Parent Questionnaire for Screening Early Language Development in Children with Cleft Palate

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This study investigated the efficacy of a parent questionnaire as a component for screening early language development of children 16 to 30 months of age with cleft lip and palate. Thirty nonsyndromic children with cleft lip and palate and 30 children without clefts received the *MacArthur Communicative Development Inventory: Toddler (CDI:Toddler)*, administered by a pediatrician. In addition, a speech-language screening was performed by a speech-language pathologist. Results of the two assessments indicated that the *CDI:Toddler* was a valid screener of language development when compared with a comprehensive speech-language screening. Language and speech characteristics of the subject populations are discussed. In particular, differences between the cleft and noncleft groups demonstrated evidence of delays in expressive language development in the children with cleft lip and palate.

KEY WORDS: *cleft lip and palate, communication, developmental assessment, early identification, language, speech*

Most studies examining language development of children with cleft lip and palate show an increased occurrence of language impairment (Richman et al., 1988; Chapman and Hardin, 1990; McWilliams, 1990; Scherer et al., 1991; Broen et al., 1994). Further supporting the risk of language impairment, the *Parameters for Evaluation and Treatment of Patients with Cleft Lip/Palate or Other Craniofacial Anomolies* (1993) advise that speech and language evaluations be conducted at least annually between birth and 4 years of age. In spite of this information, most cleft palate-craniofacial teams do not perform language assessments routinely due to the time commitment and cost associated with such evaluations. Although structured tests and the collection of a language sample are preferred methods of language assessment, they require considerable time and trained professionals for their administration and interpretation (Dale, 1991).

Parent report has been a component of clinical assessment in screening tools for many years (Frankenburg et al., 1975; Copland, 1987). Some language assessment measures such as the *Rossetti Infant-Toddler Language Scale* (Rossetti, 1990) and the *Sequenced Inventory of Communicative Development* (Hedrick et al., 1984) use parent report routinely as a component of the assessment battery. Although parent report has been used in assessment, it has failed to receive the standardization typical of other language assessment instruments. Only recently have there been attempts to standardize and norm parent report measures (Rescorla, 1989; Fenson et al., 1989). One of the parent report measures that has been normed and validated is the *MacArthur Communicative Development Inventory* (CDI) (Fenson et al., 1991). While this measure shows potential for clinical use, its effectiveness with different clinical populations has not been reported.

Traditionally, there has been a reluctance to use parent report as the chief source of data for assessing language performance. The primary concern regarding parent report pertains to the accuracy and specificity of the information recalled (Dale, 1991). Most parents do not recall subtle aspects of language structure or use, particularly when these milestones are not emerging at the time of report.

Nevertheless, parent report has important advantages in the assessment of early language development which should not be overlooked in children with cleft lip and/or palate. Such reports can provide information about the child's optimal performance in everyday situations, which is usually not sampled in traditional assessments. In addition, parent reports can be collected prior to direct clinical observation providing valuable preliminary information regarding a child's performance level. For example, such preliminary information may permit preselection of developmentally appropriate tests for formal evaluations. Finally, the parent questionnaire can be administered by professionals other than speech-language pathologists providing a cost-effective and practical assessment tool when patient contact time and funding are limited.

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The *MacArthur Communicative Development Inventory (CDI:Toddler)* (Fenson et al., 1991) is a parent questionnaire designed to assess the parents' report of their child's language development between 8 and 30 months of age. Two forms assess language over this age range: (1) the *CDI:Infant* assesses comprehension and expression of vocabulary and use of communicative gestures between 8 and 16 months of age, and (2) the *CDI:Toddler* samples expressive vocabulary and grammatical use between 16 and 30 months of age. Of particular interest is the *CDI:Toddler* questionnaire, which contains a 680 word vocabulary checklist in 22 semantic categories and a forced-choice format for assessing sentence grammar. A validity study (Dale, 1991) conducted on the *CDI:Toddler* questionnaire, showed excellent correlations between estimates of language development in typically developing children as measured by the parent questionnaire and data obtained from more in-depth, structured, and naturalistic assessment measures.

While these results suggest that the *CDI:Toddler* questionnaire may have valuable applications as a clinical assessment tool, the questionnaire has only recently been used with a clinical population. Using an early version of the *CDI: Toddler,* Rescorla (1989) assessed a population of late talkers and found that parent report did provide language data that correlated with formal testing. These results suggest that the *CDI:Toddler* questionnaire has potential as a component of a screening protocol for young children with, or at risk for, language impairment. The *CDI* may meet the need for a reliable, cost-effective component of language screening within the craniofacial clinic setting. Therefore, the purpose of this study was to evaluate the validity of a parent questionnaire, the *MacArthur Communicative Development Inventory*, for assessing early language development in a population of children "at risk" for language impairment (i.e., children with cleft lip and/or palate). Information regarding the differences between normal children and the children with clefts in this investigation is presented to characterize the types of language impairment that the *CDI* accurately identified when compared with a more formal language screening.

Method

Subjects

Thirty nonsyndromic children with cleft palate and 30 children without clefts between 16 and 30 months of age participated in this study. The mean age of the group with clefts was 24.5 months, and the mean age of the noncleft group was 23.8 months. Thirty-eight boys and 22 girls participated in the study. The children in the two groups were matched subject by subject for age (within 1 month), gender, and socioeconomic status. Socioeconomic status was established using the Hollingshead Scale (Hollingshead and Redlich, 1957).

Cleft type was distributed, with eight children having unilateral cleft lip and palate, nine children with bilateral cleft lip and palate, 10 children with cleft palate only, and three children with submucous cleft palate. The children with clefts were recruited from a single cleft palate/craniofacial team; the sample was considered representative of the total team population. Age range at the time of initial palate repair was 11 to 20 months of age, with a mean age of 12.5 months. Intraoral examinations were performed on all children to assure intact hard and soft palates. Criteria for exclusion in the study included: (1) any evidence of a genetic syndrome, (2) ensorineural hearing loss, (3) history of high-risk birth factors (other than clefting and prematurity defined as less than 36 weeks gestation), and (4) family language not English. The noncleft population was recruited from a general pediatric teaching practice and a general pediatric private practice. The criteria for exclusion in the noncleft group included: (1) any evidence of genetic syndrome, developmental delay, or central nervous system impairment, (2) sensorineural hearing loss, (3) history of high-risk birth factors (other than prematurity of less than 36 weeks gestation), and (4) family language not English.

Procedures

Two assessments of speech-language development were obtained for each child and are described in detail. The first assessment was administration of the parent questionnaire, The *MacArthur Communicative Development Inventory: Toddler (CDI:Toddler).* The second assessment was a speech-language screening performed by a speech-language pathologist. The evaluation consisted of a battery of formal and informal measures typically used to assess communication development in young children.

MacArthur Communicative Development Inventory: Toddler. The Toddler form of the *CDI* samples expressive language in two sections. Part I of the questionnaire is a vocabulary list consisting of 680 word options. The parent is asked to mark all the vocabulary words that they have heard recently. Part II assesses morphology and word combinations. Section A of Part II asks the parent to indicate use of "regular" word endings such as plural, possessive, progressive and past tense verbs. The parent is asked to indicate if the child is using these forms from a group of examples provided, such as "Does your child talk about ownership by adding "s" as in "Daddy's coat" or "Kitty's dish?" Sections B and C ask parents to indicate whether their children use "irregular" nouns and verbs (e.g., feet, ran) or make developmental errors such as "footses" for "feet" or "runded" for "ran." Section D provides space for the parent to provide three of the longest sentences used by the child recently. The average of these sentences is then used as one measure of sentence length. Section E is used to estimate sentence complexity. The parent responds to a forced choice group of 37 sentence pairs to "mark the one that sounds MOST like the way your child talks right now." Each pair differs in one syntactic element. For example, "Kitty sleep/ Kitty sleeping." The raw scores from Part I and sections B, C, D, and E of Part II are converted to percentiles based on the child's age. Norms for the 16 to 30 month age range examined in this study are available for Part I (vocabulary) and Part II (mean of three longest utterances). Part II,

irregular nouns and verbs and sentence complexity have norms for children older than 20 months of age.

In this study, the *CDI:Toddler* was completed by the child's primary caretaker during the craniofacial team visit or medical appointment for the noncleft children. The questionnaire took approximately 20 minutes to complete. The pediatrician introduced the questionnaire and instructed the parent. Prior to administration in the clinic, the pediatrician received training to assure consistent administration during the study. The training was provided by an experienced speech-language pathologist and consisted of review of the administration procedure included in the test manual and discussion of the interpretation of the major components of the assessment. The completed questionnaire forms were computer scanned and the raw scores were converted to percentile scores based on the child's age.

The *CDI:Toddler* has not been applied to clinical populations. Therefore, the guidelines for interpretation of scores for language disordered children have not been established. Most language assessment instruments typically use the 10th–15th percentile for demarcating the lower limits of typical development. Therefore, for purposes of this study, the criterion for failure was operationally defined as performance at or below the 15th percentile on two or more of the four *CDI* subsections. The pediatrician reviewed the computer scored results for each patient and categorized each child as having "passed" or "failed" based on the criterion percentiles described above. This judgment was made prior to the speech-language screening.

Speech-Language Screening. Following administration of the *CDI:Toddler*, the child received a 45–60 minute speech-language screening performed by an experienced speech-language pathologist. The speech pathologist was not aware of the results of the *CDI:Toddler* prior to the screening. Formal and informal assessments were used to evaluate receptive/expressive language, articulation, perceived judgments of resonance, and overall intelligibility. Receptive/expressive language was assessed using two formal developmental scales: the *Preschool Language Scale-3* (Zimmerman et al., 1992), and the *Rossetti Infant-Toddler Language Scale* (Rossetti, 1990). In addition, a 15-minute conversational language sample was elicited in a play setting with the primary caregiver. A conversational language sample is a contrived play interaction that samples the child's expressive language use during communication with a familiar person. The interaction was videotaped and the tape was used to derive a transcript of speech by the parent and child during this play interaction.

Children were provided with a variety of common age-appropriate toys that encouraged interactive play including a doll, ball, car, tractor, Cookie Monster, three small human figures, cups, spoons, plates, pans, blocks, wind-up toys, bottle, pillow, and blanket. The examiner remained in the room and made notes but did not initiate interaction with the child. The number of utterances obtained from the conversational sample for the children with clefts yielded a median 30.5 utterances per sample with a range of 12–55 utterances. The number of utterances used by the noncleft children had a median number of 35.8 and a range of 15–67 utterances per sample.

Following the play interaction, a naming activity was presented to the child. The activity consisted of object naming when the examiner pulled toys from a bag one at a time. The objects used in the activity were selected to represent a range of phonemes in common objects familiar to young children. The phonemes were selected to sample place and manner of articulation as well as voicing. Words were chosen if they met the following criteria: (1) in the expressive vocabulary of children in the 16–30 month level. Words were selected from The *MacArthur Communicative Development Inventory: Infants* expressive vocabulary list to assure age appropriateness; (2) target phoneme appeared in word initial position. Word initial position was used to choose words because many children in this age group drop the final consonant or final syllable of words; (3) the words represented single or two syllable words containing nasals (m,n), stops (p,b,t,d,k,g), fricatives (s,z,f,sh), affricates (ch,j), and glides (w,y). The child was permitted to play with the toys when the naming activity was completed. The interaction was audiotaped with a Sony Electret microphone and Marantz Professional Cassette Recorder. Articulation was assessed in spontaneous speech and through the elicited word naming procedure. The sample was analyzed for phonetic inventory, syllable structure, and intelligibility (Stoel-Gammon and Dunn, 1985). Resonance judgments of mild, moderate, and severe hypernasality were made from the child's spontaneous speech sample taken during play. Intelligibility ratings were obtained using a 1–7 anchored scale. The scale values were as follows: (1) completely intelligible speech, (2) comprehensible speech with listener attention, (3) speech required occasional repetition of words, (4) repetitions and rephrasing were necessary to understand speech, (5) only isolated words or phrases were understood, (6) speech was only occasionally understood by an adult, and (7) completely unintelligible speech.

The speech-pathologist's judgment of language function was made using the combined results of the formal and informal speech-language measures administered. For the formal measures, a standard score below the 15th percentile was used as a criterion for failure (i.e., referral for a more thorough evaluation). For those tests yielding age equivalents only, a delay of 6 months below the child's chronological age was used as a criterion for referral. Language sample information was analyzed for children with 10 words or more based on parent report. Using the 10-word criteria, five children were excluded from the language sample analysis, two children from the noncleft group, and three children from the cleft group. The sample was transcribed onto a computer-based program, the *Systematic Analysis of Language Transcripts-SALT* (Miller, 1985). The *SALT* program provides a format for entry of the language of the caregiver, child, and important context in the interaction. The *SALT* program contains a standard analysis which calculates basic descriptive language data for both the caregiver and the child. Further specific analyses beyond the standard analyses may be per-

formed to answer research questions. The language sample was analyzed for two measures of vocabulary development and two measures of grammatical development. The two measures of vocabulary development were as follows: (1) the total number of different words, and (2) the total number of words. Two measures of grammatical complexity were analyzed: (1) MLU in morphemes, and (2) the number of grammatical morphemes. No single test or procedure was considered a sufficient indicator on its own to determine "pass" or "fail." However, the combined results of informal and formal procedures were used to provide the speech pathologist with a sampling of a range of communication tasks to enhance the accuracy of the judgment.

Reliability

Intrajudge and interjudge transcription reliability was determined for 20% of the *SALT* transcripts from the video recordings. Intrajudge reliability was 92% and interjudge reliability was 89% agreement. Reliability of the nasality and intelligibility ratings was determined by having a second speech-language pathologist rate all the subjects from combined video and audio recordings. The interjudge reliability was 79% agreement for the nasality ratings and 84% agreement on the intelligibility ratings.

Results

The results of this study will be presented in two sections. The first set of findings pertain to the validity of the *CDI:Toddler* for use with a clinical population. The second set of findings describes the language and developmental characteristics of the population upon which the validity was established.

Validity: Relationship Between *CDI:Toddler* and Speech-Language Screening

Table 1 displays the pass or fail judgments made by the physician, based on the *CDI:Toddler*, compared with the performance judgments made by the speech pathologist, based on formal and informal assessment measures. A chi-square comparison showed a significant association between the "pass and fail" judgments made from the parent report and the "pass and fail" judgments from the speech-language pathologist (χ^2 (1) = 28.55, $p < .01$; $\phi = 0.69$). Statistical comparisons indicate that the pass or fail results obtained on the *CDI:Toddler* agreed with language screening judgments resulting from an extensive battery of tests.

TABLE 1 Comparison of Pass or Fail Agreement by the Physician and Speech-language Pathologist

	Physician	
	Pass	*Fail*
Speech Pathologist		
Pass	32	3
Fail	6	19

χ^2 28.55, $\phi = 0.69$, $p < .01$.

TABLE 2 Correlations Comparing *CDI* Measures with *Preschool Language Scale-3* and Four Language Sample Measures

	CDI Measures		
Language Measures	*Vocabulary*	*Mean 3 Longest*	*Complexity*
PLS-Expressive	.59**	.57**	.37*
Total words	.62**	.62**	.65**
Different words	.70**	.65*	.49**
MLU	.81**	.81**	.70**
Bound morphemes	.76**	.77**	.65**

PLSEXP = Preschool Language Scale-Expressive Language; Total words = frequency of word use in language sample; Different words = frequency of different words used in the language sample; MLU = Mean length of utterance of 50-utterance language sample (for those children who had sufficient utterances); Bound morphemes = frequency of four regular bound morphemes in language sample.
*$p < .05$, **$p < .01$.

Further analysis was performed to compare the vocabulary and syntax components on the parent questionnaire with the direct observational measures from the speech-language screening. Table 2 reports the correlations between the parent report measures and the direct observation measures. The data indicate that two *CDI* measures, vocabulary, and mean length of three longest utterances, were strongly correlated with the four language sample measures. Parent report scores always exceeded the observational measures. For example, MLU derived from parent report showed higher values than those observed in the language sample for both cleft and noncleft groups. The *CDI* measures were moderately correlated with the PLS-3. To examine how the *CDI:Toddler* measures predicted language test performance a multiple regression analysis was run with vocabulary, three longest utterances, and sentence complexity as the predictor variables. The regression equation was significant for the *CDI* vocabulary section only ($R = 0.36$, $F(1,45) = 25.25$, $p < .01$). The regression analysis indicates that the child's performance on the vocabulary section of the *CDI* was associated with performance on other standardized tests and direct observational measures of language.

Sample Characteristics of the Cleft and Noncleft Groups

Table 3 summarizes the results of the *CDI:Toddler* and the formal language measures for the study population. The data show significant differences between the cleft and noncleft groups for both parent responses and direct observational measures. Parent questionnaire measures of vocabulary and mean length of the three longest sentences showed significant differences between the groups. According to the parents, the children with cleft palate had a smaller vocabulary, with a mean vocabulary of 177 words as compared to 288 words for the noncleft group. Parent report indicated children from the cleft group used shorter sentences than the noncleft group as demonstrated by the mean sentence length of 2.5 for the cleft group and 3.4 for the noncleft group. The sentence complexity measure (number of sentence pairs for which the more complex form was selected by the parent)

TABLE 3 Mean, Standard Deviation, and t-test Comparisons of the *CDI:Toddler* and Speech-language Measures for the Cleft and Noncleft Children

Measures	*Cleft*		*Noncleft*		*t-test*
	Mean	*SD*	*Mean*	*SD*	
CDI:Toddler					
Total vocabulary	177.0	155.3	288.7	206.7	2.37*
Mean 3 longest	2.5	1.5	3.4	2.0	2.09*
Total complexity	9.8	12.0	10.7	9.8	0.27
Preschool Language Scale-3					
Receptive language	100.7	8.6	105.2	15.5	1.37
Expressive language	90.3	9.9	106.1	16.3	4.51*
Language Sample					
Total words	66.4	43.5	133.4	116.5	2.95*
Different words	44.9	38.1	76.9	62.5	2.39*
MLU	1.4	0.7	1.9	0.8	2.55*
Grammatical morphs	1.9	2.3	0.8	3.6	2.37*

* $p < .05$.

showed that children from the cleft group produced less complex sentences than the noncleft children. However, this difference was not statistically significant. Comparison of group performance on the *Preschool Language Scale-3* showed no group differences on the receptive language subtest, although there were individual subjects in the cleft group who showed receptive language impairment. However, a significant difference between the cleft and noncleft groups was observed on the expressive language subtest. The mean standard score for the cleft group was 90.3 compared to the mean of 106.1 for the noncleft group.

Results of the language sample analysis showed significant group differences for all four vocabulary and syntax measures assessed. Both the total number of words (a measure of vocabulary use) and the number of different words used (a measure of vocabulary diversity) showed lower frequencies for the cleft group than the noncleft group. The cleft group had a mean of 66.4 total words and 44.9 different words compared to the means of 133.4 and 76.9 for the noncleft group. Language sample measures of syntax showed the same pattern of group differences. The cleft group had a lower average MLU (1.4) than the noncleft group (1.9). The use of bound morphemes (i.e., word endings such as running) was lower for the cleft group (1.9) than for the noncleft group (3.8).

Articulation data for the two measures used in this study are presented in Table 4. Significant differences were found between the groups for the number of consonants used and intelligibility ratings. The cleft group used fewer consonants, a mean of 8 as compared to a mean of 10.0 for the noncleft group. Intelligibility ratings were examined as a means of determining the possible impact of articulation deficits on expressive language development. Intelligibility was rated on a 7-point, anchored scale. The scale ranged from a rating of 1, indicating complete intelligibility to a rating of 7, which indicates complete unintelligibility. Intelligibility was rated as poorer for the cleft group (3.5) characterized by the need for rephrasing or repetitions, compared with the noncleft group (2.5) judged to be comprehensible with listener attention. The relationship between intelligibility and expressive language data is shown in Figure 1. The data for intelligibility and expressive language were grouped to approximate clinically important categories. The expressive language standard scores were grouped into four categories; delayed (standard scores 70–84), low-average (85–99), high-average (100–115), and above-average (116+). Intelligibility ratings were grouped into mild impairment (1–2), moderate impairment (3–5), and severe impairment (6–7). The noncleft group showed a considerable range in their *PLS-3* standard scores and intelligibility ratings. None of the noncleft subjects showed severe unintelligibility (ratings of 6 or 7). The performance of the children with clefts showed poorer overall expressive language performance and poorer intelligibility than the noncleft group. A chi-square comparison showed a significant association between expressive language performance and intelligibility (χ^2 (4) = 23.63, $p < .05$; $\phi = 0.63$, $p < .05$).

Resonance ratings ranging from 0 (no nasality) to 4 (severely hypernasal) were made from the spontaneous speech sample. Figure 2 shows a scatter plot of the clinical groupings of standard scores from the *PLS-3* expressive language subtest and the two resonance groupings for the subjects. The nasality ratings were grouped into 2 clinical categories of mild to moderate hypernasality and moderate to severe hypernasality. Within the cleft group, hypernasality ratings of moderate

TABLE 4 Number of Consonants and Intelligibility Data for the Cleft and Noncleft Children

	Cleft		*Noncleft*	
	Mean	*SD*	*Mean*	*SD*
Number of Consonants	8.0	3.9	10.1	4.0*
Intelligibility Rating (1–7)	3.5	1.2	2.5	2.0**

*$t(58) = 2.06$, $p < .05$. **χ^2 (2) = 6.31, $p < .05$, Cramer's V = 0.32, $p < .05$. The intelligibility rating scale was divided into three groups for analysis 1–3, 4–5, and 6–7.

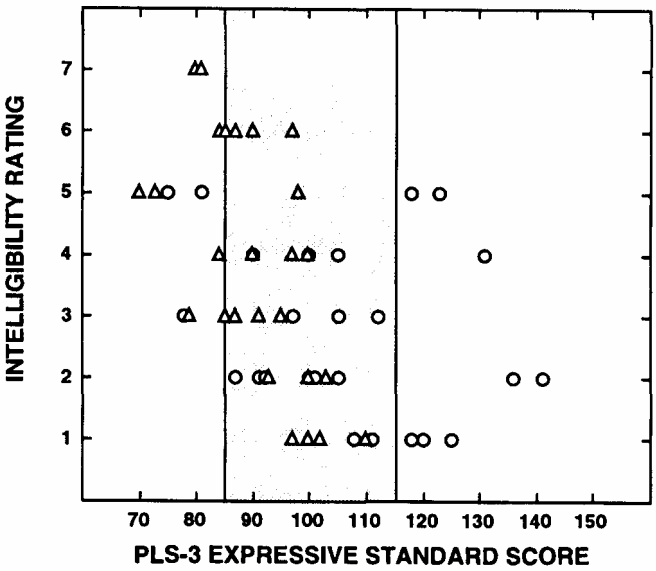

FIGURE 1 Intelligibility ratings versus *PLS-3* standard score for each subject. Data points for the children with clefts are shown in triangles and the noncleft children are shown in circles. The shaded area indicates the normal range for the *PLS-3* standard scores.

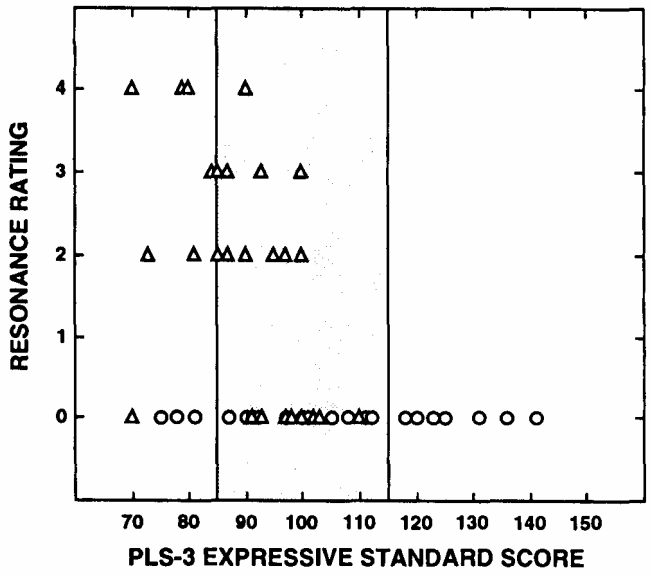

FIGURE 2 Resonance ratings versus *PLS-3* standard score for each subject. Data points for the children with clefts are shown in triangles and the noncleft children are shown in circles. The shaded area indicates the normal range for the *PLS-3* standard scores.

and severe were associated with expressive language delays (χ^2 (2) = 8.31, $p < .05$, $\phi = 0.37$, $p < .05$).

Age-Related Comparisons

The age range examined in this study, from 16 to 30 months, is a period of considerable language growth. In order to explore possible age-related differences, subjects were divided into two age groups for post-test analysis. The age groups were chosen to approximate two expressive language learning stages, 16–22 months of age, the period of single word use and 23–30 months of age, the period of multi-word use. Twenty children placed in the 16–22 month range and 40 children placed in the 23–30 month range. The results of the *CDI: Toddler, PLS-3*, and language sample were examined for performance differences between the cleft and noncleft subjects in the two age groups. Differences between the groups were observed in both age groups. These data indicate the same pattern of language delay in the younger and the older children with cleft lip/palate.

Discussion

This study indicates that the *CDI:Toddler* provides an effective method for eliciting language development information in a clinical population of children with cleft palate. The results corroborate Dale's (1991) finding that the *CDI:Toddler* assisted in the assessment of language development. Dale further suggested that the *CDI:Toddler* may have use as a clinical tool. Rescorla (1989) also suggested the potential for parent questionnaire used as a component in language screening of "at risk" children. However, prior to this study no data were available on clinical use of the *CDI*. Results of this study confirmed the usefulness of the *CDI:Toddler* in identifying children with cleft lip and palate who require a comprehensive language assessment. The high correlations between components of the *CDI* parent report and direct observational measures, particularly the language sample, indicate that parent report can be a valid means of assessing early language development. In some instances, structured parent report may be more valuable than standardized tests. For example, results of this study showed that the parent report measures demonstrated higher correlations with the language sample, than did the standardized tests. Although parent report has limitations, based on the parents' perception of their childrens' development, in most situations, it provides a valuable early identification tool when obtained in a structured manner such as the *CDI:Toddler*. Further, the time-efficient nature of such a parent questionnaire makes it attractive for use in a medical setting. Additionally, the *CDI* can be used by professionals other than speech-language pathologists.

This investigation demonstrated the validity of a parent questionnaire and also highlights the need for early language screening for children with cleft lip and palate. Expressive language delay was prevalent in this sample of 16 to 30 month olds, nonsyndromic children with cleft lip and/or palate. Similar language delays were also found across the range of ages tested. The results indicate that language screening should be a routine part of the craniofacial team visit. The availability of parent questionnaires such as the *CDI:Toddler* should encourage craniofacial teams to screen language development routinely for all young children with cleft lip and palate.

Of particular concern for children with cleft lip and palate is the potential compromise of expressive language when speech intelligibility is impaired. Studies of children without cleft palate who have language impairment have suggested that "trade-offs" exist between phonetic and linguistic complexity (Nelson and Bauer, 1991). That is, as the child attempts to put more words together or to use longer words, intelligibility of those words diminishes. For children with impaired intelligibility, language complexity may be reduced because the demands for speech production take precedence over utterance length. Results of this study indicate an association between poor intelligibility and expressive language delay. While this relationship is not surprising, the nature of the association between intelligibility and expressive language delay is not well understood. Resonance appeared to be a second variable related to expressive language delay. The relationship observed between moderate to severe hypernasality and expressive language suggested that for the cleft population, resonance may be an additional variable interacting with the child's language development.

Conclusion

The results of this study indicate that the *CDI:Toddler* parent inventory provides a valid estimate of development

for language screening of young children with cleft lip and/or palate. The questionnaire has many benefits for the cleft palate-craniofacial team. These benefits include the time-efficient nature of data collection (while the parent is waiting for appointments), the availability of normative data for comparison, and the ease of administration and analysis by team professionals. These results should not be interpreted as advocating the *CDI:Toddler* (or other parent questionnaires) as the sole instrument for language screening. Rather, the results suggest that the *CDI:Toddler* is one useful component of a language screening protocol.

Analysis of the speech and language characteristics of the cleft and noncleft groups emphasizes the importance of language screening for all children with cleft lip and palate. The children with clefts in this study showed a higher occurrence of expressive language delays, limited phoneme inventories, and poorer intelligibility than the noncleft group. The results indicate that children with clefts are "at risk" for early language delay and, therefore, require a routine screening protocol for identifying those children who would benefit from further assessment and early intervention.

Additional studies are needed to assess the relationship between speech production, particularly hypernasality and intelligibility, and language performance. Furthermore, longitudinal studies are needed to explore the persistence of language delay across the early language learning years and to identify variables which could assist in predicting the children who will require early intervention.

References

BAYLEY N. Bayley scales of infant development. San Antonio,TX: Psychological Corporation, 1969.

BROEN P, MOLLER K, PROUTY J. The relationship among hearing, cognition, and language. Paper presented at the American Cleft Palate-Craniofacial Association Convention 1994; Toronto.

CHAPMAN K, HARDIN MA. Communicative competence in children with cleft lip and palate. In: Bardach J, Morris HL, eds. Multidisciplinary management of cleft lip and palate. Philadephia: WB Saunders, 1990:721–726.

COPLAND J. Early language milestone scale. Austin, TX: Pro-Ed, 1987.

DALE P. The validity of a parent report measure of vocabulary and syntax at 24 months. J Speech Hear Res 1991;34:565–571.

FENSON L, DALE PS, REZNICK JS, THAL D, BATES E, HARTUNG JP, PETHICK S, REILLY JS. MacArthur communicative development inventory: toddlers. San Diego: University of California Press, 1991.

FRANKENBURG WK, DODDS JB, FANDAL AW, KAZUK E, COHRS M. Denver Developmental screening test (rev. ed.). Denver: Developmental Materials, 1975.

HEDRICK DL, PRATHER EM, TOBIN AR. Sequenced inventory of communicative development. Seattle: University of Washington Press, 1984.

HOLLINGSHEAD A, REDLICH F. Social class and mental illness. New York: Wiley, 1957.

MCWILLIAMS BJ. Language disorders. In: McWilliams BJ, Morris HL, Shelton R, eds. Cleft palate speech. Philadelphia: BC Decker, 1990.

MILLER J. Systematic analysis of language transcripts (SALT). Madison: Software Development and Distribution Center, 1985.

NELSON LK, BAUER HR. Speech and language production at age 2: evidence for tradeoffs between linguistic and phonetic processing, J Speech Hear Res 1991;34:879–892.

Parameters for the evaluation and treatment of patients with cleft lip/palate or other craniofacial anomolies. Cleft Palate Craniofac J 1993;30 (Suppl 1).

RESCORLA L. The language development survey: a screening tool for delayed language in toddlers. J Speech Hear Disord 1989;54:587–599.

RICHMAN L, ELIASON M, LINDGREN S. Reading disability in children with cleft. Cleft Palate J 1988;25:21–25.

ROSSETTI L. Infant-Toddler Language Scale. East Moline, IL: LinguiSystems, 1990.

SCHERER NJ, SNYDER L, D'ANTONIO L. Identification of language disorders in toddlers with cleft palate. Paper presented to the American Speech-Language-Hearing Association Convention, Atlanta, November, 1991.

STOEL-GAMMON C, DUNN C. Normal and disordered phonology in children, Austin, TX: Pro-Ed, 1985.

ZIMMERMAN IR, STEINER VG, POND RE. The preschool language scale-3. San Antonio, TX: Psychological Corporation, 1992.