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## Child Language in Guatemala

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Child Language in Guatemala

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## Abstract

The goal of the current study was to determine whether the *MacArthur-Bates Inventario del Desarrollo de Habilidades Comunicativas – III* (INV-III), a caregiver report language inventory developed in Mexico and normed on 30-47-month-old Mexican children, yields similar scores when administered to Guatemalan children. The inventory was completed in an interview format with the mothers of 44 Guatemalan monolingual Spanish-speaking children (ages 46-47 months) from a rural region of Guatemala, primarily of lower socioeconomic status (SES), and their scores were compared to those of 54 monolingual Spanish-speaking Mexican children the same age from an urban region of central Mexico from the norming sample. The Mexican data were obtained using either a mail-in format or interviews, depending on the educational level of the parents. Guatemalan participants were credited with dialectal variants of words on the vocabulary list. No significant differences were found between the Guatemalan and Mexican samples on the Total Words or Sentence Complexity scores, in spite of group differences in maternal education levels. Item analyses revealed group differences on only 3 of the 100 vocabulary items (favoring the Mexican children), which may be attributed to cultural and/or SES differences between the groups, and only one of the Sentence Complexity items (favoring the Guatemalan children), which may reflect the use of an interview format with all of the Guatemalan participants and only some of the Mexican participants. The results suggest that the INV-III is a viable option for assessing Guatemalan children in this age range when word equivalents are given credit.

*Key words:* caregiver report, Spanish, screening, child language, Guatemala

*Child Language in Guatemala***Introduction**

Language disorders left undiagnosed and untreated can affect other aspects of development including reading and behavior, which greatly affect a child's educational outcomes (Tomblin et al., 1997). The term "language impairment" (LI) refers to an impairment of expressive and receptive language development not caused by neurological damage, hearing impairment, or intellectual disability, and affects approximately 7% of young children (Leonard, 2014). Because children with LI vary in their language patterns, LI can be difficult to diagnose. In fact, it is misdiagnosed approximately 26% of the time in the United States at the age of 4 and 5 years (Tomblin et al., 1997), and at a greater rate in non-English-speaking children (Samson & Lesaux, 2008). Obtaining a reliable diagnosis of LI is especially difficult before the age of 4 years because of the wide variability seen in children's early language skills.

Even though a diagnosis of LI may not be made reliably until the age of four, weaknesses in language development and the possible need for further evaluation and services may be identified before that age. For example, children who do not reach certain language milestones (e.g., use of at least fifty different words and 2-word combinations by the age of two years) are considered at risk for having LI (Taylor, Zubrick, & Rice, 2013). When children do not reach these milestones in expressive language, they are considered to be "late talkers," regardless of whether they are typically developing in receptive language skills (Rescorla & Dale, 2013). Some children with late expressive language emergence subsequently develop language typically, but we cannot be certain that they will *not* have LI at the age of 2 years (Dale, Price, Bishop, & Plomin, 2003). Moreover, many children who are late talkers at the age of 2 but are

not subsequently diagnosed with LI continue to struggle with language-related problems during the later years of school (Bavin & Bretherton, 2013).

With proper screening techniques, children under the age of 4 with late language emergence can be identified and receive early intervention and monitoring before LI is diagnosed. Early identification and referrals to professionals have favorable outcomes at this stage of language development (Shevell, Majnemer, Webster, Platt, & Birnbaum 2005). Valid and reliable screening tools that are time- and cost-efficient can be used to identify preschool-age children with weaknesses in language development. For example, children with late language emergence and possible LI can be compared to typically developing children of the same age, culture, and language community using norm-referenced instruments (Guiberson & Rodríguez, 2010). Preschool staff can use the results of language screening to determine which children need individualized attention and/or referrals to speech-language pathologists (SLPs) for additional evaluation. At present, normative data on valid and reliable language screening measures are not available for many populations of children in the world. The lack of appropriate tools for screening children's language skills in Spanish-speaking countries, especially those in Latin America, leave many children with LI undiagnosed and untreated (Jackson-Maldonado et al., 2003). The present study aims to fill this gap, by exploring the use of a norm-referenced caregiver report measure developed in one Spanish-speaking community (in Mexico) with another Spanish-speaking community (in Guatemala) in which children with LI are currently under-served.

### **Assessing Language in Young Children: Use of Caregiver Reports**

Research has shown that the evaluation of the professional, combined with the caregiver's input, yields the most valid assessment of a young child's development (Crais &

Calculator, 1998; Guiberson, 2009; Oetting, Cleveland, & Cope, 2008). Caregiver reports are cost- and time-efficient because they can be completed before a professional sees the child in a clinical setting (Jackson-Maldonado et al., 2003). Caregiver reports are valid measures of children's language development as they more directly reflect what children learn across multiple real-life settings (Crais, 1995). During a clinical assessment conducted by a professional, a young child may lose attention, be uncomfortable with the setting in which the assessment takes place, or be intimidated by interaction with new people. These issues can be avoided with the use of a caregiver report. The *MacArthur-Bates Communicative Development Inventories* (CDIs) were designed to obtain information from caregivers that is current and sample emergent language skills, using a recognition format rather than a recall format (Fenson et al., 2007; Jackson-Maldonado et al., 2003). For example, the CDIs include checklists rather than relying only on open-ended questions, to ensure that caregivers only address children's current abilities and that the limitations of relying on recall memory are avoided (Fenson et al., 2007). The CDIs are well-established and extensively used norm-referenced language inventories that measure a range of language and communication skills including vocabulary production, grammatical structures, and word combinations (Fenson et al., 2007). They allow professionals to compare one child's language development to that of a group of typically developing children of the same age (Fenson et al., 2007; Jackson-Maldonado et al., 2003). The use of the CDIs has been extensively studied in education, research, and clinical settings with a variety of populations and in a variety of situations (Law & Roy, 2008).

The CDIs we use today began in the 1970s in Rome and the United States. Bates, Camaioni, and Volterra (1975) constructed four forms, called the "Early Language Inventories," to assess English- and Italian-learning infants' language development at 8-12 months of age. The

American English (Dale, 1991, 1996; Dale, Bates, Reznick, & Morisset, 1989; Fenson et al., 2007) and Italian (Caselli & Casadio, 1993) CDIs were developed concurrently. Therefore, the CDIs have allowed for cross-linguistic research from their inception. The CDIs have been adapted and normed for use in approximately 60 other languages and in several dialects of English, and shorter forms of the original longer forms have been developed for several languages (Dale & Penfold, 2011). Cross-linguistic adaptations of the CDIs have been found to be valid and reliable assessment tools (e.g. Eriksson & Berglund, 1999; Simonsen, Kristoffersen, Bleses, Wehberg, & Jørgensen, 2014; Trudeau & Sutton, 2011). The words and grammatical structures used in cross-linguistic adaptations of the CDIs are typically derived from early language development studies in the respective language and are lexically and grammatically aligned with specific developmental milestones found in the language being studied (Caselli et al., 1995).

### **Limitations of the CDIs**

Although a variety of studies have established the validity of the CDI long and short forms (Law & Roy, 2008), more research needs to occur with larger and more diverse samples including individuals of different SES levels. An issue concerning the use of the CDI is the ability of the caregiver to report his or her child's language skills accurately. The validity of written questionnaires such as the CDI is dependent on the literacy of the parent filling out the form. This can pose particular problems with parents from low SES backgrounds, who generally have lower rates of literacy than middle SES parents (Arriaga, Fenson, Cronan, & Pethick, 1998; Jackson-Maldonado & Acosta, 2006; Stanton-Chapman, Chapman, Kaiser, & Hancock, 2004). Investigators need to ensure that caregivers have an adequate amount of literacy to fill out the form, or they must provide caregivers with assistance in completing the form. Additionally,

caregivers from different SES and cultures might interpret questions on the CDI or perceive the development of their child differently than the caregivers from the normative sample. When using the CDI to evaluate children's language development, investigators should keep in mind that the scores being obtained are not direct measures of the child's language skills but based on the caregiver's perception. For example, mothers from higher SES may overestimate their child's language skills because higher language skills can often mean better educational outcomes (Arriaga et al., 1998). Pan, Rowe, Spier, & Tamis-Lemonda (2004) found that white mothers reported their children as having larger productive vocabularies than black and Hispanic mothers. These findings may have been caused by an overestimation by white mothers of their children's language skills or by an underestimation by the black and/or Hispanic mothers of their children's language skills. However, the same children's scores on the Peabody Picture Vocabulary Test (PPVT; Dunn & Dunn, 1997) were moderately to strongly positively correlated with their CDI scores, indicating that the CDI yields similar responses as direct measures of language for low SES children (Pan et al., 2004). Other studies of the CDI have also indicated high concurrent validity with direct measures of language (Law & Roy, 2008).

Regardless of whether the CDIs validly measure vocabulary and grammar skills, children from lower SES have been found to score lower on such measures. This could make it difficult for clinicians to use the CDI to identify LI in children from lower SES. For example, children who do not have LI may score lower on the CDI because of limited exposure to particular items that is due to lower SES. It is important that mothers with a lower level of education be included in studies as maternal education level is correlated with overall language development in children (Fernald, Marchman, & Weisleder, 2012; Hoff, 2003; Song, Spier, & Tamis-Lemonda, 2013). Using the English CDI-WS long forms, Arriaga et al. (1998) found that the size of



expressive vocabulary and complexity of utterances were significantly lower in children from lower SES backgrounds when compared to age- and sex-matched peers from higher SES backgrounds. In addition to expressive vocabulary, the investigators observed that word combinations appeared later in children of lower SES (Arriaga et. al., 1998). In another study concerning the influence of SES on language development, Pan and colleagues (2004) compared the scores obtained from the CDI and standardized measures of language taken from the Peabody Picture Vocabulary Test (PPVT; Dunn & Dunn, 1997) and Bayley Scales of Infant Development (Bayley, 1993). When comparing the scores obtained from the CDI to the scores obtained from the direct clinical measures, investigators found that mothers having less than a high school diploma reported lower vocabulary for their children than mothers with more education. Further, children of mothers with less than a high school diploma scored significantly lower on the PPVT than children of mothers with a higher level of education. These findings are consistent with other research showing that children's language development is greatly influenced by mothers' input (e.g., Hoff & Tian, 2005). For example, mothers who have a larger and more diverse vocabulary often have children with a more complex vocabulary, and the number of words a child hears correlates with the number of words a child learns (e.g., Hart & Risley, 1995; Hoff, 2003). It is important to consider these findings when assessing young children from other demographics and cultures, especially those from different countries where socioeconomic status is lower relative to the United States.

### **Caregiver Reports of Language Development for Spanish-Speaking Children**

There is a great deal of research concerning the assessment of young English-speaking children and a growing amount of research with children developing bilingually (with English and Spanish) in the U.S.; however, less research has addressed the appropriate assessment of

young Spanish-speaking children residing in Latin America (Jackson-Maldonado & Acosta, 2006). Because of the scarcity of Spanish-language assessment tools relative to English-language tools, investigators and practitioners have sometimes adapted English assessment tools to Spanish. However, rather than translating tools from English to Spanish, a better method for identifying language impairment in Spanish-speaking children is to first identify the differences between atypical and typical development in the Spanish language (Jackson-Maldonado, Marchman, & Fernald, 2013), using normative data for the targeted population. In order to compensate for this lack of information, investigators found that parent involvement should be emphasized when clinicians evaluate children from Spanish-speaking communities (Guiberson, 2009). Therefore, Spanish versions of the CDI, with norms from Spanish-speaking children, were created. The *Inventarios del Desarrollo de Habilidades Comunicativas (Communicative Development Inventories, or INV)*, are Spanish adaptations of the MacArthur-Bates CDIs, developed in central Mexico.

Several INV scales exist for Spanish-speaking children: long and short forms of the INV- Words and Gestures form (INV-I) for infants ages 8 to 18 months and the INV- Words and Sentences (INV-II) form for toddlers ages 18 to 30 months, and the upper extension (INV-III) form for ages 30 – 47 months, which is a short form. The long form of the INV-I consists of a 396-item vocabulary checklist (to assess the words that are comprehended only or both comprehended and produced) and a list of intentional and symbolic gestures. The long form of the INV-II includes a 680-word vocabulary checklist (to assess the words that are produced) and questions pertaining to the morphological and syntactic development of the child. The long forms are comprehensive assessments of children's language abilities and take a great deal of time for the parent to complete. The short forms of the INV-I and INV-II each contain

vocabulary checklists of 100 items and additional questions. The short forms were developed to save time in language assessment, and also have the benefit of lessening the demands on parents with limited literacy. The short forms were constructed for education, research, and clinical settings when an in-depth profile of a child's language skills is not required. The INV-III consists of a 100-item vocabulary checklist, a list of sentences that measure morphosyntactic skills, and a list of 12 language concepts (Jackson-Maldonado & Conboy, 2011) The upper extensions were developed because of the success of previous CDI measures and the need to measure older children's emerging language skills (Skarakis-Doyle, Campbell, & Dempsey, 2009).

The INVs were adapted linguistically and culturally from the English and Italian CDIs and normed on Mexican and Mexican-American children (Jackson-Maldonado et al., 2003; Jackson-Maldonado & Conboy, 2011). Each item on each inventory was modified linguistically to accommodate lexical and grammatical differences between the languages (Jackson-Maldonado et al., 2003). Words were added based on naturalistic studies of Spanish language development (González, 1983) and from experiments conducted in urban regions of central Mexico and the United States (California) by Jackson-Maldonado and colleagues.

### **Potential Cultural and Linguistic Differences Among Groups of Spanish-speaking Children**

A child's culture affects his or her language development (Rogoff, 2011). In addition, it is important to consider cultural bias in language measures when assessing young children. For example, Peña (2007) described the case of a Mexican mother who was asked on a survey if her child was talking. The mother said "no" because she interpreted "talking" as using two to three word combinations. However, the question on the survey was designed to find if the child was producing words: single words or multiple words at the single-word level. Given the mother's answer, the child in question might have been identified as a late-talker; however, the problem

was the format of the question (Peña, 2007). Individuals from different linguistic and cultural backgrounds tend to have different ideas about the meaning of certain words and questions. Linguistic, cultural, and functional equivalences needed to be considered in the adaptations of these tools. If an assessment tool does not consider all three equivalences, then the test may not be valid.

It is necessary to establish the linguistic and functional equivalency of the INV-III for Guatemalan children and to identify any sources of cultural bias before the measure can be used with that population. Because Guatemalan children are exposed to different linguistic forms and different ways of using language than Mexican children, some items on the INV-III may not be appropriate for them. According to Rogoff (2011), the “box problem” is when similar cultures are treated like they are the same. This problem often arises in clinical and educational settings in the United States, when practitioners view people from Latin America as having one identity. They see one group of people with the same characteristics instead of separate cultures, each with its own set of linguistic, cultural, and dialectal traits. This mentality can affect the treatment of people from different cultural backgrounds. During assessment and intervention with Spanish-speaking children, it is important that clinicians are aware of cultural and linguistic differences among various speakers of Spanish and use tools that contain appropriate dialectical variants and uses of language, so that cultural bias can be avoided.

### **Goals of the Present Study**

The purpose of the current study was to obtain normative data from Guatemalan preschool children from low SES backgrounds on the MacArthur-Bates INV-III. Our ultimate goal is to determine whether the INV-III may be used to screen all children’s language abilities immediately prior to their entrance into a preschool program designed for children from low SES

backgrounds in order to identify children who need language services. It was necessary to determine whether bias in any items or in the format of the inventory would limit the use of the INV-III in Guatemala. One step in determining the validity of the INV-III with Guatemalan children from low SES backgrounds was to determine whether parents could complete the inventory in an interview format, and whether comparable responses to inventory items are obtained in this sample as in the Mexican norming sample. The focus of this paper is to report on these initial findings.

The current study was designed to determine: (a) whether there are differences between Guatemalan and Mexican children on the INV-III summary scores; (b) whether there are differences between Guatemalan and Mexican children at the level of individual items on the INV-III; (c) the effect of maternal education on INV-III summary scores in both Guatemalan and Mexican children.

## **Methods**

### **Participants**

A total of fifty Guatemalan children and their mothers were recruited through the non-governmental organization, Pequeños Pero Listos (Let's Be Ready), which supports preschool programs in small rural communities in Sacatepéquez, Guatemala. The participants were primarily of lower SES, reflecting the families residing in the communities served by Let's Be Ready. Levels of maternal education for the Guatemalan and Mexican samples are presented in Table 1. Given that children do not enter the Let's Be Ready preschool program until after their fourth birthday, the children recruited for this study were not yet attending preschool. Younger siblings, relatives, and friends of children who were served by Let's Be Ready were identified by program staff, and their parents were invited to participate in the study. An incentive of 50

Quetzales (approximately \$6.50 USD) was offered to the parents for their participation. After the completion of the interview, mothers were asked if they knew others in the community with a child of the same age who met the necessary criteria to participate in the study, and, if so, were asked to refer those families to the investigators. Twenty-three males and twenty-seven females participated in the present study.

To be included in the final sample, children needed to meet the following criteria: be 46 or 47 months of age at the time of data collection, have a monolingual Spanish background, have no indication of developmental delays or neurological disorders (see below), and be full term (no less than 37 months gestation at the time of birth). Three children were excluded due to an experimental error in computing the children's ages at the time of the interviews; one child was excluded because of the reported use of another language in the home; and two children were excluded because of pre-term birth. The final sample of 44 Guatemalan children consisted of 21 boys and 23 girls.

The Mexican data used for comparison were obtained from the norming study of the MacArthur-Bates INV-III (Jackson-Maldonado & Conboy, 2011). Children from that sample were included if they were 46 or 47 months of age at the time that the INV-III was completed and were reportedly from a monolingual Spanish-speaking home. Given that the children in this sample participated in the norming study of the INV-III in Mexico, they met similar inclusionary criteria as the Guatemalan children (i.e., full-term birth and no concerns about developmental delays or neurological disorders). A total of 54 Mexican children from an urban region of central Mexico were included. The final sample of 54 Mexican children consisted of 32 boys and 22 girls.

### **Materials and Data Collection**

The Guatemalan data were collected using a uniform interview format for all participants. The Guatemalan interview took approximately 30-60 minutes to complete, and was conducted at a site provided by the preschool, near the families' homes. Interviews were conducted by a Guatemalan teacher from the families' community, who worked at the preschool program, with assistance from an American undergraduate student in communicative disorders. After informed consent was obtained using forms approved by the University of Redlands Institutional Review Board, two questionnaires were completed: a developmental/health history questionnaire, and the INV-III. These questionnaires were also completed orally, to accommodate parents with limited literacy. The Mexican data were taken from the norming study (Jackson-Maldonado, Marchman, Rubio-Codina, & Fitzsimmons, unpublished data) and were obtained using either a mail-in format or interviews, depending on the educational level of the parents.

The developmental/health history form used with the Guatemalan families was adapted from one used in previous research with Spanish-speaking families (e.g., Conboy & Thal, 2006), and was used to ensure that all participants met the inclusionary criteria for the study. The questionnaire consists of five sections (see Appendix A). In the first section, the parent is asked to list any languages the child has been exposed to other than Spanish. In the second section, the parent is asked a variety of questions about the child's pre- and perinatal medical history, such as whether there were problems during the pregnancy, premature birth, problems during labor, seizures, lack of oxygen during birth, birth defects, or illnesses at birth. In the third section, the parent is asked about the child's post-natal medical history, including whether there were any hearing problems or middle ear infections, and whether the parent had any concerns about the child's cognitive, motor, or speech/language development. The fourth section asks about the ages

at which the child attained particular language development milestones (e.g., babbling, production of the first words, two-word combinations, and the use of complete sentences). In the fifth section, the parent is asked about the educational levels of the child's mother and father.

Information was used from this form to determine the following: 1) whether a participant's INV-III data could be included in the normative sample, and 2) SES factors that could be used to describe the sample. If the questionnaire indicated that a participant was regularly exposed to a language other than Spanish (which occurred in one case), or had significant pre-natal or post-natal medical problems including a gestational age of less than 37 weeks (which occurred in two cases), hearing problems or frequent ear infections and/or developmental problems (impaired motor skills, history of seizures, head injuries, medical problems, or language or cognitive disorders), the participant's INV-III data were excluded from the group analyses.

The INV-III comprises three sections: a vocabulary checklist, eight questions concerning language and cognitive concepts, and a Sentence Complexity scale designed to measure morphosyntactic skills (see Appendix B). A score for each item was entered into a separate column for each participant. A total of 126 items (the 100 items on the vocabulary checklist and the 26 Sentence Complexity items) were given scores of 0 or 1 for each participant and were analyzed statistically (see below).

- 1) **The Vocabulary List** was administered first. This checklist consists of 100 words including 45 nouns, 23 verbs, 15 adjectives, 6 adverbs, 4 prepositions, 3 pronouns, 3 possessive adjectives, and 1 demonstrative adjective. The parent is asked to check each item that the child produces and understands. The words were based on item-response frequencies generated using the CLEX



program (Dale & Fenson, 1996). Words were chosen based on frequency and the investigators chose a balance of different types of words. It is not necessary for the child to use the correct pronunciation in order for the parent to check the item; however, it is important for the child to use the word in its proper context. Since the INV-III was originally constructed for Mexican children, we allowed the mothers to receive credit for dialectal variants of the words. If a dialectal difference was noted, the research assistant put a star next to the word and then made a note directly on the form. The list was completed item by item, and each mother was given time to think about her child's language and to recall examples of her child's uses of particular words. Each word on the vocabulary list was checked as "known" or "not known". A score of 1 was recorded if the mother stated that the child knew and used the word, or an equivalent word used in the child's community, and 0 was recorded if the child did not know the word. Scores on this section range from 0 – 100.

2) **The Sentence Complexity scale** consists of 26 forced-choice questions about children's use of grammar and morphosyntax. Each question consists of a pair of sentences. The first sentence has a less complex grammatical structure and the second has a more complex structure; the parent is asked to select the sentence in each pair that sounds the most like the way in which her child speaks. If a mother stated that her child used both forms, then only the more complex form was marked. A score of 0 was given if the less complex structure was reported by the mother and a 1 was given if the more complex structure was reported. Scores on this section range from 0 – 26.

## Results

Descriptive statistics for the total sample, Guatemalan and Mexican samples combined, as well as separate statistics for the Guatemalan and Mexican groups, are presented in Table 2.

Additionally, statistics were calculated for groupings of age and sex in the Guatemalan and Mexican samples Table 3(a) and Table 3(b), respectively. Parametric and non-parametric tests were used to test for differences between the Guatemalan and Mexican groups on the summary scores and individual items. Cohen's  $d$  and  $\omega^2$  values were calculated as measures of effect size.

### **Summary score comparisons between the Guatemalan and Mexican groups**

Summary scores for the Sentence Complexity and the Vocabulary sections were compared between the Guatemalan and Mexican children. The distributions of vocabulary (Total Words) scores of both samples were negatively skewed. The scores from both samples, Guatemalan ( $M=79.57$ ,  $SD=18.49$ ,  $Mdn=86$ ) and Mexican ( $M=81.75$ ,  $SD=15.31$ ,  $Mdn=81$ ), were in the upper range of possible scores on the INV-III, which was expected given that the ages of the participants were in the upper limits of the age range for the INV-III. Because our raw data for the vocabulary section did not meet the criteria for a t-test, a square-root reflected transformation of the Total Words raw scores was used as the dependent variable for a t-test. The results indicated no significant difference between groups,  $t(96)=1.67$ ,  $p=.11$ ,  $d=0.33$ . Additionally, a Mann-Whitney test revealed non-significant differences,  $U=1178$ ,  $p=.9442$ ,  $r=.008$ .

The Sentence Complexity scores were also not significantly different across groups  $t(96)=1.54$ ,  $p=.13$ ,  $d=.31$ . Although these scores were normally distributed for the Guatemalan sample, the distribution for the Mexican sample was platykurtic; therefore, a Mann-Whitney test was also conducted and revealed non-significant differences between the groups,  $U=991.5$ ,  $p=.16152$ ,  $r=.165$ .

**Differences in maternal education between the Guatemalan and Mexican groups**

A Mann-Whitney Test was conducted to compare the samples on maternal education levels. To increase the number of participants in each group, the educational levels were collapsed into three categories: 1) no education or only primary school experience, 2) middle school experience, and 3) high school experience or above. The results indicated a lower maternal educational level for the Guatemalan compared to the Mexican sample,  $U=623.5$ ,  $p=0.00$ ,  $r=.473$ .

Given the group differences in maternal education, separate 2-way ANOVAs were conducted for each of the two summary scores, with sample (Guatemalan or Mexican) and the three levels of maternal education as between-subjects factors. For the Total Words score, a square-root reflected transformation was used because of negative skew in the distribution of the raw scores. The results of the ANOVA indicated no main effect of sample,  $F(1,92)=2.64$ ,  $p=0.11$ ,  $\omega^2=0.016$ , no main effect of maternal education,  $F(2,92)=1.47$ ,  $p=0.24$ ,  $\omega^2=0.009$ , and no sample by maternal education interaction,  $F(2,92)=1.17$ ,  $p=0.32$ ,  $\omega^2=0.003$ . Likewise, for the sentence complexity score there was no main effect of sample,  $F(1,92)=2.42$ ,  $p=0.12$ ,  $\omega^2=0.014$ , no main effect of mother's educational level,  $F(2,92)=1.01$ ,  $p=0.37$ ,  $\omega^2=0.000$ , and no sample by maternal education interaction,  $F(2,92)=1.01$ ,  $p=0.37$ ,  $\omega^2=0.013$ .

**Item-level comparisons between the Guatemalan and Mexican groups**

Responses to each item in the vocabulary section were compared across the Guatemalan and Mexican samples. Credit for word equivalents (i.e., dialectal variants and other synonyms) was determined through consultation with the first author of the INV-III and consultation with Guatemalan informants such as teachers and other professionals with expertise in language sciences or linguistics. The words that were accepted as word equivalents are presented in Table

4. We conducted a Fisher's Exact Test for each of the 100 words on the vocabulary list, to compare the number of children in each sample who were reported to have known and used the word, and significance values of  $p \leq .0005$  were set using a Bonferroni correction, to protect against Type I error. The numbers and proportions of each sample reported to know each word, and results of the Fisher's Exact tests, are shown in Table 5. Group differences were found to be significant for three items ("fábrica" [factory], "horno" [oven], and "librero" [bookcase]). A higher proportion of Mexican than Guatemalan children produced all three of these words (presented in bold in Table 5).

Fisher's Exact Tests were also used to compare group responses to individual items on the Sentence Complexity section. When a Bonferroni corrected significance value of  $p \leq .002$  for each of the 26 comparisons was used, only one item was responded to differently across groups (see Table 6). A higher proportion of children in the Guatemalan sample than in the Mexican sample was reported to use one of the more complex sentence structures (see the bolded item in Table 6).

### **Discussion**

In the current research, we asked whether a caregiver report language inventory, the INV-III, which was designed for and normed on Mexican preschool children – yields similar results in Guatemalan children the same age. We addressed this question by comparing the overall summary scores on two sections of the INV-III (Vocabulary and Sentence Complexity) as well as responses to individual items in those sections obtained for a group of 46-47-month-old Guatemalan children to data from children the same age in the Mexican norming study. Our larger goal is to establish local norms for the INV-III for children in Guatemala so that the

instrument may be used with children just prior to their entry into preschool programs at age 4. The present study served to determine whether bias in any items might require modifications of the INV-III for use in Guatemala, and whether bias in the format (caregiver report) might limit the instrument's use. The results indicated that summary scores for the Guatemalan and Mexican samples were not significantly different, suggesting that the INV-III is a viable option for assessing Guatemalan children in this age range. We used the INV-III in an interview format to avoid potential problems that might arise given the low educational level of many of the mothers in our Guatemalan sample. We found that, despite limited literacy, mothers were able to report on their children's language skills, and provided similar overall scores as obtained in the Mexican norming sample. Moreover, we found no effect of maternal educational level on either summary score.

Our individual item level comparisons revealed only three group differences in children's reported uses of particular words ("fábrica" [factory], "horno" [oven], and "librero" [bookcase]). Fewer Guatemalan children knew these words than Mexican children. However, the group (Guatemalan vs. Mexican) differences in responses to several words on the vocabulary list might not have reached significance because the conservative Bonferroni post-hoc method was used. If a less conservative method of protecting against Type I error had been used, a larger portion of the words from the vocabulary list might have been significantly different across samples, thus, our analyses could have potentially underestimated differences between the two samples at the item level.

The item-level vocabulary differences likely reflect differences in the experiences of the children in the two samples that stemmed from cultural and/or SES factors. However, we also found variability within each sample, which likely is due to variations in children's experiences.

During typical development, children have a range of experiences and exposure to vocabulary, especially after 30 months of age and the typical word spurt (Fenson et al., 2007). Although the children studied by the investigators were at the upper end of the age range of the norming sample, we did not expect all of the participants to know all 100 items on the INV-III vocabulary list as they may not have been exposed to certain words on the list. Given that the words on the vocabulary list are only a sample of the words that children this age are expected to know, clinicians and investigators should not expect all children to know all of the items found in the vocabulary list in order to be considered typically developing (Feldman et al., 2005).

There was only one item on the sentence complexity scale that elicited different responses from the two samples. More children from the Guatemalan sample were reported to use the more complex option for that item than children from the Mexican sample. We believe that, because the interviewer(s) were able to give more examples for a particular question, the higher score on this item for the Guatemalan sample could have been due to the use of an interview format with all of the Guatemalan mothers and only some of the Mexican mothers.

Although credit for word equivalents was given for the Guatemalan children, a few significant differences on words from the vocabulary list were still found between the Guatemalan and Mexican groups. Since there were differences found between the two groups at the item level and not the summary level, it can be said that the INV-III has the potential to be used with a variety of Spanish speaking populations and may present an overall adequate language profile of a child, as long as summary scores are used.

One important question that we asked in the current study was whether the INV-III is valid for use across different socio-cultural groups. The normative data obtained for the INV-III in Mexico was from a sample of children of higher SES than the Guatemalan sample used in the

current study. The Guatemalan sample had a significantly higher proportion of mothers with little to no education while the Mexican sample had a higher proportion of mothers with a high school diploma and/or higher. In spite of these differences in maternal education, there were no effects of maternal education on the Total Words and Sentence Complexity scores. It is possible that using an interview format with the Guatemalan sample reduced some of the negative potential effects of limited maternal education and literacy on the use of caregiver report inventories.

### *Limitations*

A significant limitation of the current study is that different elicitation methods were used for completing the INV-III with the Mexican and Guatemalan samples. All of the Guatemalan participants were given the INV-III in an interview format. The interviewer had the ability to explain the questions in more detail if necessary, potentially giving the Guatemalan mothers an unfair advantage over the Mexican mothers, most of whom were presented with the written form of the INV-III. It is possible that higher scores would have been obtained for the Mexican children if an interview format had been used with all of the Mexican caregivers who completed the forms. Jackson-Maldonado and colleagues (1993) compared scores on the INV-I and INV-III using three methods of data collection (mail-in, clinic waiting room administration, and personal interview). The investigators found that caregivers who filled out the INV form in a clinic waiting room were more likely to leave spaces blank when compared to those who completed the form during a personal interview. The investigators believed this was due to circumstances that the clinic waiting room presented. For example, many mothers who used this method typically had multiple children with them; therefore, when a mother did not understand a certain item, she would skip over the question. Mothers were more worried about watching their sick children

than filling out the INV. The investigators found that when using the interview format of the INV mothers were more likely to elaborate. Mothers that were interviewed had the opportunity to ask questions about the form in order to clarify any questions they might have had. However, an interview format might not have elicited any higher scores than a written format with higher SES parents. For example, a study conducted in Kenya using the recently developed Kilifi CDI with illiterate families found moderate to good reliability between the interview format and the traditional written format (Alcock et al., 2014). Further investigations that compare the use of the INV-III with different Spanish-speaking populations should use the interview format across all samples.

Another limitation of the current study is the use of parental recall for word equivalents. When relying on caregivers reporting words from recall, as opposed to recognition, precautions must be taken. Even when caregivers are able to use word equivalents for words on the form, investigators must be wary of the effects that recalling a word as opposed to recognizing a word has on the obtained data (Alcock et al., 2014; Fenson et al., 2007). Alcock et al. (2014) found that when mothers were asked to recall words that their children produced, the results largely depended on the frequency of those words. This could lead to inconsistent results when investigators choose to sample a larger group of children. When the CDI is being used with a range of communities, mothers may report words that their children use solely based on the frequency of a word in a given area. Children from different communities, cohorts, and SES will naturally use different words. If mothers are asked to recall words for the vocabulary section, the scores that are being obtained may be reflective of differences in word exposure as opposed to differences in language development.



### *Clinical Applications and Future Research*

Item-level differences between the samples on the vocabulary section can be influenced by dialect, culture, and SES and should be studied in further detail to determine the specific causes of the statistical differences. The next step would be to determine what items could be used to replace the items on the INV-III that elicited different responses from Guatemalan and Mexican children. It is crucial to replace these items with other items of similar difficulty. For example, the word “horno” (oven), which received a proportionally lower pass rate in the Guatemalan sample than the Mexican sample, might be replaced with the word “comal” (griddle), which is more common in low SES homes in Guatemala and Mexico. Additionally, if a less conservative method of controlling for Type I error were used to evaluate group differences in the individual vocabulary items, more statistically significant differences might have been found. Future research could explore different methods. Future studies might also incorporate replacements for words that fewer Guatemalan than Mexican children were reported to know in the vocabulary checklist. The words that replace the original words on the INV-III should be more reflective of the SES and culture of the Guatemalan population. This method will allow for mothers to recognize the words as opposed to recalling them. However, investigators must keep in mind that there are still bound to be item-level differences between individuals of this age based on exposure alone.

Using the INV-III in an interview format with the INV-III, could help to minimize potential biases that arise when obtaining data from caregivers. Using another version of the CDI in an interview format, Alcock et al. (2014) found that mothers were willing to dedicate time and energy to talk about the language development of their children with a professional. In the current study, we also found that mothers, when given the opportunity, were willing to spend

time discussing their children's language development with a professional. By sitting down and talking with caregivers, investigators can collect detailed information about children's language development, which could be useful in clinical as well as research situations.

A future investigation that would directly relate to clinical practice would be to determine the sensitivity and specificity of the INV-III for distinguishing typically developing from atypically developing children. Skarakis-Doyle and Dempsey (2009) determined that the English CDI-III had a 96.6% classification accuracy in identifying children with or without language impairment. The investigators concluded that the CDI-III can be used as a screening tool to distinguish between children with typical development and children with atypical development at the ages of 30 to 45 months (Skarakis-Doyle & Dempsey, 2009). A study like this could aid professionals in Guatemala in the assessment of language and learning impairments in preschool children. The INV-III may be useful as a screener in order to determine whether a child needs further evaluation, but its sensitivity and specificity first needs to be determined. Research has been conducted in order to test the accuracy of the CDI in determining whether children have LI (Heilmann, Weisman, Evans & Holler, 2005). Similar research is currently underway in Mexico using the INV-III, but also needs to be conducted in Guatemala where there are currently no valid diagnostic measures of LI for children this age. Future investigators could use a cross-validation of results using direct measures of children's language skills, clinician judgments, and tests of predictive validity. Measures should include a language sample analysis and the use of standard clinical procedures that demonstrate acceptable levels of specificity and sensitivity for LI such as the Preschool Language Scale Spanish (PLS-5; Zimmerman, Steiner, & Pond, 2011). The obtained data can be used to test whether the INV-III has an acceptable level of predictive validity for distinguishing-typical development from atypical development in Guatemalan

children. After assessing the language skills of children using the INV-III, clinicians can use preschool language measures to determine whether the children who scored below a certain cut off on the INV-III subsequently developed LI in preschool. Direct measures with adequate levels of sensitivity and specificity can be used to help determine the predicative validity of the INV-III.

With normative data on the INV-III from Guatemala children, Guatemalan educators and speech-language therapists can have a valid tool for detecting language-learning problems at the preschool level. In addition to improving language-screening practices in Guatemala, the results of this study may help improve language-screening practices in bilingual communities in the United States. During 2014 alone, sixty-three thousand unaccompanied minors traveled across the border into the United States. A majority of these children were from El Salvador, Honduras, and Guatemala (Renwick, 2014). This has created a need for assessment tools that address the increasing population of Spanish-speaking children in the United States (Jackson-Maldonado, Marchman, & Fernald, 2013). Children from Spanish-speaking populations in the United States are more likely than their peers to be of lower SES and be at risk for language delays (Goldstein, 2004). Obtaining normative data in Guatemala on the INV-III will be helpful for the future investigation of young children of Guatemalan descent living in the United States. However, investigators should obtain data on children of Guatemalan descent who live in the United States. These children would have very different vocabularies, based on experiences, than children living in Sacatepéquez, Guatemala. Additionally, many children who live in the United States are bilingual, learning English and Spanish; therefore, their exposure to English would affect their scores on the INV-III.

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