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# Affordances in the Home Environment for Motor Development-Infant Scale, Spanish Translation

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**Running title:** AHEMD-IS Spanish Translation

**Affordances in the Home Environment for Motor Development-Infant Scale, Spanish Translation**

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### **Abstract**

**Background:** The home environment has a critical influence on an infant's development and well-being. The Affordances in the Home Environment for Motor Development-Infant Scale (AHEMD-IS) is an instrument that has been developed to assess the home environment. This article illustrates the translation, validation and cultural adaptation process of the AHEMD-IS from English to Spanish. **Methods:** The AHEMD-IS underwent a comprehensive process involving a four-phase translation process: 1) Forward translation, 2) Semantic equivalence, 3) Content equivalence testing, and 4) Final version development. **Results:** Steps 1 & 2 resulted in linguistic alterations from the initial translation to enhance clarity for general public understanding. In step 3, mothers reported the instrument was clear and easy to complete. Step 4 involved a final review of the instrument. **Conclusion:** The final outcome is a validated instrument that may prove beneficial when evaluating the home environment with Spanish-speaking populations, particularly those of Mexican descent.

*Keywords:* AHEMD-IS, Spanish Translation, Cultural Adaptation, Home Environment, Infant

**Affordances in the Home Environment for Motor Development-Infant Scale, Spanish Translation**

The home environment has been recognized as a critical component of children's development (Abbott & Bartlett, 1999; Gottfried, 2013; Straus & Knight, 1999). Evidence has attributed the home environment to have a strong influence on intellectual development, childhood obesity, academic achievement, and social behaviors (Bradley & Caldwell, 1976; Bradley, Caldwell, & Rock, 1988; Davis-Kean, 2005). Importantly, research has found that the influence of the home environment begins early in life and is associated with infant development (Ammar et al., 2013; Abbott & Bartlett, 1999; Abbot & Bartlett, 2001; Abbott et al., 2000; Caçola, Gabbard, Santos, & Batistela, 2011). For example, more supportive home environments in terms of access to stimulating equipment (i.e., toys) and parent/infant interaction have been associated with higher levels of infant motor development and cognitive development (Veitch, et al., 2011; Miquelote et al., 2012). Conversely, negative or less supportive home environments have been linked to impaired cognitive and language development by the age of three (Sontag-Padilla et al., 2015).

In light of these findings researchers have been developing instruments to assess the home environment in order to map the relationship between the home environment and development of infant motor skills (Ammar et al., 2013). One such instrument is the Affordances in the Home Environment for Motor Development-Infant Scale (AHEMD-IS) (Caçola, Gabbard, Montebelo, & Santos, 2015). The AHEMD-IS is based on the selected propositions of ecological (affordance) theory (Mifin, 1979; Gibson, 2002). This theory suggests that the environment plays a key role in the provision of opportunities and resources for action. Affordances are considered aspects of the environment that offer a person the possibility for action which can aid in learning or developing a skill (Hirose, 2002; Stoffregen, 2002). The AHEMD-IS utilizes parental self-

report to identify the quality and quantity of factors that impact infant motor skill development within the home environment including the affordance of toys, materials, apparatuses, and availability of space. Research utilizing the AHEMD-IS has demonstrated a positive association between motor affordances and motor ability (Miquelote et al., 2012) and shown the influence of socioeconomic status on availability of affordances (Freitas et al., 2013). Since its creation, the AHEMD-IS has gained in popularity as a clinical tool and as a research outcome measure (Caçola et al., 2015). However, the instrument is only available in two languages (English and Portuguese). In order to further examine the impact of the home environment on infants' development in an increasingly multi-cultural society, it is important to ensure that instruments are available in multiple languages.

The fastest growing ethnicity in the United States is Hispanic/Latinos (Colby & Ortman, 2015) with Hispanics of Mexican origin accounting for nearly two-thirds of the Hispanic/Latino population (Colby & Ortman, 2015; PEW, 2013). Unfortunately, Hispanic/Latino populations are at an increased risk of having a developmental delay relative to non-Hispanic white children and Mexican American children have considerably lower rates of cognitive growth than non-Hispanic white children (Boyle et al., 2011; Fuller et al., 2015). Additionally, Hispanic/Latino populations suffer from higher rates of obesity and from lower levels of physical activity (Ogden et al., 2012; Gordon-Larsen et al., 2000; Rivera et al., 2002). Considering the importance of the home environment, it is critical to understand how the home environment is contributing to the motor development of Hispanic/Latino infants. However, the AHEMD-IS has not been yet been translated and validated with a Spanish-speaking population (Ammar, et al., 2013), despite the fact 38% of United States Hispanic/Latino adults primarily use Spanish to communicate (Taylor, Lopez, Martinez, & Velasco, 2015). Due to the increasing number of Spanish-speaking

individuals residing in and outside of the United States this could be isolating research findings from a very prevalent culture in our global society (Haun et al., 2014). Efforts are needed to ensure that linguistically comparable instruments are available for use with non-English speaking populations in order to ensure the results of research can be generalizable to more diverse populations (Lee, Li, Arai, & Puntillo, 2008). Therefore, the purpose of this study was to translate and systematically validate a Spanish equivalent of the AHEMD-IS.

### **Methods**

Three Spanish-speaking bilingual Americans participated in the translation process. A systematic approach for instrument translation and cross-cultural adaptation was utilized to conduct the translation (Pan et al., 2005; Squires et al., 2013). All individuals had translation experience and had been bilingual for 20+ years. Each translator was assigned a specific role for the translation process; translator, reviewer, and designated decision maker (Beaton et al., 2002). Assignments were made based on years of experience translating thus the translator had 20+ years of experience, the reviewer 5+ years, and the designated decision maker 25+ years. The aim of the translation process was to achieve cultural and conceptual clarity rather than literal linguistic equivalence (Pena, 2007). A four-phase translation process was utilized (Lee, Li, Arai, & Puntillo, 2008). The following steps were taken: 1) Forward translation; 2) Semantic equivalence testing through back translation; 3) Content equivalence testing; and 4) Final version development. Additional details regarding each step are described below.

#### ***Step 1: Forward Translation***

The forward translation consisted of having the instrument translated from the original language (English) into the target language (Spanish) (Maneesriwongul & Dixon, 2004). The

translator was responsible for the initial translation of the instrument. The reviewer was then asked to review the initial translations and make modifications as needed. Finally, the designated decision maker was responsible for evaluating any discrepancies found between the two initial translations to determine the appropriate translation moving into the next steps.

***Step 2: Semantic Equivalence Testing Through Back Translation***

This step was conducted to ensure that the meaning of each word was similar in each language after translation (Lee, Li, Arai, & Puntillo, 2008; Flaherty et al., 1988). This process involved back translation of the document from Spanish to English to be conducted by the reviewer. The reviewer would then meet with the designated decision maker to discuss any discrepancies found.

***Step 3: Content Equivalence Testing***

Once initial translation was complete each item of the instrument was evaluated for content equivalence. The purpose of this process was to determine the relevance of an item to a specific culture while acknowledging that some constructs cannot be insinuated across cultures (Lee, Li, Arai, & Puntillo, 2008; Flaherty et al., 1988). This was done to ensure the translation was accurate in meaning, grammar, syntax, and used language that was familiar and culturally appropriate for the Spanish-speaking population. This evaluation was completed by having a sample of Spanish-speaking mothers who predominantly spoke Spanish within the home complete the translated instrument and a semi-structured interview discussing the instrument. A snowball recruiting method in which existing participants are asked to identify and provide the contact information for other potential participants was conducted. Mothers were eligible if they were a native Spanish-speaker and had a child under 18 months of age. Mothers were provided up to one hour to complete the AHEMD-IS however the process took no longer than 30 minutes.

Upon completion mothers participated in an audio-recorded brief semi-structured interview conducted in Spanish with research personnel trained in qualitative interview methods. The interview was developed based on discrepancies found during the initial translation steps as well as basic questions to assess clarity and understanding. Mothers were asked questions regarding frequency of use of the materials (i.e., toys) mentioned within the AHEMD-IS and relatedness of the materials when comparing the instrument to their reality. They were asked to rate the level of instrument clarity on a scale of one to ten as well as to provide suggestions to improve clarity. The interviews lasted 20 to 30 minutes and were conducted in Spanish in a private location that was chosen by the participant. Participants received a \$10 gift card for participation.

#### ***Step 4: Final Version Development***

Upon completion of the modifications made due to the back-translation and feedback from the interviews, the reviewer and the decision maker read through the instrument one final time.

## **Results**

#### ***Step 1: Forward Translation***

The assigned translator was asked to conduct the initial translation from English to Spanish. The translator was provided thirty days to complete the translation. Once this translation was complete, the reviewer analyzed the translation to see if the instrument was in ‘layman’s terms’ to ensure the instrument could be easily understood by the general public. She was given thirty days to review the translation and suggest modifications. Both translators were asked to document changes that strayed from the literal linguistic translation and provide explanations as to why those changes were made. This resulted in 14 items altered by the



translator and 26 items altered by the reviewer. Finally, the designated decision maker assessed both translations and evaluated the linguistic changes made. He reviewed each translation along with explanations of documented changes in order to complete the final forward translation. In the event of a discrepancy between the first two translations the designated reviewer discussed discrepancies with the initial reviewers and then made the final decision on the appropriate translation. A sample of the forward translation process is available in Table 1.

<Insert Table 1 Here>

### ***Step 2: Semantic Equivalence Testing Through Back Translation***

After the designated decision maker confirmed completion of the revised forward translation, back translation was conducted. The designated reviewer translated the document from Spanish to English. Any Spanish translations that strayed from the original English version were discussed with the designated decision maker from Step 1 until consensus was reached to determine if additional changes needed to be made to the translated instrument. Justification for any differences based on cultural needs is documented in Table 2.

<Insert Table 2 Here>

### ***Step 3: Content Equivalence Testing***

Interview findings suggest mothers (n=5) felt the instrument was very clear and easy to complete. Mothers were provided a verbal explanation to rate the ease of the instrument on a scale of 1-10 (1=low, 10=high) the average score was a 9.2. Additionally, when mothers were asked to rate the wording clarity of the instrument using the same scale the average score was a 10. When asked why she gave a score of 10 one mother responded, 'Because pretty much everything that is listed on your survey are things my daughter uses at home, and I used it for my other daughter when she was a little girl, so a lot of those things are very common and very well-

known.’ Another mother who gave a score of 10 reported she did so, ‘because I understood the wording and everything, the pictures helped too.’ All five mothers reported being familiar with all of the toys mentioned in the instrument. In regards to ways to improve the instrument mothers had no suggestions for wording alteration however one mother did have a few formatting suggestions.

#### ***Step 4: Final Version Development***

The instrument was considered final after steps 1-3 were complete and appropriate adjustments were made after the completion of each step. Steps 1 and 2 resulted in linguistic alterations from the initial translation to enhance clarity for general public understanding. Step 3 resulted in minor formatting changes based on feedback received during the mother interviews. Both the reviewer and designated decision maker read through the document one final time. Both individuals were given one week to make changes and render the final document. The entire translational process is presented in Figure 1.

<Insert Figure 1 Here>

### **Discussion**

The home environment during a child’s infancy can have a critical impact on his or her motor development. While researchers have been developing tools to assess affordances within the home environment, one such instrument (AHEMD-IS) was currently not available in Spanish, one of the largest increasing populations within the United States. Thus, the purpose of this study was to translate and systematically validate a Spanish equivalent of the AHEMD-IS. Through the four-step process, we created a version of the AHEMD-IS that is designed for and appropriate for a Spanish speaking population in the United States.

The AHEMD-IS has a total of 35 items combined in four dimensions (Physical Space, Variety of Stimulation, Fine-Motor Toys, and Gross-Motor Toys). All questions in the instrument were developed to be answered by the primary caregiver of the infant, typically the infant's mother (Han & Jun, 2013). It is important to note that the content equivalence testing occurred with mothers who were only of Mexican descent; thus, additional testing with other Hispanic/Latino origins may be needed to expand the reach of the translated instrument. However, due to the high number of Mexican American children within the U.S., this is an important population to ensure that assessment tools are readily available for (Pew Research Center, 2013).

There were several aspects of the translation process that were challenging. First, there were several differences between the initial and reviewed translation. This could be due to the initial translator having more experience in more formal written translation rather than verbal and the reviewer having more experience with verbal interpreting and conversational translation. The reviewer was asked to ensure the document would be clear and understood by a wide variety of education levels and thus changes were made to simplify the language. Additionally, the reviewer was of a similar age of young mothers in the study and thus also ensured the translation was generationally appropriate. The use of the third translator, the decision maker, allowed for a third perspective from an individual with multiple years of both written and verbal translating.

Second, the use of the mother interviews to ensure cultural clarity was vital however the mothers provided no recommendations for wording changes and thus no changes occurred based on these interviews. Although one mother did have a few formatting suggestions, after discussion between the reviewer and decision maker it was determined that these changes would alter the integrity of the survey and not allow it to match the original instrument. The lack of

recommendations and changes could have occurred for a variety of reasons. First, the mothers interviewed may not have felt comfortable providing wording changes on a topic they were unfamiliar with. Second, the use of 1-10 scale may have caused mothers to exaggerate their opinions and answer in a way they thought the researchers would want to hear.

Overall, this survey has undergone a comprehensive analysis to ensure both literal and cultural clarity when being used in Spanish-speaking populations. We believe this instrument can provide great insight into the home environments of Spanish-speaking families, particularly those of Mexican descent. Further validation studies are warranted to ensure this translation is cultural specific to additional Spanish-speaking ethnicities.

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## AHEMD-IS Spanish Translation

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AHEMD-IS Spanish Translation

| Table 1  |   |   |   |
|--|---|---|---|
| Translation Alterations  |   |   |   |
| English Translation  | Initial Translation   | Final Translation   | Explanation                                   |
| Environment  | Entorno   | Ambiente  | Modified to fit typical population            |
| Guardians  | Tutores   | guardiánes  | Modified to fit typical population            |
| Read each question carefully and mark the box that best reflects your answer   | Lea cada pregunta cuidadosamente y marque la celda que contenga la respuesta que más se asemeje a su respuesta.   | Lea cada pregunta cuidadosamente y marque el cuadro que tenga la respuesta que más refleja su respuesta.  | Modified to fit typical population            |
| Hand (graspable) toys: simple rattles, mouthable toys (teethers), graspable mirrors.   | Juegos de manipulación: maracas o sonajeros para bebé, mordedores, espejos manipulables.  | Juguetes de mano: maracas o sonajeros para bebé, mordedores, espejos de mano  | Initial translation was too formal            |
| Because you know your baby very well, you are the best person to provide this kind of information.   | Usted es la mejor persona para proveer este tipo de información porque conoce a su bebé muy bien.   | Usted es la mejor persona para dar este tipo de información porque conoce a su bebé muy bien.   | Initial translation was too formal            |
| The questionnaire is composed of an initial section with questions about your baby and your family, followed by three sections that address: Physical Space in the Home, Daily Activities, and Play Materials. | La primera parte de este cuestionario contiene preguntas acerca de su familia y su bebé. Luego, le siguen tres secciones que tratan acerca del espacio físico en casa, sus actividades diarias y los materiales que utiliza en los momentos de juego. | La primera parte del cuestionario tiene preguntas sobre su bebé y su familia. Después, siguen tres partes que se tratan del espacio físico en casa, sus actividades diarias, y los materiales que usa a la hora de jugar. | Altered to better reflect English translation |

AHEMD-IS Spanish Translation

| Table 2  |  |   |  |
|--|--|---|--|
| Modifications based on back-translation  |  |   |  |
| English Version  | Initial Translation  | Modified Translation  | English Equivalent   |
| It is important that you fill out the questionnaire as accurately as possible, thinking about what you have available, such as toys, or what happens in your home to encourage your baby's movement and play.  | Es muy importante que llene el cuestionario correctamente. Tome en cuenta las cosas que tiene a su alcance, tales como los juegos del bebé o evento que pasan en su casa que animan a que su bebé se mueva y juegue.                                 | Es importante que usted llene el cuestionario lo más correctamente posible. Tome en cuenta lo que tenga disponible, como los juguetes o los eventos que pasan en su hogar que animan a su bebé a mover y a jugar.         | It is important that you fill out this questionnaire as accurately as possible. Take in account what you have available, such as toys or events that occur in your home that encourage your baby to move and play. |
| The questionnaire is composed of an initial section with questions about your baby and your family, followed by three sections that address: Physical Space in the Home, Daily Activities, and Play Materials. | La primera parte de este cuestionario contiene preguntas acerca de su familia y su bebé. Luego, le siguen tres secciones que tratan acerca del espacio físico en casa, sus actividades diarias y los materiales que utiliza en los momentos de jugo. | La primera parte del cuestionario tiene preguntas sobre su bebé y su familia. Después, siguen tres partes que se tratan del espacio físico en casa, sus actividades diarias, y los materiales que usa a la hora de jugar. | The first part of the questionnaire has questions about your baby and your family. Next, three sections follow that address physical space in the home, daily activities, and play materials.                      |
| I/We regularly (at least twice a week) play games with my/our child to practice learning about body parts.   | Yo/nosotros usualmente jugamos a practicar las partes del cuerpo   | Yo/nosotros regularmente jugamos a practicar las partes del cuerpo con mi/ nuestro niño/a   | I/We regularly play to practice body parts with our child  |
| In tummy time play.  | Alfombra para gatear o de actividades.   | En la alfombra para gatear o jugar boca abajo.  | Playing on a carpet face down  |
| Free to move in any space of the house.  | Tiene la libertad de moverse libremente alrededor de la casa.  | Puede moverse libremente alrededor de la casa.  | Can move freely in any space of the house  |

Figure 1. Overview of Translation Process

