Intelligence 52 (2015) 36–43

Contents lists available at ScienceDirect

Intelligence

The structure of intelligence in children with specific learning disabilities is different as compared to typically development children

David Giofrè *, Cesare Cornoldi

Department of General Psychology, University of Padua, Italy

ARTICLE INFO

Article history:
Received 29 April 2015
Received in revised form 22 June 2015
Accepted 18 July 2015
Available online 25 July 2015

Keywords:
Specific learning disorder
WISC-IV
General Ability Index
Full-Scale Intelligence Quotient
Cognitive profile of children with a SLD
Theories of intelligence

ABSTRACT

Children with specific learning disabilities (SLDs) are characterized by a poor academic achievement despite an average intelligence. They are therefore typically assessed not only with achievement tests, but also with intelligence tests, usually the Wechsler Intelligence Scale for Children (WISC). The assumption of a discrepancy between IQ and achievement in children with SLD has been questioned, however, and the implications of using different measures in batteries of intellectual subtests have not been thoroughly investigated. The present study examined these issues, taking advantage of a large database of scores obtained in the ten core subtests of the WISC-IV by a group of 910 Italian children with a clinical diagnosis of SLD, who were compared with the children considered for national standardization purposes. Our results support the doubts raised concerning the IQ-achievement discrepancy model, showing that relevant discrepancies can emerge even within the WISC profile. The four main WISC-IV indexes were found differently related to intelligence (measured by means of the *g*-factor) and the *g* content of many subtests differed in children with SLD vis-à-vis typically-developing children. These results have important implications both theoretical, indicating that the *g*-factor is weakly identified in children with SLD children, and practical, indicating that the QI obtained with the WISC-IV may not be a good measure of intellectual functioning for children with SLD, which are discussed.

© 2015 Elsevier Inc. All rights reserved.

Intelligence is one of the most important and most often assessed constructs in psychology (Gottfredson, 1997a). It has been demonstrated, for instance, that intelligence tests such as the WISC, the WAIS and the Raven progressive matrices are among the psychological tests most commonly used in Europe, taking first, second and fourth places, respectively (Evers et al., 2012). This may be due to the importance of intelligence, which is also confirmed by the fact that intelligence can predict important academic and occupational outcomes, and performance in everyday life (e.g., Deary, Strand, Smith, & Fernandes, 2007; Gottfredson, 1997b; Schmidt & Hunter, 2004).

The WISC, and particularly the WISC-IV (Wechsler, 2003), which is the latest version to become available in many countries, is one of most often used psychological tests. The popularity of the WISC-IV is probably due to the fact that it is relatively quick to administer and it measures important cognitive factors of relevance to the assessment of both typical populations and clinical groups (Prifitera, Saklofske, & Weiss, 2008). The WISC-IV, as presented in the test manuals, is structured around four factors, considered among the main basic factors underlying intelligence: i) the verbal comprehension index, which measures verbal abilities such as comprehension and verbal reasoning; ii) the perceptual reasoning index, which measures abilities such as abstract problem solving and the non-verbal manipulation of materials; iii) the working memory index, which measures the capacity of retaining and manipulating verbal material for a short period of time; and iv) the processing speed index, which measures the ability to respond promptly and focus attention on a task. These four factors have been amply studied and are supported both statistically and clinically (Wechsler, 2004).

Alternative factorial structures of the WISC-IV have also been proposed, however, drawing from different theories of intelligence. In the light of the CHC (Cattell, Horn and Carroll) theory of intelligence, for example, it has been argued that a five-factor structure is plausible in the WISC-IV (Keith, Fine, Taub, Reynolds, & Kranzler, 2006), which would include the four factors of the classical WISC-IV, but also distinguish between a fluid and a visual factor. This five-factor structure has been questioned for at least two reasons: i) the model fit is not very different from that of the classical structure, implying that the five-factor structure is not necessarily superior; and ii) the model has a perfect loading of the fluid reasoning factor on the general factor (*g*), which makes one of the two factors redundant (see Styck & Watkins, 2014). In addition, only the ten core subtests are administered in many settings (including the clinical one), as this is what is typically prescribed to estimate a child's full-scale intelligence quotient (FSIQ), and only having data available on ten subtests makes it impossible to refer to the five-factor structure of the WISC-IV. Discussions on these issues have been further complicated by the hypothesis that the structure of intelligence may

* Corresponding author at: Department of General Psychology, University of Padova, Via Venezia 8, 35131 Padova, Italy.
E-mail address: david.giofre@gmail.com (D. Giofrè).

http://dx.doi.org/10.1016/j.intell.2015.07.002
0160-2896/© 2015 Elsevier Inc. All rights reserved.

differ in children with an atypical development, e.g., in children with specific learning disabilities (SLDs) (see for a discussion Styck & Watkins, 2014).

The debate concerning the structure of intelligence and its assessment with the WISC scale has strong implications for children with SLD, who are characterized by impairments in academic domains (e.g., reading or math), despite a good or normal IQ. In fact, IQ has traditionally been assessed in children with SLD in order to identify this discrepancy between intelligence and academic achievement (Fuchs & Fuchs, 2006). This approach has also been preserved in recent research not founded on the concept of discrepancy with a view to ruling out any intellectual disability that might explain SLD children's weaknesses in the academic domain (DSM-5; American Psychiatric Association, 2013).

In many countries, the WISC is the most popular test for assessing intelligence in children, especially in cases of SLD. The test, and the WISC-IV version in particular, not only affords a measure of general IQ, but also enables us to investigate different aspects of the performance of children with SLD. To give an example, recent studies using the ten core subtests and the classical four-factor structure found the performance of children with SLD strongly impaired in the Working Memory and, to a lesser extent, in the Processing Speed, but not in the Perceptual Reasoning or Verbal Comprehension indexes (Cornoldi, Giofrè, Orsini, & Pezzuti, 2014; De Clercq-Quaegebeur et al., 2010; Poletti, 2014). Such evidence suggests that the intelligence of children with SLD may be organized differently from that of typically-developing children, especially as regards the role of working memory (WM) and processing speed (PS).

Working memory and intelligence (as measured by the *g*-factor) are very closely correlated in typically-developing children, although they are separate constructs (Cornoldi & Giofrè, 2014; Cornoldi, Orsini, Cianci, Giofrè, & Pezzuti, 2013; Demetriou et al., 2014; Giofrè, Mammarella, & Cornoldi, 2013). The fact that children with SLD may be of normal intelligence but impaired in their WM thus raises problems particularly for theories based on the assumption that WM and *g* are hardly distinguishable and almost isomorphic (e.g., Martínez et al., 2011). The fact that PS seems to be impaired in children with SLD also contrasts with some theories of intelligence that hypothesize a fundamental role for processing speed in explaining intelligence, based on a large body of literature showing a relationship between intelligence and processing speed (for a review see Jensen, 2006) — though it has also been claimed that this relationship is not very strong (Hunt, 1980, 2011). In fact, the *g*-content of many processing speed tasks is relatively small, making it very hard to claim that differences in processing speed equate to differences in intelligence level.

Differences in WM, and especially in the processing speed, between normal and SLD groups therefore do not necessarily imply differences in the *g*-factor, and including them in a measure of intelligence can pose problems. In addition, impairments in cognitive processing abilities (which include both WM and processing speed) are often indicated as the core deficits in children with SLD (see Johnson, Humphrey, Mellard, Woods, & Swanson, 2010), so impairments in processing speed may share a common cause with impairments in WM, and be unrelated to differences in intelligence.

Finally, although research provides only weak evidence of a deficit in the domain measured by the Verbal Comprehension Index in children with SLD, it is noteworthy that these children often have difficulties in the verbal domain. For example, many children with SLD had previously been diagnosed with an early language problem (American Psychiatric Association, 2013), and they may reveal verbal impairments in tasks associated with intellectual functioning. They often have trouble not only with word recognition and spelling, but also in reading comprehension (e.g., Swanson & Ashbaker, 2000). Hence it can also hypothesized that weaknesses in the Verbal Comprehension Index do not necessarily coincide with weaknesses in *g* (and therefore in intelligence).

To sum up, using a classical intelligence test like the WISC and assuming the generalizability of the theories of intelligence underlying such test may prove problematic in the case of children with SLD, and the matter warrants more in-depth investigation. In the present study we examined these issues by taking advantage of the availability of WISC-IV measures obtained for a large sample of children with SLD.

The first aim of the present study was to test whether children with SLD are impaired in the WISC-IV, and in which particular tasks/factors. In a first set of analyses, we expected to find that children with a diagnosis of SLD have specific deficits in some intellectual measures. In particular, we tried to confirm previous findings of moderate-to-severe impairments of children with SLD in both the Working Memory and the Processing Speed indexes, but not in the Verbal Comprehension or in the Processing Speed indexes (Cornoldi et al., 2014; Poletti, 2014). We therefore expected only small differences between the SLD and controls in the General Ability Index (GAI; Prifitera et al., 2008), which combines the Verbal Comprehension and the Perceptual Reasoning indexes, but moderate or large differences in the Cognitive Proficiency Index (CPI; Saklofske, Coalson, Raiford, & Weiss, 2010), which combines the Working Memory and the Processing Speed indexes.

A second aim of the present study was to identify the best-fitting model of intelligence for children with SLD. As different models are theoretically plausible, we tested in our sample different solutions based on the WISC-IV looking for further evidence that the classical four-factor structure is tenable in children with SLD, contrasting it with alternative factor structures, that have also been associated to WISC, but derive from classical theories of intelligence, either based on a single factor (Spearman, 1904; see also Jensen, 1998) or on a verbal/spatial distinction (Vernon, 1950; see also Johnson & Bouchard, 2005). Having established the most appropriate solution, we tested whether any of the tasks revealed cross-loadings on multiple factors due to the specific characteristics of children with SLD.

A third aim, connected to the first two, was to test whether the structure of intelligence derived from the WISC-IV is "equivalent" for typically-developing children and those with SLD. In fact, based on previous evidence on SLD and on the hypothesis that the four-factor structure was tenable in our sample, we assumed however that the relationship on the latent level between the four factors of the WISC-IV might differ between a group with SLD and a group of typically-developing children. In particular we hypothesized that the direct link between *g* and some of the first-order factors should be lower in SLD than in typically developing children, and that the indirect effect of *g* on the manifest variable (i.e., for the corresponding subtests) was lower in the SLD group than in the typically-developing children.

In fact, the relationship between the *g*-factor and the other factors of the WISC-IV might, in the case of SLD, be weaker in two domains (i.e., working memory, processing speed) and maybe also in a third domain (verbal comprehension), in which case the *g*-loading of the tasks used to measure these factors should also be lower in the SLD than in the typically-developing group. If so, differences emerging in tasks in the working memory, processing speed and verbal comprehension domains would reflect differences not necessarily in *g*, but in underlying factors. Finally, we also examined whether, due to the presence of specific deficits in the case of SLD, loadings of the tasks on their respective factors were the same, and whether the correlation between the first-order factors (i.e., the perceptual reasoning, verbal comprehension, working memory and processing speed) was weaker in the SLD than in the typically-developing group.

1. Method

1.1. Participants

Under the auspices 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. A preliminary analysis was conducted when the

Download English Version:

https://daneshyari.com/en/article/929014

Download Persian Version:

https://daneshyari.com/article/929014

Daneshyari.com