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Adaptation of the Wechsler Intelligence Scale for Children-IV (WISC-IV) for Vietnam

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Abstract

Intelligence testing is used for many purposes including identification of children for proper educational placement (e.g., children with learning disabilities, or intellectually gifted students), and to guide education by identifying cognitive strengths and weaknesses so that teachers can adapt their instructional style to students' specific learning styles. Most of the research involving intelligence tests has been conducted in highly developed Western countries, yet the need for intelligence testing is as or even more important in developing countries. The present study, conducted through the Vietnam National University *Clinical Psychology CRISP Center*, focused on the cultural adaptation of the WISC-IV intelligence test for Vietnam. We report on (a) the adaptation process including the translation, cultural analysis and modifications involved in adaptation, (b) present results of two pilot studies, and (c) describe collection of the standardization sample and results of analyses with the standardization sample, with the goal of sharing our experience with other researchers who may be involved in or interested in adapting or developing IQ tests for non-Western, non-English speaking cultures.

Keywords

Vietnam; intelligence testing; intelligence tests; WISC; IQ; clinical psychology

Intelligence is a central and critical factor in human life. It (or the relative lack thereof) has been linked to educational and vocational performance and success, socio-economic status, creativity, involvement in crime and delinquency, health risk behavior, and positive psychological development in general as well as life expectancy and moral development (Rindermann, 2008). The formal assessment of intelligence began in France in the early 20th century for the purpose of identifying children in need of special education / assistance classes (Binet & Simon, 1916). Intelligence testing is still used for similar purposes, for identifying children with learning disabilities or mental retardation so that they can receive appropriate educational services. It is used as well to identify and place intellectually gifted students. Intelligence testing also can be used to guide education, by identifying specific

cognitive strengths and weaknesses of the student so that the teacher or tutor can match their instructional style to the student's specific learning style (Kaufman, 1994).

Although scholars still do not fully agree on the definition of intelligence, in general empirical reviews support the validity of intelligence tests (e.g., Meyer et al., 2001). However, most of the research involving intelligence testing has been conducted in Europe or highly developed English speaking countries such as the U.S. and Australia (Georgas, Weiss, van de Vijver & Saklofske, 2003). Yet intelligence testing for use in education is as or even more important in developing countries, given developing countries' relatively limited resources (Carr & Schumaker, 1996), and the need for efficient use of educational resources.

Although intelligence tests have been culturally adapted for some of the largest developing countries such as China (e.g., Chen et al., 2010), for many other developing countries there are no well adapted intelligence tests. Vietnam, the country upon which the current research report focuses, is one such country. Although geographically small with a landmass of approximately 330,000 km², it is the 13th largest country in terms of population, with slightly less than 90 million people (Central Intelligence Agency, 2010). Prior to the recent economic downturn, it had the second most rapidly expanding economy in the world, but remains a low income country with a per capita gross domestic product of \$1,032 (World Bank, 2010). Although it would be of substantial benefit to the country's educational and vocational development given that Vietnam is a young country with over 25% of the population under the age of 15 (Central Intelligence Agency, 2010), there currently are no culturally adapted standardized intelligence tests available for use in Vietnam (Tran, 2009).

The study or assessment of intelligence even within a single culture is an intricate process, to which cultural adaptation adds another layer of complexity. In the case of Vietnam, there are a number of issues that make intelligence test adaptation a complex challenge. The goal of intelligence testing is to assess general intellectual ability (i.e., intelligence) rather than to assess learning (which is the domain of achievement testing) but it is difficult to fully separate the two (Suen & French, 2003). For instance vocabulary, which is often a part of intelligence tests, is influenced by both intelligence and the understanding of words, but also by exposure to a wide range of words. Thus, an underlying assumption of intelligence tests assessing vocabulary is that all individuals will have had roughly equivalent *opportunity* for exposure to words. That is, it is assumed that two people of equal intelligence in different circumstances will have had roughly equal opportunities for exposure to the words, and thus the opportunity to learn them. This is of course never precisely true, but in countries like the United States with high levels of mandatory education, it may be a somewhat reasonable assumption.

However, in Vietnam this may be less likely to be the case. Although government support for urban and rural schools is relatively equally distributed in Vietnam as compared to other developing countries (Holsinger, 2009), differences in educational opportunities between urban and rural areas are pronounced (Nguyen, 2004). This is in part due to the fact that in urban areas, parents themselves tend to be more highly educated, and that significantly more urban families send their children to private schools which provide more educational opportunity as compared to public schools (Dang & Tran, 2010). Therefore, it is important to reduce confounding of geographic location with performance on tests. This is further complicated by the fact, however, that more intelligent individuals may migrate to urban areas where more economic opportunities are available, hence creating true urban vs. rural differences in intelligence.

Adaptation of WISC-IV

The goals of the present study were to (a) translate the WISC-IV from English into Vietnamese, (b) culturally adapt this translation for Vietnam, (c) conduct pilot testing to refine the quality of the adaptation, and (d) standardize the resultant test by collecting data from a large normative sample. In the sections below, we first describe the various steps in the adaptation process, and then summarize the changes made during this process, the goal of which is to share our experience with other researchers who may be involved in or interested in adapting or developing IQ tests for non-Western, non-English speaking cultures.

Selection of WISC-IV

Our decision to focus upon the WISC-IV was based on several factors. First, we wanted to select a test that was conceptually broad, so that it would cover as wide an intellectual area as possible. Second, we wanted to use a test that was widely used throughout the world to allow for cross-cultural research. And third, it was of course necessary that the test be well developed and validated in the source country, in this case the U.S. Ultimately, we selected the WISC-IV. Although it is sometimes criticized for not being explicitly theory-based, the Wechsler intelligence tests are the most widely used formal intelligence tests in the world (Saklofske, Weiss, Beal & Coalson, 2003). After completing negotiations with the copyright holder and becoming its official distributor in Vietnam, the decision was made to use the WISC-IV. Due to relatively limited resources, the initial project focused on the 10 Core Subtests of the WISC-IV.

Adaptation Committee

The first step in the adaptation process was the formation of the Adaptation Committee, which had the purpose to oversee the project, and to provide overall guidance. Members were selected based on their (a) cultural and linguistic understanding of the culture of origin of the WISC-IV (the U.S.) and of Vietnam, (b) their understanding of test development, and / or (c) child clinical psychology, in particular the assessment of intelligence. The committee consisted of four members. The head was a Vietnamese Ph.D. child clinical psychologist fluent in English, and the other members were a U.S. Ph.D. child clinical psychologist fluent in Vietnamese, a Vietnamese clinical psychologist with an M.S. who was fluent in English, and a U.S. Ph.D. in child clinical psychology living in Vietnam.

WISC-IV-VN, Version 0.1

The first step in the process was the initial translation of the English WISC-IV into Vietnamese. This was conducted by a Vietnamese child clinical psychology Ph.D. graduate student fluent in English. This produced WISC-IV-VN version 0.1.

WISC-IV-VN, Version 0.2

All items but in particular items from the Similarities, Picture Concepts, Vocabulary and Comprehension subtests were reviewed in English for the cultural appropriateness of their content by Adaptation Committee. General recommendations for changes were made and these recommendations were applied to version 0.1, which produced WISC-IV-VN version 0.2.

WISC-IV-VN, Version 0.3

Next, four experts external to the Adaptation Committee, including a Vietnamese Professor in Clinical Psychology, a Vietnamese MD (psychiatry) / Ph.D. (epidemiology), and two Vietnamese Masters in Psychology provided individual reviews of the *WISC-IV-VN*,

Version 0.2, with suggestions for changes. The full Adaptation Committee reviewed these suggestions and each item. Decisions regarding changes were made as a group, and this produced *WISC-IV-VN, Version 0.3*.

Pilot Study 1: WISC-IV-VN, Version 0.4

The purpose of the first pilot study was to identify and modify items that were confusing to children. Twenty children participated in this pilot study. To minimize urban / rural cultural differences in the WISC-IV-VN, half of the children came from urban areas, and half from rural areas. Each child read through all of the items in Version 0.3 and was asked to identify items that were confusing. Based on these reviews, items identified as confusing were modified by a Vietnamese and American member of the Adaptation Committee. This produced *WISC-IV-VN, Version 0.4*.

Cultural modifications

A number of cultural and culturally-related factors needed to be considered in the adaptation of the WISC-IV for Vietnam. Some of these were linguistic. For instance, the Vietnamese language makes frequent use of compound words wherein two simple words are combined into a more complex word, directly based on the meaning of the two component words. The English word “nonsense” is, for example, a word of moderate difficulty for young children. But in Vietnamese, the word for nonsense is the compound word “vo nghĩa” wherein vo means “without” and “nghĩa” means “meaning.” Thus, in Vietnamese vo nghĩa is a simple word to understand, even for relatively young children, because the definition of the word is directly contained in the compound components. Thus, “nonsense” and “vo nghĩa” have different difficulty levels and different response patterns in English and Vietnamese, and the Vietnamese word vo nghĩa would not be an appropriate parallel word on a vocabulary subtest for the English word nonsense.

Other cultural factors that needed to be considered involved differences in social and political structures. For instance, in the Comprehension Subtest political or social concepts not a part of Vietnamese society needed to be changed to more common concepts with parallel meaning and logic. For example, a Comprehension item asks about the importance of freedom of speech in democracy. Vietnam is not a democracy nor is there formal freedom of speech, so this item was changed to ask why people should vote for the General Assembly (the primary elected national legislative body).

Other modifications were related to a more general lack of familiarity with objects. In Picture Concepts, some objects (e.g., a milk cartoon) on the WISC-IV are presented in a visual style unfamiliar to Vietnamese children, and consequently were redrawn in a more familiar style. Also in Picture Concepts, certain objects were not familiar at all to certain subgroups Vietnamese children, and were changed to items of similar content and logic. For instance, one item is a fire hydrant, but there are few fire hydrants in rural Vietnam. This item was replaced with a well, which is familiar to both urban and rural children. Similar modifications were made in the Comprehension Subtest. For example, one item asks why cars have seat belts. In Vietnam, the large majority of people do not use cars as a form of transportation, and people who do use cars generally do not use seat belts. This item was changed to asking why one should wear a helmet when driving a motorbike, which are a common form of transportation in Vietnam.

Pilot Study 2: Version 1.0

The second pilot study had two purposes. The first was to identify items with excessively low item-total correlations, and replace or modify them as necessary. The second purpose was to adjust item presentation order. The sample consisted of 82 children aged 6–16 years

who were recruited through community hand-outs and direct contacts with random community residents from the greater Hanoi area. The sample was stratified across gender, age, and geographic distribution around greater Hanoi. The sample was administered *Version 0.4*. Table 1 (below) reports the alpha internal consistency estimates for the various sub-scales for the 82 participants administered *Version 0.4*. Internal consistency estimates were not computed for the Coding and Symbol Search subtests, since the structure of these subtests is not appropriate for internal consistency (i.e., the score on these subtests is based on how many items an individual can complete during a specified time period, rather than the number of items an individual answers correctly).

The first purpose of pilot study was to identify problematic items based on item-total score correlations for each sub-scale. However, the item-total score correlations for all item were above 0.15 and thus no problematic items were identified. The second purpose of the pilot study was to re-order the items following their difficulty level in the Vietnamese version. This was necessary because the WISC-IV, like many ability tests, does not administer the full set of items to most individuals, but rather administers the subset of items targeted at the individual's ability level, initially based on age.

Item re-ordering was based on (a) a conceptual analysis of the difficulty of the items in the U.S. / English vs. Vietnam / Vietnamese versions as well as based on (b) the proportion of children who answered the item correctly in this pilot study, including those for whom the item was below their basal level (see Dang et al. 2011 for details of item order analyses). For instance, in the Similarity Subtest, one item asks about the similarity between a frown and a smile, which requires an abstract understanding of emotional expression. This item was more difficult for the Vietnamese children, probably because in Vietnamese culture there is relatively little focus on emotional expression. This item was moved from position #10 to #15. In Comprehension Subtest, an item asks about the advantages and utility of public libraries which are not common in Vietnam and hence not familiar to Vietnamese children; this item was moved from position #11 to #13. Another item asks about the importance of copyrights. The idea of copyright is new in Vietnam, and most people copy books, CDs, etc. without any concern or stigma. This item was moved from position #15 to #18. These modifications produced *WISC-VN-IV, Version 1.0*.

Standardization of the WISC-IV-VN

The standardization sample consisted of 735 Vietnamese children, with an age range from 6–16, stratified in one year age blocks, and balanced for gender. The sample was selected from four different geographic areas in north Vietnam, identified through public population lists in order to avoid confounding sample selection with level of intellectual functioning, as would occur if children were selected through the schools. The sample was stratified for geographic distribution to match the national population, following the General Statistics Office of Vietnam (2010). For reporting purposes, the GSO breaks Vietnam down into rural (70%), urban (20%), and suburban (10%) districts, and our sampling for the standardization sample was stratified to match this distribution. The sample was individually administered *Version 1.0* (see Dang et al. 2011 for WISC-IV-VN norm tables). Table 2 (above) reports the alpha internal consistency estimates for the various sub-scales.

In addition to computing internal consistency estimates, we also computed correlations between the raw scores on each scale, and the child's age, as a test of the validity of the scales. Given that mean raw scores on the WISC-IV and other validated intelligence tests increase with age (Wechsler et al., 2004), we hypothesized that each scale would show a significant, positive, and large correlation with age. As Table 3 shows, all correlations were positive, significant ($p < .0001$), and greater than .40.

Discussion

The purpose of the present project was to adapt and standardize the WISC-IV for Vietnam. Our results generally provide support for the success of the adaptation. Overall, the Cronbach alphas in the standardization sample for the ten subscales were acceptable, with the lowest being in the .77. In regards to the internal consistencies, we had expected that the subscales with the least apparent potential for cultural influence (e.g., Digit Span; Block Design) would show the highest levels of internal consistency, due to fewer influences extraneous to intelligence influencing responses. However, we in fact found that Digit Span Forward and Backward, two sub-scales that were not modified, had the lowest internal consistencies in both the pilot study #2 sample as well as in the standardization sample. These lower internal consistencies, relative to the other subscales, resulted from the fact that some participants found it easier to recall longer digit spans than shorter spans.

Why this was the case is unclear. The WISC Digit Span is thought to be a measure of several related intellectual abilities, including abilities in attention and concentration, sequencing, number facility, and auditory short-term memory (Carroll, 1997; Gregoire, 2001; Hale, Hoepfner & Fiorello, 2002). However, it is possible that the two subscales, particularly Digit Span Backwards, may also require certain executive functions related to the ability to keep track of and manipulate numbers in the working memory, and the use of mnemonic strategies to enhance the effectiveness of the memory (Hale et al., 2002; Woody-Dorning & Miller, 2001). It is possible that as the demands of the task increased (i.e., as the length of the sequence to be recalled increased), participants may have switched from the use of less demanding but less efficient strategies to more efficient strategies, resulting in some cases in better recall for longer sequences.

However, this would not explain such a process would result in lower internal consistency for Digit Span in Vietnam as compared to the U.S. (cf., Wechsler et al., 2004). One rather speculative possibility has to do with the meaning of the individual numbers. There is an implicit assumption in the Digit Span subscale that numbers have no implicit meaning that links them together, beyond their numeric relations. However, in Vietnamese culture certain numbers are considered lucky (6, 8) and certain numbers are considered unlucky (3, 7). It is possible that the longer sequences by chance had some kind of implicit structure related to this meaning that made them easier to remember. This is of course highly speculative, and the precise reason for the relatively low internal consistency with Digit Span is unclear.

In addition to computing internal consistencies, we also computed correlations between the WISC-IV-VN subscale scores and age. Most sub-scales showed strong correlations above .60, supporting the validity of the WISC-IV-VN. However, the two digit span sub-scales again showed lower coefficients in the moderate range (.44 and .46). The Symbol Search sub-scale, which is similar to digit span in that it involves short term memory for non-verbal stimuli, also correlated with age in the moderate range (.44). Why these scales showed relatively smaller (although still in the moderate range) correlations with age is unclear. One possible explanation is that Vietnamese children often spend several hours a day after school being tutored, studying a range of subjects (Tuan & Harpham, 2005), with younger children sometimes spending more time studying. Such a pattern could reduce the correlation between age and academic achievement. However, if this were the case, one might expect to see more of an effect with subjects likely more highly influenced directly by studying (e.g., vocabulary), which was not the case with our results.

Overall, however, results of the pilot studies and standardization support the validity and potential utility of the WISC-IV-VN in Vietnam. Future research may be useful to try to

understand why the digit span subtests appear to function somewhat differently among Vietnamese children and adolescents.

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Table 1Internal consistency alpha for *WISC-IV-VN, Version 0.3*

Subscale	Alpha
Block Design	.82
Similarity	.91
Digit Span Forward	.79
Digit Span Backward	.78
Coding (not computed)	--
Picture Concepts	.85
Vocabulary	.95
Letter-Number Sequencing	.90
Matrix Reasoning	.91
Comprehension	.90
Symbol Search (not computed)	--

Table 2Internal consistency alpha for *WISC-IV-VN, Version 1.0, standardization sample*

Subscale	Alpha
Block Design	.83
Similarity	.91
Digit Span Forward	.77
Digit Span Backward	.82
Coding (not computed)	--
Picture Concepts	.85
Vocabulary	.95
Letter-Number Sequencing	.90
Matrix Reasoning	.91
Comprehension	.90
Symbol Search (not computed)	--

Table 3Correlations between *WISC-IV-VN, Version 1.0* sub-scales and age

Subscale	Correlation
Block Design	.63
Similarity	.72
Digit Span Forward	.44
Digit Span Backward	.46
Coding	.64
Picture Concepts	.64
Vocabulary	.68
Letter-Number Sequencing	.62
Matrix Reasoning	.64
Comprehension	.69
Symbol Search	.44