



## Development of a preschool developmental assessment scale for assessment of developmental disabilities

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### ABSTRACT

The aim of this paper was to describe the development of the cognitive domain of the Preschool Developmental Assessment Scale (PDAS) for assessment of preschool children with developmental disabilities. The initial version of the cognitive domain consisted of 87 items. They were administered to 324 preschool children, including 240 children from preschools and 84 children with developmental disabilities. Initial Rasch analysis results indicated that the fit statistics of 42 of the items were outside the acceptable range. Based on the fit statistics and considering the overall structure of the scale, the revised version consisted of 40 items and this version conformed to the Rasch expectations. The revised 40-item scale could differentiate between children with typical development and children with developmental disabilities. It could also differentiate between children from different age groups. The internal consistency estimate (KR-20) was .93. The cognitive domain of the PDAS is considered a promising developmental assessment tool for assessment of developmental disabilities.

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### 1. Introduction

It is generally accepted that early identification and intervention are important strategies in promoting the development of children with developmental delay or disabilities. Developmental assessment is often conducted by professionals and subsequent intervention services are determined based on the assessment results (Long, Blackman, Farrell, Smolkin, & Conaway, 2005). Developmental assessment consists of “a linear progression of skills acquisition” (Long et al., 2005, p. 157) derived theoretically or based on research evidence. It is generally expected that developmental assessment should provide information on a child’s developmental status, and be able to contrast normal and abnormal development (Petermann, 2008). In other words, developmental assessment should demonstrate an ordering of how children progress through a certain domain (Wilson, 2008). Furthermore, children are compared against their same age peers in terms of functioning. Developmental assessment should cover a range of domains including cognitive abilities, receptive and expressive language, fine and gross motor skills, visual perception, and social-emotional skills (Petermann, 2008). There are many commonly used developmental assessment scales for different domains such as Griffiths Mental Development Scales – Revised (Griffiths, 1996), Bayley Scales of Infant and Toddler Development – Third Edition (Bayley, 2006), Reynell Developmental Language Scales (Reynell & Huntley, 1985). These scales can only be administered by trained professionals such as psychologists, speech therapists or paediatricians.

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To provide a comprehensive assessment for preschool children, it is often necessary to have combined administration of tests on different domains by respective disciplines. This is often resource intensive and sometimes not logistically viable. The aim of the present project is to develop a Preschool Developmental Assessment Scale (PDAS) which covers areas on cognitive, social, language, literacy, numeracy, visual perception, fine and gross motor skills, which can be administered by different professionals such as psychologists, speech therapists, paediatricians, physiotherapists and occupational therapists. Children being identified to have significant delays in particular domains can then be referred to professionals in the specific areas for more detailed assessment. This paper describes the development of the cognitive domain of the PDAS.

Based on the literature, there are some criteria governing the development of a developmental assessment tool. In terms of the psychometric characteristics, Johnson and Marlow (2006) point out that the normative sample should be representative of the population for whom the test is designed for and the sample should be large enough so accurate comparisons can be made. Furthermore, the test should be reliable and valid, meaning that the test should yield the same results when repeatedly administered and it should measure what it is supposed to be measured. In terms of the content, Long et al. (2005) also specify that the skills measured should be based on sound theory and research evidence.

### 1.1. Content

Sattler (2008) describes four theoretical perspectives for assessment. The developmental perspective focuses on the interplay between genetic disposition and environmental influences, and development progresses towards specific goals. Growth is conceptualized to be both qualitative (new processes or structures) and quantitative (change in degree of magnitude). The normative-developmental perspective is an extension of the developmental perspective and focuses on changes in cognition, affect and behaviour with reference to same age or sex peers. A cognitive-behavioural perspective emphasizes the importance of cognition and environment in influencing behaviour and emotion. A family-systems perspective emphasizes the importance of the family system in influencing the child's behaviour. Sattler (2008) argues for an eclectic approach in assessment.

In the development of the items for the cognitive domain of the PDAS, this study drew from several sources. The first was The Early Learning and Development Benchmarks (Kagan, Britto, Kauerz, & Tarrant, 2005) which outlines the goals for young children's development. It integrates different theoretical perspectives with established research, which is in line with Sattler (2008) and Long et al. (2005). It is grounded in a multi-dimensional view of child learning, including physical health and motor development, social and emotional development, approaches to learning, general knowledge and cognitive development, and, language and literacy (Kagan, Britto, Kauerz, & Tarrant, 1995). The second was the Early Development Instrument (EDI) (Janus & Offord, 2007) which measures children's readiness to begin learning at school and is completed by kindergarten teachers. It is a population level measure which cannot be used as a measure of children's academic achievement or as a tool for identifying children with special education needs. In Canada, it is used for children between 4 and 6 years of age. The EDI has been adapted for use in Australia as a general measure of child development for children aged 4–5 (Andrich & Styles, 2004; Brinkman et al., 2007). Finally, the local preschool curriculum guide (Curriculum Development Council, Hong Kong Education and Manpower Bureau, 2006) was also used to guide the development of items as the assessment tool would need to be grounded within the local context.

To map out the progress of the items and skills, the Wright map would be used. The Wright map charts the ordering of the items from the easiest to the most difficult, based on empirical data. In the Wright map, both child's ability and item difficulty will be located on the same scale (Wilson, 2008). This would also enable us to examine the adequacy of the items in targeting the ability range of the children.

### 1.2. Psychometric properties

For reliability, the internal consistency approach assumes that the items of an instrument should be measuring the same construct, or in other words, the items should be homogeneous (Pedhazur & Pedhazur Schmelkin, 1991). The most often used is the alpha coefficient which has been shown to be identical to Kuder-Richardson 20 (KR-20) (Pedhazur & Pedhazur Schmelkin, 1991).

In terms of validity, Wilson (2008) argues that there should be a single underlying characteristic that an instrument is designed to measure, and this instrument should function as planned. This is related to the concept of unidimensionality which is a key concept in Rasch analysis. The idea of unidimensionality is also related to the concept of additivity. It is only meaningful to sum up items measuring the same construct to form a total score. Rasch analysis provides infit and outfit statistics to indicate whether the requirement of unidimensionality can be met. In relation to the functioning of the developmental assessment instrument, as stated by Petermann (2008), the instrument should be able to provide information on a child's developmental status, and be able to contrast normal and abnormal development.

In this study, Rasch analysis would be used to examine the unidimensionality of the instrument and items would be removed or modified based on Rasch analysis results and theoretical considerations. The Wright map would be used to examine the targeting of the items and the ordering of the items. Furthermore, the instrument would be used with children from different age groups to test whether it could differentiate between the age groups. In addition, children in preschools and children known to have developmental disabilities would be assessed to investigate whether this instrument could differentiate between these two groups.

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