

Discriminating Children With Language Impairment Among English-Language Learners From Diverse First-Language Backgrounds

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Purpose: In this study, the authors sought to determine whether a combination of English-language measures and a parent questionnaire on first-language development could adequately discriminate between English-language learners (ELLs) with and without language impairment (LI) when children had diverse first-language backgrounds.

Method: Participants were 152 typically developing (TD) children and 26 children with LI; groups were matched for age ($M = 5;10$ [years;months]) and exposure to English ($M = 21$ months). Children were given English standardized tests of nonword repetition, tense morphology, narrative story grammar, and receptive vocabulary. Parents were given a questionnaire on children's first-language development.

Results: ELLs with LI had significantly lower scores than the TD ELLs on the first-language questionnaire and all the

English-language measures except for vocabulary. Linear discriminant function analyses showed that good discrimination between the TD and LI groups could be achieved with all measures, except vocabulary, combined. The strongest discriminator was the questionnaire, followed by nonword repetition and tense morphology.

Conclusion: Discrimination of children with LI among a diverse group of ELLs might be possible when using a combination of measures. Children with LI exhibit deficits in similar linguistic/cognitive domains regardless of whether English is their first or second language.

Key Words: English-language learners, child second language acquisition, child bilingualism, language impairment, assessment, parent questionnaires, nonword repetition, tense morphology, narratives

In linguistically and culturally diverse communities, like those in Canada and the United States, there is a need for effective language assessment resources for children who speak English as their second language (L2). Identification of language and learning disorders among English-language learners (ELLs) is complicated by the fact that their English-language abilities are still developing, and the majority of tests have been normed with monolingual native speakers only; therefore, overidentification of language and learning disorders in ELLs has been a persistent concern (Bedore & Peña, 2010; Cummins, 2000; Donovan & Cross, 2002; Gutiérrez-Clellen, Restrepo, & Simon-Cerejido, 2006; Kohnert, 2010; Paradis, Genesee, & Crago, 2011). However, a “wait and see” approach where ELL children who might have language or learning difficulties are not identified until their oral English abilities converge with

those of native speakers could lead to a delay in timely intervention because it can take up to 5 years in school for this to occur (Cummins, 2000; Saunders & O'Brien, 2006). Regarding *specific* or *primary* language impairment (LI), identifying ELL children with this disorder is additionally challenging because the core deficits of the disorder forming the basis of diagnosis are in the domain of language and closely related cognitive systems, precisely where bilingual/monolingual differences are often observed even in typically developing (TD) children (Kohnert, 2010; Paradis et al., 2011).

Much research that is aimed at addressing the challenges of assessment with ELLs has focused on developing Spanish–English bilingual assessment procedures so that clinicians can test bilingual children in both languages, compare them with an appropriate comparison group, and take into account some unique aspects of bilingual language competence and use (e.g., Bedore, Peña, Garcia, & Cortez, 2005; Bedore, Peña, Gillam, & Ho, 2010; Goldstein, 2012; Gutiérrez-Clellen et al., 2006; Gutiérrez-Clellen & Simon-Cerejido, 2007, 2010; Peña, Gutiérrez-Clellen, Iglesias, Goldstein, & Bedore, 2013). In contrast to the wealth of research on Spanish–English speakers, there is a paucity of research aimed at addressing the challenges of assessment with ELLs from diverse first-language backgrounds.

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Demographics in North America point to the importance of including diverse ELL populations in research on language assessment with bilingual children. Whereas in the United States there is a large concentration of Spanish first-language children, the presence of ELL children with non-Spanish backgrounds is not negligible; it is approximately 20%, or 1,000,000 children, and they speak a variety of typologically distinct first languages (U.S. Department of Education, 2008). In Canada, nearly half a million children do not speak English or French as their mother tongue. These children speak approximately 100 different languages, with the most dominant group, the Chinese languages, comprising approximately 20% of the total (Statistics Canada, 2011). Thus, even though bilingual assessment could be considered the best practice with ELLs, it is important to consider alternative strategies when the diversity among ELLs might impact the ability to adequately and comprehensively assess their dual-language abilities.

One strength of the bilingual assessment approach is the emphasis on comparing bilingual children with each other, instead of with monolinguals, for the purposes of identifying children with LI. Regarding diverse ELL groups, it is likely that bilingual children's language abilities could only be compared in English because it is the sole language they have in common. This raises questions about whether single-language test results in the L2 can provide adequate comparative information for assessment. For example, any group of same-aged ELLs would have a range of exposure time to their English L2, thus causing substantial variance in their performance on English tests (Golberg, Paradis, & Crago, 2008; Hammer, Lawrence, & Miccio, 2008; Kohnert, 2010; Paradis, 2011; Vagh, Pan, & Mancilla-Martinez, 2009). Furthermore, a group of ELLs with diverse first languages might display even more variance than a homogenous group of ELLs due to cross-linguistic transfer, which, in turn, could affect their performance on tests probing English phonological and morphosyntactic skills in particular (Kohnert, 2010; Paradis, 2011; Paradis et al., 2011). However, variance notwithstanding, some research has indicated that single-language testing can result in adequate discrimination of children with LI among Spanish-English bilinguals when an appropriate bilingual comparison group is used (Gutiérrez-Clellen et al., 2006; Gutiérrez-Clellen & Simon-Cerejido, 2007; but see Gutiérrez-Clellen & Simon-Cerejido, 2010). Whether it is possible to differentiate children with and without LI among diverse ELL children based on single-language testing in English remains unknown.

Another insight of the bilingual assessment approach is that obtaining information on the first-language development of L2 children is highly relevant to assessment, because children would not have an endogenous language disorder like LI in one language but not the other, and information on both languages would provide more comprehensive documentation of a bilingual's linguistic abilities, especially if the first language is the more proficient language (American Speech-Language-Hearing Association [ASHA], 1985, 2004; Canadian Journal of Speech-Language Pathology & Audiology [CASLPA], 1997; Gutiérrez-Clellen & Simon-Cerejido, 2010; Kohnert,

2010). Nevertheless, barriers to effective assessment of an ELL child's first language in diverse contexts are numerous and include (a) lack of bilingual speech-language pathologists, appropriate tests, or qualified interpreters and/or cultural brokers from the child's background to administer tests or collect language samples, and (b) limited available documentation on the typical and atypical course of development of that language to interpret test or language sample information about a child's first-language development if obtained. Given the presence of barriers to direct assessment of children's first language in a diverse context, an alternative is obtaining indirect information on a child's first-language development via parent questionnaire.

Recent research has revealed that parents can be a reliable source of information on their bilingual children's language abilities. For example, studies have shown that parent ratings of differential use and proficiency in both languages correlate with observed outcomes in each language (Bedore, Peña, Joyner, & Macken, 2011; Gutiérrez-Clellen & Kreiter, 2003; Hammer et al., 2012). Research has also revealed the potential clinical value of parent questionnaires. Massa, Gomes, Tartter, Wolfson, and Halperin (2008) examined the extent to which parent and teacher ratings of at-risk ELL children's difficulties in reading, writing, listening, and speaking were in concordance with results from standardized tests administered to the children. They found a moderate and negative correlation between rating scales and test results, indicating that the higher the difficulty ratings, the lower the test results. Bedore et al. (2011) also found significant and negative correlations between ratings of parent and teacher concern and bilingual Spanish-English children's performance on semantic and morphosyntactic tests. Furthermore, Restrepo (1998) included parent questionnaire data among the measures used to discriminate children with LI among a group of predominantly Spanish-speaking children in the United States. Her analyses indicated that a combination of Spanish-language measures and questionnaire data on children's language abilities could result in good discriminability of the children with LI. Similarly, Paradis, Emmerzael, and Sorenson Duncan (2010) examined whether scores from a parent questionnaire on ELL children's first-language development could function to discriminate between TD ELL children and ELL children with LI. The questionnaire was designed for ELL children with diverse backgrounds, rather than being specific to a particular cultural-linguistic group. Paradis et al. (2010) found that the scores from the questionnaire discriminated well overall, but with superior specificity to sensitivity, suggesting it could be a useful clinical instrument if it were used in conjunction with other measures.

The goal of this study was to investigate the potential of two strategies for assessment with diverse ELL children: using an ELL comparison group and parent questionnaire on first-language development. More specifically, we sought to determine whether ELL children with LI could be discriminated from their TD ELL peers on the basis of a combination of performance on English standardized tests and parent questionnaire data.

Nonword Repetition and Tense Morphology in English-Language Impairment

Bedore and Peña (2010) argue that tests probing areas of extreme difficulty for children with LI, so-called clinical markers, are likely to be more effective for assessment with bilingual children. Much research has shown English-speaking children's performance on nonword repetition tasks and their accuracy with tense-marking verb morphology to be such areas of extreme difficulty for children with LI (Bedore & Leonard, 1998; Bishop, Adams, & Norbury, 2006; Conti-Ramsden, 2003; Conti-Ramsden, Botting, & Faragher, 2001; Gathercole, 2006; Rice, 2004; Rice & Wexler, 1996). However, because L2 learners, even TD children, are still developing their English phonology and morphosyntax, their accuracy in nonword repetition and use of tense morphology might be too variable for effective differentiation between TD children and those with LI. For example, Kohnert, Windsor, and Yim (2006) found that TD Spanish-English bilingual children had scores on an English nonword repetition task lower than those of TD monolingual children, showing some overlap with monolingual children with LI. Similarly, Paradis and colleagues found that young ELLs from diverse first-language backgrounds showed a great deal of overlap with same-aged monolinguals with LI in their accuracy with verb morphology (Paradis, 2005; Paradis, Rice, Crago, & Marquis, 2008). Furthermore, prior studies have shown that ELL children whose first languages mark tense grammatically acquire this aspect of English morphosyntax more quickly than those whose languages do not include grammatical tense marking (Blom & Paradis, 2013; Blom, Paradis, & Sorenson Duncan, 2012), and Paradis (2011) found that such cross-linguistic transfer influenced ELL children's scores on a standardized test of tense morphology, the Test of Early Grammatical Impairment (Rice & Wexler, 2001).

Research comparing the abilities of ELLs with and without LI for nonword repetition or tense morphology is limited; however, there appears to be some potential for these measures to be effective for assessment with ELLs, in spite of the variability introduced by ongoing development of the L2. Girbau and Schwartz (2008) found that a Spanish nonword repetition task showed good discriminant accuracy for children with LI among Spanish-English bilinguals. Gutiérrez-Clellen and Simon-Cerejido (2010) found performance on nonword repetition tasks in both English and Spanish, if combined, to be clinically useful. Regarding tense morphology, studies have found significant between-group differences between ELLs with TD and those with LI in their use of inflectional tense morphology (Blom & Paradis, 2013; Jacobson & Schwartz, 2005; Paradis, 2008), although additional techniques, such as linear discriminant function analysis, were not included in these studies. Further research on the clinical discriminatory properties of nonword repetition and tense morphology in the English L2 context is warranted.

Narrative Skills in English-Language Impairment

Storytelling or narrative production from a set of pictures is a task that yields multiple sources of information

about a child's language abilities from the story macrostructure to the details of the vocabulary and morphosyntax used (Bedore et al., 2010; Cleave, Girolametto, Chen, & Johnson, 2010). Regarding narrative macrostructure, a child's ability to describe a picture story adequately to a naïve listener requires some command of the target language lexicon and morphosyntax, but it also requires cognitive-linguistic interface skills to produce the essential components/events of a coherent story, for example, establishing the setting and describing an initiating event, a response, and an outcome (Gutiérrez-Clellen, 2012; Schneider, Hayward, & Dubé, 2006). Such narrative macrostructure abilities are often referred to as *story grammar* (Stein & Glenn, 1979). Researchers have found that English monolingual and Spanish-English bilingual children with LI show deficits in their narrative macrostructure abilities, including story grammar, indicating that examining such abilities could be useful for assessment (Gutiérrez-Clellen, 2012; Schneider et al., 2006).

Because cognitive-linguistic interface skills such as story grammar can be potentially shared between the two languages of bilinguals (Cummins, 2000), they might be a source of strength in TD ELL children's English development early on, and in turn a source of difference between TD ELLs and ELLs with LI. Research has shown that early literacy skills and narrative macrostructure components are more likely to be associated between the two languages of bilingual children than more language-specific lexical and morphosyntactic oral language abilities (Cardenas-Hagen, Carlson, & Pollard-Durodola, 2007). Furthermore, Cleave et al. (2010) found no differences in story grammar abilities between English monolingual children with LI and predominantly English-speaking ELLs with LI, indicating that this measure might be relatively less biased against nonmonolingual speakers. These findings motivate further research into the clinical discriminatory properties of narrative story grammar with ELLs.

The Present Study

The primary objective of this study was to examine whether children with LI could be discriminated from their TD peers among a diverse group of ELLs who were still in the process of acquiring their English L2. To meet this objective, we examined the discriminatory properties of a parent questionnaire on first-language development together with ELL children's performance on standardized tests of nonword repetition, verb tense morphology, and narrative story grammar. The Peabody Picture Vocabulary Test (Dunn & Dunn, 1997) was also included as a control test because, in contrast with the other tests, in previous research it has not been shown to be an effective measure for identifying LI in English monolingual children (Gray, Plante, Vance, & Henrichsen, 1999). In addition, we conducted secondary analyses to examine the extent to which differentiation between TD ELLs and ELLs with LI was influenced by factors contributing to variance within a group of ELLs such as differences in length of exposure to English and first-language background.

Method

Participants

There were 152 TD ELL children and 26 ELL children with LI in this study. Children were residing in either Edmonton or Toronto, Canada, at time of testing; the majority was from Edmonton. They spoke a variety of first languages (Arabic, Assyrian, Cantonese, Farsi, Hindi, Mandarin, Portuguese, Punjabi, Urdu, Somali, Spanish, and Vietnamese). The children were from newcomer (immigrant and refugee) families in which both parents were foreign born and L2 learners of English. Forty-two percent of the ELL children were also foreign born. Crucially, the Canadian-born ELL children were not exposed to English on a consistent basis until they started a preschool or school program. Although children were experiencing variation in how much English was spoken in their homes when we tested them, they were all exposed exclusively or primarily to their first language before the age of 2;0–3;0 (years;months); this was a criterion for inclusion in the study. On average, the TD children began learning English in a preschool program at age 4;2; the children with LI did so at age 3;8. Thus, these children were sequential bilinguals rather than simultaneous bilinguals from birth.

Children and their families in the TD group were recruited from schools or through agencies that assist newcomer families. Children in this group were attending regular kindergarten or Grade 1 classes, with no history of special education placements or diagnoses of developmental difficulties or delays, according to parental report. Children with LI were recruited either from caseloads of certified speech-language pathologists working in the schools or from special kindergarten and preschool programs for children with language and cognitive delays. Speech-language pathologists work as part of the educational teams in these programs and referred these children to us. All children with LI in this sample had undergone speech-language assessments and were assigned either to a special program or to one-on-one intervention with a speech-language pathologist on the basis of the outcome of these assessments. Tests used and assessment protocols differed according to region and program, and we did not have access to individual assessment reports for the children. However, for many of the Edmonton children, parent concern was noted and included as a component in the assessment, according to the speech-language pathologists we spoke to. Also as part of the recruitment process, we requested referrals to children who had the following exclusionary characteristics: no autism spectrum disorder, no hearing impairment, no frank neurological damage, no moderate–severe intellectual disability, and no significant speech-sound disorders.

The children in the TD and LI groups for this study were selected from larger groups in order to be matched for age at testing, months of exposure to English, and first-language typology. Matching was on the basis of group equivalencies rather than pairwise matching, as there were many more TD children than children with LI. We eliminated as few children as possible from the larger sample as part of

the matching process to maintain a good-sized sample. In this study, the TD children had a mean age of 5;10 and a mean of 20 months' exposure to English, and the children with LI had a mean age of 5;9 and a mean of 24 months' exposure to English (*SD* and ranges appear in Table 1). Independent-groups *t* tests revealed no differences between these groups for age and exposure to English. Children's first languages were divided into two groups: tense-marking first language (code = 1) and non-tense-marking first language (code = 0). This division was based on typological characteristics regarding grammatical tense and verb inflection in the first language that have been used in prior research with ELLs from these language backgrounds (see Blom & Paradis, 2013; Blom et al., 2012; Paradis, 2011). All languages except Mandarin, Cantonese, and Vietnamese had a code of "1" because all of them mark tense grammatically and have inflectional verbal paradigms. The ratio of children with tense-marking/non-tense-marking first languages was 105/47 for the TD children and 17/9 for the children with LI. The participant groups were equivalent with respect to the proportion of tense-marking and non-tense-marking first languages, as shown by the means in Table 1 in the First language row, which were derived from the 1-0 coding. An independent-samples *t* test on first-language typology scores was not significant.

Additional participant characteristics displayed in Table 1 are family socioeconomic status and child's non-verbal IQ abilities. Both the TD and LI groups included families from different socioeconomic backgrounds, as shown by the ranges in mothers' and fathers' years of education. Education in the home country was included in this calculation; 12 years of education were considered to be equivalent to secondary school. Even though there was

Table 1. Participant characteristics for the TD and LI groups.

Characteristic	Group	<i>M</i>	<i>SD</i>	Range
Age (mos)	TD	70.33	7.086	58–86
	LI	68.65	9.316	58–103
Exposure to English (mos)	TD	20.49	10.065	7–48
	LI	24.42	11.614	7–49
First language ^a	TD	0.69	0.0464	0–1
	LI	0.65	0.485	0–1
Mothers' education (yrs)	TD	14.14	3.33	0–22
	LI	11.00	3.49	6–18
Fathers' education (yrs)	TD	14.69	3.75	1–22
	LI	11.92	3.60	5–20
Nonverbal IQ	TD	105.70	11.849	81–148
	LI	96.12	10.469	76–120

Note. mos = months; TD = typically developing; LI = language impairment; yrs = years.

^aTense-marking first language = "1" (Arabic, Assyrian, Farsi, Hindi, Portuguese, Punjabi, Urdu, Somali, Spanish); non-tense-marking first language = "0" (Cantonese, Mandarin, Vietnamese).

overlap in the range of years of education between the two groups, the TD group parents had more years of schooling on average than the LI group parents: mother's education (14.14 vs. 11.00), $t(176) = 3.138, p < .001$; father's education (14.69 vs. 11.92), $t(171) = 3.380, p < .001$. Finally, a nonverbal IQ screen was included in the testing in this study (Columbia Mental Maturity Scales; Burgemeister, Hollander Blum, & Lorge, 1972), and children's nonverbal IQ standard scores are in Table 1. IQ scores for the children with LI were significantly lower than those for the TD group, $t(164) = 3.785, p = .001$, which is a common pattern in research on LI (Leonard, 1998; Swisher, Plante, & Lowell, 1994). Even though the mean IQ for both groups fell within normal limits (85–115), there were seven children with scores between 76 and 84 across both groups.

The participant groups in this study overlap with, but are not identical to, those in Blom and Paradis (2013), Paradis et al. (2010), and Paradis (2011). Ethics approval for conducting this research was granted to the first author of this study from the Health Research Ethics Board at the University of Alberta, Canada.

Procedure

Children were given the English tests and the nonverbal IQ screen either at school or in their homes. Parents were given the questionnaire at home, with the assistance of an interpreter. No significant differences in test scores arose from differences in testing location. The content, administration, and scoring for the questionnaire and the tests are described below.

The Alberta Language Development Questionnaire (ALDeQ; Paradis et al., 2010; see also www.chesl.ualberta.ca). The ALDeQ is a parent questionnaire on early language milestones, current first-language abilities, activity preferences and behavior, and family history. Answers are scored on rating scales such that lower scores are more consistent with what might be expected for children with LI, and higher scores more consistent with typical development. The rating scale scores yield a total proportion score (denominator derived from the number of questions answered) with a range of 0–1.0.

The Nonword Repetition/Comprehensive Test of Phonological Processing (CTOPP; Wagner, Torgesen, & Rashotte, 1999). The CTOPP nonword repetition subtest is a measure of phonological short-term memory. Children are asked to accurately repeat nonsense words played on a CD that increase in syllable length and phonological complexity. Children's responses are recorded and scored later while listening to the recording. Children are scored on how many words they accurately produced until they reached ceiling for errors, with omissions and substitutions of sounds counting as errors. Standard scores have a mean of 10, with a normal range of 7–13.

Screening Test of Early Grammatical Impairment (TEGI; Rice & Wexler, 2001). The TEGI screener consists of two subtests that measure children's accuracy in producing the third person singular [-s] inflection, the past tense regular [-ed] inflection, and past irregular verb forms.

Children are given prompts while examining pictures that elicit the use of the target verb inflection. Accuracy scores are proportion correct based on correct productions divided by the number of scorable responses. For irregular verbs, children are scored as correct if they overregularize the form (e.g., "digged" instead of "dug"). The rationale for the inclusion of overregularized forms as correct is that they are responses marked for inflection, instead of bare verb stems (cf. Examiner's Manual; Rice & Wexler, 2001). The TEGI is a criterion-referenced rather than norm-referenced test, and thus there are no standard scores.

Story Grammar/Edmonton Narrative Norms Instrument (ENNI; Schneider, Dubé, & Hayward, 2005). The ENNI consists of short image sequences depicting stories that increase in complexity in terms of an increase in events, objects, and characters. Children are shown the pictures first then are asked to tell the story with the book turned away from the tester so they cannot rely on joint attention or pointing. Children's stories are recorded and later transcribed using the CHAT system (MacWhinney, 2000; see also www.childes.cmu.edu). The stories can be analyzed for a range of macrostructure and linguistic components, but only story grammar was included in this study. The story grammar scoring scheme for each ENNI story consists of assigning points to the number of elements a child included in his or her story that are considered to be elements that form a "good" story according to research on narratives (e.g., introducing characters, establishing setting, describing an initiating event, etc.). Importantly for the purposes of this study, errors in grammar or lexical usage do not play a direct role in the scoring for story grammar. Ten percent of all transcripts were transcribed and scored by a second research assistant, and the transcriptions and scoring were compared with the originals for discrepancies. Reliability of words transcribed and scoring ranged from 90% to 98%. ENNI story grammar standard scores have a mean of 10 and a normal range of 7–13.

The Peabody Picture Vocabulary Test—III (PPVT; Dunn & Dunn, 1997). The PPVT is a measure of receptive vocabulary size. Children are asked to point at a picture in an array of four that matches the word given by the tester. Children's scores are calculated on the basis of number of pictures accurately selected until they reached a ceiling for errors. Standard scores have a mean of 100 with a normal range of 85–115.

Analyses presented in the Results section are based on standard scores for the English tests except the TEGI. This requires some justification because these standard scores are based on converting raw scores according to an ELL child's age based on monolingual norms. The reason for the use of standard scores is that even though the groups in this study were equivalent for mean age, there was an age range within each group, and prior research with this and another sample of ELLs showed that older ELLs tend to be more advanced in their English development even when length of exposure is held constant (Golberg et al., 2008; Paradis, 2011). Thus, use of standard scores in the analyses would control for this factor. All analyses reported

in this study showed the same overall patterns with raw as with standard scores; however, the linear discriminant function analyses in particular had superior sensitivity outcomes when standard scores were used. This is possibly due to controlling for the variation in performance introduced by the age variation in the sample. As mentioned above, the TEGI does not have standard scores. However, this should not matter for the analyses in this study because the scores from the TD-norming sample for the TEGI in this age range are stable and close to ceiling, that is, not normally distributed (Examiner's Manual; Rice & Wexler, 2001). Therefore, it is unlikely that standard scores would change much in the age range we are looking at in this study, even if such scores existed for the TEGI.

Results

Between-Group Analyses

The first analyses consisted of comparisons between the TD ELL children and the ELL children with LI on the questionnaire and English test scores. Independent-samples *t* tests showed that the TD group's scores were significantly higher than the LI group's scores on the ALDeQ, CTOPP, ENNI, and TEGI, but not the PPVT. Mean scores for each group and statistical results are in Table 2. Effect size calculations (Cohen, 1988) revealed a large effect size between the groups for the ALDeQ and the CTOPP, medium effects sizes for the ENNI and TEGI, and a small effect size for the PPVT.

A subsequent analysis was performed where the scores of the individual ELL children with LI were compared with the distribution of scores from the TD ELL group for the purposes of further investigating overlap between them. More specifically, we examined whether the scores for each measure for each child with LI were -1 *SD* or lower than the ELL mean. The PPVT was excluded because the *t* test analysis above was nonsignificant. Results indicated that 15/26 children with LI had scores of -1 *SD* or lower than the

TD mean on 3/4 or 4/4 measures, and 23/26 had scores in this range for at least 2/4 measures. For three children, only 1/4 scores fell in that range, but the children had borderline scores for at least one other test.

The final column of Table 2 shows the percentage of children in each group whose score fell -1 *SD* or lower than the monolingual mean for their age, or below the criterion score for the TEGI. The purpose of this analysis was twofold. First, we wanted to investigate the extent to which the children in this study had achieved English language skills akin to their monolingual-age peers. In other words, we wanted to make sure that they were still in the process of learning their L2. Second, we wanted to explore the potential for overidentification of LI in TD ELL children. For each test, the percentage of children performing below monolingual-based expectations was higher for the ELLs with LI, as would be expected. The percentage of the TD children performing below monolingual-age expectations ranged from 24% to 78%, depending on the test, but importantly, there was no test where 100% of the TD ELL children had scores within the norms for monolinguals.

Linear Discriminant Function Analyses

The results of the between-group analyses showed the potential for differentiation between children with TD and LI among ELLs. Therefore, linear discriminant function analyses were carried out next to further understand which measures or combinations of measures could discriminate between the TD children and the children with LI. We adopted Plante and Vance's (1994) criteria for assessing classification results, namely that specificity/sensitivity of 80%–89% can be considered *fair*, and specificity/sensitivity of $> 90\%$ can be considered *good*.

Pearson correlational analyses between the language measures for the TD and LI groups were conducted first to ascertain the strength of the relationships between them before the discriminant analyses were conducted. Results in Table 3 show more significant correlations for the TD

Table 2. Between-group comparisons for the parent questionnaire and English tests.

Measure	Group	Score <i>M</i> (<i>SD</i>)	<i>t</i>	<i>p</i>	Cohen's <i>d</i>	Below monolingual norms/crit ^a
ALDeQ	TD	0.80 (0.12)	<i>t</i> (176) = 13.095	.000	2.53 (large)	
	LI	0.47 (0.14)				
CTOPP	TD	7.7 (2.0)	<i>t</i> (175) = 4.943	.000	1.13 (large)	42%
	LI	5.6 (1.7)				88%
TEGI	TD	0.55 (0.34)	<i>t</i> (170) = 3.297	.001	0.75 (medium)	78%
	LI	0.30 (0.33)				92%
ENNI	TD	9.3 (3.5)	<i>t</i> (26.9) = 2.525	.018	0.62 (medium)	24%
	LI	6.8 (4.4)				48%
PPVT	TD	88 (17)		<i>ns</i>	0.17 (small)	38%
	LI	85 (18)				43%

Note. ALDeQ = Alberta Language Development Questionnaire; CTOPP = Comprehensive Test of Phonological Processing; TEGI = Test of Early Grammatical Impairment; ENNI = Edmonton Narrative Norms Instrument; PPVT = Peabody Picture Vocabulary Test.

^aPercentage of children whose score was -1 *SD* or lower than the monolingual standard score mean/below the monolingual criterion score on the TEGI.

Table 3. Correlations between language measures for the TD and LI groups.

Measure	TEGI	ENNI	PPVT
<i>TD group</i>			
CTOPP	.242**	.239**	.269**
TEGI	—	.282**	.487**
ENNI		—	.330**
<i>LI group</i>			
CTOPP	.412	.133	.291
TEGI	—	.492*	.478*
ENNI		—	.453*

* $p < .05$. ** $p < .01$.

than the LI group, most probably a result of sample size differences. For both the TD and LI groups, significant correlation coefficients between the language measures were small to moderate, with none above .50, suggesting the tests are measuring reasonably separate aspects of language.

The first discriminant analysis was conducted with a full model (i.e., all measures predicting group membership): the ALDeQ, CTOPP, TEGI, ENNI, and PPVT. This analysis was significant, $\chi^2(5) = 123.581$, $p = .001$, and yielded an eigenvalue of 1.338 and canonical correlation of .757 (see Table 4). Classification results from this function were 91% specificity (TD correctly classified as TD) and 91% sensitivity (LI correctly classified as LI). Even though this function achieved good discrimination, the uneven size of each of the predictors, as shown by the standardized function coefficients, indicated that further analyses with reduced models should be conducted. The second and optimal discriminant analysis included the ALDeQ, CTOPP, ENNI, and TEGI, but not the PPVT. This model was significant, $\chi^2(4) = 124.04$, $p = .000$, with an Eigenvalue of 1.326 and canonical correlation of .755, indicating similar discriminant abilities as Model 1 (see Table 4). The standardized discriminant coefficients for Model 2 revealed that the strongest predictor was the ALDeQ, followed by TEGI = CTOPP > ENNI. Classification properties for Model 2 were specificity of 92% and sensitivity of 91%. The results of a third discriminant analysis presented in Table 4 show that

further reducing the model resulted in *fair* rather than *good* classification for sensitivity. Subsequent analyses with smaller numbers of factors yielded significant functions, but with poorer discrimination properties (i.e., specificity or sensitivity below 90%, or below 80% if the ALDeQ was not included in the analysis).

Role of Length of English Exposure and First-Language Typology

Although the TD and LI groups were equivalent in terms of length of exposure to English, there was a broad range of exposure to English within each group, 7–48 months for TD and 7–49 months for LI. Because children’s proficiency in English should increase along with their exposure to the language, variation in exposure time could influence differentiation between TD children and children with LI. Accordingly, we investigated the role of exposure to the L2 on children’s performance on the English tests through between-group analyses. The children were divided into two exposure groups: low exposure = 7–18 months (TD: $n = 76$, LI: $n = 9$) and high exposure = 19–49 months (TD: $n = 72$, LI: $n = 15$). The dividing point was the median of the sample. Table 5 shows the scores for the TD children and children with LI when they are divided into low- and high-exposure groups. Because dividing the children into two exposure groups caused the LI group numbers to be small, nonparametric Mann–Whitney U comparisons were conducted. Comparisons between the TD and LI children in the low-exposure group produced no significant differences for the tests, although results for the TEGI and ENNI approached significance, with $p = .065$ and $p = .078$, respectively. Comparisons between the TD and LI children in the high-exposure group yielded significant differences in scores for the CTOPP and TEGI, but not the PPVT or ENNI. (ENNI scores approached significance at $p = .072$.)

Both the TD and LI groups were equivalent in the proportional distribution of children whose first languages marked grammatical tense or not. This equivalency was undertaken because previous research found that first-language typology influenced rate of acquisition of verb morphology in L2 English. We conducted analyses to

Table 4. Comparative discriminant function models.

Model	χ^2	p	Standardized coefficients	Specificity	Sensitivity
1	123.581	.001	ALDeQ .913 CTOPP .264 TEGI .295 ENNI .121 PPVT -.078	91%	91%
2	124.1	.001	ALDeQ .924 CTOPP .265 TEGI .265 ENNI .087	92%	91%
3	122.6	.001	ALDeQ .937 CTOPP .291 TEGI .210	90%	83%

Table 5. English tests scores by English exposure groups.

Group	CTOPP	TEGI	ENNI	PPVT
<i>Low exposure (7–18 months)</i>				
TD	7.1	.45	9.1	83
LI	6.0	.26	6.0	78
<i>High exposure (19–49 months)</i>				
TD	8.3	.65	9.5	93
LI	5.4	.33	7.3	88

ascertain whether differentiation between the TD and LI groups for the TEGI could have been modulated by first-language typology. Mann–Whitney U comparisons were conducted between the TD and LI groups within each first-language typology category. (Nonparametric tests were chosen for the same reasons as above for length of exposure analyses.) There was a significant difference between the TEGI scores for the TD and LI groups whose first languages mark tense: TD(105) = .62, LI(15) = .34; $p = .006$, but not between the TD and LI groups whose first languages do not mark tense: TD(47) = .37, LI(9) = .24.

Discussion

The objective of this study was to investigate the possibility of discriminating children with LI among ELL children who had diverse first-language backgrounds. The bulk of existing research on assessment with ELLs has been based on Spanish first-language children, and yet, a substantial number of ELLs in both Canada and the United States have diverse language backgrounds. Therefore, it is relevant for clinical practice to understand whether effective assessment could be carried out when speech-language pathologists can only examine children's English skills directly, and first-language development indirectly. Accordingly, we administered a set of English standardized tests to 152 ELL children with TD and 26 children with LI and a questionnaire on children's first-language development to their parents. Between-group and linear discriminant function analyses were carried out to determine whether the children with LI could be differentiated from those with TD based on these English tests and the questionnaire.

We first conducted between-group analyses with ELL children's scores from tests of nonword repetition (the CTOPP), tense morphology (the TEGI), story grammar (the ENNI), and receptive vocabulary (the PPVT), as well as scores from a parent questionnaire on first-language development (the ALDeQ). The ELL children with LI in this study had significantly lower scores than their TD peers on the ALDeQ and all the English measures except the PPVT, with medium to large effect sizes. Eighty-nine percent of the ELL children with LI had scores on at least two tests lower than -1 SD below the TD ELL mean, further indicating differentiation between the groups. The ELL children's performance was additionally analyzed in terms of whether each child met the minimal monolingual-based age expectations on each test (i.e., a score ≥ -1 SD from the mean or

\geq the criterion score). A smaller percentage of TD children fell below monolingual-age expectations than children with LI; however, the percentage of the TD children scoring below age expectations was substantial, ranging from 24% to 78% depending on the test. In sum, these between-group analyses revealed the potential for differentiating children with LI among ELLs even when children were clearly still in the process of acquiring their English L2. Furthermore, the percentage of TD ELL children not meeting monolingual-based expectations for performance indicates that using monolingual norms for interpretation of abilities could indeed put TD ELL children at risk for overidentification of LI.

The between-group analyses were followed by linear discriminant function analyses. The optimal model from these analyses included the ALDeQ, CTOPP, TEGI, and ENNI, but not the PPVT. This model showed good classification properties, with both specificity (TD as TD) and sensitivity (LI as LI) greater than 90%. These results go beyond the between-groups analyses in showing that ELL children with LI had a profile across these combined measures that clearly distinguished them from their TD peers. Thus, the discriminant function analysis outcomes suggest that accurate identification of children with LI among ELL children could be possible when ELL children are compared with each other.

The strongest discriminator among the measures in the optimal model was the ALDeQ (standardized coefficient = .924). Differences between the TD and LI group scores for the ALDeQ were the largest as well ($d = 2.53$). Both these findings point to how vital information on first-language development is to accurate identification of children with LI among ELLs at this stage of L2 development (ASHA, 1985, 2004; CASLPA, 1997; Gutiérrez-Clellen & Simon-Cerejido, 2010; Kohnert, 2010). Paradis et al. (2010) examined discrimination between TD ELL children and ELL children with LI based on the ALDeQ alone and found that specificity was over 90%, but sensitivity was less than 80%. Thus, they recommended the ALDeQ be used in conjunction with other measures. Results of this study offer support for this particular recommendation and also provide further evidence for the general clinical usefulness of parent questionnaires in the assessment of ELL children (cf. Bedore et al., 2011; Massa et al., 2008; Restrepo, 1998).

The English-language measures that best discriminated between the TD and LI groups in this study were nonword repetition (CTOPP: $d = 1.13$; standardized coefficient = .265) and tense morphology (TEGI: $d = 0.75$; standardized coefficient = .265). It is notable that nonword repetition and tense morphology also discriminate well for monolingual English-speaking children the same age (Bedore & Leonard, 1998; Bishop et al., 2006; Conti-Ramsden, 2003; Conti-Ramsden et al., 2001; Gathercole, 2006; Rice, 2004; Rice & Wexler, 1996). Furthermore, the TD and LI groups did not differ to the same extent on all English-language measures. There were no between-group differences for the PPVT, and this measure did not contribute significantly to the discriminant analysis. Although both analyses showed that

the ENNI contributed to differentiation between groups, comparison of coefficients in the discriminant analysis (see Table 4) show that nonword repetition and tense morphology contributed more. Therefore, even though these children's English L2 phonological and morphosyntactic development was still in progress, group differences were apparent between TD children and children with LI for tests drawing on these linguistic domains. This finding is consistent with prior research comparing ELL children with and without LI (Blom & Paradis, 2013; Girbau & Schwartz, 2008; Gutiérrez-Clellen & Simon-Cerejido, 2010; Jacobson & Schwartz, 2005; Paradis, 2008). In a nutshell, the pattern of results across the English tests indicates that areas of extreme difficulty for children with LI remain the same whether English is a child's first or second language (cf. Bedore & Peña, 2010).

Despite the parallels in linguistic profile between ELLs with LI and monolinguals with LI, the relatively small contribution of the English-language tests to the discriminant function models merits further consideration. Comparison of the standard coefficients in Table 4 show that the discriminatory properties of the model are heavily skewed toward the ALDeQ and not the English-language tests. One explanation for the limited contribution of the English tests could be that the set of tests included in this study did not provide a sufficiently comprehensive assessment of children's abilities. Recall that children's performance on just one subtest of each of the CTOPP, TEGI, and ENNI instruments were included. This choice was made because each subtest probed a linguistic ability of interest with respect to differentiating ELL children with LI from their TD peers, as outlined in the introduction. It is possible that if more comprehensive tests of linguistic abilities were included in a future study of similar design, the contribution of children's performance in English to the discrimination of children with LI might be larger. Another explanation might lie in the influence of variance in exposure time to English and in first-language background, although some caution in interpreting the results of these analyses is needed because of the small numbers for the LI subgroups in particular. Our examination of differentiation between the TD children and the children with LI for the English tests when they were divided into low- and high-exposure groups showed better differentiation between TD and LI in the high-exposure group. Therefore, it is possible that English-language tests would discriminate children with LI better when ELLs have had more exposure to, and thus more proficiency in, English. Furthermore, results also showed that differentiation between the TD and LI groups was better on the TEGI for those children whose first languages marked tense grammatically. Thus, it could be the case that discrimination is enhanced when a test probes a morphosyntactic construction that can be transferred from the first to the second language. A worthwhile direction for future research would be to examine the discriminatory properties of additional English tests, systematically taking into account the impact of ELL children's length of English exposure and first-language background. Doing so might reveal a larger contribution of ELL

children's English test performance to the discrimination of LI than was found in the present study.

Summary of Clinical Implications

Results from this study point to the possibility of identifying children with LI among ELLs with diverse cultural-linguistic backgrounds even when they are still developing their English skills. This possibility appears to depend on the ability to norm-reference ELL children to each other and to include information on first-language development via parent questionnaire. Future research aimed at developing ELL norm-referencing for these and additional English tests could prove useful for clinical practice. The present study is one component of such a research project focused on developing ELL norm-referencing procedures in combination with parent questionnaire data; outcomes of the project are publicly available for use by clinicians (Child English Second Language Centre; see www.chesl.ualberta.ca).

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