CHAPTER 1
INTRODUCTION

A conservative estimate suggests that more than 200 million children under the age of 5 years from developing countries fail to reach their developmental potential as they are exposed to multiple risk factors, including poverty, malnutrition, poor health, deficient care, and impoverished home environments. Evidence indicates that as vulnerable young children grow up, they will be less likely to succeed in school and be productive adults, and hence fail to achieve their developmental potential (Davis-Kean, 2005; Pike, Lervolino, Eley, Price, & Plomin, 2006; Walker, Wachs, Meeks-Gardner, Lozoff, Wasserman, Pollitt, Carter, & the International Child Development Steering Group, 2007). The failure of children to fulfill their developmental potential and achieve satisfactory educational levels plays an important part in the intergenerational transmission of poverty (Kaur, Menon, & Konantambigi, 2001; Misra & Tiwari, 1984; Najman, Aird, Bor, O’Callaghan, Williams, & Shuttlewood, 2004; Turkheimer, Haley, Waldron, D’Onofrio, & Gottesman, 2003). The discrepancy between the current developmental levels of children and what they would have achieved in a more nurturing environment with adequate stimulation and nutrition indicates the degree of loss of potential (Grantham-McGregor, Cheung, Cueto, Glewwe, Strupp, & the International Child Development Steering Group, 2007).

It is noteworthy that many adverse physical and psycho-social conditions co-vary and do not occur in isolation. Cumulative rather than singular exposure to a confluence of psychosocial and physical environmental risk factors is a potentially critical aspect of the environment of childhood poverty (Evans, 2004; Olness, 2003; Sidhu, Malhi, & Jerath, 2010a, 2010b). Children from disadvantaged homes begin their lives with a poorer platform of health and a reduced capacity to benefit from the economic and social advances experienced by the rest of society (Duncan, Yeung, Brooks-Gunn, & Smith, 1998; Misra, 1990; Sharma & Chaudhary, 2009). In addition, the epidemic of neuro-developmental insults is escalating as a result of rising population numbers, higher survival rates of children who are surviving conditions that compromise their development, and limited resources for helping the affected
individuals (Olness, 2003). It has been estimated that 780 million of the world’s children aged younger than 15 years have brain injury with associated cognitive impairments and the annual United Nations International Children’s Emergency Fund report on the state of world’s children in 2001 makes a strong case for investing in the earliest years of childhood, especially the period between birth and 3 years of age when the brain is developing and especially vulnerable to injury (UNICEF, 2001).

In India alone, there are about 65 million disadvantaged children (UNICEF, 2005), including 18 million street children (Sen, 2009). India is a signatory to the United Nations Convention on the Rights of the Child held in 1989. The Convention for the Rights of the Child established the principle that children have the right to survive and to develop, and governments are responsible for supporting families in their childbearing. The Constitution of India imposes on the state a primary responsibility of ensuring that all the needs and rights of the children are adequately met and children are fully protected, and it directs the state, through its various articles, to provide free and compulsory education to all children in the age group of 6 to 14 years, prohibit child trafficking, and mandates that no child work in any hazardous industry. The Government of India has adopted a National Policy for Children in 1974 and developed a National Charter for Children in 2004, introduced a National Plan for Action for Children in 2005, and constituted the National Commission for Protection of Child Rights in 2006.

India has devised programs and schemes which are specially designed to improve the survival, growth, and development of young disadvantaged children in order to ameliorate and prevent the negative effects of social, physical, and economic risks. In India, the health sector has advocated for early child development programs for children with low birth weight, developmental delays, and from low-income disadvantaged environments. Government-supported preschool programs for children are increasing and compulsory preschool education has been proposed. The Integrated Child Development Services (ICDS) in India was launched in 1975, and it provides counselling to pregnant and lactating mothers about nutrition, growth monitoring for children 0 to 5 years, and feeding and preschool centres for children 3 to 6 years old. The program has been implemented at low cost, and serves more than 30 million children (Rao, 2005; Rao & Sharma, 2002).
As a result of national programmes launched in the country, there has been a distinct improvement in child survival over the past few decades. However, concern has been expressed that this diminished mortality may simply be adding to the pool of sub-standard survivors (Raj, Saggurti, Winter, Labonte, Decker, Balaiah, & Silverman, 2010). It has been argued that there is a concomitant need to focus attention towards the quality of life of surviving children. National data on the prevalence of various developmental disabilities is scarce. Isolated macro and micro prevalence surveys report prevalence of developmental disabilities ranging from 2 to 17% (Bodhankar & Shashikala, 1995; Girimaji & Srinath, 2010; Singhi, Kumar, Malhi, & Kumar, 2007; Srinath, Kandasamy, & Golhar, 2010). Although there has been perceptible progress in addressing the challenges posed by developmental disabilities in India on all fronts, there is still a long way to go in terms of developing a locally and nationally relevant and reliable database, effective implementation of legislation and policies, and development of effective, accessible, and affordable interventions (Giramaji & Srinath, 2010; Sen, 2009).

Child disability is an emerging global health priority. Although poverty alleviation programmes are at the forefront of the nation’s socio-economic agenda, the most vulnerable children remain the most invisible and allude detection and hence fail to benefit from intervention facilities. These vulnerable children survive while living in poverty during the most critical stages of cognitive, social, and emotional development (Chilton, Chyatte, & Breaux, 2007, Walker et al., 2007). Research indicates significant relationships between the child’s nutritional status and physical, cognitive, and psychosocial development (Joe, Mishra, & Navaneetham, 2009; Rao, Joshi, Kanade, & Kulkarni, 1989; Singh, Kaur, & Dube, 1986). Studies indicate that severe and early malnutrition has an adverse impact on brain growth and function, intelligence, and indices of physical development (Agarwal & Upadhyay, 1987; Upadhayay, Saran, Agarwal, Singh, & Agarwal, 1992).

Assessing and addressing developmental issues is important, given the growing focus on child development, the importance of early experience on brain development, and evidence that early identification of developmental problems can result in better developmental outcomes (Halfon & Inkelaar, 2003; Olness, 2003). Early identification of developmental disorders is critical to the well-being of children.
and their families as delayed or disordered development may indicate an increased risk of behaviour disorders or associated developmental disorders. Early identification leads to further developmental and medical evaluation, diagnosis, and treatment including early developmental intervention (American Academy of Pediatrics, 2006).

Tasks related to child development during preventive care visits with infants, toddlers, and young children can be conceptualized as having four major objectives (Glascoe, 1998; Sices, 2004, 2007). The first is to provide anticipatory guidance to help parents prepare for the acquisition of new developmental skills, particularly emerging skills that place infants and young children at risk of physical injury. The second goal is to provide information to parents about typical behaviours at different development stages, to address developmentally appropriate behaviours and to help parents anticipate emerging skills and behaviour. The third objective is to promote the development of young children in general. Finally, the major goal of developmental monitoring is to identify in a timely manner children whose development is falling behind or is atypical and to respond actively to the developmental concerns raised by parents.

Timely and periodic assessment of young children’s development makes it possible to identify and treat developmental disabilities at the earliest possible point of manifestation to prevent loss of developmental potential (Glascoe & Dworkin, 1995; Malhi & Singhi, 1999). Early intervention is important for optimising the developmental progress in the delayed child (Oberklaid & Efron, 2005). The course of development can be altered in early childhood by effective interventions that change the balance between risk and protection, thereby, shifting the odds in favour of more adaptive outcomes (Shonkoff & Philips, 2000).

Child assessment is a skilled professional activity that requires great care, time, and responsibility. Decisions regarding classification and placement are made on the basis of assessment of the child’s development. Therefore, assessing the development of the child is an important skill which has an immense impact on the child and the parent’s life as parental expectations about the child and a child’s feeling of self worth can often be influenced, positively or negatively, by the findings of an evaluation (Huber & King-Thomas, 1987).
Testing the development of a child can be done either by a developmental screening or a diagnostic evaluation test. Developmental screening provides preliminary information which indicates whether there is a need for further testing of the child. On the other hand, developmental diagnostic assessment offers a clearer delineation of strengths and weaknesses of the child, which may offer a diagnosis, identify the need for an intervention, and provides guidelines for appropriate intervention. However, early identification of developmental and behavioural problems is fraught with challenges. Pediatricians and other health care providers working with children have routine contact with most young children, yet well-child visits are brief and cover many issues other than developmental and behavioural care. Health care providers tend to use problematic measurement techniques including heavy reliance on clinical observation and informal checklists that lack validation and distinct cut-offs or use screening tests with limited accuracy (Sices, 2004). As a consequence, only about 30% of children with developmental disabilities and mental health problems are detected prior to school entrance at which point they have lost all opportunities for early intervention (Halfon, Regaldo, Sareen, Inkelas, Reuland, Glascoe, & Olson, 2004).

Over the past two decades and a half, the technical adequacy of instruments intended for the evaluation of young children has been investigated and critiqued by several investigators (e.g., Bracken, 1987; Bracken & Nagle, 2007; Bradley-Johnson, 2001; Emmons & Alfonso, 2005; Malhi & Singhi, 1999). It has been argued that reliable and valid assessment of young children is difficult due to a number of factors, including rapid and uneven development in a number of domains and behavioural issues typical of young children. These factors can adversely affect the accuracy, stability, and predictive ability of estimates of the developmental level and intelligence of young children (Bracken, Keith, & Walker, 1994; Bracken & Walker, 1997).

In his review of 10 preschool instruments used for individual diagnosis and educational placement, Bracken (1987) noted that, in general, instruments intended for children under 4 years of age with delays presented the most pertinent psychometric concerns. Flanagan and Alfonso (1995) reported that assessment tests for young children had poor floors and item gradients for preschoolers making them
inadequate for testing children with severe delays. Therefore, it is important that assessment instruments for young children have adequate technical and psychometric properties which are clearly stated so that practitioners working with young children can make informed decisions regarding test selection and appropriate interpretation (Emmons & Alfonso, 2005).

In an effort to identify young children at-risk for potential developmental and academic delays, there is a need to have several developmental screening and assessment instruments. Developmental screening refers to brief, low cost procedures used to obtain preliminary information about a wide range of skills and behaviours for a large number of children in order to identify those children who are at risk for potential developmental problems (Gridley, Mucha, & Hatfield, 1995). According to Johnson and Marlow (2006), screening is one of the leading activities in preventive efforts towards maintaining child health. The data gathered from screening of young children can be effectively applied to enhance early school success and assist teachers and parents in adapting curricula to the specific needs of these children (Gridley et al., 1995). Early intervention of children at risk can result in several short and long term gains including an increase in achievement, decreased need for special education, and lower retention rates in school (Herrod, 2007).

In recent years there is an increasing emphasis on providing all children, including those from culturally, linguistically, socially, and economically diverse backgrounds, as well as children with disabilities, appropriate opportunities to learn the knowledge and skills necessary to be successful in society (Edgar, Patton, & Day-Vines, 2002; Notari-Syverson, Losardo, & Lim, 2003). The current trend of using standardized psychological assessment instruments normed on upper and middle socio-economic status children is a matter of concern for professionals working with children from culturally diverse, economically and socially weaker sections of the society as these assessment instruments are typically biased against these children (Falk, 2002; Garcia, 1994). Although these tests provide information on the child’s status as compared to mainstream children, they fail to take into account the cultural differences in values, beliefs, and attitudes; cultural and linguistic influences on assessment; contextual influences on the measurement of behaviour and cognition; and alternative pathways to development (Notari-Syverson et al., 2003). These factors
pose serious challenges in the early detection of children from diverse backgrounds. It has been suggested that developmental delays in children from diverse and deprived backgrounds often are not detected at an early age mainly because parents of these children have a different understanding of what a disability is and as a consequence develop varying levels of tolerance for developmental delays (Pavri, 2001). Further, the conception of disability also determines the extent to which families seek early intervention services. Furthermore, limited literacy levels of parents restrict the access to educational materials disseminated by child agencies and also reduce their ability to effectively communicate with medical and educational personnel (Lequerica, 1995).

Several guidelines have been proposed for working with children from culturally and economically diverse groups (Pavri, 2001). First, there is a need to enhance public awareness of early intervention services. Second, encourage grassroots participation of community members in early identification of children belonging to marginalized groups. Third, develop culturally appropriate screening programs and developmental tests. Finally, develop a tracking system to monitor development in identified at-risk children.

Despite the substantial evidence that comprehensive early development programs are effective in increasing children’s chances of success, the investments by the Indian government in child development programs are low. A World Bank evaluation of the Indian ICDS program indicated that it had only a modest positive effect because of low funding, work overload of community level workers, and insufficient training (Gragnolati, Shekar, Dasgupta, Bredenkamp, & Yi-Kyoung, 2005).

There is considerable and compelling evidence to show that early development programs are beneficial and justify their costs manifold (Gillespie & Allen, 2002; Li, Barnhart, Stein, & Martorell, 2003; Pollit, Gorman, Engle, Martorell, & Rivers, 1993). There are many important considerations justifying the need for governments to invest heavily in child development programs (Engle, Black, Behrman, de Mello, Gertler, Kapiriri, Martorell, Young, & the International Child Development Steering Group, 2007). First, events in the early years of child’s life influence the child’s productivity and learning ability throughout the life course, and are effective
strategies for reducing poverty among disadvantaged populations. Secondly, programs increase the efficiency and effectiveness of school expenditures by reducing drop-out rates and grade repetition. Finally, increasing schooling for girls has long term effect on their children's survival, growth, and development.

An estimated 5 to 10% of the pediatric population has a developmental delay or disability (Boyle, Decoufle, & Yeargin-Allsopp, 1994; Nair, George, Padmamohan, Sunitha, Resmi, Prasanna, & Leena, 2009). Generally, developmental delay is a term used to describe a child who does not reach developmental milestones at the expected age, even after allowing for the broad variation of normality (Glascoe, 1998; Rydz, Shevell, Majnemer, & Oskoui, 2005). Developmental disability is an important health issue with considerable burden to the individual, family, and society. There has been increasing pressure to identify those children with developmental delay at an earlier age, with the current focus being on infants and toddlers (American Academy of Pediatrics, 2001, 2006; Majnemar, 1998; Squires, Nickel, & Eisert, 1996). This has been spurred by several factors. First, in recent years the neuro-maturational view that development is intrinsically programmed and takes place in a predictable sequence that is essentially hardwired into the central nervous system and unchangeable by environment has become less important (Majnemar, 1998; Rydz et al., 2005). Alternatively, a systems approach views the brain development as dependent on environmental influences, thereby suggesting that a favorable environment could enhance and optimize development. Secondly, early intervention programs for developmental delay have yielded positive and beneficial results (Hertzman & Wiens, 1996; McCarton, Wallace, & Bennett, 1996; Shonkoff & Hauser-Cram, 1987). As a result, several professional organizations, such as Indian Academy of Pediatrics and American Academy of Pediatrics, are strongly endorsing the early identification of delayed children by child health practitioners (American Academy of Pediatrics, 2001, 2006; Choudhury, 2009).

With the availability of appropriate intervention programs and the growing acknowledgement of the efficacy of these programs, there is an urgent need for child health care personnel to provide appropriate developmental screening and assessment tests. Research further shows that approximately half the children with developmental delay are not detected until school age (Glascoe, 2000). This is primarily because
mild delays and deviations are often hard to detect because children develop in spurts and, at times, discontinuously. Developmental disabilities also encompass a spectrum of problems of varying kinds and severity. Although there is a broad agreement as to what constitutes clear-cut delay and deviation, there is not complete consensus among child health professionals as to the severity at which evaluations and interventions become appropriate. Child development is a dynamic process and is hard to measure by its very nature. There are several streams of development, including gross motor, fine motor, language, social, emotional, adaptive, and cognitive, and these are interrelated and complex within themselves. Children develop skills variably and often show a new skill inconsistently when first mastering it. A single test administered at one point of time may not provide a complete developmental picture of the child making periodic assessment necessary to detect emerging disabilities as the child grows (Glascoe, 1998).

It is important to recognize that despite the need to identify children at the earliest, developmental screening tests have limited ability to predict future functioning, largely because of the nature and complexity of measuring the continuous process of child development (Dworkin, 1993; Glascoe, 2000). Moreover, screening tools have little diagnostic utility, particularly for identifying subtle impairments, as they are first-line measures to identify individuals who require more detailed assessment (Johnson & Marlow, 2006; William & Holmes, 2004). Further, development is malleable and has age-related manifestations; therefore, there is a need for repeated assessments.

In many developing countries, the most commonly used method for the evaluation of developmental and cognitive delay is observations made by clinicians or teachers (Alcock, Holding, Mung’ala-Odera, & Newton, 2008). However, clinical impressions are not effective in assessing development (American Academy of Pediatrics, 1994). Using only clinical judgment, fewer than 30% of children who have language disabilities, mental retardation, or other developmental problems have been found to be detected (Glascoe & Dworkin, 1995). Where more structured assessment methods have been used, researchers have often applied materials and tests with translated instructions (Mulenga, Ahonen, & Aro, 2001) and this has led to test scores
showing restricted within population variability, limiting the ability of the investigators to characterize development (Connolly & Grantham-McGregor, 1993).

Data from India regarding the prevalence of developmental delay and disabilities is scarce. However, it has been shown that that prevalence of developmental disabilities is higher in the developing than in the developed countries (Aly, Taj, & Ibrahim, 2010; Tan & Yadav, 2008). In many developing countries, including India, there is a social stigma attached to persons with developmental abilities. Generally, there is no provision for the management of childhood disabilities in the healthcare services and families have to bear the brunt of care (Pal & Choudhry, 1998; Rastogi, 1981). Available social and educational services are also scarce and elementary and tend to alienate rather than integrate disabled children into the main fabric of the society (Peshawaria & Menon, 1991; Singhi, Goyal, Pershad, Singhi, & Walia, 1990).

Moreover, in India, using intelligence and developmental tests developed in the Western countries is a common practice because of limited availability of assessment instruments for very young children (Anadalakshmy, 1982; Bhave, Bhargava, & Kumar, 2009; Murlidharan, 1992). Bevli (1990) has pointed to the danger of importing Western tests for use in other socio-cultural settings. The dangers include the use of culturally inappropriate and irrelevant test items, inappropriate testing methods, and use of tests not standardized on the target population (Bhave et al., 2009; Gupta & Patel, 1991). Several Indian authors have emphasized the need to ensure that developmental assessment tests should be culturally sensitive, developed and standardized on population which is representative of the population to be tested (Chaudhari, 1996; Kumar, Iyengar, Bhasin, Gupta, & Kumar, 1995; Malhi & Singhi, 1999; Singhania & Sonksen, 2004; Singhi, 1992).

Despite the need for developmental assessment of children, particularly the deprived groups, there are few indigenously constructed developmental tests for clinical practice and research. Moreover, majority of the developmental tests available are screening instruments that focus narrowly on score calculation or profile pattern description, rather than a detailed professional assessment involving more comprehensive gathering of diverse information on the background context and
characteristics of the individual so as to develop a broader understanding of the individual uniqueness. In the last two decades a few developmental screening instruments have been devised in India for use with preschoolers including the Baroda Development Screening Test for Infants (BDSTI; Phatak & Khurana, 1991); the Trivandrum Developmental Screening Chart (TDSC; Nair, George, Philip, Lakshmi, Haran, & Sathy, 1991), Screening Test Battery for Assessment of Psychological Development (Vazir, Naidu, Vidyasagar, Lansdown, & Reddy, 1994), and the Lucknow Development Screen for Indian Children (Bhave et al., 2009)

In the Indian context, there is, therefore, an urgent need for a standardized, culturally sensitive, indigenously developed assessment tool which assesses multiple domains over the entire development period in order to obtain a broader record of development than that provided by most existing tests in the country. There is a need for a developmental battery which provides a range of standardized scores at the domain and the overall test composite score level that is useful in assessing the functional abilities of a child and in the identification of children with global developmental delay or children with specific delays in one or more domain. In addition, the development battery should provide a profile of child’s strengths and weaknesses and assist child health professionals to design an individualized plan of remedial intervention of the child based on the unique profile of the child.

Keeping some of the above issues in mind, the present study attempts to construct a standardized development battery for Indian children aged 0 to 7 years and 11 months in five key areas of development including motor, adaptive, personal-social, cognitive, and communication. The specific aims of the study are as follows:

1. To construct a multi-domain Development Assessment Battery for Indian children aged 0 to 7 years and 11 months.
2. To establish norms for children aged 0 to 7 years and 11 months, in terms of percentile rank scores and domain and total test developmental quotient scores.
3. To establish inter-rater, test-retest, and internal consistency reliability of the Development Battery.
4. To establish content, construct, and criterion related validity of the Development Battery.