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The Use of Public Health Databases to Estimate the Risk for Special Education Placement

by

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ABSTRACT

Objectives: This study examines risk factors associated with placement in special education in the first grade. The purpose is to help identify children in need of early intervention services.

Methods: Records for children enrolled in first-grade special education on December 1, 1998 were linked to birth certificate records for 1990, 1991, and 1992. Child Service Coordination (CSC) records were also linked to identify the children who received CSC services and the associated risk conditions.

Results: Children were more likely to receive special education services if they were low birth weight, low gestational age, had a low Apgar score or a congenital anomaly, or were part of a multiple birth. Familial factors that increased the odds of special education placement were low parental education, less than adequate prenatal care, maternal smoking during pregnancy, and parental/familial limitations such as difficulty in parent-infant bonding or limited social skills.

Conclusions: By considering both environmental/familial and child-level factors, we can better ensure that at-risk children are identified and referred for early intervention services.

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Introduction

It is important to identify, as early as possible, those children who are most at risk for future placement in special education and likely to benefit from early intervention. Most often, services do not begin until children reach school age, so the opportunity for early intervention is lost. We need to know how to identify and prioritize young children for services based on family and child characteristics present early in life that may predict children's later need for special educational services.

A variety of studies have attempted to determine which children are at risk for developmental problems. The findings from these studies reveal that a single risk factor is not very effective in determining risk.¹⁻⁵ A combination of biological (child-level) and environmental risk factors provides the best prediction of later developmental functioning.⁶⁻¹⁴ Studies examining the interaction between child variables (e.g. low birth weight, Apgar score) and environmental variables (e.g., socioeconomic status, marital discord, father absence) have found that infants at biological risk are more susceptible to the effects of environmental risk.

North Carolina is one of a few states that identify and serve young children who are at risk. There is an extensive identification system called Child Find, and services are provided to at-risk children from birth to age three, and their families, based on the presence of one or more biological and/or environmental risk factors. However, we must refine the methods to determine which at-risk children will likely demonstrate developmental problems and would likely benefit from early intervention services.

This study examines the feasibility of using North Carolina public health databases as a means of identifying specific risk factors for children in need of early intervention services. We use three state data sets to ascertain their utility in predicting special education placement based on family and child risk factors.

Methods

Birth records, Child Service Coordination (CSC) identification and referral records, and special education data were linked. Combining information in this way resulted in a longitudinal record for each child, facilitating the examination of early childhood and family risk factors predictive of special education placement.

Records from the North Carolina Department of Public Instruction for 13,109 first-grade children receiving special education services on December 1, 1998 were linked to 1990, 1991, and 1992 birth files. Approximately 75 percent of these special education records were linked to a birth record, resulting in a data set of 9,775 records with birth and special education information. The birth records for 1990-92 were also linked to CSC data. CSC is an early intervention and service coordination program for young children with or at risk for disabilities and their families. Services are usually provided before age 3. Approximately 20 percent of the 9,775 records for children receiving special education also had matching CSC data, indicating that the children received early intervention services. By comparison, approximately 9 percent of all young children in North Carolina are enrolled in the CSC program.

A case-control methodology was used. Three controls were matched to each case on the basis of gender, race, and year of birth. None of the 29,325 controls born during 1990-1992 were in first grade special education. The records for the controls contained the birth certificate information plus any matching CSC data.

Statistical analyses included: a) univariate logistic regression models to determine how much a risk factor increased the odds of special education placement; and b) a multiple logistic regression model to determine how much each risk factor, in the presence of the others, increased the odds of special education placement. Educational status (i.e., special education vs. general education) served as the outcome variable. Significant variables from the

univariate models were entered into the multiple-variable model to determine the most important independent effects. The risk factors used are shown in Table 1. For the univariate regression models involving the parental condition and parental limitation variables (from the matching CSC records) and for the multiple regression model, which involved these variables, only the subset of the records with the CSC component was used. Records with missing data on any one or more of the variables were not included in the regression models.

Results

Sixty-eight percent of the sample was male. By race, the breakout was 61 percent Caucasian, 36 percent African American, and 3 percent Other. Of the children who received special education, 60 percent were identified as having a speech/language impairment as the primary condition, 14 percent a

learning disability, 12 percent mental retardation, 5 percent other health impairments, 3 percent emotional and behavioral disabilities, and 6 percent other problems. For children receiving special education, 79 percent entered the service system at school age.

The univariate logistic regression models with parental risk factors showed several variables were significantly associated with educational status (see Table 2). Having a mother or father with less than a high school education was associated with a higher risk for special education placement (Odds Ratios = 2.3 and 1.5, respectively) compared to having a parent with higher education. Parental conditions and limitations, as defined in Table 1 (CSC data from the identification and referral form) were associated with a higher risk of special education (Odds Ratios = 1.9 and 2.9, respectively).

Table 1

Risk Factors Used in Analysis

(Data are from the birth certificates, unless otherwise noted.)

Pregnancy and Birth Risk Factors

- Apgar score
- Birth weight
- Adequacy of Prenatal Care Utilization Index
- Gestational age
- Maternal smoking during pregnancy
- Congenital anomalies
- Multiple birth

Parental/Family Risk Factors

- Education level of mother and father
- Age of mother and father
- Parental conditions¹
- Parental limitations²

¹ Includes the presence of parental mental retardation, parental mental illness, maternal PKU, maternal HIV, or parental blindness. Data are from CSC records.

² Includes difficulty in parent-infant bonding, history of abuse or neglect by parent, limited familial and social support, or limited social skills. Data are from CSC records.

Table 2**Odds Ratios for Individual and Family Risk Factors (Univariate Models)**

Risk Factor	Category	Odds Ratio*
Maternal education less than high school	Parental risk	2.3
Paternal education less than high school	Parental risk	1.5
Parental conditions	Parental risk	1.9
Parental limitations	Parental risk	2.9
5-minute Apgar score less than 7	Pregnancy and birth factors	1.4
Very low birth weight	Pregnancy and birth factors	1.3
Moderately low birth weight	Pregnancy and birth factors	1.4
Gestational age 24 to 37 weeks	Pregnancy and birth factors	1.3
Adequacy of prenatal care	Pregnancy and birth factors	0.95
Maternal smoking during pregnancy	Pregnancy and birth factors	1.3
Multiple birth	Pregnancy and birth factors	1.4
Congenital anomalies at birth	Pregnancy and birth factors	1.1

*Unadjusted. All odds ratios are statistically significant at $p < .05$.

In the univariate logistic regression models with pregnancy and birth factors, several variables were associated with a significantly increased risk of a child being placed in special education (Table 2). Children with a 5-minute Apgar score less than 7, very low birth weight (less than 1500 grams), moderately low birth weight (1500 to 2499 grams), or gestational age between 24 and 37 weeks were at increased risk of special education placement. A higher level of adequacy of prenatal care was associated with a lower risk of special education placement. Maternal smoking during pregnancy, multiple birth, and the presence of congenital anomalies (as reported on the birth certificate) were associated with a higher risk of special education. However, despite statistical significance, some of these effects were quite modest, and so the results should be interpreted with caution.

Each significant variable in the univariate models was entered into a multiple-variable model to determine which factors had the strongest independent associations with special education placement. After controlling for all of the variables in the model, children with the following risk factors are at higher

risk for special education placement (statistically significant adjusted odds ratios are shown in parentheses): low Apgar score (1.2), very low birth weight (1.2), moderately low birth weight (1.1), smoking during pregnancy (1.1), multiple birth (1.3), low education of mother (1.9), low education of father (1.3), parental conditions (1.6), and parental limitations (2.5). The variables that placed a child most at risk were the parental conditions and limitations variables as compared to data gathered from birth certificates. These findings point to the value of gathering extensive early parental data for children who are at risk.

Discussion

These data allow us to understand better which child and family risk factors place a child at risk for later special education placement. Children with both biological risk factors (e.g., low Apgar score, low birth weight, multiple birth) and environmental risk factors (e.g., low education of parents, maternal tobacco use during pregnancy, parental limitations) are most at risk for later special education placement.

Although the effects of some of the variables were moderate, it is clear that environmental risks are important. The presence of a caregiver with limited functioning (e.g., mental illness, mental retardation) or with other limitations (e.g., problems with parent-infant bonding, history of abuse or neglect, limited social skills) significantly increases the odds of special education placement. Identification of children who are most at risk should, therefore, take into account the functioning of the family system. By considering both environmental and child-level factors, we can better ensure that at-risk children are identified and referred for early intervention services.

Because of the relatively small sample size where the CSC data were present, the analyses involving parental conditions and parental limitations were conducted with composite variables. A study with a larger sample size could better identify which specific parental factors best predict the need for early intervention services. Nevertheless, this study demonstrates the feasibility of using multiple linked public health data bases to identify risk factors for childhood developmental problems.

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