

VALIDITY OF THE MINNESOTA CHILD DEVELOPMENT  
INVENTORY IN SCREENING FOR LANGUAGE DELAYS IN A  
GROUP OF CLINIC-REFERRED AND NORMAL PRESCHOOLERS

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A Thesis Submitted to the Department of Psychology  
in Partial Fulfilment of the Requirements for the  
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**Validity of the Minnesota Child Development  
Inventory in Screening for Language Delays in a  
Group of Clinic-Referred and Normal Preschoolers**

**Abstract**

The concurrent validity of the Minnesota Child Development Inventory (MCDI) language scales (Expressive Language and Comprehension-Conceptual) was examined to determine their effectiveness in identifying young preschool-aged children with expressive and/or receptive language delays. Mothers of 75 3- to 5-year-old preschool-aged children completed the MCDI and their ratings were compared with their children's performance on a set of objective, standardized tests examining language functioning. These standardized tests included the Verbal scale of the McCarthy Scales of Children's Abilities, the Expressive One-Word Picture Vocabulary Test, and the Peabody Picture Vocabulary Test - Revised. A group of 42 clinic-referred children with known or suspected developmental delay were compared to a group of 33 normal, non-clinic children from local daycare centers. Demographic information was also collected to gain a better understanding of factors which may influence the degree of agreement between maternal report and the children's actual test performance. The appropriateness of using the MCDI language scales for the screening of language delays is discussed.

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## Table of Contents

	<u>Page</u>
Abstract.....	ii
Acknowledgements.....	iii
Table of Contents.....	iv
List of Tables.....	vi
List of Figures.....	vii
INTRODUCTION.....	1
- The MCDI as a Preschool Screening Instrument.....	1
- Screening for Language Delays.....	7
- Use of Parental Report in Screening for Developmental Delays.....	13
- Influencing Factors on Parents' Perceptions.....	15
- Influence of Parental Perceptions on Parental Report.....	16
- Purpose of this Study.....	19
- Hypotheses.....	20
METHOD.....	25
- Subjects.....	25
- Measures.....	25
- Procedure.....	26
RESULTS.....	28
- Subgroup Descriptions of the Subjective and Objective Measures.....	29
- Correlation Analyses of Subjective and Objective Test Measures.....	32
- Expressive language.....	34
- Receptive language.....	34
- Classification Analyses.....	35
- Classification of expressive language status: CR group.....	38
- Classification of expressive language status: NC group.....	41
- Classification of receptive language status: CR group.....	42
- Classification of receptive language status: NC group.....	45
- Examination of Demographic Factors.....	45
- Multiple Regression Analyses.....	46
- Prediction of expressive language ability: CR group.....	51
- Prediction of expressive language ability: NC group.....	53
- Prediction of receptive language ability: CR group.....	54
- Prediction of receptive language ability: NC group.....	54

## Table of Contents (continued)

	<u>Page</u>
DISCUSSION.....	57
- Group Differences on the Subjective and Objective Language Measures.....	57
- Relationships Between the Language Measures.....	59
- Classification of Expressive and Receptive Language Abilities.....	63
- Influence of the Demographic Variables.....	67
- Prediction of Expressive and Receptive Language Abilities.....	68
- Conclusions.....	72
REFERENCES.....	74
APPENDICES.....	83
- A. Detailed demographic information for the CR and NC groups.....	84
- B. 1. Introductory letter to daycare directors.....	88
2. Introductory letter to parents.....	90
3. Study consent form .....	91
- C. Demographic Questionnaire.....	93
- D. Regression results excluding missing data.....	100

## List of Tables

	<u>Page</u>
1. Means and Standard Deviations for the Subjective (MCDI) and Objective (MSCA/EOWPVT/PPVT-R) Measures.....	30
2. Correlations Between the MCDI, MSCA, EOWPVT, and PPVT-R Scores for the CR and NC Groups.....	33
3. Sensitivity, Specificity, and Hit Rates Based on Borderline or Moderate-Severe Cutoffs for Classification of Delay.....	36
4. Demographic Descriptions of the Clinic-Referred (CR) and Non-clinic, Control (NC) Groups.....	47
5. Correlations Between the Demographic Variables and the Language Measures.....	49
6. Regression Results Showing the Prediction of Expressive Language Ability from Demographic and Test Variables for the CR and NC Groups.....	52
7. Regression Results Showing the Prediction of Receptive Language Ability from Demographic and Test Variables for the CR and NC Groups.....	55

## List of Figures

	<u>Page</u>
1. Percentage of agreement between the MCDI Expressive Language (EL) scale and the objective language measures (MSCA Verbal scale and EOWPVT) based on a borderline cutoff for classification of delay.....	39
2. Percentage of agreement between the MCDI Expressive Language (EL) scale and the objective language measures (MSCA Verbal scale and EOWPVT) based on a moderate-severe cutoff for classification of delay.....	40
3. Percentage of agreement between the MCDI Comprehension-Conceptual (CC) scale and the objective language measures (MSCA Verbal scale and PPVT-R) based on a borderline cutoff for classification of delay.....	43
4. Percentage of agreement between the MCDI Comprehension-Conceptual (CC) scale and the objective language measures (MSCA Verbal scale and PPVT-R) based on a moderate-severe cutoff for classification of delay.....	44

There is a growing recognition among professionals who work with young children of the need for early identification of children who are at risk for developmental disabilities. With early screening for such deficits, one might enhance the probability of detection and, with implementation of intervention, minimize the extent of the deficit (see reviews by Bailey & Simeonsson, 1988; Casto, 1987; Simeonsson, Cooper, & Scheiner, 1982). The following study examines the usefulness of the Minnesota Child Development Inventory (MCDI; Ireton & Thwing, 1974) in identifying young preschool-aged children who may be language delayed, comparing maternal report to children's performance on objective, standardized tests. A clinic-referred group with known or suspected developmental delays and a normal, non-clinic group will be compared.

#### The MCDI as a Preschool Screening Instrument

While the Denver Developmental Screening Test (DDST; Frankenburg & Dodds, 1967) continues to be the most widely used preschool screening instrument, it has been criticized for having a low detection rate for children with mild delays and it has failed repeatedly to identify accurately preschool children at risk for school failure (Borowitz & Glascoe, 1986). The MCDI (Ireton & Thwing, 1974) is a maternal report questionnaire that is proving to be quite valuable as an early screening instrument for children who are functioning below age-expected levels. The MCDI is intended to be used for children between the ages of 1 to 6 years and it is easily administered, brief, and inexpensive. The mother is simply

required to respond "yes" or "no" to a series of 320 randomly ordered age-related statements describing children's development and behavior. A profile is obtained yielding eight developmental scales: General Development (GD; 131 items), Gross Motor (GM; 34 items), Fine Motor (FM; 44 items), Expressive Language (EL; 54 items), Comprehension-Conceptual (CC; 67 items), Situation Comprehension (SC; 44 items), Self-Help (SH; 36 items) and Personal-Social (PS; 34 items). The General Development (GD) scale is comprised of the most age-discriminating items from the seven other scales and provides an overall index of development. Separate norms are provided for girls and boys. A child is considered to be functioning below age-expected levels if the score on one or more scales falls below the range of scores obtained by children in the standardization sample who were 20% younger than the target child. This is indicative of a borderline delay. An interpretation of developmental retardation is suggested when the target child's scores fall below the range of scores obtained by children in the standardization sample who were 30% younger.

Byrne and Backman (1986) identified three limitations of the MCDI concerning (a) the manner in which the scales were determined, (b) the absence of standard scores, and (c) the restricted demographic distribution of the normative sample. First, the MCDI scales were not determined by factor or cluster analyses. Second, the MCDI employs a percentage cutoff

technique to identify delays in children, however, this method seems inconsistent when the MCDI is most often compared to a standard deviation of the criterion measures. Third, the normative sample was comprised of 796 white, predominantly middle class children, hence limiting the MCDI's generalizability to a more heterogeneous population. Byrne and Backman (1986) conducted a large scale study on 1332 children ranging in age from 12-49 months and across a more diverse demographic sampling to address these limitations.

A major shortcoming of the limited amount of research on parents' assessments of their preschool children's skills, using not only the MCDI but other parental questionnaires, is that the majority of these studies involved developmentally delayed or handicapped children. There is a paucity of data existing for nondelayed or normal preschoolers. Also, there appear to be even fewer studies available comparing the usefulness of measures for these two groups, which would allow one to examine the applicability or validity of these parental questionnaires across a more heterogeneous sample.

The few studies that have investigated the validity of the MCDI have consistently reported this questionnaire to correlate significantly with objective developmental tests, accurately classifying preschoolers differing in various abilities (Byrne, Backman, & Smith, 1986; Gottfried, Guerin, Spencer, & Meyer, 1983, 1984; Guerin & Gottfried, 1987; Ireton, Thwing, & Currier, 1977). Ireton et al. (1977)

examined the validity of the MCDI in identifying children with developmental disorders among a group of 109 preschoolers who were clinic-referred with suspected developmental problems. The mothers' ratings on the MCDI, in particular on the GD, FM, EL, and CC scales, were compared to the children's performance on the Stanford-Binet (SB) or the Wechsler Preschool and Primary Scale of Intelligence (WPPSI), on unspecified fine motor tasks, and on an unspecified measure of the child's expressive language skills. The authors reported moderate sensitivity rates in all areas assessed. Percent agreement of classification of delay between the GD scale and the SB-IQ or the WPPSI IQ, the fine motor tasks, and the expressive language tasks were 85%, 64%, and 71%, respectively. The comparison between the receptive language measurement of the MCDI (CC scale) and the SB-IQ or the WPPSI Verbal IQ was much lower at 30% agreement. It was reported that of the sample of children studied, 88% were rated as normal on the CC scale as well as having a normal IQ on the Stanford-Binet or WPPSI.

Byrne et al. (1986) examined the concurrent validity between the MCDI GD scale and the McCarthy Scales of Children's Abilities' General Cognitive Index (MSCA-GCI; McCarthy, 1972) for a group of 71 preschoolers who were clinic-referred for evaluation of suspected developmental delay. Significant positive correlations were reported using both standard scores (the age-equivalent score on the GD scale was converted to a developmental quotient to ease comparison

with the GCI) and age-equivalent scores for both measures. A significant chi-square analysis revealed a high sensitivity rate of 97% while specificity was slightly lower at 73%. The overall hit rate was a moderately high 83% in accurately reflecting the cognitive status of the preschoolers.

Gottfried and his colleagues (Gottfried et al., 1983, 1984; Guerin & Gottfried, 1987) examined the concurrent relationship of maternal perceptions, as measured on the MCDI, with a standard psychometric measure, the MSCA. This was done not only in relation to general cognitive ability but also in relation to specific areas of development and behavior for a group of non-clinic children who were studied over a 3 1/2 year period (from age 2 1/2 to age 6). Over the span of these studies, the MCDI General Development (GD) scale and the two language scales (Expressive Language: EL and Comprehension-Conceptual: CC) showed consistently positive and highly significant relationships with the McCarthy cognitive scales (i.e., all scales except the Motor scale). While the MCDI language scales correlated more highly with the McCarthy scales than did the GD scale, the GD, EL, and CC scales correlated the highest overall with the MSCA GCI. These findings confirm similar reports by Dean and Steffen (1984) who found that when responses by mothers on the MCDI were compared to a more traditional measurement such as the MSCA, the accuracy of the maternal responses was most consistently associated with skills necessary for success on the MSCA

Verbal scale, which in more specific terms involves language skills. Language skills, as assessed on the MCDI, were found to be among the specific abilities which most strongly correlated with subsequent developmental status. Similarly, when the MSCA was used as a predictor of subsequent status, tasks involving language skills emerged as the primary predictors (Guerin & Gottfried, 1987).

Gottfried et al. (1983), calculating a prediction-performance matrix comparing classification of delay using the GD scale and the GCI, revealed sensitivity to be 80% while specificity was a high 97%. These values were noted to be of comparable magnitude but in the reverse direction to those reported by Byrne et al. (1986). However, an overall hit rate of 97% was reported. The noted difference in magnitude of classification of these measures in these two different series of studies might be partially explained in terms of the noted differences between the populations studied. While Byrne and his colleagues examined a group of clinic-referred preschoolers who were suspected of being developmentally delayed, Gottfried and his colleagues examined a group of normal preschoolers. The efficacy of the MCDI may therefore vary as a function of the group on whom it is used. The MCDI was intended to be used as a screening instrument for identification of children whose development is below age-expected levels. Any screening instrument, including the MCDI, must not only be useful in detecting developmental

disabilities in children who are suspected or known to be at-risk (that is, children in a high prevalence population), but it must also be generalizable to the whole population. The screening instrument must be effective in detecting children in low prevalence populations who may be mildly delayed.

Of the studies which have examined the validity of the MCDI as a screening instrument, the majority have predominantly compared the GD scale to some criterion measure such as the MSCA GCI or Stanford-Binet IQ with little or no attention devoted to the effectiveness of the other seven scales. As noted by Diedrich and Carr (1984), after walking, talking is the next major developmental milestone which causes the most concern for parents and which prompts them to seek professional advice. It would therefore be beneficial to examine the screening effectiveness of the MCDI motor and language scales in more detail, if we are to fully understand the benefits and limitations of the MCDI as a screening instrument for detecting developmental disabilities in young children.

#### Screening for Language Delays

Opinions often vary as to when concern should arise over a child's abilities. Referrals for concern over a child's language abilities most frequently occur after age 3 (Whitman & Schwartz, 1985). In terms of language development, the foundations of language are fully established in normal children between 38-40 months of age (Walker, Gugenheim,

Downs, & Northern, 1989). A child should have mastered the basic structure of his/her language by age 3 and subsequently be perfecting competence in these skills (Miller & Gildea, 1987).

When evaluating a child with suspected language delay, it is necessary to consider several questions: (a) is the child's hearing intact, given the well-documented association between hearing impairment and difficulties in speech and language development (Rentschler, Rupp, & Presley, 1980); (b) is the child's expressive and/or receptive language delayed, and (c) is this delay specific to language or is it a more global delay? (Whitman & Schwartz, 1985). It is also important to make the correct diagnosis concerning the type of language impairment, not only because of the influence on the choice of treatment but also because of the influence on prognosis (Stevenson, 1984). As expected, those children who have a more severe language impairment (perhaps both expressive and receptive deficits compared to expressive only or receptive only) also have a poorer outcome. Caution is advised when assuming that the language-impaired child has "caught up". Many language-impaired preschoolers appear to be normal by age 5, but closer examination reveals that they have achieved skills which are generally mastered at a relatively young age (e.g., syntax and phonology) and which often reach a plateau by this age anyway.

Unfortunately, very few language screening instruments exist to date. Very few studies have been reported which have examined the screening effectiveness of the MCDI language scales. Eisert, Spector, Shankaran, Faigenbaum, and Szego (1980) studied a group of 34 low birthweight children between the ages of 31 to 58 months. Controlling for age, they found a significant, positive correlation between the MSCA GCI and Verbal scale and the MCDI GD, EL, and CC scales. Next to the GD scale, the CC scale was found to be the most age-discriminating scale of the MCDI. They further compared the MCDI language scales to the Peabody Picture Vocabulary Test (PPVT; Dunn, 1959), a frequently used measure of receptive language ability, but found only low correlations between the PPVT and all of the MCDI scales. The authors advised caution in interpreting the MCDI as a poor predictor of language development and rather, suggested caution about the nature of the PPVT in that it provides a measure of only one aspect of language (i.e., single-word receptive vocabulary). Results similar to those discussed by Eisert et al. (1980) were reported by Gottfried and his colleagues (Gottfried et al., 1983, 1984) with a group of normal preschoolers aged 30-42 months. Again, the GD, EL, and CC scales of the MCDI were highly correlated with the McCarthy cognitive scales (i.e., all scales except the Motor scale). These studies lend support for the use of the MCDI in screening for delays in clinic-referred groups and in normal groups of preschoolers.

Kenny, Hebel, Sexton, and Fox (1987) also examined ratings of language skill (EL and CC) on the MCDI using an abbreviated 135-item form of the MCDI which also measured FM and SH skills. An initial group of 490 preschool children were rated on the MCDI and subsequently, a subsample of 364 of these children (74%) were tested on the MSCA within one month of their third birthday. Significant correlations were reported between all of the MCDI scales and the MSCA index scores with the exception of the SH scale which was nonsignificantly related to any of the McCarthy scales. The EL and CC scales of the MCDI showed the highest correlations with the MSCA.

A recent study by Tomblin, Shonrock, and Hardy (1989) provided evidence for the concurrent validity between the MCDI language scales and the Sequenced Inventory of Communication Development (SICD; Hendrick, Prather, & Tobin, 1975) Expressive and Receptive Language scales in a group of 57 2-year-old children. The EL and CC scale scores were significantly correlated with both SICD scales. However, somewhat unexpectedly, the CC scale correlated more strongly with the SICD Expressive Language scale than with the Receptive Language scale. It was speculated that since comprehension is not overt and can only be inferred by children's behaviors, mothers may have more difficulty in rating this ability. This, in turn, may lead to more variable results. On closer examination, the content of the CC scale

actually measures behaviors which involve expressive language skills.

Finally, Chaffee and her colleagues (Chaffee, Cunningham, Secord-Gilbert, Elbard, & Richards, 1990) conducted a study examining the screening effectiveness of the MCDI language scales in a group of 152 children ranging in age from 24 to 87 months who had been referred to a communicative disorders clinic for assessment of speech and language delay. The Reynell Developmental Language Scales (Reynell, 1977) served as criteria. The MCDI's age-equivalent scores were converted to developmental quotient scores. To determine the most clinically useful cutoff, the scores were subdivided into 10-point intervals ranging from 40 to 110 and compared with a criterion of delay for the Reynell scores which was one standard deviation below the mean for age. Scores  $\leq 80$  were found to yield the best classification rates of normal and delayed status for both the MCDI EL scale and the MCDI CC scale. In terms of test sensitivity, or the accuracy of identification of delayed language status, 88% and 77% were correctly classified as delayed in expressive language ability and receptive language ability, respectively. Classification of normal expressive and receptive language status was less accurate (45% and 64%, respectively). It was concluded that the clinical utility of the MCDI as a screening tool for identifying expressive and/or receptive language delay may be setting-dependent. That is, the MCDI can be useful in high-

prevalence settings such as speech and language clinics, however, its use should be limited to ruling out language delay in low-prevalence settings such as daycare centers.

The aforementioned studies provide some support for the utility of the MCDI in screening for language delay. However, at this time, only Eisert et al. (1980), Tomblin et al. (1989), and Chaffee et al. (1990) have compared the MCDI to measures that are explicitly measures of language (i.e., the PPVT, the Reynell, and the SICD) in attempts to assess the validity of the MCDI for screening of language delay. More empirical research is warranted to gain a better understanding of the usefulness of the MCDI language scales in detecting language delay in young children. It is the purpose of this study to examine these issues in more detail.

Language is considered to be an important facet of overall cognition and children with language delay often have lower intelligence (Stevenson, 1984; Whitman & Schwartz, 1985). In a study by Olson, Bayles, and Bates (1986) of children's speech progress during the first two years of life, the child's vocabulary size was found to be the most sensitive predictor of cognitive maturity. Several studies have indicated that children who present with language impairments as preschoolers often continue to have difficulties in school and frequently present with behavior problems (Aram & Nation, 1980; Bishop & Edmundson, 1987; Silva, Justin, McGee, & Williams, 1984). Early identification of these children is

imperative so that appropriate intervention may be implemented. Language-delayed children do make gains in language development through intervention but it has been suggested that these gains may also be affected by the child's cognitive level. Children within the normal range may be more responsive to treatment than children with poorer cognitive skills (Cole & Dale, 1986). The MCDI has been shown to have good predictive validity in screening for preschoolers who are at risk for later school difficulties (Colligan, 1976; Guerin & Gottfried, 1987). However, this has been examined more in terms of the GD scale than specifically in terms of the language scales.

#### Use of Parental Report in Screening for Developmental Delays

Some studies have suggested that parents are generally aware when their child's development is not progressing normally but they do not recognize the extent of their child's delay (Johnson, Poteat, & Kushnick, 1986). The pediatrician is often the first professional whom the parent approaches with questions relating to their child's development and most frequently, these questions focus on the child's ability, or inability, to walk or talk (Deidrich & Carr, 1984; Kenny et al., 1987; McCormick, Shapiro, & Starfield, 1982). However, many pediatricians do not do routine developmental screening due to time and cost constraints and the majority, therefore, rely on parents to recall the child's developmental milestones and to provide information regarding the child's current

developmental status (Smith, 1978). Physicians' varying levels of familiarity with appropriate application of screening measures and/or the unavailability of such measures have also been noted to be major hindrances in the practice of routine developmental screening (Walker et al., 1989).

To attain a comprehensive evaluation of the child, the clinician often must rely on information from several sources, including his/her own clinical observations, test results, and parental reports (Carey, 1982). There are a number of benefits of using parental reports. For example, parent-completed questionnaires are time- and cost-effective for the professional and they provide the opportunity for the professional to be alerted to potential areas of difficulty prior to the office visit. Office visits allow observation of the child only over a short period of time in a specific setting and young children are not always cooperative during an assessment. Hence, parent-completed questionnaires may provide information because parents have the opportunity to observe their children over a longer period of time and under a variety of different circumstances. Parental reports may also be beneficial to the parents in that they allow parents to play an active role in the assessment of their child and they often learn more about their child by having to focus on age-appropriate behaviors (Beckman, 1984; Byrne, Backman, & Smith, 1986; Sonnander, 1987).

### Influencing Factors on Parents' Perceptions

Little is known about the factors which influence parents' perceptions of their children's development. Beckman (1984) and Carey (1982) have reported a higher degree of agreement between maternal report and clinical evaluation for behaviors which are more easily measured or observable (e.g., language skills). Maternal report has been found to be more valid if the mother has at least a high school education (Carey, 1982; Dean & Steffen, 1984; Knobloch, Stevens, Malone, Ellison, & Risemberg, 1979). Greater sensitivity has also been reported with a greater magnitude in delay (Byrne et al., 1986; Coplan, 1982). Coplan (1982) hypothesized that parents of developmentally disabled children would be more attentive to their children, in comparison to a group of parents with children of varying abilities, and that their perceptions would therefore be influenced. A study by Siegel (1982) suggests otherwise. In her study examining parents' interactions with their preterm and fullterm infants, the parents of the two groups did not differ in their interactions with their children. With language-disabled children, Schodorf and Edwards (1983) found parent-child interactions to be significantly different than those with linguistically normal children. These studies imply that parents' perceptions of and interactions with their children may not always correspond. What parents perceive and how their actions reflect these perceptions may differ. A few studies have attempted to

clarify the factors which influence parents' perceptions of their children (e.g., perinatal factors such as gestation age, birthweight, perinatal complications; child-related factors such as age, gender, birth order; or parent-related factors such as age, education, occupation, marital status) however, no definitive conclusions have been reached (see Bee et al., 1982; Eisert et al., 1980; McCormick et al., 1982; McGillicuddy-DeLisi, 1982; Siegel, 1982; Siegel et al., 1982).

As clinicians continue to rely on parents as sources of information for evaluating a child's developmental status, more research is needed to evaluate the validity of these parental reports. Not only do we need more information on the specific range of factors which may influence a parent's report, we also need to examine in more detail how different areas of development and behavior are rated. We also need to examine which screening instruments are more appropriate for particular groups of children and how these ratings might differ for groups of developmentally disabled children compared to nondisabled children. While these issues should not be ignored, more importantly, one must remember that the effectiveness of any screening instrument will depend greatly on the validity of the measurement with which it is compared.

#### Influence of Parental Perceptions on Parental Report

If clinicians are to rely on parental report, a valid and reliable comprehensive questionnaire for screening of children with developmental problems must be available. It has been

suggested that the validity of parental reports may be higher if the type of behavior is more easily assessed (e.g., language versus social aspects of the child's development). In terms of language skills, expressive language is easier to assess than receptive language (Allen, Bliss, & Timmons, 1981; Beckman, 1984). A critical issue concerns the level of agreement between the parents' perceptions of their child's developmental status and objective assessment obtained by the child's performance on a standardized psychometric measurement of functioning. The measurement against which the questionnaire is to be compared must be norm-referenced, reliable, and valid, as the effectiveness of a screening instrument may only be as good as those measures with which it is compared. The most useful way to evaluate a test's concurrent validity is through classificational analyses of true positives (TP), true negatives (TN), false positives (FP), and false negatives (FN). Indices of sensitivity (defined as accuracy of identifying below-average performance;  $TP/(TP+FN)$ ) and specificity (defined as accuracy in identifying average performance;  $TN/(TN+FP)$ ) are frequently used in evaluating the effectiveness of a screening instrument. If sensitivity is high, there will be few underreferrals or false negatives, and if specificity is high, there will be few overreferrals or false positives. Meisels (1989) recommends using criterion cutoff points of greater than 80% for both sensitivity and specificity if using a

screening instrument for prediction of developmental problems in young children.

Professionals need to be aware of parents' estimations and expectations of their child's future development as this can greatly influence how they relay current evaluations of their child's abilities and how well parents accept their child's diagnosis (Anton & Dindia, 1984; Coplan, 1982). Parental perceptions may greatly influence the quality of the parent-child interaction. Given that the quality of parental involvement has been shown to be a major predictor of treatment outcome for delayed children, it would seem appropriate to include the development of realistic parental perceptions and expectations as a major goal of treatment (Serbin, Steer, & Lyons, 1983).

Parents may be inaccurate in their ratings in one of two ways: they may overestimate or underestimate their child's abilities. If parents overestimate their child's abilities, delivery of early intervention or referral to other specialists may be impeded. Overestimation may also lead to unrealistic expectations, and hence, unrealistic demands placed on the child (Anton & Dindia, 1984; Johnson et al., 1986; Olson, Bates, & Bayles, 1982; Olson et al., 1986; Petersen & Sherrod, 1982). Children of parents who underestimate their abilities and who consider them to be slow may be at-risk for developmental disability due to a self-fulfilling prophecy (McCormick et al, 1982). In a study by

Miller (1986) examining mothers' beliefs about their children's cognitive abilities, he reported that mothers tend to underestimate what infants and young children can do and to overestimate what older children can do. It is assumed that if the accuracy of mothers' observations of their children is improved, mothers will then provide situations to optimize development. They will be less likely to present situations that are either too boring or too demanding for the current capabilities of their child (Hunt & Paraskevopoulos, 1980).

Several studies have reported mothers' ratings of their children's development to be highly valid or accurate vis-a-vis results from objective tests measuring the child's abilities (Carey, 1982; Eisert et al., 1980; Knobloch et al., 1979; Olson et al., 1982; Schery, 1985). Mothers' judgments can have a fairly high degree of validity if they are elicited in an appropriate manner. Mothers tend to be more accurate if they are given specific statements to evaluate and if they are asked to assess their child's current level of functioning rather than being asked to recall developmental milestones, which becomes more difficult as a function of time (Coplan, 1982; Hart, Bax, & Jenkins, 1978; Knobloch et al., 1979).

#### Purpose of this Study

The purpose of this study is to evaluate the concurrent validity or the effectiveness of the MCDI language scales (EL and CC) in detecting expressive and/or receptive language delays in a group of clinic-referred (CR) and normal, non-

clinic (NC) preschoolers. The relationship or level of agreement between the mother's ratings of her child's language abilities on the MCDI and the child's performance on standardized objective measures of language functioning will be examined and compared for both groups. The concurrent validity of the MCDI will be discussed in terms of sensitivity, specificity, and hit rates, in relation to the objective, criterion measures. In general, comparisons will be made between ratings on the EL and CC scales of the MCDI and the MSCA Verbal scale. Given the documented association between language ability and overall cognition, intercomparisons will also be made with these language measures, the MCDI GD scale, and the MSCA GCI. An attempt will also be made to analyze the effectiveness of the MCDI in detecting specific language delays (i.e., either expressive or receptive in nature), comparing the MCDI language scales to performance on the Expressive One-Word Picture Vocabulary Test (EOWPVT; Gardner, 1979) and the PPVT-R. Demographic information will be gathered to examine factors which may influence the accuracy of mothers' ratings of their children's language abilities.

### Hypotheses

The following questions will be addressed in this study and the subsequent outcomes are hypothesized:

1. In evaluating preschool-aged children's language abilities using the MCDI language scales (Expressive Language

and Comprehension-Conceptual), do mothers' reports of their children who are referred for developmental assessment for suspected or known developmental delay (i.e., a clinic-referred or CR group) differ from those reports from mothers whose children are not referred and considered normal (i.e., a non-clinic, control or NC group)?

It is hypothesized that there will be differences between the mothers' ratings of the language abilities of the clinic-referred and non-clinic groups, but the magnitude of the differences will interact with the child's age, the degree of language impairment, and/or the type of language impairment. It is hypothesized that there will be greater variability in scores on both language measures for the CR group compared to the NC group, and that the CR group will be rated lower on both measures across all age levels.

It is anticipated that there will be less between-group difference, however, on the Expressive Language (EL) scale, as a result of the limitations in applicability of this scale beyond age 3. There may be a within-group difference on the EL measure for the CR group, but again, this will be dependent on the child's age and degree of impairment. There will be minimal variability in EL scores for the NC group because it is expected that these children will be functioning at or above the 3-year level, and very few, if any, NC children will be delayed on this measure. Relative to the findings for the MCDI's measure of expressive language ability, a greater

between-group difference is anticipated for mothers' ratings of receptive language skills on the CC scale. This anticipated finding may provide support for earlier reports on the discriminating power of this scale. Once again, it is hypothesized that there will be greater variability in the CR group's scores compared to a more limited range for the NC group.

2. Is the MCDI effective in screening for language delays in preschoolers who are clinic-referred or in those who are considered normal, non-clinic, controls?

It is hypothesized that the effectiveness of the MCDI in screening for language delays in preschoolers will also be dependent on the child's age, magnitude of the child's impairment, and/or the type of language impairment. In examining the relationship and the level of agreement between the mothers' reports on the MCDI language scales and the children's performance on specific objective language measures (i.e., the Expressive One-Word Picture Vocabulary Test: EOWPVT, Gardner, 1979, for single-word expressive ability and the Peabody Picture Vocabulary Test - Revised: PPVT-R, Dunn & Dunn, 1981, for single-word receptive language ability), if these measures truly reflect expressive and receptive language skills, then a significant relationship is expected between the MCDI EL scale and the EOWPVT, and between the MCDI CC scale and the PPVT-R.

When compared to objective psychometric measures such as the MSCA Verbal scale, maternal reports on the MCDI will be more accurate or will show a higher level of agreement for older children. This assumes a more stabilizing pattern of language development as children age and mothers increase familiarity with their older children. It is hypothesized that maternal reports will also be more accurate the more delayed the child, based on the underlying assumption that more significant delays are easier to observe than delays which are more subtle or borderline in degree of impairment. It is also anticipated that high, positive correlations will be revealed between the MCDI language scales and the MSCA Verbal scale, which is a more generalized measure of language ability. This would replicate earlier reports of these relationships. However, a higher correlation is expected to be reported for the CC scale given that it represents a larger number of items across a wider age range and its proven discriminatory power compared to that of the EL scale which represents fewer items across a more limited age range.

3. Is the validity of the maternal report related to family demographic variables? Do the demographic variables contribute differently to the prediction of expressive or receptive language abilities dependent on group membership, that is, whether the child is clinic-referred or normal, non-clinic, control?

This issue is examined in an attempt to clarify factors which may or may not influence the validity of the MCDI language scales in screening for language delays in preschoolers. It is hoped that there will be no between-group differences in terms of family demographics, hence reducing error variance, but some within-group differences are anticipated. It is hypothesized that first-time mothers will be less accurate than mothers who have had more than one child. Hence, this would offer support for the implication that mothers of later-born children have had more experience with and exposure to children, and therefore, more opportunity to become familiar with age-appropriate development and behavior. This familiarity will play a significant role in determining the concurrent validity between the mothers' evaluations on the MCDI and the children's performance on the standardized psychometric measures.

## Method

### Subjects

The study sample was comprised of 75 children, ranging in age from 3 years to 5 years, 8 months, and their mothers. A clinic-referred (CR) group consisted of 42 children (25 girls and 17 boys) who had been referred to the Psychology Department of the Izaak Walton Killam (I.W.K.) Children's Hospital, a regional pediatric teaching hospital, for evaluation of suspected or known developmental delay. A normal, non-clinic (NC) group consisted of 33 preschoolers (18 girls and 15 boys) enrolled in local daycare centers. Children in each group were subdivided among three age levels: age 3 years, age 4 years, and age 5 years (CR  $\bar{M}$  age = 52.48 months,  $SD$  = 9.63; NC  $\bar{M}$  age = 52.33 months,  $SD$  = 9.32). Mothers of the CR children tended to be less educated and more likely to be at home, which in turn, is reflected in their lower SES level, and more likely to be in a married or common-law relationship than were mothers of the NC children. More detailed descriptions of the CR and NC groups are provided in Appendix A.

### Measures

Mothers completed the MCDI and for the purposes of this study, only the Expressive Language (EL), Comprehension-Conceptual (CC), and General Development (GD) scales were examined. The MCDI format was the same as that used by Byrne et al. (1986), which they modified to make easier for mothers

to answer and produced less error in transferring data for analyses. The children were administered the MSCA, from which the Verbal scale and the General Cognitive Index (GCI) were examined, the PPVT-R (Form L or M), and the EOWPVT. The EOWPVT is analogous to the PPVT-R and is designed to assess single-word expressive vocabulary for children aged 2 years to 11 years, 11 months.

### Procedure

Data from the clinic-referred group were retrieved from the files of those children aged 3 to 5 years who were seen in the Psychology Department of the I.W.K. Children's Hospital and for whom an assessment had been completed and complete scores were available on the MCDI, MSCA, PPVT-R, and EOWPVT. Mothers were typically asked to complete the MCDI before the child was assessed formally. Each child had been assessed by an experienced clinical child psychologist who was unaware of the developmental profile of the MCDI prior to psychological testing.

Permission was obtained from local daycares to contact mothers who would be willing to participate with their preschool-aged child. An attempt was made to contact various centers around the city of Halifax whose clientele were from diverse socioeconomic levels (as measured by Hollingshead's Four Factor Index of Social Status; Hollingshead, 1975). An initial introductory letter was sent to the daycare director and if permission was granted, an introductory letter and

consent form were distributed by the daycare to the mothers (see Appendix B). Mothers who gave written consent to participate in the study were given the MCDI and a questionnaire on demographic information to complete at home (see Appendix C). More detailed information was gathered on the NC group for purposes of a subsequent study comparing NC mothers' and fathers' MCDI ratings. It was also not possible to gather as much detailed demographic information on the clinic-referred group due to the data being examined retrospectively. Arrangements were made to test the non-clinic children individually at their daycare center. Due to difficulty in obtaining a sufficient number of non-clinic 5-year-old children from the daycare centers, consent to participate was obtained from five friends who were mothers of normal 5-year-olds and these children were tested in their homes. Calculation of Spearman rank correlation coefficients indicated that this subgroup differed from the remaining CR group in terms of SES level, maternal employment status, marital status, and only child status.

The MSCA, PPVT-R, and EOWPVT were administered to each child in this order, maintaining the order of presentation in which these measures had been administered to the majority of the CR children. The MCDIs were not scored until testing had been completed for each child to ensure that the examiner remained unaware of the resulting MCDI profiles.

## Results

All analyses were conducted separately for the clinic-referred (CR) group ( $n = 42$ ) and the normal, control (NC) group ( $n = 33$ ) to examine any differences attributable to group membership, and when appropriate, the two groups were compared. Standard scores for the McCarthy Scales of Children's Abilities (MSCA), Expressive One-Word Picture Vocabulary Test (EOWPVT), and Peabody Picture Vocabulary Test - Revised (PPVT-R) were used. Since the MCDI raw scores are not standard scores and are expressed in terms of age-equivalents, the MCDI age-scaled scores were converted to developmental quotients ( $DQ = \text{mental age}/\text{chronological age} \times 100$ ) to facilitate comparisons with the standard scores of the objective language measures. Descriptive statistics of the subjective (MCDI) and objective (MSCA, EOWPVT, and PPVT-R) measures were computed separately for the CR and NC groups and the two groups were subsequently compared using  $t$  tests. To examine the relationship between the mothers' ratings on the MCDI and the objective results from the MSCA, EOWPVT, and PPVT-R, Pearson-product moment correlations were calculated. Particular attention was paid to the relationship between the MCDI language scales [Expressive Language (EL) and Comprehension-Conceptual (CC)] and the EOWPVT and PPVT-R to clarify the mothers' ratings on measures of expressive and receptive language abilities.

To conduct classification analyses, the measures were classified into categories of normal, borderline delay, and moderate-severe delay as follows: MCDI normal =  $\leq 20\%$  below chronological age (CA), borderline delay =  $> 20\% - \leq 30\%$  below CA, moderate-severe delay =  $> 30\%$  below CA, and MSCA, EOWPVT, and PPVT-R normal =  $< 1$  SD below CA, borderline delay =  $\geq 1 - < 2$  SD below CA, and moderate-severe delay =  $\geq 2$  SD below CA. Subsequent chi-square analyses were conducted using a 2 (MCDI: No Delay vs. Delay) x 2 (MSCA, PPVT-R, or EOWPVT: No Delay vs. Delay) matrix based on a definition of delay as (a) borderline, and (b) moderate-severe as described above. Based on the results of these chi-square analyses, sensitivity, defined as the accuracy of identifying below average performance, specificity, defined as the accuracy of identifying average performance, and hit rates, defined as the accuracy of overall correct identification, were examined.

As a final comparison between the CR and NC groups, multiple regression analyses were performed for each group to examine the influence of the demographic variables and the objective tests' scores on the MCDI language scales' ratings (see Ghiselli, Campbell, & Zedeck, 1981 for justification in conducting subgroup multiple regression analyses).

#### Subgroup Descriptions of the Subjective and Objective Measures

Means and standard deviations for each subjective and objective language measure are summarized in Table 1. On average, children in the CR group tended to be rated as being

Table 1

Means and Standard Deviations for the Subjective (MCDI) and Objective (MSCA/EOWPVT/PPVT-R) Measures

Measure	<u>M</u>	<u>(SD)</u>	Range	<u>t</u> <sup>°</sup>
<b>MCDI<sup>c</sup></b>				
<b>EL</b>				
CR <sup>a</sup>	74.40	(18.05)	41.82 - 112.50	-5.15 <sup>*</sup>
NC <sup>b</sup>	98.83	(23.02)	57.35 - 139.54	
<b>CC</b>				
CR	80.77	(21.06)	40.00 - 120.00	-7.85 <sup>*</sup>
NC	116.03	(16.83)	72.55 - 156.82	
<b>GD</b>				
CR	79.82	(17.90)	46.67 - 119.05	-8.26 <sup>*</sup>
NC	110.09	(12.46)	76.47 - 146.51	
<b>MSCA<sup>d</sup></b>				
<b>Verbal</b>				
CR	45.57	(11.75)	<22 - 72	-6.08 <sup>*</sup>
NC	59.06	(5.53)	48 - 75	
<b>GCI</b>				
CR	87.71	(19.93)	<50 - 124	-7.51 <sup>*</sup>
NC	114.97	(9.31)	100 - >150	
<b>EOWPVT<sup>d</sup></b>				
CR	89.14	(17.69)	54 - 123	-5.66 <sup>*</sup>

(table continues)

Measure	M	(SD)	Range	t <sup>e</sup>
NC	109.24	(11.47)	91 - 139	
PPVT-R <sup>d</sup>				
CR	89.91	(15.71)	49 - 126	-6.01 <sup>e</sup>
NC	109.70	(11.88)	90 - 136	

<sup>a</sup>n = 42.    <sup>b</sup>n = 33.    <sup>c</sup>Developmental quotients.    <sup>d</sup>Standard scores.    <sup>e</sup>df = 73, 2-tailed.

<sup>f</sup>p < .001.

delayed or below expected age levels on the MCDI language scales. However, results of testing on more objective psychometric measures indicated group performance was more within the average or age-expected ranges. For those in the NC group, mothers' ratings on the MCDI and children's performance on all of the objective measures tended to fall within age-expected levels. T-test analyses indicate a significant group difference between the CR and NC groups on all of the MCDI questionnaire and test measures examined (see Table 1), with the scores for the CR group being consistently lower than the scores for the NC group.

#### Correlation Analyses of Subjective and Objective Test Measures

To examine the relationships between scores obtained on the MCDI language scales and scores obtained on the objective measures, Pearson product-moment correlational analyses were conducted (see Table 2). The correlation coefficients were consistently lower for the NC group compared to the CR group. Tests for calculating the significance of the difference between two correlation coefficients for independent samples (Ferguson, 1976, p. 184) revealed some group differences within the MCDI comparisons. The two groups differed significantly in the EL: CC correlations ( $z = 2.19, p < .05$ ) and the CC: GD correlations ( $z = 2.31, p < .05$ ). They also differed on the correlations of the overall general development measures (MCDI GD: MSCA GCI,  $z = 2.12, p < .05$ ). Also noted was the significant group difference between the McCarthy

Table 2

Correlations Between the MCDI, MSCA, EOWPVT, and PPVT-R Scores  
for the CR and NC Groups

	EL	CC	GD	MSCA-V	GCI	EOWPVT	PPVT-R
<b>EL</b>							
CR <sup>a</sup>		.75 <sup>***+</sup>	.68 <sup>***</sup>	.67 <sup>***</sup>	.65 <sup>***</sup>	.79 <sup>***</sup>	.68 <sup>***</sup>
NC <sup>b</sup>		.42 <sup>**</sup>	.35 <sup>*</sup>	-.18	.03	-.13	-.17
<b>CC</b>							
CR			.91 <sup>***+</sup>	.65 <sup>***</sup>	.74 <sup>***+</sup>	.68 <sup>***</sup>	.67 <sup>***</sup>
NC			.75 <sup>***</sup>	.22	.41 <sup>**</sup>	.02	.17
<b>GD</b>							
CR				.58 <sup>***</sup>	.72 <sup>***+</sup>	.63 <sup>***</sup>	.61 <sup>***</sup>
NC				.03	.38 <sup>*</sup>	-.19	.09
<b>MSCA-V</b>							
CR					.92 <sup>***+</sup>	.70 <sup>***</sup>	.87 <sup>***++</sup>
NC					.79 <sup>***</sup>	.47 <sup>**</sup>	.48 <sup>**</sup>
<b>GCI</b>							
CR						.68 <sup>***</sup>	.87 <sup>***++</sup>
NC						.25	.41 <sup>**</sup>
<b>EOWPVT</b>							
CR							.69 <sup>***</sup>
NC							.60 <sup>***</sup>

<sup>a</sup>n = 42.    <sup>b</sup>n = 33.

\* p < .05.    \*\* p < .01.    \*\*\* p < .001.

Group differences:    + p < .05.    ++ p < .01.

Verbal scale and PPVT-R relationships ( $z = 3.38, p < .01$ ).

Expressive language. For the CR group, the MCDI EL developmental quotient scores were significantly intercorrelated with the CC and GD developmental quotient scores ( $r = .75, p < .001$ , and  $r = .68, p < .001$ , respectively). They were also significantly correlated with each of the objective language measures (MSCA-V:  $r = .67, p < .001$ ; EOWPVT:  $r = .79, p < .001$ ; and PPVT-R:  $r = .68, p < .001$ ).

Based on the mothers' ratings of the NC group, the EL scores were also significantly intercorrelated with the CC and GD scales ( $r = .42, p < .01$ , and  $r = .35, p < .05$ , respectively). However, the magnitude of these relationships were diminished compared to those reported for the CR group. For the NC group, the EL scores were not significantly correlated with any of the objective language measures.

Receptive language. The CC ratings of the CR group were also significantly correlated with the scores on the GD scale ( $r = .91, p < .001$ ) and with each of the objective language measures (MSCA-V:  $r = .65, p < .001$ ; EOWPVT:  $r = .68, p < .001$ ; and PPVT-R:  $r = .67, p < .001$ ). It is of interest that the CC scale, a measure of receptive language ability, was correlated to a similar degree with both the objective receptive language measure (i.e., the PPVT-R) and the objective expressive language measure (i.e., the EOWPVT).

Examination of the correlation matrix for the NC group

indicated similar relationships between the MCDI CC scale and objective language measures compared to those reported for the EL scale. The CC scale was significantly correlated with the GD scale ( $r = .75$ ,  $p < .001$ ), however, it was not correlated with any of the objective language measures.

#### Classification Analyses

To investigate the concurrent validity of the MCDI language scales using the objective language measures as criteria, chi-square analyses were conducted separately for the CR and NC groups using 2 (MCDI: No Delay vs. Delay) x 2 (MSCA, EOWPVT, or PPVT-R: No Delay vs. Delay) matrices based on a classification of delay as (a) borderline or (b) moderate-severe, as described above. To examine the concurrent validity of the MCDI's expressive language measure, the mothers' ratings on the Expressive Language (EL) scale were compared to the children's performance on the McCarthy Verbal scale (MSCA-V) and on the EOWPVT. The mothers' ratings on the MCDI Comprehension-Conceptual (CC) scale were compared to the children's performance on the McCarthy Verbal scale and on the PPVT-R to examine the concurrent validity of the MCDI's receptive language measure. The percentage of agreement between the MCDI scales and the objective language measures (see Figures 1 through 4) and sensitivity, specificity, and hit rates were calculated (see Table 3) for each classification analysis. Since all of the NC children scored within the normal (i.e., no delay) range on all of the

Table 3

Sensitivity, Specificity, and Hit Rates Expressed in Percentages Based on Borderline or Moderate-Severe Cutoffs for Classification of Delay

	Sensitivity	Specificity	Hit Rate
	CR Group		
EL x MSCA-V			
Borderline	64	57	60
Moderate-Severe	100	78	81
EL x EOWPVT			
Borderline	82	72	76
Moderate-Severe	100	78	81
CC x MSCA-V			
Borderline	71	79	76
Moderate-Severe	100	81	83
CC x PPVT-R			
Borderline	80	85	83
Moderate-Severe	100	71	79
	NC Group		
EL x MSCA-V			
Borderline		91	91
Moderate-Severe		97	97

(table continues)

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	<b>Sensitivity</b>	<b>Specificity</b>	<b>Hit Rate</b>
<hr/>			
<b>EL x EOWPVT</b>			
<b>Borderline</b>		<b>91</b>	<b>91</b>
<b>Moderate-Severe</b>		<b>97</b>	<b>97</b>
<b>CC x MSCA-V</b>			
<b>Borderline</b>		<b>97</b>	<b>97</b>
<b>Moderate-Severe</b>		<b>100</b>	<b>100</b>
<b>CC x PPVT-R</b>			
<b>Borderline</b>		<b>97</b>	<b>97</b>
<b>Moderate-Severe</b>		<b>100</b>	<b>100</b>

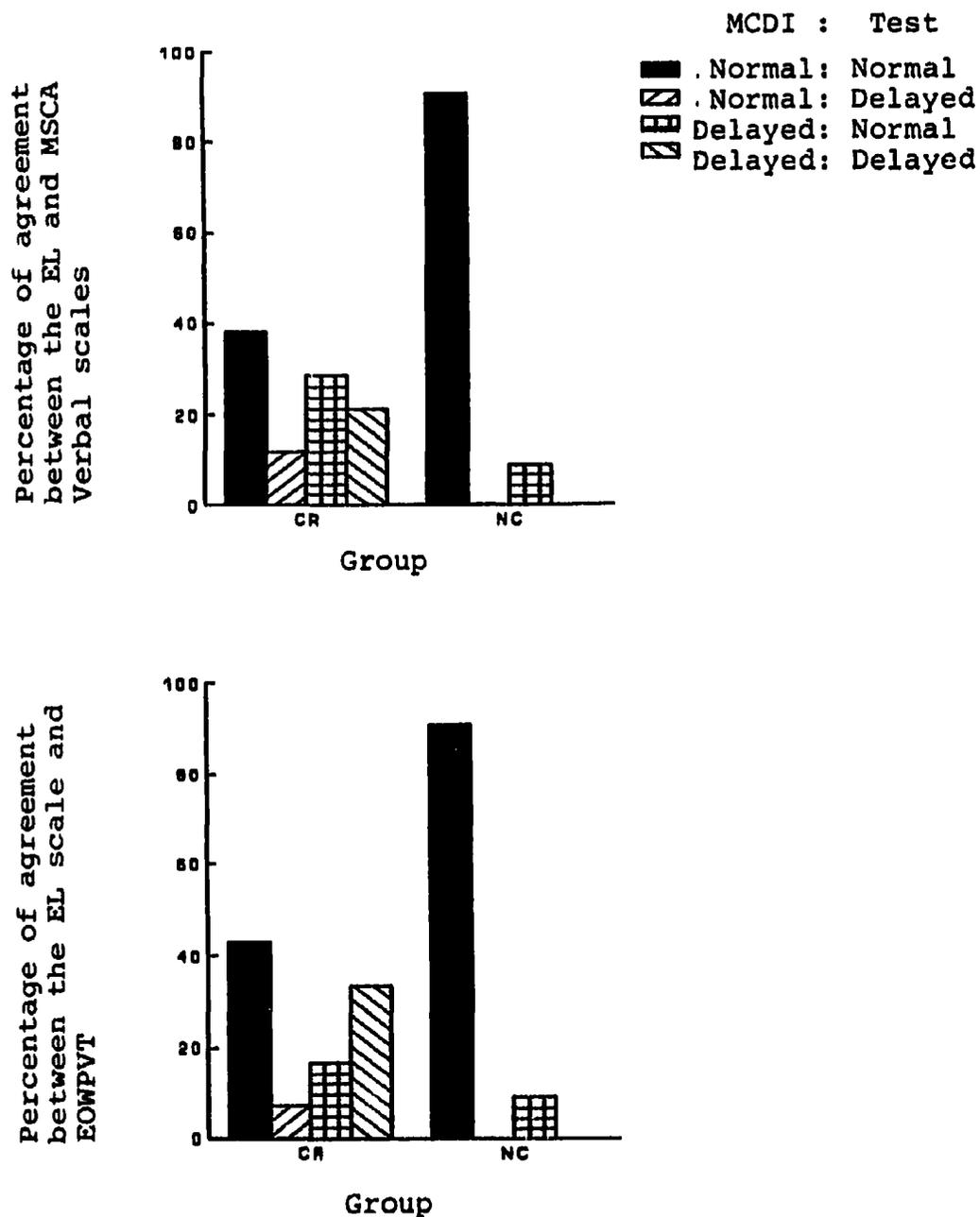
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objective criterion measures, it was not possible to calculate  $\chi^2$  and sensitivity rates within this subgroup.

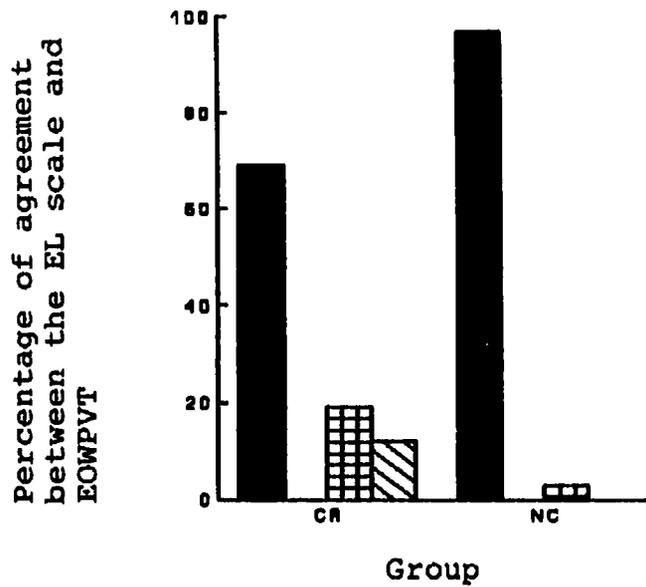
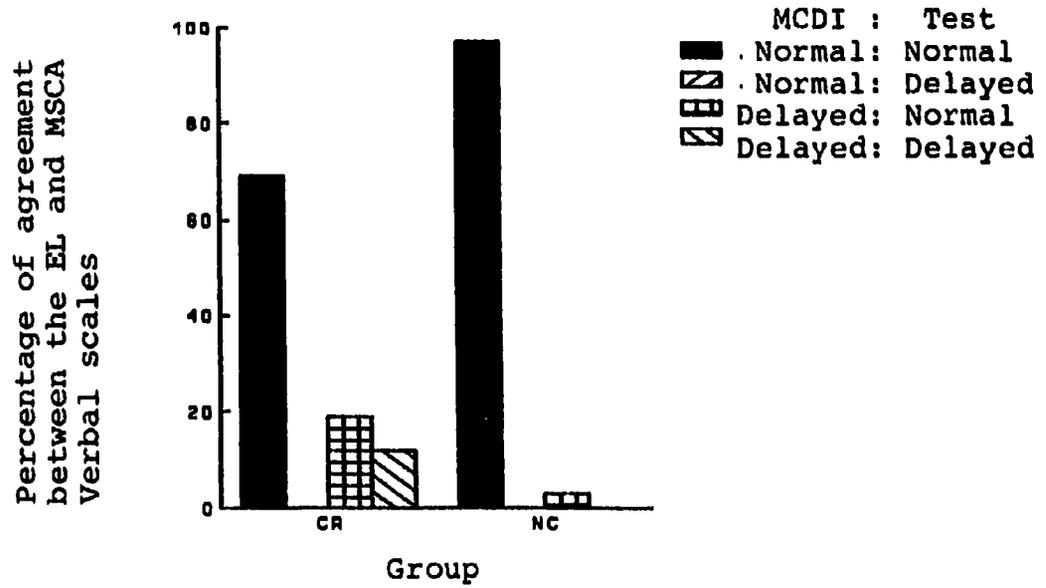
Classification of expressive language status: CR group.

Examination of Figure 1 and Table 3 indicates that when the classification of expressive language delay was based on a borderline level of functioning, higher sensitivity and specificity rates for expressive language status of the clinic-referred group were obtained when the criterion measure was the EOWPVT, which is a particular test of expressive language ability, compared to the McCarthy Verbal scale, which is a measure of more general verbal ability assessing such skills as verbal fluency and verbal memory. The EL scale classified 21 out of 42 (50%) CR children as borderline delayed. Subsequently, it correctly classified only 9 out of 42 (21.4%) children who were also classified as delayed on the McCarthy Verbal scale [ $\chi^2(1, n = 42) = 1.71, ns$ ]. When these same ratings on the EL scale were compared to performance on the EOWPVT, only 14 (33.3%) of these delayed children had also been identified as delayed on the EOWPVT [ $\chi^2(1, n = 42) = 11.96, p < .001$ ].

As anticipated, classification of both normal and delayed status improved with both criterion measures when the classification cutoff was changed from the borderline to moderate-severe classifications (see Figure 2). Relative to the rates obtained for the borderline classifications, when a moderate-severe cutoff was employed, the classification rates



**Figure 1.** Percentage of agreement between the MCDI Expressive Language (EL) scale and the objective language measures (MSCA Verbal scale and EOWPVT) based on a borderline cutoff for classification of delay.



**Figure 2.** Percentage of agreement between the MCDI Expressive Language (EL) scale and the objective language measures (MSCA Verbal scale and EOWPVT) based on a moderate-severe cutoff for classification of delay.

improved substantially when the criterion measure was the McCarthy Verbal scale. They also increased, but to a lesser degree, when the criterion measure was the EOWPVT. However, with this more liberal cutoff, no differences in classification rates were found between the criterion measures. When the moderate-severe delay classifications were used, only 13 out of 42 (31%) CR children were classified as delayed on the EL scale. Only 5 (11.9%) of these children were classified as moderate-severely delayed on both the EL and McCarthy Verbal scales [ $\chi^2(1, n = 42) = 12.66, p < .001$ ]. Similarly, only 5 of these children were also classified as moderate-severely delayed on both the EL scale and the EOWPVT [ $\chi^2(1, n = 42) = 12.66, p < .001$ ].

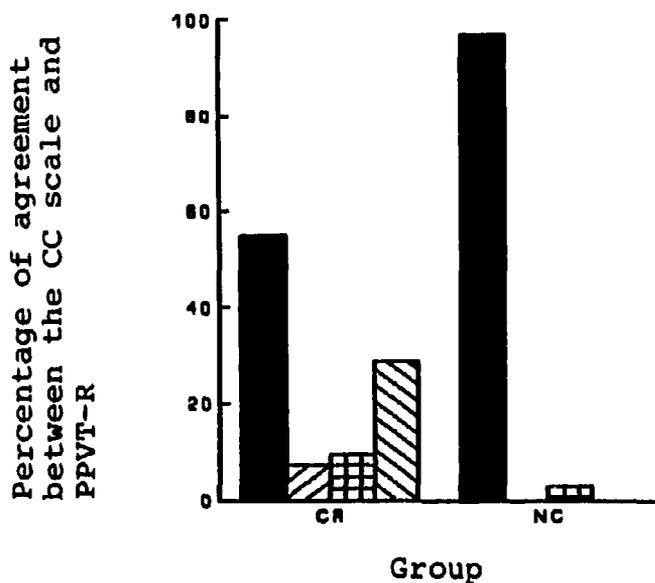
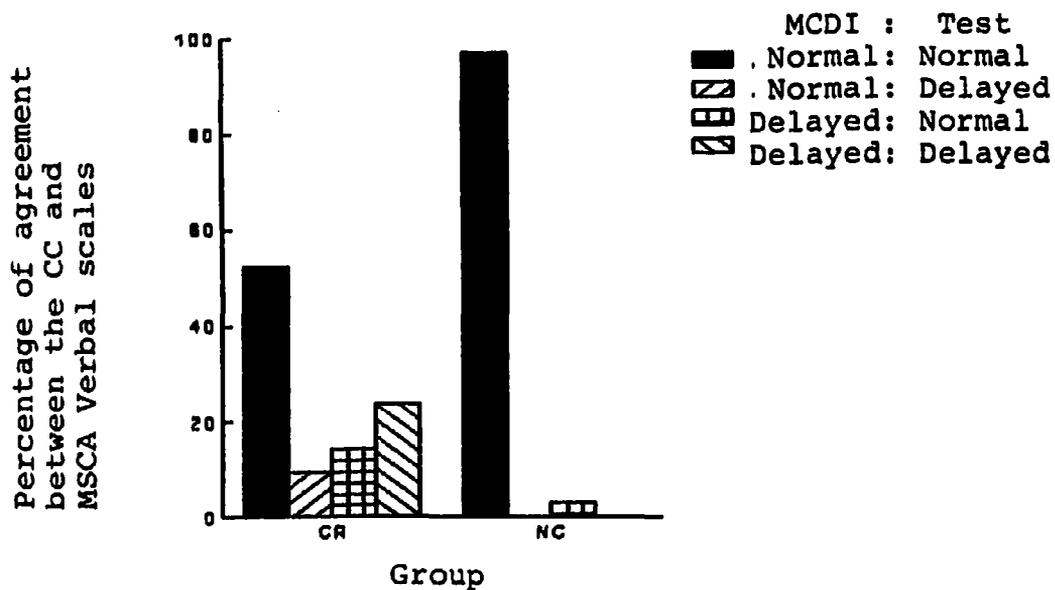
Classification of expressive language status: NC group.

As indicated in Table 3, and Figures 1 and 2, classification of expressive language status of the non-clinic, control children was similar using both objective language measures (i.e., the MSCA-V and EOWPVT) as criteria and when both the borderline and moderate-severe cutoff classifications were employed. Only 3 out of 33 (9.1%) NC children were classified as borderline delayed on the EL scale, however, they scored within the normal range on both the McCarthy Verbal scale and EOWPVT. Once again, as noted with the CR group, classification rates improved with the change to a more liberal cutoff. With the change in the cutoff criterion, only one (3%) of the NC children remained delayed on the EL scale.

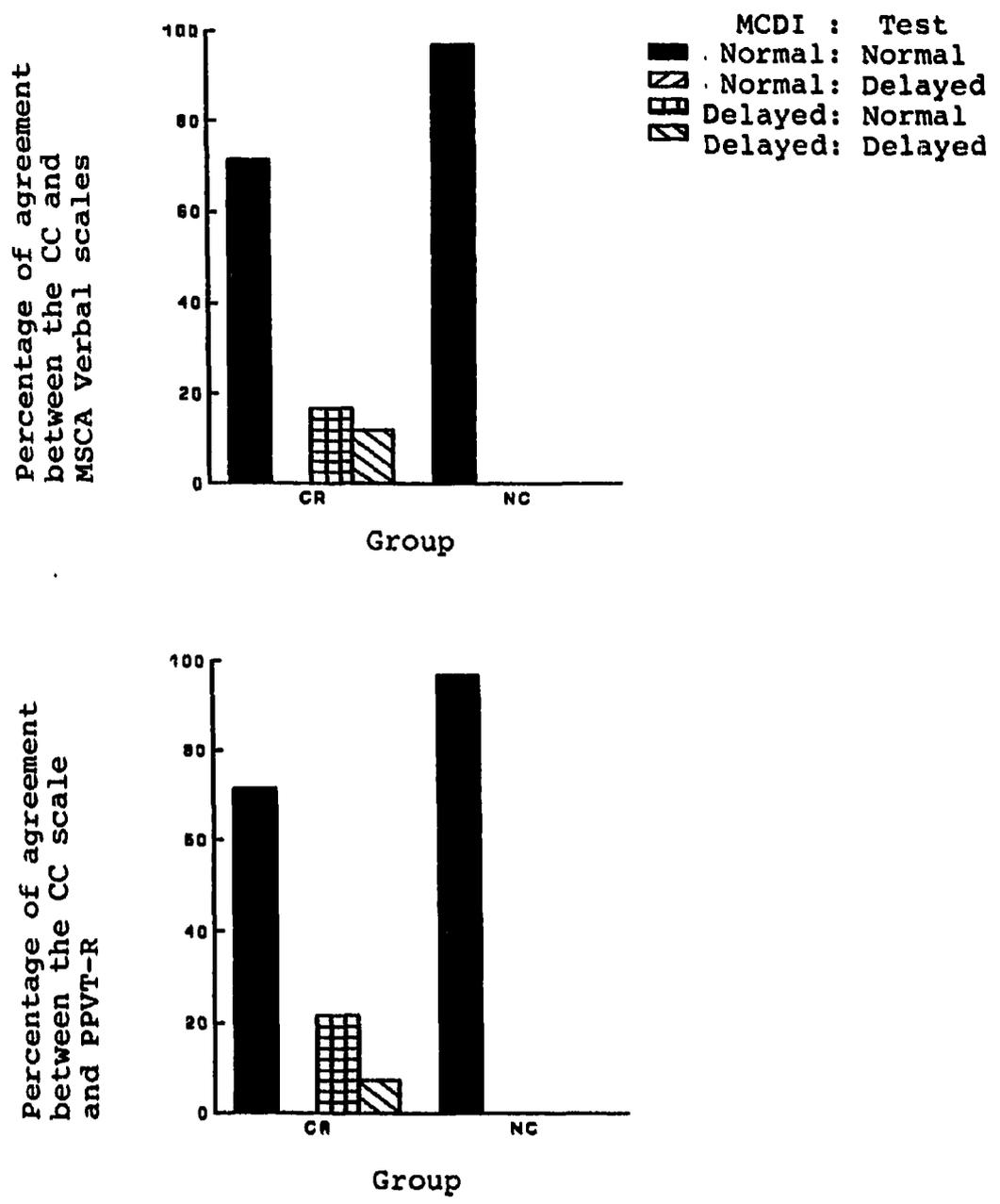
Classification of receptive language status: CR group.

Classification of receptive language status of children in the CR group, using the McCarthy Verbal scale and the PPVT-R as criterion measures, and using a borderline cutoff, yielded results with a similar pattern to that found after classifying this group's expressive language status (see Table 3 and Figures 3 and 4). That is, slightly higher sensitivity and specificity rates, and in turn, an overall higher hit rate, resulted when the criterion for measuring receptive language status was the PPVT-R, which is a particular test of receptive language ability, compared to the McCarthy Verbal scale, which is a more general test of verbal ability. Employing the borderline cutoff for classification of delay, 16 out of 42 (38.1%) CR children were classified as delayed on the MCDI CC scale, however, only 10 (23.8%) of these children were also classified as delayed based on their McCarthy Verbal scale performance [ $\chi^2(1, n = 42) = 9.89, p < .01$ ] and 12 (28.6%) of these children were also classified as delayed on the PPVT-R [ $\chi^2(1, n = 42) = 17.37, p < .001$ ].

When the cutoff criterion of delay was changed to the moderate-severe classification, and the maternal ratings on the CC scale were compared to the children's performance on the McCarthy Verbal scale or on the PPVT-R, the sensitivity, specificity, and hit rates increased when the criterion measure was the McCarthy Verbal scale. However, when the PPVT-R was the criterion measure, the sensitivity rate increased



**Figure 3.** Percentage of agreement between the MCDI Comprehension-Conceptual (CC) scale and the objective language measures (MSCA Verbal scale and PPVT-R) based on a borderline cutoff for classification of delay.



**Figure 4.** Percentage of agreement between the MCDI Comprehension-Conceptual (CC) scale and the objective language measures (MSCA Verbal scale and PPVT-R) based on a moderate-severe cutoff for classification of delay.

but the specificity and hit rates decreased. The number of CR children classified as moderate-severely delayed on the MCDI CC scale was reduced slightly to 12 (28.6%) from 16. Only 5 of these children were also classified as delayed on the McCarthy Verbal scale [ $\chi^2(1, n = 42) = 14.19, p < .001$ ]. However, when the criterion measure was the PPVT-R, only 3 of these 12 children were also classified as delayed on the PPVT-R [ $\chi^2(1, n = 42) = 8.08, p < .01$ ].

#### Classification of receptive language status: NC group.

Classification of receptive language status of children in the NC group was very accurate but there were no differences attributable to the criterion measure used (MSCA-V vs. EOWPVT) nor to whether the classification of delay was based on a borderline or moderate-severe cutoff (see Table 3 and Figures 3 and 4). Only one child from the NC group was classified as delayed on the MCDI CC scale, based on the borderline cutoff, however, this child's performance was within the normal classification range on both the McCarthy Verbal scale and the PPVT-R. When the definition of delay was changed to the moderate-severe cutoff, this child was subsequently classified as not delayed on the MCDI CC scale.

#### Examination of Demographic Factors

Information was also gathered on various demographic variables to examine possible relationships with the MCDI and objective language measures. Descriptive information for both the clinic-referred (CR) and non-clinic, control (NC)

subgroups is summarized in Table 4. A full description of the demographic characteristics for each subgroup can be found in Appendix A.

Pearson product-moment correlational analyses were also conducted examining the possible relationships between the demographic variables and the MCDI's Expressive Language and Comprehension-Conceptual scales, the McCarthy Verbal scale, the EOWPVT, and the PPVT-R. These results are summarized in Table 5. Very few of the demographic variables were significantly correlated with the language measures for both the CR and NC subgroups. There was a significant low negative correlation between maternal education level and the children's performance on the McCarthy Verbal scale ( $r = -.37$ ,  $p < .05$ ) in the NC group.

#### Multiple Regression Analyses

As a final step, multiple regression analyses, employing the stepwise method, were conducted to examine the predictability of the preschoolers' expressive and receptive language abilities, as measured by the MCDI. The developmental quotients of the Expressive Language (EL) and Comprehension-Conceptual (CC) scales were the outcome variables, and the demographic and objective language measures were the predictors. The prediction of both expressive language status and receptive language status was examined separately for each study subgroup (clinic-referred and non-clinic, control) to examine if the predictor variables contributed differentially

Table 4

Demographic Descriptions of the Clinic-Referred (CR) and Non-clinic, Control (NC) Groups

	Group		
	CR ( <u>n</u> = 42)	NC ( <u>n</u> = 33)	<u>t</u> ( <u>df</u> ) <sup>a</sup>
<b>Mother</b>			
Age [ <u>M</u> ( <u>SD</u> )]	31.03 (4.98)	32.76 (5.02)	(66) = -1.43
Education ( <u>mode</u> )			(66) = -5.66 <sup>**</sup>
partial high school	26%		
community college		45%	
Employment Status			(63) = 2.49 <sup>*</sup>
Full-/part-time	50%	88%	
Home	47%	3%	
Unemployed	3%	9%	
SES [ <u>M</u> ( <u>SD</u> )]	33.77 (11.77)	46.90 (10.26)	(64) = -4.80 <sup>**</sup>
Marital Status			(66) = -2.61 <sup>*</sup>
Married/Common-law	86%	76%	
Single	14%	3%	
Separated/Divorced		21%	
<b>Child</b>			
Age [ <u>M</u> ( <u>SD</u> )]	3.98 (0.87)	3.88 (0.82)	(73) = 0.49

(table continues)

Group			
	CR (n = 42)	NC (n = 33)	t (df) <sup>a</sup>
Only Child Status			(68) = 0.08
Yes	32%	70%	
No	68%	30%	
Siblings [ <u>M</u> ( <u>SD</u> )]	1.19 (1.13)	0.76 (0.61)	(67) = 1.84
Treated for Ear Infections			(67) = 0.50
Yes	64%	70%	
No	36%	30%	

<sup>a</sup> 2-tailed, df vary due to missing data in the CR group.

\* p<.05.   \*\* p<.001.



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	<b>N</b>	<b>EL</b>	<b>CC</b>	<b>MSCA-V</b>	<b>EOWPVT</b>	<b>PPVT-R</b>
				<b>Child</b>		
<b>Treatment of Ear Infections</b>						
<b>CR</b>	<b>36</b>	<b>-.10</b>	<b>.06</b>	<b>.16</b>	<b>.04</b>	<b>.11</b>
<b>NC</b>	<b>33</b>	<b>-.06</b>	<b>.12</b>	<b>.005</b>	<b>.04</b>	<b>.02</b>
<b>Number of Siblings</b>						
<b>CR</b>	<b>36</b>	<b>-.24</b>	<b>-.16</b>	<b>.01</b>	<b>-.18</b>	<b>-.05</b>
<b>NC</b>	<b>33</b>	<b>-.22</b>	<b>-.12</b>	<b>-.06</b>	<b>-.26</b>	<b>-.05</b>

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\*  $p < .05$ .

to each language ability, dependent on group membership. In cases where data were missing the variable mean was substituted. All scores were subsequently transformed to a standard  $z$  score and all multiple regression equations are based on these  $z$  scores. Regression analyses were also conducted excluding the missing data but only for comparative purposes (see Appendix D).

Prediction of expressive language ability: CR group. In an attempt to predict the expressive language status of children in the CR group from the combination of objective test scores and demographic factors examined in this study, the EOWPVT score and only-child status were found to be significant predictors of Expressive Language (EL) scores in the CR group (Table 6). The addition of the only-child status variable, however, minimally increased the variance accounted for from 62% to 65%. Examination of the Expressive Language (EL) scores revealed that mothers in the CR group with only one child rated their child higher on expressive language skills ( $M = 82.25$ ) than did mothers with more than one child ( $M = 72.50$ ),  $t(35) = -2.16$ ,  $p < .05$ . Although there were significant differences on the Expressive Language scores relative to only-child status, there was not a significant relationship reported between this variable and EL scores ( $r = -.26$ , ns).

Table 6

Regression Results Showing the Prediction of Expressive Language Ability from Demographic and Test Variables for the CR and NC Groups

Variables in Regression Equation	$R^2_{step}$	Beta	$F^a$
CR Group			
EOWPVT	.62	.61	67.43 <sup>*</sup>
Only-Child Status	.65	-.15	38.48 <sup>*</sup>
NC Group			
Child's Age	.61	-.67	50.91 <sup>*</sup>
Child's Sex	.86	.50	102.86 <sup>*</sup>

<sup>a</sup>F value for a variable's beta weight in the final equation, after all variables have been entered.

<sup>\*</sup>p<.001.

Prediction of expressive language ability: NC group. The child's age and sex made the most significant contributions in predicting expressive language status, as measured by the MCDI EL scale, in the study's NC group of children (Table 6). There was a substantial change in the percentage of variance accounted for when the child's sex was added into the regression equation, increasing from 61% to 86%. Further examination of the contributions of the child's age and sex to the prediction of expressive language ability in the NC group indicated significant differences in EL scores across all age and sex comparisons. The EL developmental quotient scores were significantly higher for the 3-year-olds ( $M = 117.92$ ) than for the 4-year-olds ( $M = 97.01$ ),  $t(22) = 3.41$ ,  $p < .01$ , and the 5-year-olds ( $M = 73.49$ ),  $t(20) = 6.85$ ,  $p < .001$ . The 4-year-olds also scored significantly higher than the 5-year-olds,  $t(18) = 4.09$ ,  $p < .001$ . With regards to the child's sex, non-clinic, control girls were rated significantly lower on the MCDI EL scale ( $M = 84.85$ ) than non-clinic, control boys ( $M = 115.61$ ),  $t(31) = 5.10$ ,  $p < .001$ . In addition to the significant age and sex comparisons, these factors were significantly correlated with expressive language ability, as measured by the EL scale ( $r = -.79$ ,  $p < .001$  and  $r = .68$ ,  $p < .001$ , respectively).

Prediction of receptive language ability: CR group. A similar set of regression analyses were completed to examine the prediction of receptive language ability using the Comprehension-Conceptual (CC) scores of the MCDI as the

outcome variable and similar predictor variables as those used in the expressive language regression analyses with the exception of the EOWPVT score which was replaced with the objective, receptive language measure, the PPVT-R. Calculation of the regression equation for the CR group indicated a significant contribution made by the PPVT-R score and maternal employment status in accounting for 48% of the variance in predicting receptive language status (Table 7). When combined with scores on the PPVT-R, maternal employment status contributed only another 4% to the variance but it was not significantly correlated with the ratings on the MCDI CC scale ( $r = .13$ , ns), nor were there any significant differences on the CC ratings relative to whether or not the mother worked outside the home,  $t(30) = .18$ , ns.

Prediction of receptive language ability: NC group. When prediction of the CC scores was examined for the NC group, the test and demographic variables loaded differently into the regression equation than for the CR group. Only the child's age contributed significantly to the prediction of the CC scores, however, it accounted for only 9% of the variance. While there were no differences on the receptive language (CC) scores between ages 3 ( $M = 123.90$ ) and 4 ( $M = 111.37$ ), or ages 4 and 5 ( $M = 110.36$ ), there were significant age differences between ages 3 and 5. The 3-year-olds scored significantly higher on the CC scale than the 5-year-olds,  $t(20) = 2.44$ ,

Table 7

Regression Results Showing the Prediction of Receptive Language Ability from Demographic and Test Variables for the CR and NC Groups

Variables in Regression Equation	$R^2_{step}$	Beta	F <sup>a</sup>
CR Group			
PPVT-R	.44	.62	33.05**
Maternal Employment Status	.48	.20	19.91**
NC Group			
Child's Age	.09	-.23	4.26 <sup>*</sup>

<sup>a</sup>F value for a variable's beta weight in the final equation, after all variables have been entered.

<sup>\*</sup>p<.05.   <sup>\*\*</sup>p<.001.

$p < .05$ . The child's age was also significantly correlated with CC scores ( $r = -.35$ ,  $p < .05$ ).

## Discussion

The preceding study has provided further evidence that the MCDI language scales (Expressive Language: EL and Comprehension-Conceptual: CC) are clinically useful in screening for expressive and/or receptive language delay in a group of clinic-referred preschoolers but are less appropriate for a group of normal, non-clinic children. These results validate the purpose for which the MCDI was originally designed, that is, to identify children who are functioning below age- and sex-expectations (Ireton et al., 1977).

It is assumed that the differences revealed between the CR and NC groups are true differences and not reflections of biases in sampling techniques. Nonetheless, some caution is advised when interpreting these results and the reader should be aware of some methodological limitations. Although all of the objective tests were administered in a similar order of presentation and in the standardized manner of administration, the circumstances under which the MCDIs were completed and the children tested varied for each group. Treatment variability and subject variability may be associated with increased error variance.

### Group Differences on the Subjective and Objective Language Measures

The clinic-referred (CR) children scored significantly lower than the non-clinic, control (NC) children on all of the subjective (MCDI) and objective (MSCA, EOWPVT, and PPVT-R)

language measures examined. There was a tendency for mothers to rate their CR children, on average, as delayed on the MCDI scales. However, when the CR children's performance on the objective psychometric measures was examined, as a group, performance tended to be within one standard deviation below the mean for expected age levels. As a group, children in the NC group were rated within normal limits on the MCDI and performed within normal limits on all of the language measures. Although the overall scores for the CR group were not unexpected, it was somewhat surprising that they had performed within normal ranges on all of the objective measures. Two interpretations of these results might be considered. First, despite the wider range of scores obtained on all measures by children in the CR group, these children who had been referred for assessment of known or suspected developmental delay were higher functioning than expected. Perhaps an overgeneralization had been made and it was incorrectly assumed that these children would be delayed on the measures assessed just by nature of their association with a group with a higher prevalence of delayed development. Another interpretation is that the objective language measures may have been inappropriately chosen. This may hold particularly true for the EOWPVT and PPVT-R which are designed to assess single-word expressive and single-word receptive language abilities, respectively. These skills may be too rudimentary or simplified to distinguish between variable

levels of normal or delayed performance within this age group studied. As noted by several researchers (Miller & Gildea, 1987; Stevenson, 1984; Walker et al., 1989; Whitman & Schwartz, 1985), a child should have mastered the basic foundations of language around age 3 years and subsequently be perfecting competence in these skills. Many language-impaired preschoolers appear to have "caught up" and have age-appropriate language skills by age 5. However, closer examination of these language-impaired children reveals that they have achieved skills which are generally mastered at a relatively young age and which often reach a plateau by this age anyway. Although the single-word language abilities assessed by the EOWPVT and PPVT-R may be skills which children will continue to develop, these particular aspects of language development may be relatively simpler than some of the abilities assessed by the MCDI such as more complex expression and the formation of concepts.

#### Relationships Between the Language Measures

All of the subjective and objective language measures were significantly intercorrelated for the CR group. For the NC group, the EL and CC scales of the MCDI were significantly correlated but neither scale was significantly correlated with any of the objective language measures (i.e., the McCarthy Verbal scale, the EOWPVT, or the PPVT-R). The magnitude of the correlations were generally larger for the CR group compared to the NC group perhaps reflecting the greater variability in

scores for the CR group or the reduced variability in scores for the NC group. The MCDI language scales were also significantly correlated with the MCDI's measure of general development (General Development: GD scale) for both study groups. This was not surprising given the documented relationships between these MCDI scales and the reported high internal reliabilities (Gottfried et al., 1983, 1984; Ireton & Thwing, 1974). However, if the contribution of the error variance is substantial, caution is advised in interpreting these relationships as the differences between the correlations may be less powerful.

Johnson et al. (1986) investigated the accuracy of maternal report in assessing various areas of development and found that mothers' estimates of expressive language were very similar to the children's mental age test scores but in other areas, such as receptive language, mothers tended to overestimate the children's abilities compared to their mental age test scores. However, all relationships between the mothers' estimates and children's performance or actual test scores were significantly correlated. Eisert et al. (1980) had reported a nonsignificant relationship between the PPVT and MCDI. These results could be interpreted as suggesting that the MCDI is not a good predictor of receptive language ability but the authors cautioned about the nature of the PPVT in that it is not a comprehensive measure of receptive language and it

only assesses one aspect of receptive language (i.e., single-word receptive vocabulary).

As anticipated, the EL scale correlated to a higher magnitude with the objective expressive language measure, the EOWPVT. The magnitude of the relationship between the EL scale and the objective receptive language measure, the PPVT-R, was more surprising. It was somewhat unexpected though that the CC scale, a measure of receptive language ability, was similarly correlated with both the objective expressive language measure and the objective receptive language measure. Perhaps the rating of expressive and receptive language skills involves similar abilities, or are perceived to be similar, and they are not unique ratings. Both the EL and CC scales were similarly correlated with the McCarthy Verbal scale for the CR group. Both MCDI scales were not significantly correlated with the McCarthy Verbal scale for the NC group. This may reflect the limited variability in EL scores for the NC group and the limitations beyond age 3 for this scale. The McCarthy Verbal scale scores may have been in a limited range also since all of the NC children scored within the normal range on this test.

Given the central role that verbal skills play in the construct of measured cognition, a strong relationship between the MCDI language scales and general cognitive development was expected (Dean & Steffen, 1984; Eisert et al., 1980; Gottfried et al., 1984; Ireton et al., 1977). Support for this is

demonstrated in this study. For the CR group, each of the MCDI language scales correlated significantly with each of the measures of overall development (i.e., the GD scale of the MCDI and the GCI of the MSCA). For the NC group, there was a significant relationship between the EL scale and only the GD scale, and it was relatively low ( $r = .35$ ). This relationship may further indicate the limitations of the EL scale, reflected by the lack of variability in scores obtained for the age group studied. The correlations between the CC scale and the two overall measures of general development were higher which supports the discriminating power of the CC scale, second only to the GD scale. The CR and NC groups were also only significantly different on the relationships involving the CC scale but not the EL scale.

Tomblin et al. (1989) reported significant correlations between the MCDI language scales and the SICD language scales. The lowest correlation was between the MCDI and the SICD Receptive Language scale. Surprisingly, the CC scale was more strongly related to the SICD Expressive Language scale rather than to the SICD Receptive Language scale ( $r = .65$  vs.  $r = .48$ , respectively). When  $t$  tests were conducted to examine the difference between mean age-equivalent scores for each measure, there was no difference found between the MCDI EL scale and SICD Expressive Language scale scores. However, there was a significant difference between the MCDI CC age-equivalent scores and the SICD Receptive Language scale

scores. The finding by Tomblin and his colleagues that the CC scale was more strongly associated with the expressive language measure than with the receptive language measure suggests that this scale is not measuring receptive language very well, but rather, it seems to be measuring a combination of receptive and expressive language skills. Two explanations are offered to account for these findings. First, expressive language skills are more easily observable than are receptive language skills. Therefore, receptive language abilities may only be inferred by a child's actions, hence, resulting in more variable ratings. Second, an examination of the type of statements in the CC scale indicates that the majority of items appear to reflect expressive behavior; 35/67 items involve statements such as "names", "uses", or "expresses".

The moderately high correlation between the EOWPVT and PPVT-R also suggests that these measures of expressive and receptive language development may yield similar results for preschool-aged children.

#### Classification of Expressive and Receptive Language Abilities

Examination of classification rates comparing the MCDI language scales to the objective language measures as criteria reveals relatively high sensitivity, specificity, and hit rates for all comparisons. However, in screening for developmental delays, the challenge is to detect children with borderline or mild delays, ensuring that these children will not be missed for subsequent intervention and treatment. It is

important to minimize the frequency with which the screening measure fails to identify a problem when one exists or to keep the percentage of false-negatives to a minimum (Ullman & Kausch, 1979).

Meisels (1989) recommended using criterion cutoff points of greater than 80% for both sensitivity and specificity if using a screening instrument for prediction of developmental problems in young children. If one was to use these guidelines, then it would appear to be inappropriate to use the MCDI Expressive Language scale for predicting expressive language delay in preschool-aged children who are clinic-referred. Although a higher percentage of children were identified as delayed using the EOWPVT as the criterion measure, which is a test of a specific expressive language skill, the specificity rate was not similarly as high and the overall classification hit rate was less than 80%. For the NC group, a 91% identification rate of normal performance was found for both the McCarthy Verbal scale and the EOWPVT employing the borderline cutoff. Ireton et al. (1977) had reported sensitivity of 71% in comparing EL ratings to performance on an unspecified expressive language task.

The appropriateness of utilizing the MCDI EL scale and/or these objective criterion measures in predicting expressive language delay is questionable. A particular concern in using the EL scale to screen for expressive language delay is its limited applicability to children beyond 3 years of age. The

items on this scale range in age level from 2 months to 4 years but the items sample only the first three years adequately; there are only seven items beyond this age level. Realizing these limitations, the EL scale may be useful in screening children who are language delayed and functioning at levels at which the EL scale is applicable. It may be useful in identifying delay in a high prevalence condition such as the clinic-referred sample but only useful in ruling out delay (or identifying normal development) in a low prevalence condition such as the non-clinic, control sample. It is important for clinicians to keep these limitations in mind, especially when the child is older than 3 years of age.

There is often higher agreement for easily observable measures, such as expressive language (Beckman, 1984). However, when the concurrent validity of the Comprehension-Conceptual (CC) scale was examined employing the McCarthy Verbal scale and the PPVT-R as criterion measures to predict receptive language ability, the classification rates were slightly higher than those reported for the expressive language measures. Similar to the expressive language findings, the more specific measure of receptive language ability, the PPVT-R, rather than the more general verbal measure, the McCarthy Verbal scale, yielded slightly higher sensitivity and specificity rates based on the borderline classification of delay for the CR group. Once again, prediction of receptive language ability for the NC group

appeared to be in the direction of ruling out, rather than identifying, delay. Ireton et al. (1977) had reported sensitivity of 30% and specificity of 88% in predicting performance on the Stanford-Binet IQ or WPPSI IQ from ratings on the CC scale. They recommended that the CC scale could not be used to predict intellectual retardation because more than one-third of the children who scored in the retarded range on the MCDI had a normal IQ. In 23% of these cases, the children also had an expressive language impairment. The results of the present study illustrate that the CC scale may be useful, however, when predicting specific receptive language impairment for a high prevalence condition such as the clinic-referred sample examined. Ireton et al. concluded that a normal score on the CC scale tended to contraindicate developmental language delay, and this is supported by the findings of the present study.

When a child is delayed, there may be more opportunities for the mother to overestimate the child's abilities and fewer chances to underestimate the child's abilities. Similarly, if the child functions within the normal range, there are fewer chances of overestimating and more chances of underestimating (Price & Gillingham, 1985). Overestimations are generally more common than underestimations (Hunt & Paraskevopoulos, 1980; Miller, 1986; Sattler, Feldman, & Bohanen, 1985; Serbin et al., 1983). The main error made for the 3- to 5-year age range is overestimation of the child's abilities (Hunt &

Paraskevopoulos, 1980). In contrast, however, Coplan (1982) reported that parental estimates can be very accurate if their child is high-risk or abnormal. Parental overestimations of their child's abilities may be reflected more in the hopes of the parents. Anton and Dindia (1984) have suggested that it is important for the clinician to be aware of these estimations and expectations when deciding how the child should be treated.

#### Influence of the Demographic Variables

Although the mothers in the CR and NC groups differed significantly on some of the demographic variables examined (e.g., maternal education, employment status, SES, and marital status), the children did not differ significantly from each other. The low and nonsignificant correlations reported for both the CR and NC groups between the demographic variables and the subjective and objective language measures confirms previous reports by other researchers who have attempted to gain a better understanding of factors which may influence maternal perceptions (Bee et al., 1982; Eisert et al., 1980; McCormick et al., 1982; McGillicuddy-DeLisi, 1982; Siegel, 1982; Siegel et al., 1982). There was a significant low negative correlation reported between maternal education level and performance on the McCarthy Verbal scale for children in the NC group but interpretation of this relationship is difficult. Given the number of correlations conducted, it is suspected that this finding may be a spurious one which does

not reflect a true relationship between these variables. The lack of a relationship between SES and the MCDI and MSCA supports previous reports that the relationship between the MCDI and MSCA are independent of SES (Gottfried et al., 1984).

#### Prediction of Expressive and Receptive Language Abilities

Employing the demographic and language measures as predictors of expressive or receptive language abilities, as measured by the MCDI EL and CC scales, results of the regression equations indicate that the predictor variables contributed differently to each language ability dependent on the child's group membership, whether CR or NC. The EOWPVT score and only-child status were found to be significant predictors of expressive language status in the CR group, accounting for a combined total of 65% of the variance. For the NC children, the child's age and sex made the most significant contributions in predicting expressive language status, accounting for 86% of the variance.

The finding that CR mothers with one child rated their child higher on the MCDI EL scale than mothers with more than one child suggests that experience with other children may have an impact on maternal ratings of expressive language ability. It could be suggested that as a function of having less opportunity to become familiar with age-appropriate development and behavior, first-time mothers may be less accurate, and perhaps overestimate the expressive language abilities of their child with known or suspected developmental

delay. Conversely, it is assumed that mothers of more than one child have had more opportunity to observe appropriate behaviors and may therefore rate their child more realistically, which is lower. On the other hand, it may be argued that mothers with only one child have more time to spend with their one child and may be more perceptive in noting their child's behaviors. This may result in a more accurate assessment of their expressive language skills compared to mothers with more than one child who must divide their attention among their children.

At first glance, it would appear that the NC children are more delayed on the EL scale the older they are. However, this reflects the limited sampling of appropriate behaviors beyond age 3 and the reduced variability in EL scores for the older ages. The significantly lower expressive language developmental quotient score calculated for girls than boys suggests that the expressive language skills of girls were poorer than the same skills for boys, however, another interpretation is offered. Although the number of items sampling expressive language beyond age 3 for both girls and boys is equivalent, these items are spread over a wider age range for boys, hence allowing for the possibility of larger discrepancies between the child's mental age and chronological age, and in turn, resulting in a larger developmental quotient score for boys. These age and sex differences exemplify the limitations of the MCDI in assessing expressive language

skills in normal preschoolers and further emphasize the importance of clinicians using the MCDI for the purposes for which it was designed, that is to screen for development which is below age and sex expectations. Hence, although the age and sex comparisons were significant, the validity or significance of these differences is negligible.

The PPVT-R scores and maternal employment status accounted for 48% of the variance in predicting receptive language ability in the CR group. Only the child's age contributed significantly to prediction of receptive language ability in the NC group, and it accounted for only 9% of the variance. Hunt and Paraskevopoulos (1980) examined the accuracy of mothers' knowledge of their children's abilities on several items of standardized tests of intelligence. It was found that mothers who had a higher education and more work experience made fewer errors of overestimation and fewer false predictions about their children's abilities than mothers with less education and less work experience. Gottfried et al. (1984) also reported a tendency for maternal education, employment status, and the child's birth order to be related to MCDI scores. MCDI and MSCA scores were consistently higher for mothers who were more educated, not working, and whose child was first born. It may also be explained by suggesting that mothers who stay home may have more opportunity or experience in interacting with their child (McGillicuddy-DeLisi, 1982). Therefore, they may be able to evaluate the

more difficult to observe receptive language skills better. In the present study, more of the mothers of the CR children did not work compared to their NC counterparts (50% home or unemployed CR mothers vs. 12% home or unemployed NC mothers). However, contrary to the above-mentioned studies, these mothers did not differ in their ratings of their child's receptive language ability. Given the limited additional contribution of maternal employment status to predicting receptive language ability, as measured by the MCDI CC scale, and the lack of any significant difference between mothers who work and those who do not work, its relative importance as information to be gathered by the clinician is questionable or at least needs further investigation.

Similar to the results reported for the prediction of expressive language abilities in the NC group and the subsequent limitations of using the EL scale with this population, caution should also be urged when utilizing the MCDI to assess receptive language abilities in normal preschoolers. The significant differences reported between children aged 3 years and 5 years suggests that more of the 3-year-olds were higher functioning for their age relative to the 5-year-olds within their age group. On closer examination, though, the Comprehension-Conceptual scale actually does not sample many items beyond age 5 (6 items for females and 8 items for males). Therefore, there is a greater chance for greater variability in scores for the 3-year-olds than there

are for the 5-year-olds due to the wider range of items sampled for the younger age level. This wider range also allows for a greater discrepancy between the child's mental age and chronological age, hence resulting in more variable developmental quotient scores.

### Conclusions

The importance of detecting language delays early cannot be overemphasized given the strong relationship between language skills and subsequent developmental status (Guerin & Gottfried, 1987). The preceding study has demonstrated that the Expressive Language (EL) and Comprehension-Conceptual (CC) scales of the MCDI may be useful in screening for language delays in young preschoolers. However, these scales are more appropriately used when the children are from a high prevalence condition, such as the clinic-referred sample, rather than from a low prevalence group, such as those children in the non-clinic, control sample. This study has also demonstrated reasonable sensitivity and specificity rates with very specific language measures as criteria (the EOWPVT and PPVT-R). Further empirical investigations are necessary with criterion measures which evaluate expressive and receptive language skills across a broader spectrum and for language skills which may not be as rudimentary as those assessed by the current measures. The limitations of the EL scale must also be kept in mind when interpreting a profile for a child who is older than 3 years unless the child is

functioning below age- and sex-expectations. As a final note, the influence of various demographic factors on maternal ratings on the MCDI remains inconclusive. Although very few relationships were revealed between the demographic factors gathered and the MCDI language scores, the differential contributions of some of these factors to the prediction of expressive or receptive language abilities in clinic-referred or normal, non-clinic preschoolers indicate that further investigations are warranted.

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**Appendix A**

Table A-1

Detailed Descriptions of the Demographic Variables for the CR and NC Groups

	Group			
	CR		NC	
	n	(%)	n	(%) <sup>a</sup>
Child				
<b>Age</b>				
3 years	16	(38)	13	(39)
4 years	11	(26)	11	(33)
5 years	15	(36)	9	(27)
Total	42		33	
<b>Age x Gender</b>				
3 years	12 F: 4 M		6 F: 7 M	
4 years	5 F: 6 M		5 F: 6 M	
5 years	8 F: 7 M		7 F: 2 M	
Total	25 F: 17 M		18 F: 15 M	
<b>PPVT-R x Age</b>				
3 years	2 L: 14 M		8 L: 5 M	
4 years	5 L: 6 M		6 L: 5 M	
5 years	12 L: 3 M		5 L: 4 M	
Total	19 L: 23 M		19 L: 14 M	
<b>Only-child Status</b>				
Yes	12	(32)	23	(70)
No	25	(68)	10	(30)
Unknown	5	(12) <sup>b</sup>		
<b>Number of Siblings</b>				
0	12	(32)	11	(33)
1	11	(30)	19	(58)
2	11	(30)	3	(9)
3	2	(5)	0	(0)
5	1	(3)	0	(0)
Unknown	5	(12)		
<b>Younger Siblings</b>				
0	30	(86)	21	(64)
1	4	(11)	11	(33)
2	1	(3)	1	(3)
Unknown	7	(17)		

(table continues)

	CR		NC	
	n	(%)	n	(%)
<b>Older Siblings</b>				
0	18	(51)	22	(67)
1	12	(34)	10	(30)
2	3	(9)	1	(3)
3	1	(3)	0	(0)
5	1	(3)	0	(0)
Unknown	7	(17)		
<b>Treated for Ear Infections</b>				
Yes	23	(64)	23	(70)
No	13	(36)	10	(30)
Unknown	6	(14)		
<b>Mother</b>				
<b>Age [M (SD)]</b>	31.03	(4.98)	32.76	(5.02)
<b>Education</b>				
< Grade 9	1	(3)	0	(0)
Grade 9	6	(17)	0	(0)
Partial high school	9	(26)	0	(0)
Completed high school	7	(20)	2	(6)
Partial community college	0	(0)	0	(0)
Completed community college	5	(14)	15	(45)
Partial university	1	(3)	3	(9)
University degree	6	(17)	9	(27)
Graduate/Professional degree	0	(0)	4	(12)
Unknown	7	(2)		
<b>Employment Status</b>				
Fulltime	14	(44)	24	(73)
Parttime	2	(6)	5	(15)
Home	15	(47)	1	(3)
Unemployed	1	(3)	3	(9)
Unknown	10	(24)		
<b>Marital Status</b>				
Single	5	(14)	1	(3)
Common-law	1	(3)	2	(6)
Married	29	(83)	23	(70)
Separated	0	(0)	5	(15)
Divorced	0	(0)	2	(6)
Widowed	0	(0)	0	(0)
Unknown	7	(2)		

(table continues)

	CR		NC	
	n	(%)	n	(%)
<b>SES</b>				
major business/professional	1	(3)	6	(19)
minor professional/technical	11	(31)	16	(52)
craftsman/clerical/sales	10	(29)	8	(26)
semi-skilled	11	(31)	1	(3)
unskilled/merial services	2	(6)	0	(0)
unknown	7	(17)	2	(6)

<sup>a</sup>Calculations exclude missing data. Totals may not equal 100% due to rounding errors.

<sup>b</sup>Based on total n.

**Appendix B**

Director  
Daycare  
Address  
Address  
Address

Dear -----

I am interested in contacting parents who would be willing to participate with their child in a study I am conducting examining mothers' and fathers' perceptions of their 3, 4, or 5 year old preschool child's language abilities. I am currently enrolled in Saint Mary's University Masters of Science program in Clinical Psychology and I am conducting this study as part of my Masters' thesis, under the supervision of Dr. Ken Hill. This study has been approved by SMU's Research Ethics Committee.

While this study may be of no immediate benefit to the participants, I hope it will contribute to our knowledge of the roles parents play in providing information about their children's development and behavior, particularly as it relates to the child's language abilities. All of the information obtained from the parents and their children is completely confidential and their names will not be made public in any form which may identify them as participants.

The study will take approximately 1/2 hour of the parents' time at home and approximately 1 hour of the child's time at daycare. It is preferable that the children be seen in their daycare rather than at home. A separate room, away from the other children and with as few distractions as possible, will be required, if space in your center allows for such an arrangement. Parents will be asked to complete two questionnaires each, where possible; one reflecting various aspects of their child's development and behavior, and the other, about themselves and their family. An appointment will then be arranged at your daycare to see each child whose parents have given written permission to participate. Each child will be asked to perform a number of tasks designed to assess various abilities. These tasks are designed to be fun and interesting to young children and most children enjoy doing them.

If you give me permission to contact the families in your center. I will ask you to distribute the attached letter and consent form to parents for their consideration. I will ask you not to give these forms to parents whose child, to the best of your knowledge, has been seen in the past, is currently being seen, or is to be seen in the near future by a psychologist, speech-language pathologist, occupational therapist, or similar professional for evaluation of known or suspected problems. For those parents who agree to

participate, I will then ask you to give them the questionnaires to complete at home and have them return it completed on the day the appointment has been made to see their child.

I will contact you within the next few days to answer any questions you might have, and if this study meets with your approval, to make the necessary arrangements for letter and consent form distribution and subsequent arrangements for those who agree to participate with their children.

Thank you for your time and consideration of this proposal.

Sincerely,

Bonnie Hondas, B.A.  
(M.Sc. Candidate)

Dear Parents,

I am sending letters to parents of 3, 4, and 5 year olds to see if they would be interested in participating in a study I am conducting examining preschool children's language abilities. I am currently enrolled in Saint Mary's University Masters of Science program in Clinical Psychology and I am conducting this study as part of my Masters' thesis, under the supervision of Dr. Ken Hill. This study has been approved by SMU's Research Ethics Committee and I have been given permission to contact you by your child's daycare.

While this study may be of no immediate benefit to you or your child, I hope it will contribute to our knowledge of the roles parents play in providing information about their children, particularly as it relates to the child's language abilities. All of the information obtained from you and your child is completely confidential and your names will not be made public in any form which may identify you as participants.

This study will take approximately 1/2 hour of your time at home and approximately 1 hour of your child's time at daycare. Where possible, both mothers and fathers will be each asked to complete two questionnaires; in one, you will be asked about your child's development and behavior, and in the other, you will be asked to provide information about yourselves and your family such as your age, level of education, occupation, the number of days per week your child attends daycare, and whether there are other children in your family. An appointment will be arranged at your child's daycare in which he/she will be asked to perform a number of tasks designed to examine various abilities. These tasks are designed to be fun and interesting to young children and most children enjoy doing them.

If you are interested in participating in this study or would like more information, please complete and return the attached form the next day your child comes to daycare. The necessary arrangements will then be made through your child's daycare for your participation in this study or to contact you to answer any questions you might have. If you prefer, I may be contacted at work during the day at 420-2178. If you should sign the consent to participate with your child and then later change your mind and wish to withdraw, you are under no obligation and you may do so at any time. You may also contact my thesis supervisor Dr. Ken Hill, SMU Psychology Department (420-5853) if I am unable to satisfactorily respond to any concerns or should you have any formal complaints about this project.

Thank you for consideration of this proposal.

Sincerely,

Bonnie Hondas, B.A.  
(M.Sc. Candidate)



**Appendix C**

Dear Parents,

Thank you for consenting to participate with your child in my study which is examining parents' evaluations of their preschool-aged children's language abilities. Please find enclosed two sets of two questionnaires labeled Questionnaire #1 and Questionnaire #2. To ensure that all of the information obtained from you and your child remains completely confidential, you and your child have been assigned an identification number which I have written in the upper right hand corner of each questionnaire form. You may only be identified through referral to a master list which is accessible only to myself and my thesis supervisor. Do not write your name, your child's name, or any other information, other than that which is asked in the questionnaires, which might later identify you as participants.

If possible, I request that both mothers and fathers each complete a set of questionnaires separately. If one parent is unavailable to complete his or her questionnaires, I ask the parent participating to complete Part A of the other parent's Questionnaire #2. Carefully read the instructions for each questionnaire before beginning.

I have made arrangements to see your child at the daycare center on \_\_\_\_\_. I ask that you fully complete these questionnaires 1-3 days prior to this appointment and return all of them with your child on this day.

Thank you again for taking the time and the interest to participate in this study.

Sincerely,

Bonnie Hondas, B.A.  
(M.Sc. Candidate)

ID # \_\_\_\_\_

QUESTIONNAIRE #2

To be completed by \_\_\_\_\_  
Mother                      Father

INSTRUCTIONS FOR COMPLETION OF QUESTIONNAIRE #2:

This questionnaire gathers information about you and your family about factors which may or may not influence parents' evaluations of their children's language abilities. Read each item carefully. Answer each item as accurately as possible. Again, it is important that you answer all of the items.

Thank You.







----- / ----- / -----  
 ----- / ----- / -----  
 ----- / ----- / -----  
 ----- / ----- / -----  
 ----- / ----- / -----

**PART C: Information about your child in this study**

Has your child been seen in the past, being seen in the present, or expected to be seen in the near future by a psychologist, speech-language pathologist, occupational therapist or similar professional for any known or suspected developmental or behavioral problems?

----- Yes ----- No

Has your child been treated in the past for ear infections?

----- Yes ----- No

If Yes:

When?

-----  
 -----  
 -----

How many days per week does your child attend daycare?

----- number of 1/2 days ----- number of full days

How many friends does your child play with outside of daycare?

----- none ----- 1 ----- 2 ----- 3 ----- 4 or more

How many times per week are spent with these friends?

----- less than 1 ----- 1 ----- 2 ----- 3 or more

Overall, do you feel that your child is functioning at his/her age level?

----- Yes ----- No

If No:

----- above age level; estimate by how much (----- months)

----- below age level; estimate by how much (----- months)

Do you feel that your child's language abilities are at his/her age level?

----- Yes ----- No

If No:

----- above age level; estimate by how much (----- months)

----- below age level; estimate by how much (----- months)

**Appendix D**

Table D-1

Regression Results Showing the Prediction of Expressive Language Ability from Demographic and Test Variables for the CR and NC Groups Excluding Substitutions for Missing Data

Variables in Regression Equation	$R^2_{step}$	Beta	F <sup>a</sup>
CR Group ( $n = 26$ )			
EOWPVT	.59	.58	36.91 <sup>*</sup>
NC Group ( $n = 31$ )			
Child's Age	.62	-.67	48.86 <sup>*</sup>
Child's Sex	.86	.50	94.18 <sup>*</sup>

<sup>a</sup>F value for a variable's beta weight in the final equation, after all variables have been entered.

<sup>\*</sup> $p < .001$ .

Table D-2

Regression Results Showing the Prediction of Receptive Language Ability from Demographic and Test Variables for the CR and NC Groups Excluding Substitutions for Missing Data

Variables in Regression Equation	$R^2_{step}$	Beta	F <sup>a</sup>
CR Group (n = 26)			
PPVT-R	.42	.67	19.42 <sup>**</sup>
Maternal Employment Status	.53	.28	14.92 <sup>**</sup>
NC Group (n = 31)			
Child's Age	.10	-.26	4.61 <sup>*</sup>
MSCA Verbal	.19	.51	4.58 <sup>*</sup>
SES	.28	.25	4.84 <sup>*</sup>

<sup>a</sup>F value for a variable's beta weight in the final equation, after all variables have been entered.

<sup>\*</sup>p<.05.   <sup>\*\*</sup>p<001.