Research in Developmental Disabilities 35 (2014) 2224–2230

Contents lists available at ScienceDirect

Research in Developmental Disabilities

# Differences in the intellectual profile of children with intellectual vs. learning disability

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ARTICLE INFO

*Article history:*
Received 27 March 2014
Received in revised form 12 May 2014
Accepted 16 May 2014
Available online 11 June 2014

*Keywords:*
Specific learning disability
Intellectual disability
WISC-IV
General Ability Index
Full-Scale Intelligence Quotient

ABSTRACT

The WISC-IV was used to compare the intellectual profile of two groups of children, one with specific learning disorders (SLDs), the other with intellectual disabilities (ID), with a view to identifying which of the four main factor indexes and two additional indexes can distinguish between the groups. We collected information on WISC-IV scores for 267 children ($M_{age}$ = 10.61 [SD = 2.51], range 6–16 years, females = 99) with a diagnosis of either SLD or ID. Children with SLD performed better than those with ID in all measures. Only the SLD children, not the ID children, revealed significant differences in the four main factor indexes, and their scores for the additional General Ability Index (GAI) were higher than for the Cognitive Proficiency Index (CPI). Children with a diagnosis of SLD whose Full-Scale Intelligence Quotient (FSIQ) was <85 showed a similar pattern. Our findings confirm the hypothesis that children with SLD generally obtain high GAI scores, but have specific deficiencies relating to working memory and processing speed, whereas children with ID have a general intellectual impairment. These findings have important diagnostic and clinical implications and should be considered when making diagnostic decisions in borderline cognitive cases.



## 1. Introduction

One of the main criteria adopted in the traditional theoretical and clinical approach to specific learning disorders (SLDs) and intellectual disabilities (ID) is an overall measure of intelligence, typically the Full-Scale Intelligence Quotient (FSIQ). A classical criterion for diagnosing ID is an IQ below 70 associated with severe adaptive problems and onset in developmental age, while for SLD it is a discrepancy between a high FSIQ (or an average intelligence) and poor academic performance (American Psychiatric Association, 2000). In Italy, for example, a diagnosis of ID currently requires a FSIQ below 70, whereas a diagnosis of SLD is typically used for cases with a FSIQ above 85 associated with a clear discrepancy between this high FSIQ and a low achievement at school (Istituto superiore di sanità, 2011). This approach has recently been questioned for a number of reasons. For a start, children with a borderline intellectual functioning (Alloway, 2010) are left in an undefined, often residual category. The FSIQ may be too generic and lose important information about a child's intellectual level in clinical populations (e.g. Fiorello et al., 2007). As a consequence, a program of intervention for a given child cannot be supported by a comparison between their intellectual strengths and weaknesses (Ferrer, Shaywitz, Holahan, Marchione, &

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http://dx.doi.org/10.1016/j.ridd.2014.05.013
0891-4222/

Shaywitz, 2010; Hale, Fiorello, Kavanagh, Holdnack, & Aloe, 2007; Tanaka et al., 2011). These problems help to explain why the DSM-5 (American Psychiatric Association, 2013) omits any reference to the discrepancy between IQ and achievement, only mentioning academic difficulties not explained by an intellectual disability (see also Tannock, 2013).

Given these considerations, the latest version of the WISC battery (WISC-IV) includes the recommendation that we pay less attention to the FSIQ and more to the four factor indexes representing intelligence in verbal comprehension (VCI), perceptual reasoning (PRI), working memory (WMI), and processing speed (PSI). Some authors maintain, however, that switching from earlier versions to the latest version of the WISC has not changed the state of things, and that the FSIQ remains the most informative measure of intelligence – as confirmed, for instance, by a better long-term stability (Watkins, Glutting, & Lei, 2007; Watkins & Smith, 2013).

It has also been suggested that clinicians should focus on other measures instead of the FSIQ or the four IQs. Another two global indexes can be derived from the WISC-IV (Wechsler, 2003), i.e. a General Ability Index (GAI) obtained by combining the VCI with the PRI, and a Cognitive Proficiency Index (CPI) resulting from combining the WMI with the PSI (Prifitera, Saklofske, & Weiss, 2008; Saklofske, Coalson, Raiford, & Weiss, 2010). The GAI has the greatest load on the *g*-factor, so it could be particularly appropriate for diagnosing intellectual disabilities (ID). On the other hand, a study comparing the GAI and FSIQ in a large sample of children found no evidence to justify dismissing the FSIQ in favor of the GAI (Koriakin et al., 2013). It is worth noting, however, that these findings were based more on children with ID than on cases with a specific learning disability (SLD), and focused mainly on their adaptive functioning.

Children with SLD may represent a different case. In particular, it would seem sensible to use the two additional scores obtainable with the WISC-IV (the GAI and CPI) because children with SLD are typically characterized by a marked discrepancy between their good general intellectual abilities (measured by the GAI) and their poor processing skills (measured by the CPI). The processing deficits of children with SLD very often relate to working memory (WM) (Swanson & Ashbaker, 2000; Swanson, 1993), and processing speed (PS) (Proctor, 2012). A measure of IQ that relies too heavily on measures of WM and PS might therefore underestimate the intellectual abilities of children with a SLD. This could have clinical and practical implications in the case of children with a relatively high score on the GAI and a lower one on the CPI because such children often do not meet the criteria for a diagnosis of SLD and they are erroneously included in groups of cognitively borderline or even ID children. That is why the use of IQ measures and discrepancy formulas to diagnose SLD has often been criticized (Siegel, 1988).

A more accurate clarification of the differences in the intellectual profiles of children with ID and SLD could also facilitate the accurate diagnosis of cases with borderline profiles, apparently presenting features of both ID and SLD. Such cases typically have a FSIQ between 71 and 84, and are sometimes included in a particular category, variously defined in the DSM-5, although it is not considered a mental disorder: "borderline intellectual functioning" is coded among the "other conditions that may be a focus of clinical attention". Based on the distribution of IQs, these cases would represent a very important category that would include 13.5% of the normal population. There are few reports on this condition, however, and very little attention has been paid to this population: the category occupies just 7 lines in the DSM-5; and the diagnosis is relatively infrequent (Karande, Kanchan, & Kulkarni, 2008). This is because these cases are frequently associated with a diagnosis of either ID or SLD, without any clear and detailed criteria for establishing which diagnosis is the more appropriate.

The aim of the present study was to examine these issues by taking advantage of a large number of WISC-IV ratings that we collected in groups of children with a clinical diagnosis of SLD or ID. We aimed: to confirm that children with SLD had a clear discrepancy between their GAI and CPI scores that was not found in cases of ID; and to investigate the implications for "borderline" cases, i.e. children with a diagnosis of SLD and borderline IQs.

## 2. Method

### 2.1. Participants

Under the sponsorship of the Italian Association for Learning Disabilities (AIRIPA), we invited a group of experts to provide data obtained by administering the WISC-IV to children with a certified clinical diagnosis of learning disorder or intellectual disability, based on the ICD-10 International Coding System. We thus collected information on 267 children and adolescents between 6 and 16 years of age, with a WISC-IV assessment on the 10 principal subtests, 190 with a clinical diagnosis of specific learning disorder (SLD) ($M_{age}$ = 10.74 [SD = 2.47]; females = 61),[1] and 77 with a clinical diagnosis of intellectual disability (ID) ($M_{age}$ = 10.29 [SD = 2.61]; females = 38). Using the SLD group classification (the ICD-10), there were: 39 children with F81.0 (specific reading disorder), 12 children with F81.1 (specific spelling disorder), 9 children with F81.2 (specific disorder of arithmetical skills), 86 children with F81.3 (mixed disorder of scholastic skills), 8 children with F81.8 (other developmental disorders of scholastic skills), 4 children with F81.9 (developmental disorder of scholastic skills, unspecified) and 32 children with two or more of the previous diagnoses within the F81 category: 14 had a diagnosis of F81.0 and F81.1; 4 had a diagnosis of F81.0, F81.1, and F81.2; 2 children had a diagnosis of F81.0 and F81.2; 5 children had a diagnosis of F81.0 and F81.8; 3 children had a diagnosis of F81.0, F81.8, and F81.2; and 4 children had a diagnosis of F81.2 and F81.8.

[1] A child with a diagnosis of SLD and an IQ of 63 was excluded from the analysis.