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## BRIEF REPORTS AND SUMMARIES

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### *A Cross-Cultural, Comparative Study of the American, Spanish, and Mexican Versions of the WISC-IV*

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The question regarding the appropriateness of the use of tests of intelligence and cognitive abilities developed in the United States to assess people from other countries was renewed in the debate between Suen and Greenspan (2008) and Sánchez-Escobedo and Hollingworth (2009; Fina, Sánchez-Escobedo, & Hollingworth, in press). This controversy arose from challenges in the translation, adaptation, and norm development of an intelligence test (in this case, the Wechsler Adult Intelligence Scale—Third Edition) for use with the Mexican population. Suen and Greenspan argued against the use of Mexican norms in high-stakes decision cases regarding Mexicans (i.e., the death penalty). Sánchez-Escobedo and Hollingworth claimed that, despite

some error and misgivings in the process of norm development, versions adapted to measure intelligence in other cultural contexts have the potential to provide useful information about the test taker, and they should not be dismissed.

In this current work, we attempt to advance and extend the scrutiny of intelligence tests in bilingual or Spanish-speaking populations by examining differences in three versions of the Wechsler Intelligence Scale for Children—Fourth Edition (WISC-IV): the tests and norms created for use with English-speaking American children, Spanish-speaking children in American schools, and Spanish-speaking children in Mexico. This is an exploration of the challenges and demands for adapting tests beyond mere language translation, and the effects of using norms developed in different cultural contexts to evaluate test takers.

## THE WISC

The WISC was first published by Wechsler in 1949. A revised edition was published in 1974 as the WISC-R. The third edition (WISC-III) was released in 1991. The current version intelligence, the WISC-IV, was published in 2003. The WISC-IV, like its predecessors, will likely be the most widely used children's intellectual ability assessment in the United States (Prifitera, Weiss, Saklofske, & Rolfhus, 2005).

The WISC-IV is the culmination of a 5-year research program in the United States (The Psychological Corporation, 2003). It followed an iterative process, where each phase led to further refinements of the scale. Several pilot studies were administered prior to the National Tryout Stage. Then, all the accumulated evidence from the previous stages was reviewed and the research questions were reexamined. These data were used to further refine a standardization edition of the WISC-IV. The standardization stage included administering the test to a stratified sample of 2,200 children aged 6 through 16 years 11 months. This sample was stratified on key demographic variables: age, sex, race, parent education level, and geographic region. In addition, the proportions of subjects from each racial group—Whites, African Americans, Hispanics, and Asians—were based on the corresponding age groups from the 2000 U.S. census data.

Exclusion criteria for the WISC-IV standardization sample included: if a subject had been tested on any IQ test in the last 6 months; uncorrected visual impairment; uncorrected hearing loss; not fluent in English; primarily nonverbal or uncommunicative; upper extremity disability that would affect motor performance; currently admitted to hospital, mental, or psychiatric facility; and currently taking medication that might depress performance (The Psychological Corporation, 2003).

Children with any of the following previously diagnosed physical conditions or illness were excluded: stroke, epilepsy, brain tumor, traumatic brain injury, brain surgery, encephalitis, and meningitis. However, to accurately represent the children attending school in the United States, a representative proportion (about 5.7%) of children from special group studies were added to the norming sample.

There are 10 core subtests and 4 supplemental subtests in the WISC-IV. The scaled scores for the 10 core tests sum to 4 different indices (the Verbal Comprehension Index, the Perceptual Reasoning Index, the Working Memory Index, and the Processing Speed Index). The WISC-IV also provides a Full Scale IQ (FSIQ), which ranges from 40 to 160 points. The typical administration takes between 65 and 80 minutes for most children.

The WISC-IV reports an enhanced clinical utility for providing assessment of fluid intelligence,<sup>1</sup> working memory, and processing speed (The Psychological Corporation, 2003). Each successive version also claims to be less biased against minorities and females than previous editions, and each purports to make the administration more effective, because test developers have considered input from practitioners and experts in the field. These changes reflect advances in cognitive theory and information processing paradigms, theoretical models of intelligence, test construction, and professional practice (Harris & Llorente, 2005).

There have been many translations and adaptations of the WISC-IV, and norms have been established for several countries and languages.<sup>2</sup> Grégoire et al. (2008) present the challenges related to the culturally sensitive assessment of children in diverse cultures, such as cultural bias, construct bias, method bias, and item bias. These challenges raise issues about construct equivalence in the adapted tests, but cross-national studies examining such concerns in previous versions of the WISC support the notion of equivalence across cultures (see Georgas, Weiss, van de Vijver, & Saklofske, 2003). For example, a 12-country study found similarities in the factor structures of the WISC-III, suggesting the universality of the cognitive processes captured by the WISC-III (Georgas, van de Vijver, Weiss, & Saklofske, 2003). Although a similar study needs to be conducted for the WISC-IV, the findings from this study are relevant, because they are based on similar models of intelligence (Grégoire et al., 2008).

The WISC-IV Spanish is a comprehensive adaptation of the WISC-IV developed for use with Spanish-speaking children learning English as a second language and acculturating to the United States (The Psychology

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<sup>1</sup> Fluid intelligence refers to inductive and deductive reasoning, skills that are thought to be largely influenced by neurological and biological factors.

<sup>2</sup> For example, Spanish (United States, Spain, and Mexico), French (France and Canada), German (Germany, Austria, and Switzerland), English (Canada and United Kingdom), Welsh, Dutch, Japanese, and Chinese, among others.

Corporation, 2005). For the purpose of this discussion, the WISC-IV Spanish will be referred to as the WISC-IV Hispanic, to avoid confusion between the language and the population targeted. The goal of the Hispanic adaptation was to develop an instrument equivalent to the WISC-IV, with items that elicit the same response processes and measure the same construct. It was designed to be representative of Spanish-speaking children of diverse backgrounds living in the United States (The Psychological Corporation, 2005, p. 52). This version was standardized with 851 subjects in a stratified sample of children from various Hispanic origins living in the United States, including Cuba, Puerto Rico, and Central and South America.

Test items were revised to minimize cultural bias across multiple regions of origin. Although the test items are presented in Spanish, children earn credit for answers in either Spanish or English. Results are comparable for all U.S. children the same age. Supplemental tables allow additional interpretations based on comparisons with all Hispanic children or by subgroups of the Hispanic population (e.g., Puerto Rican, Cuban). The WISC-IV Hispanic is appropriate to use when the child is Spanish-language dominant, is in his or her first 5 years in the U.S. education system, or is referred for neuropsychological evaluation for educational diagnosis and services.

The Mexican version of the WISC-IV was published in 2007 (Sánchez-Escobedo, 2007). Like the WISC-IV Hispanic, it is a comprehensive adaptation of the WISC-IV, and both the Hispanic and Mexican editions followed recommendations for translation, adaptation, and best practices put forth by the International Guidelines for Test Use (International Test Commission, 2001) and the Standards for Psychological and Educational Testing (AERA, APA, & NCME, 1999). The standardization sample for norm development consisted of 1,234 Mexican children in 11 age groups. Participants were drawn from 12 of the 32 states in Mexico. Children with obvious physical or intellectual disabilities and whose first language is not Spanish (i.e., Mayan, Nahuatl, etc.) were excluded. The sample was stratified on age, sex, and type of school (private or public).

The Mexican adaptation of the WISC-IV was necessary for several reasons. First, the WISC-IV was not adapted for use in Mexico, so there was not an appropriate version to use in Mexico. Second, when the WISC-R emerged, it was found that, when American norms were used, scores were roughly 15 points below the expected mean for the three main scales (Padilla, Roll, & Gomez, 1982). The consequently adapted version, the WISC-RM (Revised for Mexico), with norms adjusted for Mexican children, was widely used until 2007 (Esquivel, Heredia, & Lucio, 2007). However, practitioners discovered that this test tended to overestimate IQ. Many hypotheses were posited, including the one that suggested the inclusion of many children with learning difficulties in the

original sample or procedures to compensate for the underestimation of IQ with the original WISC-R. Practitioners in Mexico called for a new and properly adapted version of the WISC test and norms specifically developed for Mexico.

In summary, all three versions of the WISC-IV under consideration consist of the same 10 core subtests, plus 4 supplemental subtests. Additionally, all three were designed for use with children between 6 years and 16 years 11 months. In general, they require comparable administration time and all provide Verbal Comprehension, Perceptual Reasoning, Working Memory, Processing Speed, and Full Scale IQ scores. However, there are some substantive differences among the three. Table 1 summarizes major features and differences of the three versions under scrutiny. What follows is an examination of the possible reasons for these inconsistencies.

## DIFFERENCES IN FORMS

The three Record Forms were reviewed and qualitatively compared. The Hispanic form has a section for percentile rank adjustment depending upon parental level of education, U.S. educational experience, or both. On the Mexican version, the table to estimate the mean scores of the subtests was moved to the front page for stylistic purposes and to conserve space. On the Analysis page, the most salient difference is that the Mexican version uses a preestablished statistical significance level of  $p < 0.05$  to estimate discrepancies and to facilitate scoring, because this is the common significance level used for interpretation. In the Mexican standardization process, consulted experts suggested that

**TABLE 1**  
Features of the WISC-IV Under Scrutiny

	WISC-IV version		
	American	Hispanic	Mexican
Sample size	2,200	851	1,234
Simple type	random stratified	conventional stratified	conventional stratified
Administration time	65–80	70–90	60–90
Number of norm	33	33	20 groups
Publication date	2003	2004	2007
Authors	Rolfhus & Zhu	Harris & Williams	Sánchez et al.
Publishers	Harcourt Assessment/ PsychCorp	Harcourt Assessment/ PsychCorp	Manual Moderno
Number of sessions	1 session	1 Session	2 sessions if 14 subtests

the inclusion of these values would encourage screening for strengths and weaknesses. In addition, the Mexican version has slightly larger fonts and figures than the Hispanic and American versions.

The most significant difference among the subtests themselves is the ordering of items in each version based on the Index of Difficulty derived from the standardization data. For example, in *Vocabulary*, the concept of *bicycle* was easier for Americans, ranking 10 on the American form and 12 on the Mexican form, whereas the term *brave* was easier for Mexicans, ranking 10 on the Mexican form and 12 on the American form. The same order of items was found in subtests where the order is irrelevant to the test administration, such as *Digit Span*, *Coding*, *Letter-Number Sequence*, *Symbol Search*, and *Cancellation*.

The second important difference found was the number of items included in some routines. For example, in *Similarities*, the Hispanic version has 24 items, whereas the Mexican and American versions have 23 items. Likewise, in the *Comprehension* section, the American and Mexican versions have 21 items, whereas the Hispanic has 20. This different number of items may be due to ceiling effects (i.e., no participant responded to item 21 on the Hispanic version).

Not surprisingly, differences were found between the Hispanic and Mexican versions in the two verbal tests: *Similarities* and *Vocabulary*. Words like *plátano* (banana) have multiple variants in the Hispanic version (e.g., *banana*, *guineo*) according to the language variation found in Hispanic children from different national origins. In *Similarities*, *pen/pencil*, *rubber/paper*, and *picture/statue* are found in the Mexican version, whereas *candle/light*, *guitar/drum*, and *ball/wheel* are found only in the Hispanic version. In *Vocabulary*, the Mexican version contains words such as *remedar*, *emigrar*, and *disparate* to replace the culturally inappropriate terms from the Hispanic version: words such as *garrulo*, *enmienda*, and *alemador*, which are unusual terms in Mexican Spanish. Likewise, in *Comprehension*, the Hispanic version has concepts such as *doctors*, *newspapers*, and *monopoly*, whereas the Mexican version was edited to read *medics*, *news*, and *owner*. In *Letter-Number Sequence*, the Mexican version provides more practice items.

The Mexican version is completely written in Spanish, including directions to the test administrator. However, the Hispanic version has directions and the names of the subtests written in English. Thus, the test administrators for the Hispanic version need to be bilingual.

Regarding protocols for test administration, the Mexican WISC-IV technical manual recommends that, if the complete battery is to be administered, it should be done in two sessions, with a break of a minimum of 30 minutes, over 24 hours (Sánchez-Escobedo, 2007). This followed from observations made during the standardization process that some Mexican children became tired and distracted during the test

administration. For the majority, it may be due to their lack of experience to testing routines like the WISC-IV.

## NORM COMPARISON

To examine differences in features and possible implications of using one set of norms or another, a fictional raw score profile was created and raw scores were transformed using two hypothetical cases: a 7 and 16 year old. The American version served as the baseline to compare the Hispanic and Mexican versions. Table 2 summarizes the raw scores and the scale scores calculated using norms from each of the three versions of the *WISC-IV* (see Table 3). Figures 1 and 2 reveal similar patterns in the profiles of subtest scores and composite scale scores.

When compared against American norms, both the Hispanic and the Mexican versions tend to underestimate the FSIQ of high-aptitude 7 year olds, whereas they tend to overestimate the performance of low-aptitude 16 year olds. In almost every case, the Mexican norms tend to differ more from the American norms than the Hispanic norms do. It can be observed that the patterns seen in the indexes tend to be similar across the three versions. One substantive difference is the Hispanic norms tend to

**TABLE 2**  
Raw to Scale Score Conversions for 3 Versions of the WISC-IV

Subtest	Raw score	Age 7			Age 16		
		American	Hispanic	Mexican	American	Hispanic	Mexican
Similarities	22	16	14	16	6	5	7
Vocabulary	34	16	16	16	5	5	6
Comprehension	21	14	15	14	5	5	7
Information	16	15	16	15	5	6	6
Block design	34	15	15	16	6	6	7
Picture concepts	14	12	12	12	4	4	6
Matrix reasoning	17	13	13	14	5	5	6
Picture completion	19	11	11	11	3	3	5
Digit span	16	14	16	14	8	10	8
Let-num seq.	15	13	14	12	5	6	6
Arithmetic	17	12	13	13	4	4	6
Coding	32	7	7	6	1	1	2
Symbol search	23	11	11	11	5	5	8
Cancellation	60	11	11	11	3	3	5

*Note.* Let-num seq. = letter-number sequence.

**TABLE 3**  
**Composite Scores for 7 and 16 Year Olds for 3 Versions of the WISC-IV**

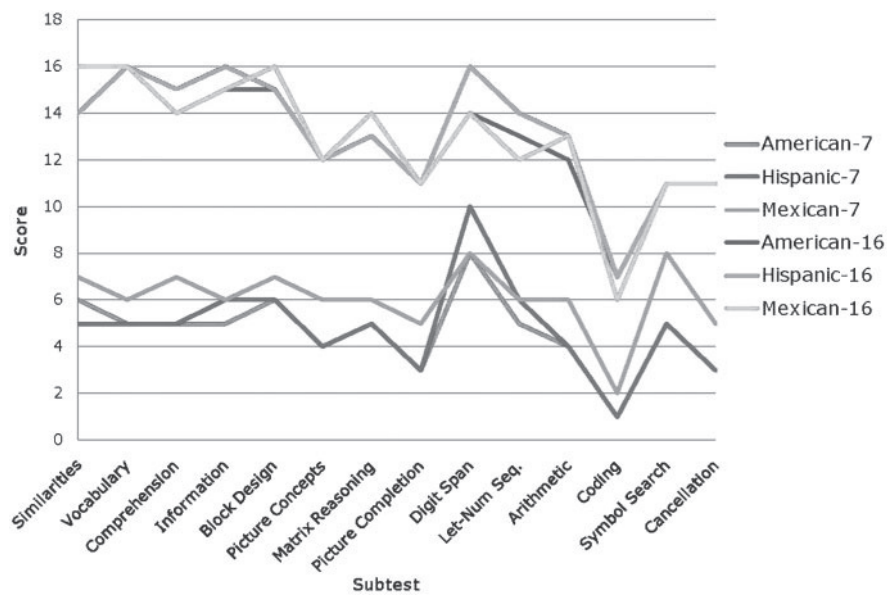
Scale	Age 7			Age 16		
	American	Hispanic	Mexican	American	Hispanic	Mexican
Verbal comprehension	124	130	132	73	71	81
Perceptual reasoning	121	121	125	69	69	77
Working memory	120	129	116	80	88	83
Processing speed	94	94	91	62	62	73
FSIQ	128	125	123	57	66	65

*Note.* FSIQ = full-scale IQ.

overestimate Working Memory when compared with the other two. Likewise, Mexican norms tend to overestimate Perceptual Reasoning and Verbal Comprehension compared to the American norms.

## DISCUSSION

In this section we provide guidelines for making decisions regarding what test to use, how to deal with differences, and what to expect in



**FIGURE 1.** Comparison of the subtest scaled scores from 3 sets of norms. The top 3 lines show the score pattern for a hypothetical 16 year old, and the bottom 3 lines show the score pattern for a hypothetical 7 year old.



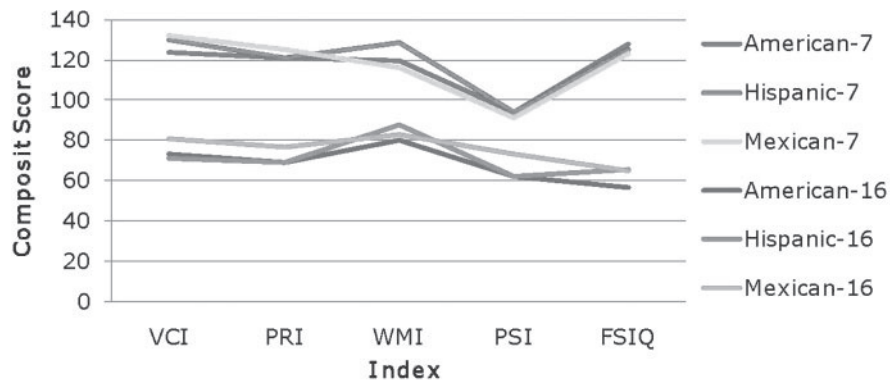


FIGURE 2. Comparison of the composite scores from 3 sets of norms. The top 3 lines represent the pattern for a hypothetical 7 year old, and the bottom 3 lines represent a pattern for a hypothetical 16 year old.

future development of norms and adaptation of psychological test batteries. The American WISC-IV should be used when cultural immersion and English language competency are apparent. English Learners in the United States should be assessed with the Hispanic form, and Mexican children should be assessed with the Mexican form.

During the translation and adaptation of a test, it is important to make sure the test is understandable to the test takers, the directions are easy to comprehend, and the items are ordered on an appropriate scale of difficulty. In general, translation of verbal routines seems to be appropriate, and the differences between the Hispanic and Mexican version language translations are minor. Given that the Mexican children are usually less exposed to large-scale testing than American students, and to reduce possible sources of bias, it is appropriate that the Mexican version provides additional practice exercises prior to some of the subtests (Geisinger, 1994). This reduces the effect familiarity with the item format might have on the score.

Further research is needed to study the effects of using different norms for a given version of the test across all ages. For example, what happens when the American version is interpreted with Hispanic or Mexican norms? In addition, because scores for special populations require the use of American norms, it casts doubt on the accuracy of the scores and the interpretations that can be made. One question to consider in future research is: Would the estimation of an average score derived from the use of the three sets of norms provide a better estimate of intelligence?

It is not surprising to see differences, because the norms were developed for use with different populations. These inconsistencies may in fact be due to meaningful differences in the characteristics of the

population taking the test. For example, to understand how culturally different American and Mexican public schools are from one another, consider this: Of the 87% of Mexican students attending the public educational system, 53% started their formal education in first grade, and 90% of them attend school only part-time. In addition, in Mexico there is a dropout rate of 22% in 7th grade, and only 8% of Mexico's population over 18 years has a bachelor's degree (Santibañez, Vernez, & Razquin, 2005; INEGI, 2009; INEE, 2009).

Different norms are appropriate when the test is administered to qualitatively different populations. In this case, the cultural backgrounds, educational experiences, and testing experiences are vastly different across the three groups. Few Mexican public schools provide services American schools take for granted, such as hot meals and transportation. Furthermore, special education and psychological and counseling support in Mexico are partial and inconsistent, and schools suffer from rotating teachers and scarce resources. Whereas the Mexican government invested an average of U.S. \$1,350 per student, the United States invested an average of U.S. \$11,293 in 2005 (U.S. Department of Education, 2009; INEGI, 2009). These values in and of themselves are reason enough to warrant the use of different adaptations of a test. Hispanic test takers in the United States may have experienced Mexican schooling, but they are in transition into American schools when they take the WISC-IV Hispanic. These students often receive assistance, meals, transportation, English language support, and have undergone previous testing for placement purposes. As Ogbu (1994) asserted, IQ tests are constructed to measure a specific aspect of intelligence and "the cognitive skills tapped by these tests are those that Western cultures emphasize in their formal schooling" (p. 369). It is therefore reasonable to expect that test takers in these three circumstances would perform differently.

## CONCLUSIONS

The WISC-IV has been adapted because of different semantic variations in the target populations. In general, the format variations facilitate administration and scoring. This in turn may decrease the biases and obstacles involved in cross-cultural intelligence testing.

The differences in standardized scores are a result of different sets of norms and are expected. For example, the Mexican norms tend to estimate higher IQ than the Hispanic and American norms for children with relative low competence, whereas Mexican norms tend to underestimate the IQ of high-competence children. Indeed, the long-standing debate about fairness in cross-cultural intelligence testing is revived by the issues described in this comparison of different versions of the same

test. In particular, it is imperative that test administrators select the appropriate edition of both the tests and the norms for the target population, to ensure that scores are interpreted in their cultural context. Teachers should be aware of the limitations and boundaries of intelligence tests and the effects of using a test created in one population but administered in another. They also must consider whether the defined construct is present in the target population and how well it is measured by the adapted test. As Garcia-Coll and Magnuson (1999) assert, “basic psychological and behavioral constructs might not mean in one culture what they mean in another” (p. 10).

Test adaptation and norm development in different cultures seem to be a renewed field of interest in educational psychology. It is apparent that there are various interesting avenues of research that can be undertaken in the future to address the questions raised in this study.

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