Telehealth Measures Screening for Developmental Language Disorders in Spanish-Speaking Toddlers

Mark Guiberson, PhD, CCC-SLP

Division of Communication Disorders,
University of Wyoming, Laramie, Wyoming.

Abstract

Background: This is the second of two studies that described the use of telehealth language screening measures for use with young Spanish-speaking children. **Introduction:** The purpose of this study was to describe the classification accuracy of individual telehealth language screening measures as well as the accuracy of combinations of measures used with Spanish-speaking toddler-age children from rural and underserved areas of the country. **Materials and Methods:** This study applied an asynchronous hybrid telehealth approach that implemented parent-structured play activities with a standard set of stimuli, and interaction with a My First Words e-book. These interactions were recorded with a mini camcorder. In addition, a traditional pen and paper parent questionnaire measure was collected. Sixty-two mostly Spanish-speaking preschool-age children and their parents participated. Twenty-two children had developmental language disorders (DLDs) and 40 had typical language development. **Results:** Although several of the individual measures were significantly and strongly associated with standardized language scores, only reported vocabulary had classification accuracy values that were desirable for screening for DLDs. An improvement was observed when reported vocabulary was combined with a number of different words children produced during interactions with parents. **Conclusions:** This research provides additional evidence showing the effectiveness of a hybrid telehealth model in screening the language development of Spanish-speaking children. More specifically, reported vocabulary combined with number of different words produced by a child can provide informative and accurate diagnostic information when screening Spanish-speaking toddler-age children for DLDs. These findings replicate the first study in showing that hybrid telehealth approaches that combine the use of video technology and traditional pen and paper surveys yield strong results, and may be a viable screening alternative when face-to-face access to a bilingual provider is not possible.

Keywords: education, pediatrics, rehabilitation, telehealth

Introduction

Spanish-speaking children under the age of five represent one of the fastest growing segments of the population in the United States.^{1,2} Medical and educational professionals are responsible for screening the language skills of Spanish-speaking toddlers for developmental language disorders (DLDs). Primary DLD is a term used to describe children who are not acquiring language as would be expected for their chronological age and for whom language difficulties are not related to other factors (e.g., neurological, intellectual, social, or sensory deficits).³ Unfortunately, there are no psychometrically adequate measures to screen for DLDs in toddler-age Spanish-speaking children, and there is a critical shortage of bilingual professionals to screen these children.⁴⁻⁸ To complicate matters, there is a growing number of young Spanish-speaking children at risk for developmental and health disparities living in rural and underserved areas of the country.^{9,10} Providers serving rural and underserved populations desperately need evidenced-based strategies to screen and monitor the language development of Spanish-speaking toddlers. Measures that lend themselves to a telehealth model may be especially useful in addressing this problem and in bridging the gap in terms of access to bilingual professionals in rural and underserved areas of the country.¹¹

PRESCHOOLER TELEHEALTH STUDY

A recent study tested the use of telehealth measures to screen the language of Spanish-speaking preschool-age children.¹² In this study, a hybrid telehealth model was applied that included synchronous videoconferencing, video-casting of an e-book as well as video recording and traditional pen and paper forms. Results of the study showed that a processing efficiency measure (repeating nonwords) combined with either a parent vocabulary checklist or a language sample measure could provide informative and accurate diagnostic information when screening Spanish-speaking preschool-age children for language impairment.¹² It is important to remember that the behavioral characteristics of

DLDs change over time as children mature; thus, although telehealth screening measures for preschool-age children have been identified, there is a need to establish distinct and developmentally appropriate markers for use with toddler-age Spanish-speaking children. In the following sections, potential language screening measures appropriate for toddler-age Spanish speakers that could be collected through a telehealth model and brief play samples are presented.

TODDLER LANGUAGE SCREENING MEASURES

Promising measures to screen for DLDs in young Spanish-speaking toddlers include gesture, play, language sample, and parent report measures. Studies of gesture in Spanish-speaking toddlers have found that children with or at risk for DLDs demonstrate significantly less conventional (culture specific) and iconic (object depicting) gesture usage, in addition to fewer gesture and word combinations.^{13–17} Research has also shown that children with DLDs have delayed play skills including diminished symbolic play and lower levels of complexity of play than typical same-aged peers.^{18–20} A recent study of typical and DLD Spanish-speaking children revealed complexity of play skills was significantly associated with language scores.¹⁴ Language sample measures including mean length of utterance in words (MLU-W) and number of different words (NDW) produced seem to capture early linguistic development and risk of DLDs in Spanish-speaking children, and can typically be observed from naturalistic or structured parent-child interactions.^{14–25} There is evidence that Spanish-speaking parents in the United States are also accurate at identifying language learning difficulties in toddler and preschool-age children.^{23,26–30} A recent study reported classification accuracy values of 87% sensitivity and 86% specificity for a 100-item Spanish vocabulary parent checklist, the Inventarios del Desarrollo de Habilidades Comunicativas palabras y Enunciados (INV-II), as well as 91% sensitivity and 86% specificity for parent report of mean length of child's three longest utterances (RM3L).^{27,28} Both measures had strong concurrent validity when compared with a standardized Spanish language assessment. Collectively, these findings indicate that gesture, play, language sample, and parent report measures may be useful as part of a brief telehealth screening protocol.

CURRENT STUDY

Given the shortage of bilingual providers and the increase of young Spanish-speaking children in rural and underserved communities, there is a need for accessible and informative alternative approaches to screening the language development of Spanish-speaking toddlers. Empirically tested tele-

health screening measures may improve early identification and result in enhanced access to early intervention services.^{11,12} This study was designed to evaluate the classification accuracy of hybrid telehealth measures when used to screen the language development of Spanish-speaking toddler-age children from rural and underserved communities. An asynchronous model was applied, because of challenges with connectivity in the rural areas where the study was conducted. The asynchronous hybrid telehealth approach included the collection of video-recorded naturalistic play and behavioral measures, the use of an electronic tablet e-book, and parents completing traditional pen and paper forms.

RESEARCH QUESTIONS

The purpose of this study was (1) to establish the convergent validity between play, gesture, language sample, and parent report screening measures and standardized language assessment scores; (2) to describe group performance (DLDs or typical) and to make group comparisons with selected variables; (3) to examine the accuracy of the individual screening measures; and (4) to describe the accuracy of combined screening measures presented. An important aspect of this study was to evaluate brief measures as part of a telehealth screening protocol that could be used in the field.

Materials and Methods

PARTICIPANTS

Family characteristics. Participants were recruited from rural and underserved regions of three states in the Mountain-West region of the United States.^{8,31} The research team recruited families from state and federally funded early intervention programs for families from low-income households. Sixty-two toddler-age children (2.0–2.11 years of age) and their parents participated in this study. Only predominately Spanish-speaking children and families (those who spoke Spanish 80% of the time or more according to parent report) were included. Family and child developmental history information was collected through a brief demographic questionnaire. Mothers self-identified their ethnicity as Hispanic and nationality as Mexican ($n=44$), Puerto Rican ($n=7$), Guatemalan ($n=7$), Dominican ($n=2$), or Honduran ($n=2$). Maternal level of education ($n=62$) ranged from 2nd grade to some college ($M=10.42 \pm 3.90$). Paternal level of education ($n=56$) was slightly lower than maternal level of education, ranging from no formal schooling to some college ($M=9.71 \pm 4.31$).

Child characteristics. Three sources were used to establish DLD status: (1) identification of DLDs by a bilingual early

childhood assessment team; (2) parent report of concern about language development; and (3) expressive language standard score <77 (1.5 SD below the mean) on the Spanish Preschool Language Scale-Fourth Edition (SPLS-4). The group with DLDs ($n=22$) was comprised 15 boys and 7 girls with a mean age of 29.59 ± 4.10 months. The typical language (TL) group ($n=40$) was comprised 15 boys and 25 girls with a mean age of 29.13 ± 3.20 months. Children were placed in the TL group if (1) they had not been previously diagnosed as having DLD, (2) their parents did not report concerns about their language development, and (3) they had an expressive language SPLS-4 Spanish score ≥ 85 . Children from both groups had normal hearing and no known neurological impairment.

PROCEDURES

All study visits, including both play and SPLS-4 testing, were completed at local early childhood centers or in the families' homes. Parents (either mothers only or mothers and fathers) facilitated semistructured play activities for 8 min, and looked at an e-book of *Mis Primeras Palabras* (My First Words) for 8 min. A standard set of stimuli was used during play activities: an Elmo doll, a Grover doll, two cups, two spoons, one fork, a bowl, two baby washcloths, two "duplo" type blocks, two "shape sorter" type blocks, and a rattle. These toys were selected because they mapped onto the Westby's Symbolic Play Scale (SPS) as well as Linder's *complexity of play* subscale.^{32,33} An e-book version, of *Mis Primeras Palabras* was selected because earlier studies and clinical experience have shown that the board book version elicits high interest from children.¹⁴ Activities were video recorded with a mini camcorder with 48 kHz sampling rate. After the parent-facilitated measures, a native Spanish-speaking speech-language pathologist or educator administered the SPLS-4 in Spanish, while parents completed the SF-INV.

MEASURES

PLS-4 Spanish. The expressive language subtest of SPLS-4 in Spanish has strong test-retest reliability and split half internal consistency when used with 2-year-old children. Sensitivity and specificity data on 3–5 year-old children ($n=140$) revealed that the expressive communication subtest demonstrated 91% sensitivity and 69% specificity.

Gesture. Nicoladis' gesture coding system was employed to code children's gestures as conventional, deictic, or iconic.³⁴ Deictic gestures include gestures that direct another's attention (pointing, showing, and giving), iconic gestures depict an object, whereas conventional gestures are defined by the

child's culture (such as waving good-bye or holding a finger to the mouth to indicate quiet).

Symbolic play. Symbolic play was coded using the SPS, a detailed developmental protocol that includes levels of pre-symbolic (I and II) and symbolic play (I–VIII).³² For this study, symbolic play scores were assigned based upon the highest play behavior demonstrated independently without direct parent scaffolding.

Complexity of play. Complexity of play was coded using the complexity of play subscale from the cognitive age tables developed by Linder.³³ Scores were based upon the highest play behavior that children demonstrated independently, which is what practitioners in the field most often use.³³ Possible scores ranged from 1 to 72 months.

Language samples measures. The Systematic Analysis of Language Transcription (SALT) program was used to calculate MLU-W and NDW.³⁵ Following SALT conventions, only complete and intelligible utterances were included in the calculations of MLU-W, and only the intelligible words were used in the calculation of NDW.

Coding reliability. Ten graduate research assistants received ~8 h of training in gesture coding, play coding, and language transcription. Training included thorough discussion of each protocol and transcription or coding system, and coders completing coding of 2–3 training videos. Before independently beginning gesture coding, coders achieved 90% or higher point-by-point inter-rater agreement for gesture and play variables. Every fifth video was checked for point-by-point inter-rater agreement across measures, and values obtained indicated acceptable coding reliability (gesture coding 92%, symbolic play 100%, complexity of play 88%, and language samples 89%).

Results

CONVERGENT VALIDITY

The first research aim was to describe the convergent validity of gesture, play, language sample, and parent report measures in relation to a standardized measure of expressive language skills. Correlations were calculated, controlling for age, and presented in *Table 1*. The gesture and play measures were not significantly correlated with language scores on the expressive SPLS-4 Spanish. However, both language sample measures (MLU-W and NDW) as well as parent report measures (reported vocabulary and RM3L) were significantly correlated ($p \leq 0.01$) with language scores.

Table 1. Partial Correlations (Controlling for Age) Between Gesture, Play, and Language Measures

MEASURES	1	2	3	4	5	6	7	8	9	10	11
1. SPLS-4	—										
2. Deictic gesture	0.05	—									
3. Conventional gesture	0.19	0.16	—								
4. Iconic gesture	0.01	−0.10	−0.02	—							
5. Total gesture	0.17	0.76**	0.76**	0.03	—						
6. Complexity of play	0.17	−0.21	0.03	−0.10	−0.13	—					
7. Symbolic play	0.10	−0.21	−0.08	−0.10	−0.20	0.85**	—				
8. MLU-W	0.47**	0.10	0.20	0.05	0.20	0.14	−0.05	—			
9. NDW	0.70**	0.07	0.07	0.03	0.12	0.15	0.04	0.53**	—		
10. Reported vocabulary	0.68**	0.10	0.11	0.00	0.13	0.17	0.12	0.60**	0.55**	—	
11. RM3L	0.45**	0.17	0.17	0.01	0.21	0.07	0.01	0.65**	0.32*	0.65**	—

* $p \leq 0.05$.

** $p \leq 0.01$.

MLU-W, mean length of utterance in words; NDW, number of different words produced; SPLS.

$n = 62$.

DESCRIPTION OF GROUP PERFORMANCE ACROSS VARIABLES

The second research aim focused on describing group performance across the potential screening variables. *Table 2* presents descriptive statistics of gesture, play, language sample, and parent report measures by group. Owing to the small group

sizes, examination of descriptive statistics informed which three variables were selected for group comparisons.

Gesture. All children in the sample gestured, but the typical group had a higher mean of gesturing behaviors for each type of gesture and total gesture behaviors. Deictic gesture was the most frequent behavior for both groups. Conventional gesture was also seen in both groups but less frequently than deictic gesture. It was not observed in five of the TD children or three of the DLD children. Iconic gesture was the least frequent, demonstrated by none of the children with DLDs and only by five of the TD children. The total gestures for the TL and DLD groups were quite similar.

Play. Scores on Linder's complexity of play subscale varied from 15 to 54 month developmental scores, with the TL group's mean developmental score being slightly higher than that of the DLD group's. Using the SPS framework, children's symbolic play skills ranged from symbolic level I to symbolic level VIII. The two groups had very similar mean symbolic play scores.

Table 2. Means and Standard Deviations for Language, Gesture, and Play Variables by Group

MEASURES	TL GROUP ($n = 40$)		DLDs GROUP ($n = 22$)	
	M	SD	M	SD
Deictic gestures used	8.17	5.97	7.27	6.83
Conventional gesture used	5.90	6.19	4.95	6.01
Iconic gesture used	0.13	0.65	0	0
Total gesture used	14.18	8.05	12.45	10.92
Complexity of play developmental score	33.67	7.08	32.45	5.45
Symbolic play stage	5.15	1.56	5.14	1.46
MLU-W	1.49	0.28	1.27	0.27
NDW	69.43	26.45	34.13	26.04
Reported vocabulary	61.77	20.42	27.55	18.88
RM3L	4.0	1.64	2.27	1.65

DLDs, developmental language disorders; TL, typical language.

Table 3. Classification Accuracy of Selected Individual Measures

	AUC	SENSITIVITY	SPECIFICITY	$\pm$ LR (95% CI)	–LR (95% CI)
NDW	0.82*	0.73	0.83	4.16 (2.02–8.54)	0.33 (0.17–0.66)
Reported vocabulary	0.90*	0.86	0.88	6.91 (2.99–15.95)	0.16 (0.05–0.45)
RM3L	0.79*	0.46	0.93	6.06 (1.86–19.74)	0.59 (0.40–0.87)

* $p < 0.001$.

AUC, area under the curve; CIs, confidence intervals; LR, likelihood ratio.

>0.80 = desirable; 0.70–0.79 = suggestive; <0.70 = undesirable.

Language sample measures. The DLD group's MLU-W was 1.27 words per sentence, whereas the TL group's mean was 1.49. The vocabulary used (NDW) differed by groups; the DLD group's mean NDW was 34.13 and the TL group's mean NDW score was 69.43. These appeared to be substantial differences.

Parent report measures. Two parent report measures were collected: the short form INV and RM3L. The DLD group's mean RM3L was 2.27 words per sentence and that of the TL group's was 4.0 words per sentence. The reported vocabulary differed by groups; the DLD group's mean reported vocabulary was 27.55 and the TL group's mean was 61.77. These differences also appeared substantial.

GROUP COMPARISONS

Results from the convergent validity analyses as well as descriptive statistics were used to identify which three variables were selected for subsequent analyses. NDW, reported vocabulary, and RM3L were selected for group comparisons. Three independent-samples t -tests were calculated to examine differences across these variables, and Bonferroni correction factor was employed to protect against a Type I error. There was a significant group difference in NDW [$t(60) = 5.05$, $p \leq 0.001$, $d = 1.30$] with a medium-large effect size observed. There were also significant group differences in the parent report measures of reported vocabulary [$t(60) = -6.48$,

$p \leq 0.001$, $d = 1.7$] and RM3L [$t(60) = -3.95$, $p \leq 0.001$, $d = 1.02$] with large effect sizes observed.

CLASSIFICATION ACCURACY OF INDIVIDUAL SCREENING MEASURES

Classification accuracy was calculated for the most promising individual screening measures. Measures recommended by the *Standards for the Reporting of Diagnostic Accuracy* were calculated, including sensitivity, specificity, positive likelihood ratio (+LR) and negative likelihood ratio (–LR), and

area under the curve (AUC) of receiver operating characteristics curves.^{36,37} In screening for DLDs, diagnostic accuracy values greater than 0.80 are considered desirable, values between 0.70 and 0.79 are considered suggestive, and values less than 0.7 are undesirable.^{37–39} Table 3 reports AUC and classification accuracy values for MLU-W, NDW, reported vocabulary, and RM3L. Reported vocabulary had the best classification accuracy values, with desirable sensitivity and specificity.

CLASSIFICATION ACCURACY OF COMBINED SCREENING MEASURES

Given the desirable results obtained from the reported vocabulary measure, two logistic regression models were estimated to establish the most accurate diagnostic model that predicted language status (DLD or TL): reported vocabulary + NDW and reported vocabulary + RMLU. Tolerance values were acceptable ($> 1 - R^2$), indicating there was not a problem with multicollinearity. Table 4 presents classification accuracy and R^2 values for each model. Results showed that improved precision and classification accuracy can be achieved when reported vocabulary is combined with NDW.

Discussion

An asynchronous, hybrid telehealth model can be used to screen the language development of toddler-age children.

Results from this study showed that a pen and paper measure (parent report measure of vocabulary) combined with a vocabulary measure obtained from brief video-recorded parent-facilitated play activities yielded the best classification accuracy values. These findings replicate earlier studies that have described the usefulness of parent surveys in screening young Spanish-speaking children. These findings,

Table 4. Classification Accuracy of Most Promising Combined Measures

	R^2	SENSITIVITY	SPECIFICITY	$\pm$ LR (95% CI)	–LR (95% CI)
Reported vocabulary+NDW	0.63*	0.86	0.93	11.51 (3.83–34.63)	0.15 (0.05–0.42)
Reported vocabulary+RM3L	0.58*	0.86	0.88	6.91 (2.99–15.95)	0.16 (0.14–0.45)

* $p < 0.001$.

as well as findings from an earlier study, suggest that play in itself is not likely a promising screening measure.¹⁴ At the same time, brief parent-facilitated play-based and e-book interactions may yield clinically useful language sample measures. Play and gesture measures may also still be useful in developmental screenings or assessments with Spanish-speaking toddlers, especially in cases where cognitive or other more severe developmental disabilities are suspected. The inclusion of parents as play partners and informants of child development parallels the call for the use of rich behavioral observation, informed opinion, and multiple sources of data when appraising a child's development.⁴⁰⁻⁴²

Earlier studies of Spanish-speaking toddlers have shown that gesture and complexity of play are significantly associated with language measures.¹⁴ However, convergent validity values obtained from this study did not support the use of gesture or play as brief telehealth measures to screen for DLDs in Spanish-speaking toddlers. These differences may be related to the shorter observation segments (16 min compared with 40) included in this study. Complex behaviors, such as gesture and play, seem to require longer observational windows or observation over multiple sessions in order to be factored into a clinical screening decision. Given that this study aimed to test brief measures as part of a telehealth-collected language screening, longer samples would not have been practical.

This study did replicate findings from earlier studies that have shown that language sample measures and parent report measures are both significantly associated with language scores in toddler-age Spanish-speaking children.^{23,27} Parent report of vocabulary development as well as NDW yielded useful screening information. These findings are unique in that they show that a hybrid telehealth model that includes parent report and behavioral measures of vocabulary can yield useful information in screening Spanish-speaking toddlers.

There are limitations to this study, which include small sample size, unequal group sizes, and standard error of measurement of variables. The small sample size may have contributed to the finding that some measures did not distinguish DLD children and their typically developing peers. The large confidence intervals and standard error of measurement of some variables indicate high levels of variability, which can influence the precision of diagnostic accuracy of a measure. Another limitation is that for mothers with limited educational experiences, both the book and play activities may have been unfamiliar or less common experiences for them. In addition, this study used an untested e-book version as a component of studying parent-child interactions.

Knowledge gained from this study is useful clinically. Hybrid telehealth models of screening the language of young Spanish-speaking children are promising. This study replicated an earlier study that found that a combination of video-recorded behaviors and parent report measures can yield strong classification accuracy values. Given the shortage of bilingual providers, this is an important finding that indicates a screening protocol that combines parent report measures and video-recorded behaviors can be used when direct access to a bilingual provider is not possible.

Acknowledgment

This research was funded by the National Institute of General Medical Sciences (grant U54GM104944-01A1).

Disclosure Statement

No competing financial interests.

REFERENCES

- Center for Publication Education. *The United States of education: A guide to our changing demographics and their implications for public schools*. 2012. Available at www.centerforpubliceducation.org (last accessed 2016).
- U.S. Census Bureau. *Population projections for Hispanics/Latinos*. 2013. Available at www.census.gov/ (last accessed 2013).
- Paul R, Norbury CF. *Language disorders from infancy through adolescence: Listening, speaking, reading, writing, and communicating*. St. Louis, MO: Elsevier, 2012.
- American Speech-Language-Hearing Association. *Demographic profile of ASHA members providing bilingual services*. Rockville, MD: American Speech-Language Hearing Association, 2012.
- Banerjee R, Luckner J. Training needs of early childhood professionals who work with children and families from culturally and linguistically diverse backgrounds. *Infants Young Child* 2014;27:43-59.
- Guiberson M, Atkins J. Speech-language pathologists' preparation, practices, and perspectives on serving culturally and linguistically diverse children. *Commun Disord Q* 2012;33:169-180.
- Dollaghan CA, Horner EA. Bilingual language assessment: A meta-analysis of diagnostic accuracy. *J Speech Lang Hear Res* 2012;54:1077-1088.
- U.S. Department of Health and Human Services. *Birth to 5: Watch me thrive. A compendium of screening measures for young children*. Washington, DC: U.S. Department of Health and Human Services, 2014.
- Wyoming Department of Health. *Rural and frontier health*. 2013. Available at www.health.wyo.gov/rfhd/multicultural/index.html (last accessed 2016).
- U.S. Department of Health and Human Services. *Healthy people 2010 focus area 1: Access to quality health services*. Washington, DC: U.S. Department of Health and Human Services, 2013.
- Mashima PA, Doarn CR. Overview of telehealth activities in speech-language. *Telemed J E Health* 2008;14:1101-1117.
- Guiberson M, Rodriguez B, Zajacova A. Accuracy of telehealth administered measures to screen language in Spanish-speaking preschoolers. *Telemed J E Health* 2015;21:714-720.
- Bates E, Bretherton I, Synder L, Shore L, Volterra V. Gestural and vocal symbols at 13 months. *Merrill-Palmer Q* 1980;26:407-423.

14. Guiberson M. Gesture, play, and language development of Spanish-speaking toddlers with developmental language disorders: A preliminary study. *Commun Disord Q* **2015**;32(2):88–99.
15. Kelly DJ. A clinical synthesis of the "late talker" literature: Implications for service delivery. *Lang Speech Hear Serv Sch* **1998**;29:76–84.
16. Nicoladis E, Mayberry RI, Genesee F. Gesture and early bilingual development. *Dev Psychol* **1999**;35:514–526.
17. Olswang LB, Rodriguez B, Timler G. Recommending intervention for toddlers with specific language learning difficulties: We may not have all the answers, but we know a lot. *Am J Speech Lang Pathol* **1998**;7:23–32.
18. Casby MW. Symbolic play of children with language impairment: A critical review. *J Speech Lang Hear Res* **1997**;40:468–479.
19. Leonard L. *Children with specific language impairment*. Cambridge, MA: MIT Press, **1998**.
20. Terrell BY, Schwartz RG, Prelock PA, Messick CK. Symbolic play in normal and language-impaired children. *J Speech Lang Hear Res* **1984**;27:424–429.
21. Brown R. *A first language: The early stages*. Cambridge, MA: Harvard University Press, **1973**.
22. Guiberson M, Barrett KC, Jancosek EG, Yoshinaga-Itano C. Language maintenance and loss in young preschool age children of Mexican immigrants: Longitudinal study. *Commun Disord Q* **2006**;28:4–14.
23. Guiberson M. Validity of a parent vocabulary checklist for young Spanish speaking children of Mexican immigrants. *Int J Speech Lang Pathol* **2008**;10:279–285.
24. Gutiérrez-Clellen VF, Restrepo MA, Bedore L, Peña E, Anderson R. Language sample analysis in Spanish-speaking children: Methodological considerations. *Lang Speech Hear Serv Sch* **2000**;31:88–98.
25. Miller JF. Progress in assessing, describing, and defining child language disorder. In: Dale P, Cole K, Thal D, eds. *Assessment of communication and language*. Baltimore, MD: Paul Brooks Publishing Company, **1996**: 309–324.
26. Guiberson M, Rodriguez B. Measurement properties and classification accuracy of two Spanish parent surveys of language development for preschool age children. *Am J Speech Lang Pathol* **2010**;19:225–237.
27. Guiberson M, Rodriguez B, Dale P. Classification accuracy of brief parent report measures of language development in Spanish-speaking toddlers. *Lang Speech Hear Serv Sch* **2011**;42:536–549.
28. Jackson-Maldonado D, Thal D, Marchman V, Bates E, Gutiérrez-Clellen V. Early lexical development in Spanish-speaking infants and toddlers. *J Child Lang* **1993**;20:523–549.
29. Patterson JL. Expressive vocabulary development and word combinations of Spanish-English bilingual toddlers. *J Speech Lang Pathol* **1998**;7:46–56.
30. Thal D, Jackson-Maldonado D, Acosta D. Validity of a parent-report measure of vocabulary and grammar for Spanish-speaking toddlers. *J Speech Lang Hear Res* **2000**;43:1087–1100.
31. U.S. Department of Agricultural and Research Services. *Rural definitions: Background*. Washington, DC: U.S. Department of Agricultural and Research Services, **2014**.
32. Westby CE. A scale for assessing development of children's play'. In: Gitlin-Weiner K, Sandgrund A, Schaefer CE, eds. *Play diagnosis and assessment*, 2nd ed. New York: Wiley, **2000**:131–161.
33. Linder T. *Transdisciplinary play-based assessment and intervention*. Baltimore, MD: Brookes, **2008**.
34. Nicoladis E. Some gestures develop in conjunction with spoken language development and others don't: Evidence from bilingual preschoolers. *J Nonverbal Behav* **2002**;26:241–266.
35. Miller JF. *SALT: Systematic analysis of language transcripts [Computer software]*. Madison, WI: Language Analysis Laboratory, **2008**.
36. Bossuyt PM, Reitsma JB, Bruns DE, Gatsonis CA, Glasziou PP, Irwig LM, et al. Towards complete and accurate reporting of studies of diagnostic accuracy: The STARD initiative. *Fam Pract* **2004**;21:4–10.
37. Dollaghan CA. *The handbook for evidence-based practice in communication disorders*. Baltimore, MD: Paul H. Brookes Publishing Co., **2007**.
38. Law J, Boyle J, Harris F, Harkness A, Nye C. The feasibility of universal screening for primary speech and language delay: Findings from a systematic review of the literature. *Int J Lang Commun Disord* **2000**;35:165–188.
39. Plante E, Vance R. Selection of preschool language tests: A data-based approach. *Lang Speech Hear Serv Sch* **1994**;25:15–24.
40. Durán LK, Cheatham GA, Santos RM. Evaluating young children who are dual language learners: Gathering and interpreting multiple sources of data to make informed decisions. In: McLean M, Snyder P, eds. *Young exceptional children monograph series 13*. Missoula, MT: CEC, **2011**:133–156.
41. Guiberson M, Banerjee R. Evaluating young children from culturally and linguistically diverse backgrounds for special education services. *Young Except Child* **2012**;15:33–45.
42. Neisworth JT, Bagnato, SJ. Using your good judgment: Informed opinion for early intervention. In: McLean M, Snyder P, eds. *Young exceptional children monograph series 13*. Missoula, MT: CEC, **2011**:79–91.

Address correspondence to:
Mark Guiberson, PhD, CCC-SLP
Division of Communication Disorders
Dept. 3311
University of Wyoming
1000 E. University Avenue
Laramie, WY 82071-2000

E-mail: mguibers@uwyo.edu

Received: December 1, 2015

Revised: December 30, 2015

Accepted: January 4, 2016