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Parental Involvement in the Developmental Screening of Their Young Children: A Multiple-Source Perspective

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Because multiple risk factors can influence child development, methods designed to screen young children for developmental problems should incorporate information from various sources in order to cover all potential areas of delay effectively. In this study we combined results from a standardized parent questionnaire with those of an individually administered developmental screening instrument (the Early Screening Inventory) in order to predict more accurately which children will be at risk for school failure. Our results show a decrease in misclassifications after combining the parent measure with the screening instrument, thus increasing the predictive accuracy of the developmental screening process. Implications of our findings are discussed within the context of screening from a perspective of multiple risks and multiple sources of input.

Recent attention to early intervention for young children with disabilities and developmental vulnerabilities has been accompanied by a growing concern to identify these children and their families as early as possible. As mandated by the Education of the Handicapped Act Amendments of 1986 (Public Law 99-457), and its subsequent reauthorization under the Individuals with Disabilities Education Act (Public Law 102–119), identification efforts have been broadened. Not only should early identification be directed to children with established disabilities, but also to children with less well-defined developmental delays and to those who are at risk for later developmental delay if intervention services are not provided (Shonkoff & Meisels, 1990).

The early identification of children considered at risk for school failure can be accomplished effectively through developmental screening. Developmental screening provides a brief assessment of a child's developmental status in order to determine if the child has a high probability of experiencing delay in his or her development (Meisels, 1988, 1989). Because children are exposed to multiple risk factors, accurate and effective screening decisions should be based on information that addresses the multiple variables that can influence child development. In addition to individual developmental, medical, hearing, and vision screening, information obtained from parents represents a highly desirable source of input that can contribute unique and essential information to the screening process (Meisels & Provence, 1989). However, the po-

tential usefulness of parental knowledge about child development has generally been overlooked.

P.L. 99-457 encourages the active involvement of parents in the early identification process and in the development of the individualized family service plan (IFSP). Parents have multiple opportunities to view their children in a variety of situations over an extended period. Parents can also interpret their children's behavior, placing it within a broad framework and a meaningful context. Given the limitations imposed by standardized testing situations, parents' views can contribute substantially to the attainment of goals associated with the assessment process (Bagnato & Neisworth, 1991; Beckman, 1984; Blacher-Dixon & Simeonsson, 1981; Bricker, Squires, Kaminski, & Mounts, 1988; Byrne, Backman, & Smith, 1986; Glascoe, 1991; Lichtenstein, 1984).

Nevertheless, parents generally have not been considered to be viable sources of information concerning their children's development (Lichtenstein & Ireton, 1984; Shelton, 1989). Sheehan (1988) notes that parents are excluded from involvement in assessment procedures because they are considered to be unreliable reporters, lacking not only the skills to assess children developmentally but the objectivity to provide unbiased responses to standardized items. Alternatively, he points out that supporters of parental involvement argue that it is possible or even likely that parental observations are accurate, but methods for collecting parental perspectives are not.

In an effort to incorporate parents into the assessment process, several independent measures have been developed to collect systematic data from parents about their children's development. The two most widely used instruments that include parents as active members of the screening process are the Minnesota Child Development Inventory (MCDI; Ireton & Thwing, 1974) and the Denver Prescreening Developmental Questionnaire (PDQ; Frankenburg, Fandal, & Thornton, 1987; Frankenburg, van Doorninck, Liddell, & Dick, 1976).

The MCDI is a standardized parent-report measure that uses a yes/no format on 320 items concerning child development and behavior. It is intended to assess children between the ages of 1 and 6 years, yielding information about the child in seven developmental areas: Gross Motor, Fine Motor, Expressive Language, Comprehension-Conceptual, Situation-Comprehension, Self-Help, and Personal-Social. These seven scales and a General Development index are designed to identify children who are functioning at a developmental and behavioral level below what normally would be expected given the child's age and sex.

Reviews of the MCDI indicate some effectiveness in predicting developmental outcomes with certain populations, yet little evidence exists to support the measure's overall validity and reliability (Barnes, 1982; Byrne et al., 1986; Gottfried, Guerin, Spencer, & Meyer, 1984; Guerin & Gottfried, 1987; Meisels, 1988; Meisels & Wasik, 1990; Rysberg, 1985, Saylor & Brandt, 1986). Concerns linger regarding the MCDI's unrepresentative norming sample, the use of homogeneous samples in validity studies, a tendency to overestimate children's developmental status, questionable independence among and utility of certain subscales, and the absence of data supporting stability over time (Barnes, 1982; Byrne et al., 1986; Dean & Steffen, 1984; Gottfried et al., 1984; Guerin & Gottfried, 1987; Meisels, 1988; Rysberg, 1985).

A second parent measure, the Denver PDQ (Frankenburg et al., 1987; Frankenburg et al., 1976) consists of 97 items selected from the Denver Developmental Screening Test (DDST; Frankenburg & Dodds, 1967). The PDQ was designed as a first-stage screening instru-

ment. Parental ratings on selected items are used to determine if screening is necessary with the full screening measure, the DDST. The PDQ is designed for use with children from 3 months to 6 years of age, and parents are required to respond to a total of 10 questions that are selected from one of five age-specific forms.

Several studies show promise for the PDQ, but due to a questionable norming sample and validity studies using data from the DDST, as well as the absence of reliability data, all conclusions reached about the accuracy and utility of the PDQ are highly tenuous (Diamond, 1987; Lichtenstein & Ireton, 1984; Meisels, 1989; Miller & Sprong, 1986; Mitchell, 1985). Specifically, the PDQ does not have a norming sample independent of the standardization research with the DDST. Moreover, its sample is overrepresentative of higher SES families and has a large proportion of missing demographic information (Frankenburg et al., 1976). Its validity studies show the PDQ underrefers children when compared with the DDST, a measure which itself tends to underrefer at a very high rate (Meisels, 1989). Subsequently, this combined error increases the likelihood that the PDQ will miss substantial numbers of children who should receive follow-up screening. Although the PDQ has been revised to improve its utility (Frankenburg, 1985) research is still needed to incorporate comparison measures other than the DDST and the original PDQ in order to establish its validity and reliability.

Another approach that integrates parents in the screening process was developed by Bricker and her colleagues (Bricker et al., 1988; Bricker & Squires, 1989a, 1989b; Squires & Bricker, 1991). They devised a set of nine Infant Monitoring Questionnaires that parents complete when their child reaches 4, 8, 12, 16, 20, 24, 30, 36, and 48 months of age. The questionnaires each include 30 items that tap five major areas of development. Interrater reliability exceeded 90% in comparisons between parents and professionals, with test-retest reliability recorded at 95%. Validity studies of the measures, as reported up to 36 months of age, show that the questionnaires are highly accurate in excluding children who are at risk from further evaluation (i.e., high specificity), thus resulting in very few overreferrals. However, relatively large proportions of children who are at risk are underreferred. This characteristic of an assessment is known as sensitivity (i.e., the proportion of children who are correctly identified as being at risk). Thus, the Infant Monitoring Questionnaires are a promising approach to developmental screening, and, although they tend to underrefer children at high risk, they demonstrate that parents can be effectively included in the screening process.

All three of these measures represent single sources of information, however, and do not reflect a multiple-risk or multiple-source perspective concerning early childhood development. This perspective acknowledges that, due to the complex nature of the influences of multiple risks and stresses on child development, the use of any singular source of data for the purposes of screening or assessment will increase the probability of misclassifying some children. In order to represent the child's developmental status adequately, effective screening should include data from multiple sources, such as an evaluation of the parents' knowledge of the child and an assessment of the child's actual performance on a standardized behavioral protocol.

We hypothesized that by combining parental input with direct assessment it would be possible to improve the accuracy of the developmental screening process and to reduce the likelihood of classification errors that are associated with single sources of screening data. Specifically, we investigated the accuracy of an individually administered screening

instrument, the Early Screening Inventory (ESI; Meisels & Wiske, 1983, revised as Meisels, Wiske, Henderson, Marsden, & Browning, 1992) when combined with its accompanying Parent Questionnaire. In order to test our hypothesis, we addressed three questions. First, does the incorporation of a standardized parent-report measure into the developmental screening process increase the predictive validity of the ESI? Second, does the standardized Parent Questionnaire assess developmental delay differentially for children who vary on specific background characteristics? Finally, does the predictive validity of the Parent Questionnaire vary systematically depending on the child's developmental status as indicated by the screening instrument?

METHOD

Subjects

Subjects for this study were part of a larger national restandardization of the Early Screening Inventory (ESI; Meisels et al., 1992), a developmental screening measure designed to identify children between the ages of 4 and 6 years who may be at risk for school failure. (Versions of the ESI for 3-year-olds and for Spanish-speaking children have also been developed, but are not discussed in this paper.) Subjects in this study included all children who were screened with the ESI and whose parents completed a Parent Questionnaire (PQ) within ± 90 days of the ESI screening ($N = 1{,}296$, $M = -2.2$ days, $SD = 17.1$). For purposes of determining predictive validity, a subsample of 90 children was also given a diagnostic assessment, the McCarthy Scales of Children's Abilities (MSCA; McCarthy, 1972) approximately 9 months following the ESI screening ($M = 9.7$ months). Although numerous exogenous and endogenous factors could interfere over this period, it was selected to represent the average duration of a school year. As such, it is a much more rigorous test of the validity of the ESI than would be demonstrated by a study that used a concurrent design. The mean duration between the completion of the Parent Questionnaire and the administration of the ESI in the subsample that was administered the MSCA was -9.2 days ($SD = 17.6$), meaning that, on average, the PQ was completed 9 days before the ESI was administered.

Both the predictive validity subsample (i.e., MSCA subsample) and the larger sample (i.e., PQ sample) included children ranging from 4 to 6 years of age, specifically 3.96 to 5.96 years (47.6 to 71.5 months) for the PQ sample and 3.98 to 5.96 years (47.8 to 71.5 months) for the MSCA subsample. As seen in Table 1, which displays the demographic characteristics of both groups of children participating in this study, the samples were quite similar. The only significant difference between the two groups was the distribution of race ($p < .001$); the smaller predictive validity subsample did not have as high a minority representation as the larger sample. Although the larger PQ sample was almost one third non-White (28.9%), the MSCA subsample was only 13.3% non-White. Analysis of racial distributions showed that the subsample had representation from only the white, black, and Hispanic populations; the larger sample had additional representation from other populations including Asian, Native American, and other ethnicities not described individually.

Measures

Early Screening Inventory. The Early Screening Inventory (ESI; Meisels et al., 1992) is a brief assessment designed to identify children between 4 and 6 years of age who could benefit from further evaluation to determine if they may require educational intervention in order to perform adequately in school. The ESI is individually administered to children by a trained examiner; administration time is 15 to 20 minutes, and training is relatively brief. Di-

TABLE 1
Descriptive and Comparative Statistics for the Parent Questioinnaire (PQ) Sample and the MSCA[a] Subsample

Demographic Characteristic	PQ Sample (%) (N = 1296)	MSCA Subsample (%) (n = 90)
Gender (male)	48.4	48.9
Race[b]		
White	71.1	86.7
Black/African American	12.0	5.6
Other	16.9	7.7
Father's Education		
< High School	14.0	15.5
High School Graduate	45.3	39.3
> High School	40.7	45.2
Mother's Education		
< High School	16.7	15.6
High School Graduate	46.2	42.2
> High School	37.2	42.2
Family Structure		
Living with both parents	68.3	76.7
Socioeconomic Status		
Mid/High	60.6	65.6
Residence		
Rural	58.1	58.9
Presence of Siblings		
Older	58.3	58.9
Younger	46.5	41.1
Previous Preschool[c]		
Some experience	62.3	67.8
≥ 2 years	44.5	40.0

[a] McCarthy Scales of Children's Abilities (McCarthy, 1972).

[b] $p < .001$, for bivariate distribution of race (white, non-White); race was also significant ($p < .05$) when 3 levels were analyzed (white, black, other).

[c] Includes participation in preschool, day care, nursery school, Head Start, etc.

vided into three main sections (Visual-Motor/ Adaptive, Language & Cognition, Gross Motor/ Body Awareness), the ESI assesses the child's general ability to acquire skills in the areas of language, number and reasoning, large and small muscle coordination, and eye-hand coordination.

The child's overall performance on the ESI yields a single score that can be categorized into one of three recommendations: (a) *refer* for further diagnostic evaluation, (b) *rescreen* in 8 to 10 weeks (due to a marginal score), or (c) *OK* (i.e., presumed to be developing normally and not in need of further evaluation). Separate cut-off scores are provided for age cohorts reflecting 6-month intervals beginning at 3 years, 11 months, and 16 days, and ending with 5 years, 11 months, and 15 days. (See Meisels, Henderson, Liaw, Browning, & Ten Have, 1993, for a review of the reliability, validity, and normative characteristics of the ESI.)

Parent Questionnaire. The ESI is accompanied by a Parent Questionnaire (PQ). Given to the parent(s) at or before the time of the child's initial screening, the PQ is a brief survey consisting of 58 items divided into five sections that provide basic information about the child's family, school history, medical history, general health, and overall development. The 48-item child development section of the questionnaire requires the parent to respond by checking "yes," "no," or "don't know." Items were chosen that reflect common concerns about the development of young children as well as the perceptions of the individual child's primary caregivers about the child's development in areas not easily evaluated in a direct testing situation. The PQ was designed to serve as a supplement to the ESI, providing additional information rather than duplicating the information gathered from the individual testing. Actual completion time for the PQ is estimated as 5 to 10 minutes. The child development section is estimated to be at a 4th grade reading level (Fry, 1977). Questions

from the child development section of the PQ are contained in the Appendix.

McCarthy Scales of Children's Abilities. The McCarthy Scales of Children's Abilities (MSCA; McCarthy, 1972) was used as the dependent measure in this study to confirm risk status. The MSCA is a valid and reliable diagnostic assessment (see Kaufman, 1982) designed to assess children's general intellectual abilities in several cognitive and motor areas: Verbal, Perceptual-Performance, Quantitative, General Cognitive, Memory, and Motor. The General Cognitive Index (GCI), which is composed of the first three scales, is intended to provide a general estimate of the child's overall cognitive functioning and was used as an indicator of developmental delay for the children in this study. Cut-offs for delay status were determined using 1.35 standard deviations below the mean scaled score for children in each of the four ESI age cohorts. This standard deviation corresponds to GCI scores of 79, 74, 74, and 71 for age groups 3.11.16–4.5, 4.6–4.11, 5.0–5.5, and 5.6–5.11, respectively (see Meisels et al., 1993, for a description of the derivation of these cut-offs). The McCarthy was selected as a criterion for this study due to the overlap between the ESI tasks and those that make up the GCI. It was selected also because school districts frequently use an instrument such as the MSCA to determine a child's eligibility for special education services.

RESULTS

Reconstruction of the PQ Scale

Analysis of the child development section of the PQ began with recoding the 48 items, assigning a *3* to any response, whether "yes" or "no," that suggested the possibility of developmental delay, and a *1* to responses that showed no indication of delay. All blank items and *don't know* responses were coded as a *2*. Using these recoded parent responses, it was possible to restructure the survey to represent a more concise scale for collecting parental input about the child's development.

Certain items were then deleted from the PQ based in part on how each item correlated with the ESI and MSCA. Items were considered suspect if their correlations with the developmental outcomes were consistently low (<.15), not statistically significant, or negatively correlated with developmental outcome. Principal components factor analysis using a varimax rotation method confirmed the removal of suspect items. Thus, items with low loadings (<.5), or items with high loadings on weak factors were excluded from the formal scoring of the scale. In all, 10 of the 48 items were removed from the PQ based on correlational studies, factor analysis, and theoretical and practical considerations. These items are noted in the Appendix.

The PQ was scored by summing the 38 remaining items on the scale. The distributions of the actual scores for each age group

TABLE 2
Distribution of Parent Questionnaire Scores by Age Group (N = 1,296)

Age Group (range)	*n*	Range of Scores	Mean (*SD*)
4.0–4.5	147	38–80	49.10 (7.05)
4.6–4.11	395	38–81	47.21 (6.85)
5.0–5.5	449	38–75	45.90 (6.27)
5.6–5.11	305	38–70	45.46 (5.62)

are given in Table 2, which shows that the scores tend to decrease as the children get older. This trend confirms the developmental character of the scale, since younger children are not expected to perform as successfully or consistently as older children.

Because the continuous scores are age-dependent, age-specific dichotomized risk classifications were developed for the PQ, as was done for the ESI and the GCI scores. In order to promote a relatively conservative referral population, a cut-off score of one-half standard deviation above the mean score for each age group was selected (a higher score indicates the possibility of risk status). This cut-off point was chosen deliberately because of our preference to classify a fairly large number of children as at risk rather than to exclude children who may be considered delayed.

Reliability of the PQ Scale

Cronbach's alphas for the entire sample (.72) and the subsample (.75) demonstrate an acceptable reliability for the PQ (Nunnally, 1978). As shown in Table 3, the reliability of the measure varies within age groups, with a slight tendency to decrease in the youngest and oldest age groups, although an acceptable range was maintained (.56–.83). Computing the reliability of the scale using the factors generated from the factor analysis yielded similar results. The scale remained reliable for the entire sample and MSCA subsample, with alphas of .58 and .63, respectively. The youngest and oldest age groups have slightly lower alphas, but these coefficients fall below an acceptable range only within the MSCA subsample. Table 3 summarizes the reliability of the PQ scale for the entire sample and for each age group; it includes coefficients generated from the 38 individual items as well as from the 13 factors that comprise the scale.

Contribution of the PQ

The PQ risk classifications were combined with those of the ESI to create a single measure of the child's developmental risk status. This combined measure (ESI/PQ) is inclusive: a child is classified as at risk only if the child is considered at risk on both the parent measure and the individual screening measure. For purposes of this study, the ESI *re-screen* and *OK* categories were combined to reflect conservative rates of comparison with the PQ classifications of risk status.

As seen in Table 4, the specificity and false-positive ratios both improved with the introduction of the PQ; specificity increased from .83 to .94, and false positives decreased from 70% to 50%. However, the measure's sensitivity did not improve; rather, it declined. This

TABLE 3
Cronbach's Alphas for Parent Questionnaire by Age Group, Including All Items and Factors Within the Parent Questionnaire (PQ) Sample and the MSCA[a] Subsample

	PQ Sample			MSCA Subsample		
Age Group (range)	*n*	Items (38)	Factors (13)	*n*	Items (38)	Factors (13)
4.0–4.5	147	.7056	.5579	14	.5649	.4050
4.6–4.11	395	.7277	.6069	32	.7543	.6673
5.0–5.5	449	.7201	.5896	23	.8294	.7442
5.6–5.11	305	.6606	.4948	21	.6693	.4043
Total Sample	1296	.7168	.5842	90	.7514	.6271

[a] McCarthy Scales of Children's Abilities.

TABLE 4
Classification Analysis for the ESI, the Parent Questionnaire, and the Combined ESI/PQ Measure In Predicting Developmental Delay as Indicated by the MSCA[a] (N = 90)

Developmental Measure	Sensitivity	Specificity	False Positive (%)	False Negative (%)
Early Screening Inventory (ESI)	1.0	.83	70	0
Parent Questionnaire (PQ)	.83	.75	81	17
Early Screening Inventory/Parent Questionnaire (ESI/PQ)	.83	.94	50	17

[a] McCarthy Scales of Children's Abilities.

decline from 1.0 to .83 is due to the failure of the PQ to refer one of the six MSCA delay cases, all of which were referred by the ESI. Because the risk classifications on the combined ESI/PQ measure are inclusive, this child was not considered at risk by the combined measure. Due to the small base rate of actual delay cases for the sample (6/90), even a small shift in classifications substantially affected the sensitivity ratio to a fairly large extent (17% for each underreferral).

Background variables. Separate classification analyses for dummy-coded covariates representing specific background characteristics, including gender, race, SES, family structure, and previous school experience showed that the combined ESI/PQ results did not predict differentially for one group compared to the other. The addition of the parent measure improved the specificity and false positive ratios of the ESI for both groups represented within each of the dichotomous variables. With the exception of the group that included the one child who was not referred by the PQ, the addition of the PQ improved the predictive validity over the ESI when used alone. Table 5 summarizes the results from the classification analyses for selected background variables.

Differential ESI performance. Separate classification analyses were also generated to see if the benefits gained by adding the PQ to the ESI differed, depending on the child's performance on the ESI. For the 70 children not referred by the ESI, none was classified as delayed by the MSCA. Because the combined ESI/PQ measure is inclusive (a child must be at-risk on both measures to be referred), the classifications of the PQ did not change the referral status of these children on the screening measure. It follows, then, that for the group of children not referred by the ESI, the combined ESI/PQ measure did exactly what it was designed to do: it continued to exclude these children correctly from further evaluation.

For the 20 children referred by the ESI, only six were classified as delayed by the MSCA. However, by combining the classifications of the PQ with those of the ESI, the classifications improved. Nine of the 14 children referred incorrectly by the ESI were now correctly excluded from further evaluation,

TABLE 5
Classification Analysis by Selected Background Variables (N = 90)

Demographic Variables	Bivariate Categories	ESI			ESI/PQ		
		Sensitivity	Specificity	False Positive (%)	Sensitivity	Specificity	False Positive (%)
Gender	male	1.0	.88	63	.67	.95	50
	female	1.0	.79	75	1.0	.93	50
Race	white	1.0	.85	69	.80	.95	50
	non-White	1.0	.73	75	1.0	.91	50
SES	low	1.0	.77	55	.80	.85	50
	mid/high	1.0	.86	89	1.0	.98	50
Living with	no	1.0	.71	56	.75	.82	50
both parents	yes	1.0	.87	82	1.0	.97	50
Preschool	none	1.0	.73	70	.67	.96	33
experience	some	1.0	.88	70	1.0	.93	57

thereby improving the specificity ratio. Concurrently, the false positive proportion was reduced from 70% to 50% (5/10). However, due to the one case missed by the parent measure, sensitivity fell.

The ESI cross-tabulation with the MSCA produced a Cohen's kappa of .40, but the combined ESI/PQ measure generated a kappa of .59, which is within the moderate to good range (Fleiss, 1981). With small sample sizes and the small number of delayed children, these values must be interpreted with caution. Moreover, it is not possible to determine if the kappas of the two models were significantly different from one another, because the models were not independent of each other. However, it appears that the combined ESI/PQ measure is a more effective means of predicting developmental delay than is the ESI alone.

DISCUSSION

The results of this study show that the specificity, or the accuracy with which the ESI correctly excludes children from further diagnostic evaluation, increases when the results of the PQ are combined with those of the ESI. The combined measure correctly excludes 94% of those children not requiring additional diagnostic assessments, compared to the 83% who are excluded based on the ESI alone. Similarly, the false-positive ratio, or the proportion of overreferrals, decreases from 70% to 50% when the parent measure is included in the identification process. This indicates a decline of two thirds (9/14 overreferrals) in the number of children who are incorrectly referred when the screening instrument is used in isolation.

Although the false-positive ratio remains high, the extent to which the proportion of overreferrals improves is seen more clearly through the change in the absolute number of misclassifications. Of the 20 children referred by the ESI, 14 were not developmentally delayed (70% false-positive ratio). However, of the 10 children referred by the combined ESI/PQ measure, only 5 were not developmentally delayed (50% false positive ratio). The decrease in the overall number of false positives, from 14 children to 5, represents a substantial drop in overreferrals. In practical terms, this means that an additional nine children were correctly excluded from future testing, a savings in time and money

for the providers of screening and a reduction in stress for the children and families.

Separate classification analyses for the PQ show that it has a high false-positive ratio, overreferring a large number of children (81%). However, a conservative cut-off score was chosen intentionally in an effort to avoid excluding children who may have developmental delays. The PQ is not intended to serve as a stand-alone indicator of risk status; it was designed to be used in combination with other measures of child development. Because the combined ESI/PQ measure requires a child to be referred by both the ESI and the PQ, a relatively high false-positive ratio for both measures does not result automatically in a high false-positive ratio for the combined measure. In other words, only those children referred by both instruments will be referred by the combined measure for further diagnostic evaluation.

In any situation where development is predicted, false positives will occur, since development is not independent of childhood experiences, some of which are ameliorative or remedial. In this study, more than 60% of the children screened were participating in some sort of preschool program (Head Start, day care, nursery school). These programs, whether or not they have a specific curricular component, are expected to have effects on children that will result in their displaying improved developmental abilities over time.

For young children in particular, early school experiences serve as an intervention that subsequently influences development (Meisels & Shonkoff, 1990). In predictive validity studies, this unavoidably results in a substantial number of false positives. The goal, however, is to reduce the false-positive ratio as much as possible, without excluding children who should be referred for further evaluation. A shorter duration between the ESI/PQ screening and the MSCA testing would likely have resulted in fewer false positives, but we chose a 9-month time frame in order to approximate the length of a regular school year. In future studies, we intend to compare these results with those of a shorter predictive-validity time frame and investigate concurrent validity by conducting follow-up assessments 7–10 days after screening.

Overall, both the decrease in the false-positive ratio of the ESI and the increase in the specificity ratio of the ESI when the parent measure is included in the developmental screening process represent desirable outcomes. However, the combined ESI/PQ measure demonstrates some loss of sensitivity when compared with the ESI alone. The decrease from 1.0 to .83 is due to the failure of the PQ to refer one of the six children who actually had delays, all of whom were identified by the ESI.

In examining this single case, it appears that this is a situation of overestimation on the part of the parent. The child scored well within the refer range on the ESI and the delay range on the MSCA. Because this child did poorly on both measures, it is highly likely that additional information from teachers and other professionals would have contributed to a final decision to refer the child for further diagnostic evaluation. This situation underscores the importance of adopting a multifaceted approach to assessment and the need for replicating this study with a much larger sample.

Finally, additional classification analyses that adjusted for demographic variables add support to the utility of the combined ESI/PQ. Results show that the PQ increases the predictive validity of the ESI for all demographic groups, regardless of the child's gender, race, socioeconomic status, family structure, or previous school experience. Moreover, the parent measure is as effective for children classified at risk on the ESI as for those children not referred by the screening instrument.

This study avoids several of the problems that accompanied previous research con-

ducted in the area of parental involvement and early childhood assessment. Many studies have used homogeneous samples, collecting data from children already classified as delayed or from children with similar backgrounds (Alpern, Boll, & Shearer, 1980; Burgess, Asher, Doucet, Rearden, & Daste, 1984; Byrne et al., 1986; Dean & Steffen, 1984; Frankenburg et al., 1976; Ireton & Thwing, 1974; Ireton, Thwing, & Currier, 1977; Saylor & Brandt, 1986; Schafer, Bell, & Spalding, 1987). In contrast, the children in this study were randomly selected from a general preschool and kindergarten population. Furthermore, the parents in the study were not trained in techniques of reporting information, nor did they receive any special preparation for the study. In all, the parents and children in this study represent a general sampling of the early childhood population. Although the sample size is modest, it is large enough to reach preliminary conclusions about the validity and reliability of the Parent Questionnaire. Future studies should seek to increase the number of children in the sample with disabilities, thereby raising the base rate of at-risk children and lessening the likelihood of misleading classifications, in particular false positives.

In all, the psychometric qualities of the PQ used in conjunction with the ESI are acceptable; the combined ESI/PQ measure appears to be a valid and reliable measure of child development. Furthermore, from a theoretical perspective, unlike some measures that are recommended for use in isolation, the PQ is designed to accompany a developmental screening instrument. Although in this study the PQ was completed at approximately the same time as the ESI, as an alternative, after this study has been replicated with a larger and more diverse sample, the parent measure could serve as a prescreening device. As a first-stage screening instrument, the ESI would be used to screen only those children classified as at risk by the PQ. Such a first-stage screening would enhance efficiency by reducing the number of children who go on to receive a full-scale screening assessment, subsequently reducing the costs to programs of unnecessary diagnostic testing. Whether the parent measure is combined with the ESI concurrently, or whether it is used as a first-stage screening instrument before the direct screening of the child, the PQ enhances the effectiveness of the developmental screening process.

A child's potential to learn is not determined by a single risk factor, unless the event is of major and continuous proportion, such as damage to the central nervous system (Sameroff, Seifer, Barocas, Zax, & Greenspan, 1987). Instead, development is influenced by multiple risks. Identifying the cumulative effects of these risk factors requires an examination of multiple aspects of the child's development. No single measure can accomplish this, nor is it likely that one measure can incorporate all of the aspects of the child's developmental status that should be considered. The child's birth history and general health can be investigated through medical screenings. The child's potential to learn and current level of functioning can be assessed by experts through the direct testing of the child. Teachers and child care workers can also provide helpful information about the child's functioning. But parents can fill an important gap by supplying unique information about the child's growth and development that is only attainable through their eyes. The PQ/ESI combined measure bridges this gap, bringing the parent's knowledge into the screening process where it can be used to help children better achieve their potential.

Appendix

Child Development Section of the Parent Questionnaire

CHILD'S MEDICAL HISTORY

	YES	NO	DON'T KNOW
Birth			
a. Was your child premature?	☐	☐	☐
b. Baby's birth weight _____	.	.	.
c. Was oxygen required for the baby?	☐	☐	☐
d. Did the baby cry immediately when born?*	☐	☐	☐
e. During hospital stay, did the baby have yellow jaundice, rash, blue spells, or convulsions?*	☐	☐	☐
f. Did the baby stay longer than the mother in the hospital?	☐	☐	☐
g. Did the baby have difficulty with sucking or crying when first brought to the mother?	☐	☐	☐

CHILD'S HEALTH

The following questions pertain to your child at any time since birth.

Eyes			
Has your child ever had any trouble seeing?	☐	☐	☐
Have your child's eyes ever looked crossed?	☐	☐	☐
Ears			
Has your child ever had frequent ear infections?	☐	☐	☐
Has your child had any trouble hearing?	☐	☐	☐
Neurological			
Has your child ever had fainting or blackout spells?*	☐	☐	☐
frequent headaches?*	☐	☐	☐
dizzy spells?*	☐	☐	☐
fits or convulsions?*	☐	☐	☐

CHILD'S DEVELOPMENT

	YES	NO	DON'T KNOW
1. Can your child -			
a. use a spoon and fork to eat without spilling a lot?	☐	☐	☐
b. wash and dry his or her own hands?	☐	☐	☐
c. dress himself or herself?	☐	☐	☐
d. do buttons?	☐	☐	☐
e. be left alone with a babysitter without a big fuss?	☐	☐	☐
2. Does your child have -			
a. problems with eating?	☐	☐	☐
b. problems with sleeping?	☐	☐	☐
3. Does your child still soil his or her pants?	☐	☐	☐
4. Does your child -			
a. play successfully with puzzles, blocks, and other construction toys without help?	☐	☐	☐
b. hold a pencil properly?	☐	☐	☐
c. write and draw rather than scribble?	☐	☐	☐
d. prefer right hand? ☐ left hand? ☐ both? ☐			
5. Can your child -			
a. ride a tricycle?	☐	☐	☐
b. throw and catch a ball?	☐	☐	☐
6. Does your child -			
a. have many accidents?	☐	☐	☐
b. drop things more often than other children the same age?	☐	☐	☐
c. trip easily?	☐	☐	☐
d. run into things?*	☐	☐	☐
e. have trouble with stairs?	☐	☐	☐
7. Is your child -			
a. highly active?	☐	☐	☐
b. very quiet?	☐	☐	☐
c. generally a happy child?*	☐	☐	☐
8. Does your child -			
a. cry easily?	☐	☐	☐
b. often have temper tantrums?	☐	☐	☐
9. Does your child -			
a. usually follow directions?*	☐	☐	☐
b. have a very short attention span?	☐	☐	☐
10. Is your child -			
a. able to say most sounds correctly?	☐	☐	☐
b. afraid to speak?	☐	☐	☐
c. understandable to a stranger?	☐	☐	☐
11. Did your child speak later than other children you know?	☐	☐	☐
12. Does your child often repeat sounds or words (stutter or stammer)?	☐	☐	☐
13. Does your child -			
a. turn on the television at a very high volume?	☐	☐	☐
b. say "what,what?" all the time?	☐	☐	☐
c. sit very close to the television screen?*	☐	☐	☐
d. bend over and look very closely at pictures or drawings?	☐	☐	☐

If there is anything further you would like to mention about your child, please write it here.

_____

_____

_____

_____

_____

_____

_____

_____

* *Indicates 10 items dropped from formal scoring.*

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