



## The Diagnostic Adaptive Behavior Scale: Evaluating its diagnostic sensitivity and specificity



Giulia Balboni<sup>a,\*</sup>, Marc J. Tassé<sup>b</sup>, Robert L. Schalock<sup>c</sup>,  
Sharon A. Borthwick-Duffy<sup>d</sup>, Scott Spreat<sup>e</sup>, David Thissen<sup>f</sup>, Keith F. Widaman<sup>g</sup>,  
Dalun Zhang<sup>h</sup>, Patricia Navas<sup>b</sup>

<sup>a</sup> University of Pisa, Via Roma, 67, 56126, Pisa, Italy

<sup>b</sup> The Ohio State University, 1581 Dodd Dr., Columbus, OH 43210, USA

<sup>c</sup> Hastings College, P.O. Box 285, Chewalah, WA 99190-0285, USA

<sup>d</sup> University of California – Riverside, 20500 Yate Circle, Riverside, CA 92508-3126, USA

<sup>e</sup> Woodland Center for Challenging Behaviors, 9 Imlaystown-Hightstown Road, Allentown, NJ 08501-2011, USA

<sup>f</sup> University of North Carolina – Chapel Hill, CB #3270, Chapel Hill, NC 27599-3270, USA

<sup>g</sup> University of California – Davis, One Shields Avenue, Davis, CA 95616-8686, USA

<sup>h</sup> Texas A&M University, 4225 TAMU, College Station, TX 77843-4225, USA

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### ABSTRACT

The Diagnostic Adaptive Behavior Scale (DABS) was constructed with items across three domains – conceptual, social, and practical adaptive skills – and normed on a representative sample of American individuals from 4 to 21 years of age. The DABS was developed to focus its assessment around the decision point for determining the presence or absence of significant limitations of adaptive behavior for the diagnosis of Intellectual Disability (ID). The purpose of this study, which was composed of 125 individuals with and 933 without an ID-related diagnosis, was to determine the ability of the DABS to correctly identify the individuals with and without ID (i.e., sensitivity and specificity). The results indicate that the DABS sensitivity coefficients ranged from 81% to 98%, specificity coefficients ranged from 89% to 91%, and that the Area Under the Receiver Operating Characteristic Curve were excellent or good. These results indicate that the DABS has very good levels of diagnostic efficiency.

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## 1. Introduction

All current diagnostic and classification systems (Diagnostic and Statistical Manual of Mental Disorders, DSM-5; American Association on Intellectual and Developmental Disabilities' [AAIDD] Terminology & Classification Manual; and International Statistical Classification of Diseases and Related Health Problems, ICD-10) have three common criteria to rule-in or rule-out a diagnosis of Intellectual Disability (ID): (a) significant limitations in intellectual functioning, (b) significant limitations in adaptive behavior, and (c) an age of onset during the developmental period (American Psychiatric Association [APA] 2013; Schalock et al., 2010; World Health Organization, 1993).

\* Corresponding author at: Department of Surgery, Medical, Molecular & Critical Area Pathology, University of Pisa, Via Roma, 67, 56126 Pisa, Italy. Tel.: +39 050 992370; fax: +39 050 992658.

E-mail address: giulia.balboni@med.unipi.it (G. Balboni).

Adaptive behavior has been formally included in defining the condition of ID for at least the past 50 years (see Heber, 1959, 1961; Schalock et al., 2010). As discussed in Tassé et al. (2012), we have today essentially the same definition of adaptive behavior as originally proposed by Heber (1959) where adaptive behavior was defined as the collection of conceptual, practical, and social adaptive skills. Both the AAIDD (Schalock et al., 2010) and the DSM-5 (APA, 2013) define adaptive behavior similarly. Moreover, there is agreement in defining significant limitations in adaptive behavior as performance that is approximately two standard deviations below the mean (i.e., represented by a standard score of approximately 70 or less) in at least one of the three adaptive behavior domains of conceptual, social, or practical adaptive skill or in a total score from an adaptive behavior scale (APA, 2013; Schalock et al., 2010).

With the advent of the intelligence tests movement, Intelligence Quotient (IQ) scores quickly became the predominant criterion for diagnosing persons as having ID as well as planning interventions and services for this population, overshadowing consideration of the person's adaptive behavior skills and deficits. Perhaps due to debate over the precise structure of adaptive behavior (Bruininks, McGrew, & Maruyama, 1988; Harrison, 1989; Meyers, Nihira, & Zetlin, 1979; Widaman, Borthwick-Duffy, & Little, 1991; Widaman & McGrew, 1996) and even its conceptualization (e.g., Greenspan & Granfield, 1992), the importance of the role of IQ scores increased. However, since 2002 (Luckasson et al., 2002), the relevance of the construct of adaptive behavior and the role it should play in a diagnosis of ID has clearly been reaffirmed.

Despite being an integral part of diagnosing intellectual disability, a relative paucity of research studies have investigated the accuracy with which standardized adaptive behavior measures accurately identify persons with ID as having significant limitations in adaptive behavior. A key issue in such studies in identifying those behaviors that best distinguish individuals with ID from those without ID. Although more than 200 adaptive behavior measures have previously been identified (Schalock, 1999), only four of them are normed on a representative U.S. sample of the general population, and few have been developed specifically for the purpose of ruling in/out a diagnosis of ID (Tassé et al., 2012). The four instruments normed on representative US samples are: (1) Vineland Adaptive Behavior Scales-2nd edition, VABS-II (Sparrow, Cicchetti, & Balla, 2005); (2) Adaptive Behavior Assessment System-II, ABAS-II (Harrison & Oakland, 2003); (3) Scales of Independent Behavior-Revised, SIB-R (Bruininks, Woodcock, Weatherman, & Hill, 1996); and (4) Adaptive Behavior Scale-School Version, ABS-S:2 (Lambert, Nihira, & Leland, 1993). Some of these (e.g., ABS & SIB-R) have not been re-normed in 2 decades.

When reviewing the psychometric properties of these measures, accuracy to correctly identify persons with ID from individuals without ID is a key aspect. The accuracy of differential diagnosis may be evaluated comparing the standard scores of assessed individuals with and without ID diagnosis and computing diagnostic efficiency (or validity) statistics (e.g., Streiner, 2003) such as *sensitivity* and *specificity*. Sensitivity is defined as the proportion of true positives (i.e., person having ID) that are correctly identified as having ID by the test (Altman & Bland, 1994), reflecting how good a test is at correctly identifying people who have the condition the test is intended to measure (Loong, 2003). Specificity refers to the ability to correctly reject a diagnosis or identify true negatives, when the person is known not to have the said diagnosis (Altman & Bland, 1994).

Information regarding the sensitivity and specificity of an adaptive behavior assessment instrument is critical in establishing the valid use of the instrument. For example, in the case of the ABS-S: 2, the authors stated simply that “mean scores for the groups with developmental disabilities are sufficiently below the average scores of the normal group” (Lambert et al., 1993, p. 50). However, the actual percentages of people correctly classified were not provided, so the precision of the ABS-S: 2 to accurately measure significant limitations in adaptive behavior and correctly identify someone as having an ID is not known.

The SIB-R Comprehensive Manual (Bruininks et al., 1996) provided a more detailed description of sensitivity and specificity. In the manual, the authors stated that 76% of the individuals within the standardization sample were correctly classified into their original groups (51% mild ID; 74% moderate ID; and 82% non-ID). From a decision-making perspective, the fact that the lowest degree of accuracy (i.e., 51%) of the SIB-R is for the group with mild ID is not surprising, as this group is the closest to the actual diagnostic cut-off score. However, if only about half of persons diagnosed with mild ID have scores in a range that would support diagnosis, the SIB-R may not be sufficiently sensitive to identify correctly persons with mild forms of ID. Furthermore, although the SIB-R covers the age span (from infancy and up), sensitivity and specificity data were not provided for separate age groups.

For the VABS-II (Sparrow et al., 2005), the percentages of people correctly classified ranged from 71% to 100% for those aged 6–18 years old (71% mild ID; 87% moderate ID; and 100% severe and profound ID), and from 97% to 100% for individuals aged 19–86 (97% mild ID and 100% for individuals with moderate and with severe and profound ID). Data regarding the sensitivity of the VABS-II were also available by domain (i.e., communication, daily living skills, socialization, and motor skills). However, the proportion of people who were correctly excluded from the diagnosis of ID (i.e., specificity) was not reported.

The ABAS-II (Harrison & Oakland, 2003) offers data on both sensitivity and specificity across four infant-preschool samples, five school-age samples, and one adult sample. The results for the infant-preschool samples indicate that 58–73% of those with ID (sensitivity), and 0–5% without ID (specificity) scored at least 2 standard deviations below the mean on the General Adaptive Composite (GAC) score, whereas 77–86% children diagnosed with ID and 3–19% of the matched control group scored at least 2 standard deviations below the mean on one or more adaptive domains or the GAC. Across the five school-age samples and the adult sample 50–87% of those with ID and 0–17% of the matched control group scored at least 2 standard deviations below the mean on the GAC, and 62–100% with ID and 5–19% without ID scored at least 2 standard deviations below the mean on one or more adaptive domains or the GAC.

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