Nasreen, Kabir, Forsell, & Edhborg, 2013). One potential reason for this gap in the literature is the lack of relevant measures targeting infant characteristics as they relate specifically to early motor development. Although infant temperament questionnaires do exist, to the best of our knowledge, no measure exists to evaluate infant characteristics as they relate specifically to motor development during the first year of life, including movement motivation and curiosity. Given this, the primary purpose of this paper is to report on the development and testing of a new infant measure that embodies the theoretical principles of the DST. The development of this tool marks an initial step in understanding the role of infant characteristics in the motor development of infants during the first year of life. A better understanding of infant characteristics in relation to motor development can have a significant impact on planning interventions and ensuring that a given environment is optimally suited to a child's disposition and needs.

2. Materials and methods

A three-stage process was used to develop the Infant Movement Motivation Questionnaire (IMMQ): (1) Initial Item Generation, (2) Pilot Testing and Refinement, and (3) Factor Structure Analysis and Reliability (Kirshner & Guyatt, 1985). Phases 2 and 3 of this study were approved by The University of Western Ontario Health Sciences Research Ethics Board.

2.1. Phase I: item generation

Initial items were generated based on focus group sessions, pilot infant assessments, review of existing measures in the literature and theoretical relevance based on the DST. A preliminary set of focus group sessions were conducted according to the Nominal Group Technique (Delbecq, Van de Ven, & Gustafson, 1986) with a set of health professionals which included paediatric physicians, developmental therapists and parent-infant therapists ($n = 12$). Through a series of round-robin sessions, health professionals were asked to list and later rank which infant characteristics they felt were most important to early motor development. The mean ranking of each item was used to develop a list of the key characteristics with the potential to influence early motor development. These items were used to guide observations and the development of new items during a series of pilot infant assessments that involved direct observation of infants aged birth to one year in play environments.

A literature review designed to identify existing measures evaluating infant characteristics identified the Carey Temperament Scale (CTS; Carey & McDevitt, 1977), Dimensions of Mastery Questionnaire (DMQ; Morgan, Busch-Rossnagel, Barrett, & Harmon, 2005), Early Coping Inventory (ECI; Zeitlin, Williamson, & Szczepanski, 1988), and Test of Playfulness (Bundy, 1997). These measures were selected for review to identify existing items relevant to infants during the first year of life. Selected items were modified accordingly to suit the focus on motor development and to suit a 5-point Likert scale (numbers 0–5 indicating degrees of extent). Both new and modified items were reviewed by an editor to assess ease of readability and item clarity.

2.2. Phase II: pilot testing and refinement

2.2.1. Participants

A sample of 19 parents and their infants were recruited through one branch of the Ontario Early Years Centres in London, Ontario for this phase of the study. Infants ranged in age from 3 to 11 months with a mean age of 7.8 months (SD 2.8).

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