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The intellectual profile of children with autism spectrum disorders may be underestimated: A comparison between two different batteries in an Italian sample

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Abstract

Intelligence measures are typically used in the assessment of children with autism spectrum disorders (ASD), but there is a paucity of research on the implications of such testing. In the present study, we examined children with ASD using two of the most largely adopted instruments, i.e., the WISC-IV, arguably the most utilized scale in the world; and the Leiter-3, a nonverbal scale that also excludes, from the IQ calculation, working memory and processing speed, which are points of weakness in ASD. Results showed that IQ and indices of these two batteries are strongly correlated. However, the WISC-IV IQ underestimates the potential of children with ASD, particularly in children with a low functioning profile. These hold true for both the full scale IQ and three out of four indices of the WISC-IV, with remarkable implications for both assessment and treatment of these children. Practitioners working with children with ASD should be aware that the battery that they are using might severely affect the estimation of these children's potential.

Keywords: Autism spectrum disorder, ASD; intelligence; WISC-IV; Leiter-3; children; cognitive abilities; children.

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Autism spectrum disorder (hereafter ASD) is a neurodevelopmental disorder, which encompasses a heterogeneous range of deficits in social relations and language impairment, and is associated with restricted and repetitive patterns of behavior, interest and activities (Davies et al., 1994; Dawson et al., 1998). The assessment of the intellectual profile in children with ASD is of crucial importance: For example, the DSM-5 requires specifying whether ASD is associated with an intellectual disability (APA, 2013). In this respect, research has shown that intellectual impairments are often associated with ASD (e.g., Fombonne, 2012). However, the prevalence of intellectual impairments in individuals with ASD is still not clear and it varies considerably across different studies (Baird et al. 2006; Fombonne, 2012; Wignyosumarto et al. 1992; Williams et al., 2008). One possible reason for this heterogeneity is that different tests are used for assessing intelligence in these children (Nader et al., 2016).

Several batteries are employed to assess the intellectual profile of children, including children with ASD, but the most prominent one is the WISC-IV (Evers et al., 2012). For example, in Italy, virtually all children with a diagnosis of ASD are assessed with the WISC-IV or with previous versions of the same test. This is because the test is already available and well-known to most clinicians working with neurodevelopmental disorders (Cornoldi & Giofrè, 2014). One other explanation for the popularity of WISC-IV is that several indices are available, including Verbal Comprehension Index (VCI), Perceptual Reasoning Index (PRI), Working Memory Index (WMI), Processing Speed Index (PSI) and the Full Scale IQ (FSIQ), which allow the evaluation of children's individual profiles (Wechsler, 2004). The ability to compare different cognitive abilities might be crucial, particularly for certain neurodevelopmental disorders including ASD, which has been consistently associated with an uneven intellectual profile characterized by higher PRI, lower VCI and considerably impaired WMI and PSI (Mayes & Calhoun, 2008; Nader et al., 2016; Oliveras-Rentas et al., 2012). Such a finding is important and coherent with the observation that children with ASD tend to present impairments in verbal tasks compared to the nonverbal ones (Cardillo, Menazza, & Mammarella, 2018; Hamilton et al., 2018; Lincoln et al., 1988; Mammarella et al., 2014; Nader et al., 2016; Rivard et al., 2015).

The literature has shown, however, that the uneven profile characterized by higher PRI and lower VCI has not been consistent. For example, Nowell and co/authors, assessing a very large number of participants with ASD with the Differential Ability Scale-II (DAS-II), found that participants with ASD have higher rates of uneven profiles overall, but that their verbal reasoning is not necessarily lower than their visual or spatial reasoning (Nowell et al., 2005). It should be noted that Nowell and colleagues had more than 2100 participants in their sample, and it seems possible that the earlier studies suffered from the presence of small sample sizes. However, inconsistencies between the Nowell study and previous reports may be due to the specific scales used and further research is needed to clarify this issue.

The presence of discrepancies between WISC verbal and nonverbal indices has led some researchers to argue that the WISC-IV might actually underestimate the real potential of these children. Nader and collaborators (2016), for example, found that participants with ASD displayed higher nonverbal IQs, compared to the FSIQ. This result was recently confirmed by using the WISC-IV and Raven Matrices, with results showing that the estimation of the IQ is considerably higher using Raven Matrices (Bodner et al., 2014; Courchesne et al., 2015; Nader et al., 2016). However, one possible problem with measuring IQ with a single test (e.g., Raven), is that single tests are not appropriate measures of the general intelligence and tend to produce an unreliable estimation of intelligence (e.g., Gignac, 2015). In fact, the DSM-5 recommends measuring the IQ via psychometrically valid and *comprehensive* tests (APA, 2013). For this reason, further research using a comprehensive nonverbal battery is needed.

The present study examined children with ASD using the WISC-IV and a completely nonverbal battery. In fact, using two or more different batteries, which is supported by the cross-battery approach, allows one to take reliable and comprehensive estimates of the profile of strengths and weaknesses of a particular child (Flanagan et al., 2013). For the WISC-IV, we evaluated the FSIQ as well as the main indices. For the nonverbal assessment, we used the Leiter-3, comprised of three nonverbal indices, i.e., nonverbal IQ, nonverbal WM, and nonverbal PS (Cornoldi, Giofrè, & Belacchi, 2016). Leiter-3 indices are similar to the factors included in the WISC-IV, but the main difference is that in the Leiter-3 the three indices are not combined together, i.e., the nonverbal WM and PS are not used for calculation of the nonverbal IQ (Roid et al., 2013).

The Leiter-3 seems particularly appropriate for assessing intelligence in children with ASD (Brenner et al., 2017; Dinalankara et al., 2017; Horowitz et al., 2017; Kasari et al., 2013, Tager-Flusberg et al., 2017; Williams et al., 2017). We predicted that results of this assessment should reveal the presence of an uneven profile with intact or higher than normal PRI, averaged VCI, and struggles on WMI and on PSI indices (Oliveras-Rentas et al., 2012; Mayes & Calhoun, 2008). However, due to the typical language difficulties presented by children with ASD, performance on the PRI of the WISC-IV and on the Leiter-3 would be better.

In the present study, we also aimed to distinguish between children with higher and lower cognitive abilities. Following previous suggestions (e.g., Sanders, 2009), and common standards (Bergeron, Floyd, & Shands, 2008) we considered children with IQs of 70 or greater to have higher cognitive abilities (HCA), and children with IQs lower than 70 to have lower cognitive abilities (LCA). Early evidence using previous versions of the Wechsler scale (i.e., the WISC-III) indicated that children with HCA and LCA present with important differences in the strengths and weaknesses of their cognitive profile (Mayes & Calhoun, 2003). Furthermore, Bodner and collaborators (2014) suggested that underestimation of the IQ using the Wechsler scales may be more present in individuals with a lower cognitive development than in individuals at successive phases of their cognitive development, as represented by adult intelligence. The comparison between previous forms of the Leiter and the WISC carried out in the past, with result showing that Leiter IQ and the mean WISC-R performance scale IQ, were closely related and not statistically different (Shah & Holmes, 1985).

The present study, therefore, had two main goals: i) to evaluate the cognitive profile of children with ASD using two alternative batteries (i.e., WISC-IV and Leiter-3); and ii) to investigate the cognitive profile of children with ASD of HCA or LCA.

Method

Participants

Fifty participants with ASD were included in this study: 9 females and 41 males (age range in years: 6 - 16; Mean age in months = 154.9; SD = 35.5). Participants were from two specialized centers for children with autism in the northeast of Italy (Centro Diagnosi Cura e Ricerca Autismo, ULSS 9 of Verona and Center for Developmental Age and Autism, Polo Blu of Padova). ASD diagnoses were assigned by a clinical examination performed by an experienced psychiatrist or clinical child psychologist. Diagnosis was further informed by historical information and observation over time.

Batteries

Wechsler Intelligence Scale for Children—Fourth Edition (WISC-IV). The Italian adaptation of the WISC-IV (Orsini, Pezzuti, & Picone, 2012) with the four main indices, i.e., Verbal Comprehension Index (VCI), Perceptual Reasoning Index (PRI), Working Memory Index (WMI), and Processing Speed Index (PSI); and the Full Scale Intelligence Quotient (FSIQ) was used. The Italian adaptation was standardized on 2,200 children representative of the Italian population. The WISC-IV included the 10 principal subtests presented in the following order: Block Design (BD), requiring participants to recombine blocks to obtain a particular shape; Similarities (SI), requiring participants to find what two elements (e.g. water and milk) have in common; Digit Span (DS), involving immediate recall of a series of digits either in forward or backward order; Picture Concepts (PCn), requiring participants to find for each of two or three lines of objects, one object sharing a property with objects of the other lines; Coding (CD), requiring participants to associate as quickly as possible elements to patterns; Vocabulary (VC), requiring participants to name or define concepts; Letter-Number Sequencing (LN), involving working memory of reordered letters and numbers; Matrix Reasoning (MR), requiring participants to find the element correctly completing a matrix of pictorial elements; Comprehension (CO), requiring participants to explain the reasons of social everyday rules; and Symbol Search (SS) involving the rapid comparison of sequences. The Full-Scale IQ (FSIQ) is obtained from the ten subtests. Factor indexes are: the Perceptual Reasoning Index (PRI), which includes BD, PCn, and MR; the Verbal Comprehension Index (VCI), including SI, VC, and CO; the Working Memory Index (WMI), including DS and LN; and the Processing Speed Index (PSI), including CD and SS. Additional information on the subtests, main factor indexes and additional indexes are available elsewhere (Flanagan & Kaufman, 2004; Wechsler, 2004).

Leiter International Performance Scale, Third Edition (Leiter-3). The Italian adaptation of the Leiter-3 was used (Cornoldi, Giofrè, & Belacchi, 2016), with the composite Leiter-3 IQ score calculated from four subtests administered in the following order: Figure Ground, requiring participants to find a shape embedded in a complex figure; Form Completion, requiring participants to find the form resulting from the combination of elements; Classifications and Analogies, requiring participants to classify forms and to reason on object matrices; and Sequential Order, requiring participants to discover the rule governing a series of forms and add other elements coherently. We also obtained the two additional nonverbal indices referred to as nonverbal Working Memory Index (WMI), measured by two subtests (i.e., Forward and Backward Nonverbal Memory of object figures); and nonverbal Processing Speed Index (PSI), measured by two visual subtests (Attention Sustained and Nonverbal Stroop). The Leiter-3 test is completely nonverbal and even the instructions are delivered in a nonverbal modality. More detailed information on the subtests, main factor indexes and additional indexes are available elsewhere (Roid & Koch, 2017).

Procedure

Children were tested individually in four different individual sessions at the two centers where they had received the diagnosis: two sessions for each test. All children were tested by experienced psychiatrists or clinical child psychologists.

Results

Descriptive statistics of the scores obtained by the participants at WISC-IV and Leiter-3 and correlations between scores are presented in Tables 1 and 2. Notably, Leiter-3 indices were higher compared to WISC-IV indices. In particular, the mean difference between the two full scale IQs, obtained respectively with WISC-IV and Leiter-3, was large in terms of the effect size (17.8 points) and was statistically significant, $F(1, 49) = 89.16$, $p <$

.001, $\eta^2_p = .645$, while the difference between the WISC-IV's PRI and the Leiter's IQ was small and not statistically significant, $F(1, 49) = 2.36$, $p = .131$, $\eta^2_p = .046$.

To control for multiple comparisons, we carried out an omnibus analysis, on all the comparable indexes of the two tests, considering the overall group (n = 50), using a 2 battery [WISC-IV and Leiter-3] × 3 index [PRI, WMI, and PSI] ANOVA. The interaction between battery and index, $F(2, 98) = 6.92$, $p = .002$, $\eta^2_p = .124$, the effect of batteries, $F(1, 98) = 30.78$, $p < .001$, $\eta^2_p = .386$, and the effect of index, $F(1, 98) = 10.36$, $p < .001$, $\eta^2_p = .176$, were significant. Post-hoc analysis, using Bonferroni, on the interaction confirmed that the difference on the PRI between the two batteries was not statistically significant ($p = .131$), while differences on WMI and PSI were significant ($p < .001$). As for differences within each battery, differences between indexes were not statistically significant using the Leiter-3 (ps > .093). In the WISC-IV differences between PRI were statistically significant with both WMI and PSI (ps < .009), while the difference between WMI and PSI was not ($p = .832$).

In fact, as for cognitive efficiency measures, the Working Memory index was significantly lower for the WISC-IV than for the Leiter-3, with a mean difference of 15.7 points and was significant, $F(1, 49) = 19.00$, $p < .001$, $\eta^2_p = .28$; also in the case of the Processing Speed the difference was significant, $F(1, 49) = 22.59$, $p < .001$, $\eta^2_p = .32$.

Moreover, general indices obtained with the two different scales were moderately to highly related. The correlation between the two IQs in the two scales was substantial, indicating that the two variables shared more than the 58% of the variance. Unsurprisingly, the PRI and the IQ of the Leiter-3 shared a higher portion of the variance (i.e., 67%) than the other measures.

Tables 1 and 2 about here

On the basis of the common total IQ cut-off of 70 at the FSIQ, used in many countries, including Italy where, in particular, a WISC-IV FSIQ of 70 is typically used, for determining the eligibility for special consideration and support (Cornoldi, 2007), we divided children into HCA or LCA groups. In the HCA group the WISC-IV FSIQ was ≥ 70, n = 31, $M = 86.29$ (12.90) whereas in the LCA group the WISC-IV FSIQ was < 70, n = 19, $M = 53.16$ (7.92). We then explored the differences between the two groups. We first considered the WISC-IV, whereas the overall level, due to the criterion used for forming the groups, was obviously higher in the HCA than in the LCA group, with the goal of examining whether the pattern of differences was similar or varied according to the specific index. We therefore performed a 2 groups [HCA and LCA] × 4 index [VCI, PRI, WMI and PSI] mixed ANOVA. As for the principal effects, we found an obvious significant main effect of groups, $F(3, 48) = 105.96$, $p < .001$, $\eta^2_p = .688$, but also a main effect of indices, $F(3, 144) = 9.72$, $p < .001$, $\eta^2_p = .168$, confirming what had been already reported. Furthermore the interaction between groups and indices was not statistically significant, $F(3, 144) = 0.49$, $p = .687$, $\eta^2_p = .010$, with a very small effect size.

We also compared the two groups at the Leiter-3 indices and in this case, due to the nature of the test, we could exclude the IQ index and only consider the working memory and processing speed indices. We performed a 2 groups [HCA and LCA] × 2 indices [WMI and PSI] mixed ANOVA. The effect of groups was statistically significant, $F(1, 48) = 10.60$, $p < .001$, $\eta^2_p = .181$, but the interaction between groups and indices, $F(1, 48) = 1.45$, $p = .234$, $\eta^2_p = .029$, and the effect of indices, $F(1, 48) = 0.37$, $p = .545$, $\eta^2_p = .010$, were not statistically significant, with small effect sizes (Figure 1).

We then directly compared results from the two batteries in the two groups. We performed a 2 groups [HCA and LCA] × 2 batteries [WISC-IV and Leiter-3] mixed ANOVA on the IQs. The interaction between groups and batteries, $F(1, 48) = 29.12$, $p < .001$, $\eta^2_p = .378$, the effect of batteries, $F(1, 48) = 163.73$, $p < .001$, $\eta^2_p = .773$, and the effect of groups, $F(1, 48) = 86.73$, $p < .001$, $\eta^2_p = .664$, were statistically significant (Figure 1). We also performed a 2 groups [HCA and LCA] × 2 batteries [WISC-IV and Leiter-3] mixed ANOVA on the two WM indices. The interaction between groups and batteries, $F(1, 48) = 7.54$, $p = .008$, $\eta^2_p = .136$, the effect of batteries, $F(1, 48) = 26.67$, $p < .001$, $\eta^2_p = .357$, and the effect of groups, $F(1, 48) = 32.18$, $p < .001$, $\eta^2_p = .401$, were statistically significant (Figure 1). Finally, we performed a 2 groups [HCA and LCA] × 2 batteries [WISC-IV and Leiter-3] mixed ANOVA on the two cognitive efficiency indices. The interaction between groups and batteries, $F(1, 48) = 8.38$, $p = .006$, $\eta^2_p = .149$, the effect of batteries, $F(1, 48) = 31.85$, $p < .001$, $\eta^2_p = .399$, and the effect of groups, $F(1, 48) = 17.34$, $p < .001$, $\eta^2_p = .265$, were statistically significant (Figure 1). These findings were consistent and showed that children with ASD in the LCA group performed poorly on WISC-IV compared to Leiter-3, with reference to all the collected measures.

Figure 1 about here

We also decided to conduct a discriminant analysis (see Denckla 1996 for an explanation of the statistical approach and Frith & Happé, 1998 and Kenworthy et al., 2005 for implementations in ASD) to further support results obtained using “traditional” analyses. Discriminant scores were calculated by subtracting the scores obtained in the Leiter-3 from the scores obtained in the corresponding scores at the WISC-IV. Considering the overall group, discriminant scores between Leiter-3 and WISC-IV were small and not statistically significant in the PRI, $M_{diff} = 2.20$ with 95% CIs [-0.69, 5.13], while they were larger and statistically significant in the WMI, $M_{diff} = 12.32$ [6.64, 18.00], and PRI, $M_{diff} = 9.06$ [5.23, 12.89]. When considering the two groups in isolation, in the group with higher cognitive abilities discriminant indexes were small and not statistically significant in the PRI, $M_{diff} = -$

1.19 [-4.56, 2.18], the WMI, M_{diff} = 6.61 [-1.27, 14.50], and in the PSI, M_{diff} = -5.03 [-0.03, 10.09]. The complete opposite pattern was found in the group with lower cognitive abilities in which differences were statistically significant, although moderate in terms of magnitude, in the PRI, M_{diff} = 7.79 [3.30, 12.38], and extremely large and significant in the WMI, M_{diff} = 21.63 [15.35, 27.91], and in the PSI, M_{diff} = 15.63 [10.72, 20.55].

Discussion

The present study had two important aims: i) evaluating the cognitive profile of children with ASD using WISC-IV and Leiter-3; and ii) comparing the profile of children with ASD and with higher and lower cognitive abilities.

Our findings confirm that the two batteries were highly correlated. Unsurprisingly, the two IQs provided by the two batteries were strongly related, while factors belonging to the same battery were moderately related, but absolute scores produced by the two batteries were substantially different, meaning that children with ASD scored higher when tested with the Leiter-3 compared to the WISC-IV. It is worth noting that the verbal index of the WISC-IV (i.e., VCI) had weak to moderate correlations with other indices, which might indicate that – compared to typically developing children – this index is a poor predictor of cognitive functioning in these children (see Giofrè et al., 2017 on this point). This confirms that the two batteries, although highly related, could produce different estimates of the intellectual performance of children with ASD. For this reason, practitioners and researchers working in this area should be aware of this caveat when evaluating the cognitive functions of participants with ASD.

Children included in this paper were from a different cultural background compared to previous studies. However, the cognitive profile at the WISC-IV, was similar to those obtained in previous studies, i.e., PRI greater than the other indices (Mayes & Calhoun, 2008; Nader et al., 2016; Oliveras-Rentas et al., 2016). Intriguingly, the Leiter-3 indices and the PRI were generally higher than other WISC-IV indices. This finding is consistent with the observation that the FSIQ obtained from the WISC-IV tends to be very different from other tools that are nonverbally mediated (see Nader et al., 2016). This finding is also consistent with evidence on children with other developmental disorders (i.e., children with specific learning disabilities), suggesting that the FSIQ obtained the WISC-IV might be biased in children with atypical development (Giofrè et al., 2017).

Results from the comparison between children with HCA and LCA offered important information. Despite the great similarities found in the two groups, our results indicate that differences between the two batteries were more pronounced in children with a lower intellectual profile. This is particularly relevant because the selection of the battery in children with ASD and LCA might be of paramount importance for estimating their cognitive performance. This finding is particularly new and has very important clinical implications for the assessment and the treatment of children with LCA. The result might be attributed to the verbal nature of many of the tasks included in the WISC-IV. This might also be due to the fact that traditional batteries, such as the WISC-IV, are explicitly developed to test the entire continuum (e.g., IQs from 40 to 160), but struggle with extremely high and low performances (Orsini et al., 2015; Roid et al., 2013; Toffalini et al., 2019). In fact, with the WISC-IV it is very hard to measure low levels of ability (Orsini et al., 2015).

The distinction of the participants in two groups was performed by using a cut-off point of 70 using the WISC IV`s IQ. Importantly, the LCA group had an IQ of approximately 81 when using the Leiter-3, and 53 when the WISC-IV was used. This is particularly relevant from a clinical point of view, and might have important implications for the identification of intellectual disabilities. In the DSM-5, however, a cognitive scores of 70 ± 5 point is not sufficient and emphasis is given to the use of adaptive behavior assessments (e.g., Vineland Adaptive Behavior Scales, Adaptive Behavior Assessment System, etc.) to demonstrate functional impairments consistent with a diagnosis of intellectual disability. For this reason, intelligence scales should not be used in isolation and the assessment should be as comprehensive as possible.

Profile analysis is often successfully used in clinical and neurodevelopmental settings (Hale et al., 2007; Pfeiffer et al., 2000; Toffalini, Giofrè, & Cornoldi, 2017a). Also, the ASD profile may closely resemble the profile of children with other neurodevelopmental disorders including specific learning disabilities or ADHD (Cornoldi et al., 2014; Giofrè et al., 2015, 2017; Toffalini et al., 2017a). Hence, we believe that the consideration of the cognitive profile is useful for the assessment and for designing intervention, but this should not be used in isolation and a comprehensive assessment, including a variety of tools (including measures of nonverbal ability, measures of expressive and receptive language, adaptive functioning, academic achievement, and functional communication), is of fundamental importance (Toffalini et al., 2017b).

This paper has some limitations. For a start, we did not measure the adaptive behavior of these children. Indeed, recent evidence seems to indicate that some indices of the WISC-IV have an important predicting role on adaptive functioning measured in children with HCA (Oliveras-Rentas et al., 2012). Similarly, it would also be important to include measures of achievement in these children (Mayes & Calhoun, 2008). Also, although not available in many countries (e.g., Italy), the WISC-V was recently introduced. This new battery presents a significant improvement, which includes, for example, a robust Nonverbal Index and easier basal items for younger and lower ability children. It would be interesting to replicate these findings also using this new version of the scale. Finally, the inclusion of a third intelligence battery would have offered more complete information on the intellectual profile of our participants and would have made possible a group cognitive ability differentiation with an independent measure not included in the analysis. For all these reasons, a comprehensive assessment of the intellectual profile of children with ASD and with HCA or LCA status is warranted. Furthermore, it could be argued that Leiter-3 may generally overestimate intelligence. However, the IQ of the participants of this study, both at the WISC-IV and at the Leiter-3, was defined based on the normative values derived from two standardization samples with good psychometric properties. In this respect, it is also noteworthy that recent evidence, collected with Italian children with ASD, seems to indicate that the Leiter-3 is not overestimating the IQ of these children (Belacchi, Ferrandes, Toffalini, & Cornoldi, 2018). Finally, the sample size in the present study was not extremely large, and it would be important to support these findings using a larger sample size.

Despite these limitations, we believe that the present study provides experts and clinicians with important insights into the intellectual functioning of children with autism and with or without intellectual impairments, demonstrating that the way in which intelligence is assessed in these children clearly matters and caution is needed in evaluating their real intellectual potential.

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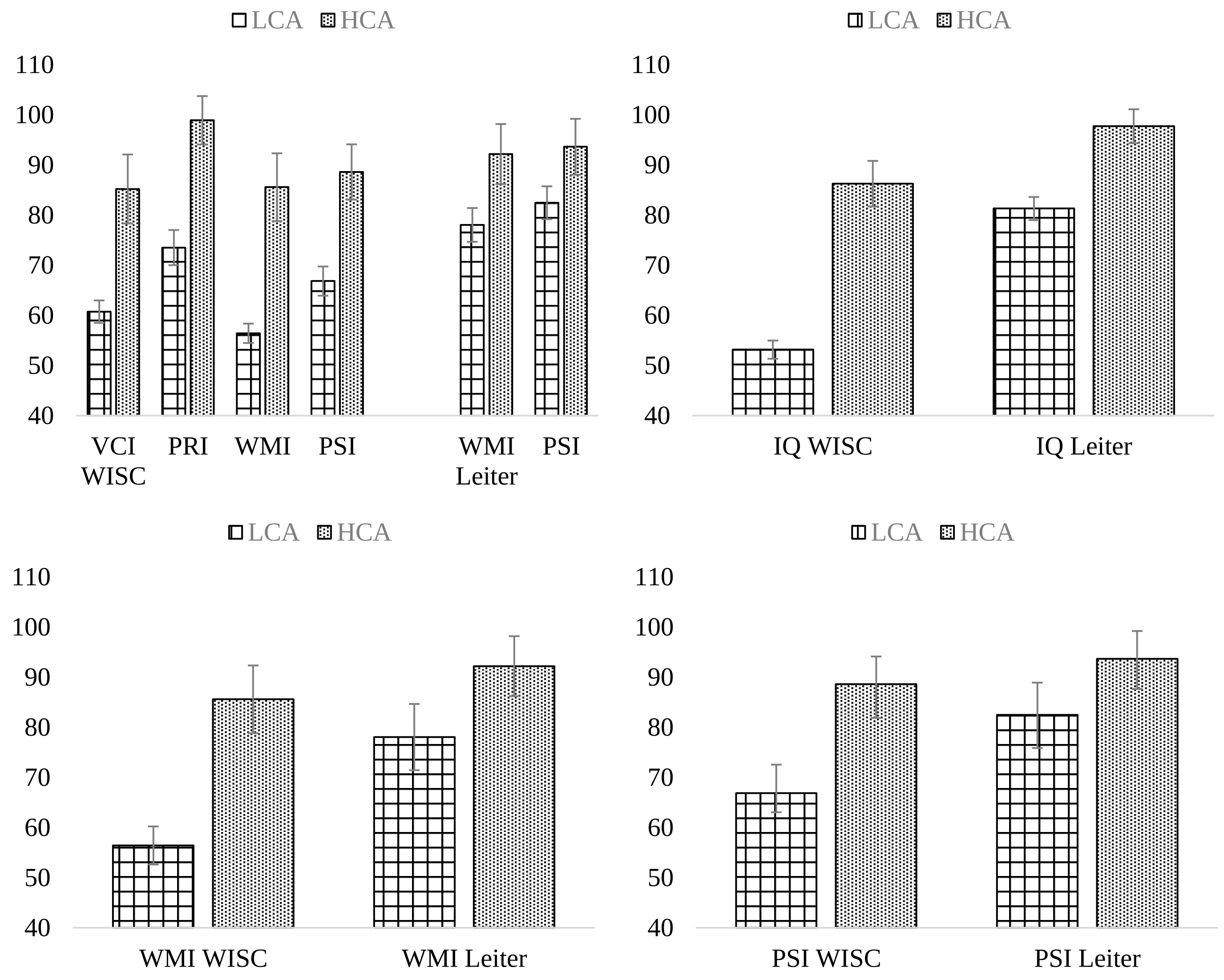
LCA
HCA
110
100
90
80
70
60
50
40
VCI
WISC
PRI
WMI
PSI
WMI
Leiter
PSI
IQ WISC
IQ Leiter
WMI WISC
WMI Leiter
PSI WISC
PSI Leiter

Figure 1. Results of the two groups with high (HCA) and low (LCA) cognitive abilities on the main indices of WISC-IV and Leiter-3 (Top-Left). Results of IQs (Top-Right), WMIs (Bottom-Left) and PSIs (Bottom-Right) at WISC-IV and Leiter-3 in the two groups with HCA and LCA. Error bars represent 95% confidence intervals.

Table 1

Correlations for the overall sample of the present study

	1	2	3	4	5	6	7	8
<u>WISC-IV</u>								
1. FSIQ	1							
2. VCI	.756**	1						
3. PRI	.764**	.359*	1					
4. WMI	.819**	.486**	.517**	1				
5. PSI	.664**	.259	.409**	.547**	1			
<u>Leiter-3</u>								
6. IQ	.745**	.401**	.863**	.512**	.470**	1		
7. WMI	.540**	.188	.492**	.485**	.571**	.549**	1	
8. PSI	.363**	.029	.194	.368**	.692**	.288*	.512**	1

Note.

** $p < .01$,

* $p < .05$

Table 2

Means and standard deviations for the overall, the HCA and LCA.

	Overall Group		HCA		LCA	
	M	SD	M	SD	M	SD
WISC-IV						
1. FSIQ	73.70	19.72	86.29	12.91	53.16	7.92
2. VCI	75.92	20.33	85.23	19.55	60.74	9.78
3. PRI	89.28	18.87	98.94	13.70	73.53	15.28
4. WMI	74.50	21.36	85.58	19.20	56.42	8.45
5. PSI	80.34	17.99	88.61	15.68	66.84	12.70
Leiter-3						
6. IQ	91.50	12.59	97.74	9.62	81.32	10.04
7. WMI	86.82	17.46	92.19	17.02	78.05	14.70
8. PSI	89.40	16.09	93.65	15.83	82.47	14.32