Defining Eligibility Criteria for Preventive Early Intervention in an NICU Population

MARION O'BRIEN, MABEL RICE, & CAROLYN ROY
The University of Kansas

Perinatal medical status, environmental risk, and infant developmental status in a group of high-risk infants cared for in an NICU immediately after birth were evaluated for their usefulness as possible criteria for entry into preventive early intervention services. Those children whose 4-year IQ scores placed them in the borderline or deficient category were considered to be the "target" group for whom early preventive intervention would have been indicated. Of the individual categories of risk, family environment was most accurate. 18-month developmental assessments were somewhat useful, and perinatal health histories were least effective in identifying the target children. The aggregation of all three categories of risk was the most accurate in identifying low performance at age 4, but would result in a high rate of under-referrals to early intervention services. A two-tiered system of developmental follow-up, based on environmental risk criteria, is proposed.

With the full implementation of Part H of P.L. 99-457, all U.S. states and territories have accepted a mandate to provide early intervention services for children under age 3 who are developmentally delayed or diagnosed as having a condition that has a high probability of resulting in developmental delay. The federal law left to the states the task of defining both developmental delay and the specific diagnosed conditions that make children eligible to receive early intervention services. Unfortunately, little information is available to guide policy makers in setting criteria for services (Meisels & Wasik, 1990). As a consequence, states' definitions vary considerably (Harbin, Gallagher, & Terry, 1991), and many children continue to reach school age before being identified as developmentally delayed (U.S. Department of Education, 1992). Given the difficulty of establishing criteria for entry of infants and toddlers into services, some have suggested that infant assessment be focused only on major disability, leaving testing for more subtle cognitive delays and learning disorders until children are close to starting school (Blackman, Lindgren, Hein, & Harper, 1987). The disadvantage of such an approach is that it limits the preventive potential of infant-toddler intervention, which, because of its promise for long-term cost savings (Barnett & Escobar, 1990), has been a strong selling point to legislators and educators.

The present study was designed to test the usefulness of a number of potential diagnostic factors that might assist in the identification of need for services in a high-risk population of infants. All the children included in this study were cared for in a neonatal intensive care unit (NICU) immediately after birth. Infants who are admitted to NICUs have highly diverse birthweights, medical complications, and family backgrounds. Full-term as well as preterm infants are treated in NICUs, and, for many of the children, the precise causes of their early birth or medical complications are unknown.
Studies of the prevalence of developmental delay in NICU graduates have typically involved comparisons between premature or low-birthweight infants and a control group of full-term healthy infants. Estimated rates of severe disability, including clinical syndromes, structural deformities, and other conditions that make children clearly eligible for early intervention services, are usually fairly low, ranging from 2 or 3% to 10% of low-birthweight infants (McCormick, 1989; Msall et al., 1991). Reported rates of less severe impairments, continued health-related problems, and long-term intellectual deficits in preterm infants vary widely. A few investigators report no or minimal differences between low-birthweight and comparison infants on measures of intellectual ability (Hawdon, Hey, Kolvin, & Findelis, 1990; Klein, 1990; Victorian Infant Collaborative Study Group, 1991). In most studies, however, higher frequencies of preterm than full-term children are found to be classified as learning disabled or requiring special school services. For example, more than half a sample of 68 premature infants, excluding those with diagnosed disabilities, were reported to have learning problems by second grade (Brandt, Magyry, Hammond, & Barnard, 1992). In another study, three times as many low-birthweight as full-term children were receiving special services in school at age 7-8 (Saigal, Szatmary, Rosenbaum, Campbell, & King, 1991). In a national-survey sample of children, those born at low birthweight were found to be 49% more likely to be referred for special education services than were those in a normative sample (Chaikind & Corman, 1990). Thus, there appears to be reason for considerable concern regarding the intellectual development of premature infants. No current studies on the long-term outcomes for the children treated in NICUs who do not fit into the premature or low-birthweight categories are available.

Furthermore, the data collected by most follow-up studies of NICU infants do not provide the kind of concrete guidelines needed to identify children for entry into early intervention services. Most investigators report percentages of low-birthweight children showing low intellectual performance or learning disabilities but do not identify the specific early markers of later developmental disability. Given current funding levels, not all children discharged from an NICU can receive comprehensive early intervention, so practitioners need criteria for referring children and families to appropriate services.

The primary purpose of the present study was to examine the usefulness of three categories of risk, perinatal medical status, family environment, and infant developmental status, as potential indicators of intellectual deficits at age 4. The sample of children included in this study was heterogeneous, representing the full range of birthweights and medical complications of children admitted to an NICU. Our goal was to determine which of the early indicators of risk was most helpful in identifying children who showed cognitive deficiencies later in development and who therefore could be considered candidates for preventive early intervention services.

**METHOD**

**Participants**

Participants in the study were 70 four-year-old children who had been cared for in the NICU of a midwestern teaching hospital from mid-1989 to mid-1990 and whose families had been visited by research staff at approximately 9-month intervals since their discharge. At the outset of the study, a total of 103 families agreed to participate. Of these, 8 children died within 3 years, and 18 families dropped out of the study before their children were 4. An additional 7 children who continued in the study were not included in this report because they had been identified in infancy as having
severe physical disabilities or mental retardation and were therefore unable to be tested using the Wechsler Preschool and Primary Scale of Intelligence - Revised (WPPSI-R; Wechsler, 1989) at age 4. The 70 children who were tested at age 4 did not differ significantly in birth weight, estimated gestational age (EGA), length of NICU stay, or family demographics from the 33 who were not.

The perinatal health histories of the participating children varied widely, which is typical of NICU populations. Fifty-three of the children (76%) were born prematurely, at EGAs ranging from 24 to 37 weeks (M = 31.3 weeks). By far the most common diagnosis for the infants was respiratory distress, which 49 (70%) of the infants had. Other diagnoses included minor congenital deformities, infections, heart or intestinal defects requiring surgery, and kidney and liver problems. Five of the children experienced intracranial hemorrhages during their hospitalization. For eight infants, premature birth was the only diagnosis.

The family situations of the participating children were also diverse. Two of the children were adopted in infancy, three were placed in foster care, and two were in the custody of grandparents. Eighteen of the children lived with only one parent (usually, but not always, the mother), whereas 47 lived in two-parent families. All of the children's mothers were 18 or older at the time of the infant's birth. The educational level of the mothers ranged from fewer than 4 years of high school (20%), through high school graduation (37%), to some college training or a degree (43%). Approximately one third of the sample were from a minority ethnic group, predominantly African American, and almost half (46%) met the income guidelines to receive welfare assistance.

At the time these infants were discharged from the NICU, Part H of P.L. 99-457 had not been fully implemented, and no comprehensive system of early intervention was in place in the region. Thus, although the hospital operated a follow-up clinic, the participation rate was very low, and there was no comprehensive system of developmental tracking or follow-up. A few of the children received sporadic services during their first few years of life, but for the most part these children did not participate in early education programs.

Procedure

For this project, in the first few months after the infant's discharge from the NICU, families were visited in their homes for collection of family demographic information. When the children were approximately 10 and 18 months old, family updates and infant-developmental-status measurements were collected. At 48 months, the families were again visited for administration of a full-scale measure of the children's intellectual performance.

Measures

Child intellectual performance. At 48 months, all children were administered a full battery of the WPPSI-R to obtain as stable a measure of intellectual performance at as young an age as possible. The test-retest stability of the WPPSI-R is estimated at .88 for the Performance IQ, .90 for the Verbal IQ, and .91 for the Full-scale IQ (Weschler, 1989). Extensive studies of the predictive validity of the earlier version of the WPPSI, which correlates highly with the revised scale, have shown WPPSI scores to predict both later measures of IQ and academic achievement accurately (Wechsler, 1989). For purposes of analysis, the children were grouped into intelligence classifications based on Wechsler (1989): superior (IQ score of 120-129), high average (110-119), average (90-109), low average (80-89), borderline (70-79), and intellectually deficient (69 and below). Children in the lowest two categories were considered to be those who would likely require special education services in the schools and for whom preventive early intervention would have been indicated.
Perinatal risk. Hospital records were used to obtain information regarding children's perinatal status, birthweight, EGA, and length of NICU stay. A perinatal risk score was developed by summing the number of health complications plus a birthweight index (1 = 1500-2500 g; 2 = <1500 g). For some analyses, a category of established disability was defined to include those nine children who were able to be tested on the WPPSI-R but had been diagnosed as having a known physical or mental disability. Their diagnoses included spina bifida (n = 1), a severe visual impairment partially corrected with glasses (n = 1), cerebral palsy (n = 2), tracheotomies (n = 3), cystic fibrosis (n = 1), and a gastrostomy tube (n = 1). The mean score on the perinatal risk index was 2.37 (SD = 1.02).

Family risk. Demographic and household information was collected by parent report, using interview forms developed for this study. Factors considered as potential sources of risk were (a) poverty status, defined as meeting the income guidelines for welfare assistance; (b) minority status, defined as other than white European American; and (c) the child's living situation, with risk defined as residing with a single parent and no extended family, with grandparents where neither biological parent lived in the household, or in a foster home. In addition to considering each of these factors separately in some analyses, a family risk index was computed as a sum of the number of categories of risk experienced by a child (M = 0.85, SD = 0.92).

Infant developmental risk. At 10 to 18 months, children's overall developmental status was assessed using the Bayley Scales of Infant Development (Bayley, 1969). Both the mental (MDI) and the motor (PDI) scales were administered. The tests were scored based on both chronological age and corrected age to allow determination of which method was most predictive of later performance, because there is considerable disagreement in the literature regarding age correction for prematurity (Barrera, Rosenbaum, & Cunningham, 1987; DenOuden, Rijken, Brand, Verloove-Vanhorick, & Ruys, 1991). At 9 months, the average MDI based on chronological age was 92.8 (SD = 24.6), and on corrected age it was 115.2 (SD = 24.9); at 18 months, chronological age averaged 93.7 (SD = 20.4) and corrected age 107.1 (SD = 20.9). A developmental risk index was developed based on whether or not a child's chronological-age MDI scores were 85 or below at either measurement point (M = 0.70, SD = 0.81, range 0-2). A dichotomous index was used because this is the procedure by which children are identified as eligible for early intervention services in most states.

Analyses
Correlational and regression analyses were used to examine the extent to which perinatal, family, and infant developmental risk measures were associated with WPPSI-R performance at age 4. Second, contingency tables were used to determine whether children who could be selected for early preventive intervention in infancy using several types of risk assessment, singly and in combination, actually showed a need for such intervention by age 4, as measured by low IQ scores.

RESULTS

Intellectual Performance
In general, the group of NICU graduates tested in this study performed at the low end of the normal range on the WPPSI-R. The mean full-scale IQ score for the entire group of children was 90.6 (SD = 12.9), at the bottom of the average category for the WPPSI-R. The children's mean verbal IQ was 93.4 (SD = 12.0) and mean performance IQ was 89.8 (SD = 13.0). (One child with cerebral palsy was unable to complete the performance subtests; as is common in educational settings, the
In the text, the author discusses the use of verbal and nonverbal measures to assess IQ in children. They mention that individual children's full-scale IQ scores ranged from a low of 38, the only child placing clearly within the deficient category, to a high of 121 for a child classified as superior. Within these extremes, 4 children scored as high average, 30 as average, 20 as low average, and 14 in the borderline range. The group of children who are most likely to require special education services in the schools are those in the borderline and deficient groups; these were therefore combined into one group of 15 children termed low IQ.

**Infant Risk Factors Associated With Later IQ Status**

Correlational analyses were run to test the usefulness of perinatal health status variables as indicators of later intellectual performance. With one-tailed significance levels defined at <.01 to control for multiple analyses, none of the individual perinatal risk variables (birthweight, ECA, or length of NICU stay) nor the computed perinatal risk index was significantly correlated with WPPSI-R scores. A t test carried out to determine whether the 9 children with diagnosed disabilities differed in IQ from the rest of the sample also indicated no significant differences.

T tests were used to examine differences in IQ associated with family demographic factors. Children in poverty (n = 32) had an average full-scale IQ score of 86.5 compared with the mean of 94.1 for the nonpoverty children (n = 38), t(68) = 2.56, p = .013. Minority children (n = 23) scored considerably lower than nonminorities (n = 47): 83.3 compared with 94.2, t(68) = 3.58, p = .001.

Correlations between Bayley scores at 10 months and 4-year IQ scores were low and not statistically significant at the .01 level, whereas the chronological-age MDI at 18 months was significantly correlated with both the full-scale and the performance IQ measures at age 4 (see Table 1). The correlation

<table>
<thead>
<tr>
<th>WPPSI-R IQ</th>
<th>Full-Scale</th>
<th>Verbal</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-Month Bayley</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronological Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDI</td>
<td>.17</td>
<td>.13</td>
<td>.18</td>
</tr>
<tr>
<td>PDI</td>
<td>.23</td>
<td>.19</td>
<td>.23</td>
</tr>
<tr>
<td>Corrected Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDI</td>
<td>.10</td>
<td>.08</td>
<td>.12</td>
</tr>
<tr>
<td>PDI</td>
<td>.19</td>
<td>.16</td>
<td>.20</td>
</tr>
<tr>
<td>18-Month Bayley</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronological Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDI</td>
<td>.32**</td>
<td>.23</td>
<td>.38***</td>
</tr>
<tr>
<td>PDI</td>
<td>.23</td>
<td>.15</td>
<td>.31**</td>
</tr>
<tr>
<td>Corrected Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDI</td>
<td>.26</td>
<td>.22</td>
<td>.31**</td>
</tr>
<tr>
<td>PDI</td>
<td>.22</td>
<td>.16</td>
<td>.29**</td>
</tr>
</tbody>
</table>

Note: WPPSI-R = Wechsler Preschool and Primary Scale of Intelligence-Revised. MDI = Mental Development Index, PDI = Physical Development Index. **p < .01, one-tailed. ***p < .001, one-tailed.

O'Brien, Rice, & Roy
coefficients between 18 month chronological age MDI and 4-year IQ scores were significantly higher than the 10 month correlations (p < .05). Thus, the MDI at 18 months was a more useful indicator of potential need for services than the 10-month MDI.

Accuracy of Risk Indices

To evaluate the usefulness of each of the risk indices used in this study as potential guidelines for referral of NICU infants to preventive early intervention services, a series of contingency tables, comparing dichotomized risk indicators with low versus typical performance on the WPPSI-R (Table 2), was developed. The risk indicators used in these analyses are derived from information generally available to early intervention personnel; these analyses can, therefore, serve as a practical guide to the identification of criteria for access to preventive early intervention services.

The accuracy of each index and combination of indices was computed in a variety of ways. Overall accuracy was calculated as the percentage of children whose infant risk designation matched their later intellectual performance; this was subdivided into sensitivity, the percentage of true problems detected by the risk index, and specificity, the percentage of children correctly identified as having no problem. The predictive value of each risk index was calculated as the percentage of children considered at risk who were in fact found to perform poorly at age 4. Finally, because inaccurate referrals are costly, either in that they do not allow children to develop to their fullest potential because of not being enrolled in appropriate services or because they encourage the delivery of services to children who do not need them, both the under- and the overreferral rates were calculated.

As Table 2 shows, none of the infant risk indices was extremely effective in identifying children whose intellectual performance at age 4 was in the low range. The highest overall accuracy and predictive value was achieved by the aggregation of perinatal, family, and developmental risk; the requirement that a child experience all three categories of risk resulted, however, in a very high overreferral rate, by which fewer than half of the children later identified as having low IQ scores would be detected. From the standpoint of identifying the children with low IQ scores, the least effective index was diagnosed disability and the most effective index was family risk. Use of family risk alone as an indicator, however, would result in a very high overreferral rate into early intervention. The next most sensitive single risk factor was developmental risk, based on Bayley MDI scores at 10 and 18 months. Use of a combination of any two risk indices did not increase the sensitivity or accuracy of prediction over the use of single factors.

DISCUSSION

Identification of children who can most benefit from early intervention services is a continuing challenge to the fields of special education and applied developmental psychology. When young children have a physical disability, identified syndrome, or chronic health condition that places them at developmental risk, they are clearly eligible to receive early intervention services. For the majority of children who are eventually identified as developmentally delayed or learning disabled and placed in special education programs, however, no organic basis or overt marker can be identified. The present study had the goal of helping professionals who are associated with NICUs or other infant health and development programs to better select children and families for receipt of intervention services that can be considered preventive, in that they help to reduce eventual developmental disability in children without diagnosed conditions.

The risk indices used in this study consisted
<table>
<thead>
<tr>
<th></th>
<th>Low IQ</th>
<th>Overall accuracy</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Predictive value</th>
<th>Underreferral rate</th>
<th>Overreferral rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosed Organic Disability</td>
<td>No</td>
<td>48/13</td>
<td>50/70 = 71.4%</td>
<td>2/15 = 13.3%</td>
<td>48/55 = 87.3%</td>
<td>13/15 = 86.7%</td>
<td>7/55 = 13.0%</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>7/2</td>
<td>8/15 = 53.3%</td>
<td>30/55 = 54.5%</td>
<td>8/25 = 32.0%</td>
<td>7/15 = 46.7%</td>
<td>25/55 = 45.0%</td>
</tr>
<tr>
<td>Perinatal Risk</td>
<td>No</td>
<td>30/7</td>
<td>38/70 = 54.3%</td>
<td>8/15 = 53.3%</td>
<td>30/55 = 54.5%</td>
<td>7/15 = 46.7%</td>
<td>25/55 = 45.0%</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>25/8</td>
<td>37/70 = 52.9%</td>
<td>12/15 = 80.0%</td>
<td>25/55 = 45.5%</td>
<td>3/15 = 20.0%</td>
<td>30/55 = 53.0%</td>
</tr>
<tr>
<td>Family Risk</td>
<td>No</td>
<td>25/3</td>
<td>43/70 = 61.4%</td>
<td>11/15 = 73.3%</td>
<td>32/55 = 58.2%</td>
<td>4/15 = 26.7%</td>
<td>23/55 = 42.0%</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>30/12</td>
<td>40/70 = 57.1%</td>
<td>11/15 = 73.3%</td>
<td>29/55 = 52.7%</td>
<td>4/15 = 26.7%</td>
<td>23/55 = 47.0%</td>
</tr>
<tr>
<td>Developmental Risk</td>
<td>No</td>
<td>29/4</td>
<td>56/70 = 80.0%</td>
<td>6/15 = 40.0%</td>
<td>50/55 = 90.0%</td>
<td>6/11 = 54.5%</td>
<td>5/55 = 9.0%</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>26/11</td>
<td>56/70 = 80.0%</td>
<td>6/15 = 40.0%</td>
<td>50/55 = 90.0%</td>
<td>6/11 = 54.5%</td>
<td>5/55 = 9.0%</td>
</tr>
</tbody>
</table>
of prenatal health history, family structure and demographics, and infant developmental tests. All three of these factors are commonly reported in the developmental and early-identification literature as indicators of potential developmental risk. Unfortunately, none of them, singly or in combination, appears to be adequate to allow for accurate early identification of children whose intellectual development is likely to be impaired by the time they reach school age. The least useful of the indices of risk were those based on medical diagnosis or prenatal health history. Thus, with the exception of diagnosed physical or mental disabilities, use of birth status variables, such as birthweight, extent of prematurity, or infant health status, does not accurately identify the children most in need of preventive intervention.

Measures of family risk and developmental progress during infancy were somewhat better predictors of later intellectual performance. Using a family risk index including poverty, minority status, and living situation identified 12 of the 15 children who tested low in IQ at age 4. Although these demographic markers do not help in understanding the processes leading to decline in developmental trajectory, they appear to be quite useful in selecting children who may benefit from early entry into educational intervention programs. Use of family risk factors alone did, however, over-identify a large number of children as being in need of intervention, which would not be cost-effective.

Use of Bayley Scale scores as indicators of risk correctly identified almost three-quarters of the children in the low-IQ group. Furthermore, the overreferral rate, although still high, was lower with this index than with the family risk index. One disadvantage of the use of the developmental index to identify risk is the difficulty and expense of testing infants repeatedly with a measure as sensitive as the Bayley Scales. From the correlational results obtained in this and other studies (Rose, Feldman, Wallace, & McCarton, 1989), Bayley Scale scores from the 1st year of life do not appear to be useful as indicators of later intellectual performance. In this study, it was the 18-month scores that were significantly correlated with IQ at age 4; the 10-month scores were not related to the later measure. Given these findings, the many infant follow-up programs that continue only through the 1st year of life are not likely to identify continuing developmental concerns with much accuracy. In the present sample, the mean MDI score at 10 months for the 15 children later identified as having cognitive delays was 89 using the infants’ chronological ages (sample $M = 93$), and 114, using corrected ages (sample $M = 115$). Overall, these scores would give the impression that the children were progressing well and catching up to typical infants. If developmental follow-up is discontinued at this point, parents and professionals may assume that intervention is not needed.

Because all infants who are discharged from NICUs can be considered to be at some risk, the most effective approach to referral for preventive intervention might be to establish a two-tiered system of follow-up and developmental testing, one based on environmental risk criteria rather than medical indicators. In such a system, intensive developmental follow-up, involving regular family visits and infant developmental assessments, would be indicated for those NICU infants whose family situations appear to be most problematic, as indicated by poverty status and family instability. If at any point the children’s developmental status dropped below the typical range, they could be referred immediately for educational intervention. A less intensive schedule of follow up could be used for other NICU infants whose family environments were more stable and facilitative. These families might be contacted periodically by phone for parental reports of the child’s developmental progress, with a Bayley or other full-scale assessment.
administered in the middle of the 2nd year, when it is likely to predict later status. Such a system would be more cost-effective than routine quarterly or biennial follow-up for all NICU infants yet would allow the earliest possible identification of delay in the most at-risk children. A similar strategy was suggested by the work of Bee et al. (1982) and was at the basis of the Early and Periodic Developmental Screening, Diagnosis, and Treatment Program. This program, unfortunately, has not achieved its potential for a variety of reasons discussed by Meisels (1984) and Meisels and Margolis (1988).

It is impossible to determine from the present study whether early educational intervention would have made a difference in the IQ scores of the children in the borderline or deficient categories. None of the children in this study sample received extensive early intervention in the form of educational programming, so no comparisons of children with and without intervention can be made. Furthermore, this sample, although ethnically and economically diverse, came from a single NICU and thus may not be representative of all regions of the country.

The use in this study of borderline IQ scores (70-79) as an indicator of intellectual disability may be questioned because in many states children with borderline IQs are not eligible for special education services. It would be anticipated, however, that most of the children testing at borderline on the WPSSI-R at age 4 would have difficulty with the transition into formal schooling and literacy and would eventually be classified as learning disabled (Kaplan, 1993). These children are also considered to be the most promising candidates for early educational intervention that would truly be preventive in that it may eliminate the need for these children to be enrolled in any special education services in the schools.

The variables used as indicators of risk in this study were selected for practical rather than theoretical reasons. That is, the risk indices are based on information that practitioners can readily obtain but they might not be as accurate in predicting outcome as more-difficult-to-obtain measures such as infant state fluctuations (Beckwith & Parmelee, 1986; DiPietro & Porges, 1991) or the quality of parent-child interactions (Bradley et al., 1995). Examination of the entire range of possible factors contributing to developmental delay in at-risk infants would be useful, but that was beyond the scope of the present study. Rather, our intent was to evaluate the usefulness of commonly observed risk factors in identifying children for whom preventive intervention might be most effective.

**SUMMARY**

Of the three categories of risk considered in this study, family risk factors were most useful as indicators of the need for preventive intervention, developmental tests at 18 months were somewhat useful, and perinatal health histories and medical diagnoses were least useful. No single index or combination of indices proved to be highly accurate in selecting only those children truly at risk for low intellectual performance. If children who are most likely to benefit from educational intervention are to be identified early, a differential system of follow up, based on environmental characteristics rather than medical diagnoses, may be necessary.

**REFERENCES**


*This research was supported by grant HD24U8001 from the U.S. Department of Education to the University of Kansas. The authors thank all the children and parents who participated in the study, Alice Minor for data collection, and Mark Byrne and Radha Shanmugam for assistance with data entry and analysis.*

Address correspondence to *Marion O'Brien*, Department of Human Development, 4001 Dole Center, University of Kansas, Lawrence, Kansas 66045. Email: mobrien@falcon.cc.ukans.edu.