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Demographically corrected norms for the Brief Visuospatial Memory Test-revised and Hopkins Verbal Learning Test-revised in monolingual Spanish speakers from the U.S.–Mexico border region

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Abstract

The large number of primary Spanish speakers both in the United States and the world makes it imperative that appropriate neuropsychological assessment instruments be available to serve the needs of these populations. In this article we describe the norming process for Spanish speakers from the U.S.–Mexico border region on the Brief Visuospatial Memory Test-revised and the Hopkins Verbal Learning Test-revised. We computed the rates of impairment that would be obtained by applying the original published norms for these tests to raw scores from the normative sample, and found substantial overestimates compared to expected rates. As expected, these overestimates were most salient at the lowest levels of education, given the under-representation of poorly educated subjects in the original normative samples. Results suggest that demographically corrected norms derived from healthy Spanish-speaking adults with a broad range of education, are less likely to result in diagnostic errors. At minimum, demographic corrections for the tests in question should include the influence of literacy or education, in addition to the traditional adjustments for age. Because the age range of our sample was limited, the norms presented should not be applied to elderly populations.

Keywords: Cross-cultural assessment; Spanish; Hispanic; Learning; Memory; Ethnic differences

1. Introduction

Culturally and linguistically appropriate assessment of cognitive functioning is necessary for the competent delivery of neuropsychological services as well as for the reliability of research results in ethnically diverse populations. Spanish is among the four most commonly spoken languages in the world, with an estimated 350 million primary speakers (Answers.com, 2005), and is the second most spoken language in the United States, where Hispanics constitute 13% of the population. According to the year 2000 U.S. population census, over 28 million people speak Spanish at home, and half of these report speaking English less than very well (US Census Bureau, 2000).

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Despite the large number of primary Spanish speakers both in the U.S. and the world, the availability of neuropsychological assessment instruments validated for use with Spanish-speaking populations remains limited. Driven by the need to assess cognitive functioning in Spanish speakers from the United States–Mexico border region, we undertook a normative study of a large battery of tests with this population. In this article, we focus on the development of norms for Spanish-speakers on two widely used tests of learning and memory: the Brief Visuospatial Memory Test-revised (BVMT-R) (Benedict, 1997) and the Hopkins Verbal Learning Test-revised (HVLT-R) (Brandt & Benedict, 2001).

The BVMT-R requires reproduction of the features and spatial placement of two-dimensional geometric figures. The existing BVMT-R was standardized and normed with 588 healthy English-speaking adults ranging in age from 18 to 79 years ($M = 38.6$, S.D. = 18.0), with a mean education of 13.4 years (S.D. = 1.8). The sample was 64.5% female and predominantly Caucasian (82%), with small proportions of African Americans (14.5%) and other ethnic groups (3.6%). Hierarchical polynomial regression analyses were used to determine the effects of age, gender, and education on test performance. The investigators concluded that education and gender did not influence test results, and as such, the standard *T*-scores generated for the BVMT-R correct only for age. Although the education range was not described, the high mean education value for the normative sample suggests that the range was limited at the low end. As such, the existing norms may overestimate impairment among those with low levels of education.

The original English language HVLT-R normative sample consisted of 1,179 adults (75% women), ranging in age from 15 to 92 years ($M = 59.0$, S.D. = 18.6), and education between 2 and 20 years ($M = 13.4$ years, S.D. = 2.9). Recruitment source and ethnic composition of the sample were not described. Participants were reportedly free of neurologic or psychiatric disorders. Stepwise multiple regressions were used to examine the influence of age, education, and gender on the four primary HVLT-R variables: total recall, delayed recall, percent retained, and the Recognition Discrimination Index. The authors found age to have the largest effect, accounting for 19% of the variance, but no significant contribution of education or gender. Despite the broad education range, the high mean education level for the normative group suggests that higher levels of education were also overrepresented in the normative sample for the HVLT-R.

The general literature concerning demographic effects on neuropsychological test performance shows that results on both verbal and nonverbal cognitive tests are significantly related to demographic factors (Perkins & Deregowski, 1982; Pineda et al., 2000), with literacy and/or level of education playing a prominent role (Ardila, 2000; Byrd, Jacobs, Hilton, Stern, & Manly, 2005; Heaton, Grant, & Matthews, 1991; Manly et al., 1999). Because education is compulsory in the U.S. until age 16, it is difficult to find neurologically normal volunteers for normative studies in this country that represent the lowest levels of education (e.g., less than 9 years). Thus, neuropsychological instruments normed with populations who are traditionally amenable to research (e.g., college students, middle class whites) may not display significant education effects, and therefore may overdiagnose abnormality in persons with low education.

In addition to literacy and educational experience, test performance may be influenced by other factors associated with cultural diversity, such as degree of acculturation (Coffey, Marmol, Schock, & Adams, 2005; Manly et al., 1998; Ostrosky-Solis, Ramirez, & Ardila, 2004; Pontón, 2001), comfort with the testing situation (Ardila, Rodríguez-Menéndez, & Roselli, 2002; Helms, 2005), intellectual richness of the developmental environment, nutrition, etc. Given that lower educational attainment, poorer quality of education, and poorer developmental milieu are more prevalent among the socioeconomically disadvantaged, who in the U.S. are often members of ethnic minorities and persons born elsewhere, existing norms for the BVMT-R, HVLT-R, and many other commonly used instruments may not account sufficiently for demographic factors that can confound interpretation of test results.

In this article, we describe the creation of norms for the BVMT-R and the HVLT-R with a sample of primary Spanish speakers from the U.S.–Mexico border regions of San Diego, California and Tucson, Arizona. We show that application of the existing published norms results in inadequate specificity in this population, particularly among those with low levels of education.

2. Method

2.1. Subjects

The normative sample consisted of 127 (73 women, 54 men) native Spanish speakers of Mexican descent from the U.S.–Mexico border regions of Arizona and California. Study participants responded to flyers or direct contact with recruiters in community settings. They were selected on the basis of having reason to spend time in the United States on