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Measuring school readiness globally: Assessing the construct validity and measurement invariance of the International Development and Early Learning Assessment (IDELA) in Ethiopia

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ABSTRACT

The post 2015 context for international development has led to a demand for assessments that measure multiple dimensions of children's school readiness and are feasibly administered in low-resource settings. The present study assesses the construct validity of the International Development and Early Learning Assessment (IDELA) developed by Save the Children using data from a sample of children (~5 years of age; $N = 682$) from rural Ethiopia. The study (a) uses exploratory and confirmatory bi-factor analyses to assess the internal structure of the assessment with respect to four hypothesized domains of school-readiness (Early Numeracy, Early Literacy, Social-Emotional development, and Motor development); (b) uses latent regression to examine concurrent validity of the domains against a limited set of child and family characteristics; and (c) establishes measurement invariance across three focal comparisons (children enrolled in center-based care versus home-based care; girls versus boys; and treatment status in a cluster randomized controlled trial of a center-based program). The results support the conclusion that the IDELA is useful for making inferences about children's school readiness. Implications for future use of the IDELA and similar instruments are discussed.

1. Introduction

Early learning skills, or "school readiness", are crucial for children's transition and adaptation to school (e.g., Blair & Razza, 2007; Cueto et al., 2016; McClelland, Morrison, & Holmes, 2000). In light of growing evidence, governments worldwide have acknowledged that the skills young children bring to the start of school are a major national issue. In particular, the ratification of the 2015–2030 Sustainable Development Goals (SDGs; United Nations, 2015) has signified an increased commitment on the part of governments to improve young children's skills and knowledge to increase their success in early primary grades and beyond. The research base and policy context of current efforts in international development have brought to the forefront the importance of developing assessments of early childhood development (ECD) and school readiness that are feasible to administer, conceptually and psychometrically validated across contexts, and aligned with national monitoring systems (e.g., Bartlett, Dowd, & Jonason, 2015; Yoshikawa & ECDAN Data Task Force, 2017).

School readiness and its measurement have received quite a bit of attention in the developmental and educational literature in high-income countries, but less in low- and middle-income countries (LMICs). This is partly due to a lack of validated measures and available data. Direct assessments that capture multiple domains of ECD and school readiness skills, are feasible to administer, and can be used and compared across regions, countries, and contexts are needed (Chavan & Yoshikawa, 2013). In addition, assessments that are sensitive enough to be used for program evaluation could further the efforts of organizations and governments aiming to improve early childhood outcomes by allowing them to assess and compare program impacts.

Such assessments may be particularly important in informing intervention efforts in Sub-Saharan Africa, where regional estimates indicate that the largest numbers of young children are not reaching their developmental potential due to stunting and living in poverty (Black et al., 2017). As a region, Sub-Saharan Africa has the largest number and proportion of 3- and 4-year old children (29.4 million, or 44%) compared to any other region with low performance in terms of

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cognitive and socioemotional development (McCoy, Peet, et al., 2016). Multi-faceted, easily administered measures would allow governments to have a more nuanced understanding of if and how their investments are translating into improved child development.

1.1. Assessing school readiness requires a multi-dimensional view of learning and development

School readiness can be defined broadly as an outcome of the early years that covers multiple dimensions of development, including early academic and behavioral skills, Social-Emotional development, and aspects of physical health including Motor development (Snow & Van Hemel, 2008; UNESCO, 2013). While most existing measures are multi-domain in nature, there are surprisingly few published empirical analyses investigating a multi-domain structure of ECD and school readiness. One study assessed the measurement properties of a composite measure of the Bracken School Readiness Assessment in a U.S. sample of kindergarten children by examining the measure's predictive and discriminant validity (Panter & Bracken, 2009). However, competing potential structures of a single overall factor vs. factors representing each of the sub-domains (A, B, C, and D of the Bracken) were not tested. The Early Development Instrument (EDI) was analyzed on a sample of Canadian children using exploratory factor analytic methods, and found to measure six distinct dimensions of development including physical health and well-being, social competence, emotional maturity, language and cognitive development, communication skills and general knowledge domains (Janus & Offord, 2007). Such studies are rare in general and even less common in LMICs. One effort to assess a contextually relevant scale, the East Asia Pacific–Early Child Development Scales (Rao et al., 2014), stands out. By assessing content validity, internal reliability, and item discrimination in six Asian countries, the results of this study revealed seven developmental domains relevant to ECD in East Asia and the Pacific, including: approaches to learning, cognitive development, cultural knowledge and participation, language and emergent literacy, Motor development, health, hygiene, and safety, and Social-Emotional development.

Domains of school readiness are also comprised of various essential skills. For example, meta-analyses have shown that Early Literacy is comprised of five essential components that are necessary but not sufficient for oral reading fluency, including oral language, vocabulary, phonemic awareness, print awareness, and letter knowledge (Snow, 2006). These constructs are often examined as a composite representing Early Literacy (e.g., Hood, Conlon, & Andrews, 2008), though some studies have examined skills individually (e.g., Sénéchal & LeFevre, 2002). Similarly, Early Numeracy consists of components including number concepts and quantities, number relationship and operations, geometry and spatial sense, patterns, and measurement and comparison (Office of Head Start, 2010). These are commonly combined to represent children's Early Numeracy ability (e.g., Anders et al., 2012).

The domain of Social-Emotional development has also been differentiated into individual skill areas, including recognizing and managing emotions, appreciating the perspectives of others, establishing positive goals, making responsible decisions, and handling interpersonal situations effectively (CASEL, 2012). Finally, motor skills are often considered in two categories – gross motor and fine motor, with the latter shown to be more important in the transition to school (i.e., Cameron et al., 2012). Most assessments have not considered measurement implications of the hypothesized sub-construct structures within broader developmental domains.

1.2. The International Development and Early Learning Assessment (IDELA)

The IDELA was developed in 2011 by Save the Children as a holistic, rigorous, open source assessment that is feasible and easily adapted to different national and cultural contexts. The initial set of items were inspired by and conceptually adapted from existing assessments such as the Denver, the Ages and Stages Questionnaire, the Bayley Scales of Child Development, and the Early Development Instrument, among other assessments. The version of the assessment utilized in this research consisted of 101 items administered through 24 subtasks designed to measure a total of 4 domains of child development: Emergent Numeracy, Emergent Literacy, Gross and Fine Motor Skills, and Social-Emotional Learning. *Items* refer to the individual responses, usually scored as correct/incorrect or yes/no (e.g., “Can you tell me how old you are?” “Can you show me the smallest circle?”). *Subtasks* refer to groupings of one or more items based on similar stimulus materials or content (e.g., the total number of letters a child can identify) and represent skills within each domain. A description of the subtasks and items is included in Section 2.3. The full assessment is available from Save the Children upon request. The adaptation of the tool to different countries includes sourcing locally appropriate materials, such as picture cards, small items for counting, and children's books, and including local educational staff to inform the content of some of the subtasks.

The intended purpose of the IDELA is to support program improvement across Save the Children's and partners’ numerous country sites, to increase accountability among ECD initiatives globally with direct assessments of ECD outcomes, and to offer comparable data about children's learning and development across countries and programs that can help bring successful ECD programs to scale. IDELA data is intended for use at aggregate levels (i.e., for impact evaluation comparisons of groups; potentially for national monitoring) and not for screening individual children for developmental delays (see ECD Action Network, 2017). The development of the assessment is described in a technical working paper (Pisani, Borisova, & Dowd, 2015).

1.3. Ethiopian context and early childhood care and education policy

We examine the IDELA measure on a sample of children from Ethiopia, a country in the horn of Africa with a population of close to 100 million. As a region, Sub-Saharan Africa has the largest proportion of young children not meeting their developmental potential (Black et al., 2017) nor basic developmental milestones (McCoy, Peet, et al., 2016). On the Human Development Index, a composite statistic of life expectancy, education, and income per capita indicators used to rank countries by overall human development and conducted by the UNDP, Ethiopia ranks in the bottom tier, number 174 out of 188 countries (UNDP, 2015). While country- and region-level estimates of the state of early childhood development in Ethiopia do not currently exist, the Human Development Index is strongly correlated to country-level estimates of early childhood development, both in terms of stunting rates ($r = .72$) and cognitive and Social-Emotional development ($r = -.84$) (McCoy, Peet, et al., 2016). The Oromia region in Ethiopia, where the data for this study come from, is one of the nine ethnically based regional states of Ethiopia and is the largest state in population and area. The region includes the nation's capital, Addis Ababa, but just 10.5% of its population live in urbanized areas (Ethiopian Government, 2016). In rural areas in Oromia, from which the sample in the present study are drawn, agriculture is the main source of livelihood and the majority of the households are poor. In 2009, 55% of families in Oromia reported falling below the consumption poverty line. This estimate is lower than the 62–79% in other rural regions in the country (Tafere & Woldehanna, 2012).

Ethiopian children officially enter grade 1 at age seven. Despite considerable progress in primary school enrollment, nearly one-quarter of 8-year olds are not enrolled in school in Ethiopia (Woldehanna, Tafere, Pankhurst, & Gudisa, 2011). Gaps in enrollment are apparent based on family and child characteristics. Specifically, children from non-poor families (measured by household assets and consumption poverty), and children with more educated parents have higher school enrollment rates than their counterparts (Woldehanna et al., 2011). Despite gender differences in enrollment, with males being more likely