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Comparison of Functional Status of 8- to 12-Year-Old Children Born Prematurely: An Integrative Review of Literature

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Prematurity affects one in eight infants in the United States, a rate that reflects an overall increase of 20% between 1990 and 2005 (March of Dimes, 2008). This integrative review presents a synthesis of the current research addressing the functional status of 8- to 12-year-old children born prematurely. Findings from this review support the belief that children born prematurely function differently than their term peers. These children have academic and social delays that may necessitate special service support through middle childhood.

PREMATURITY AFFECTS ONE in eight infants in the United States, a rate that reflects an overall increase of 20% between 1990 and 2005 (March of Dimes, 2008). Prematurity is defined as birth prior to the completion of 37 weeks of gestation, with the lower limits of viability between 22 and 24 weeks of gestation (American Academy of Pediatrics [AAP], 2004). Neonatal survival improves significantly after 28 weeks of gestation, and the neonatal survival of children born at 36 weeks of gestation approaches that of a term infant AAP, (2003). The success of neonatology was once measured by how many premature children survived to be discharged from the neonatal intensive care unit (NICU) and at what gestational age they could be saved. These measures are no longer adequate. With access to intensive neonatal care, infants born prematurely typically survive the neonatal period, moving through childhood and into adulthood with varying degrees of disability.

Outcomes of children born prematurely may be measured in multiple ways. They may be condition-specific and address the presence or absence of a diagnosis. They may be measured by laboratory or medical testing results. Outcomes may be considered in relation to how the index children compare with "normal" children or with peers with a similar condition. Other assessments may be academic, cognitive, motor, or social. Just as children are more than a diagnosis or a condition, outcome studies with singular foci fail to depict a complete picture of the children. Critical measures for research are the outcomes and sequelae that affect the future functioning of children.

Purpose

The purpose of this integrative review is to provide pediatric nurses a synthesis of research published between 1997 and 2009 pertaining to functional status of middle childhood-aged children who were born prematurely. The studies evaluated in this integrative review are limited to those that assess components of functional status, including academic success, intelligence, motor function, and neurodevelopmental progress. The findings from this review highlight how children born prematurely carry out the workload of being children and suggest implications for their future.

An abstract/poster presentation of this work will be presented at the 2010 Eastern Nursing Research Society Conference, March 24–26, 2010.
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Definition of Functional Status

Functional status is a term used to describe the intersection of health, neurologic disabilities, developmental delays, and family resources and the children's perception of these realities (Msall & Tremont, 2000). Functional status assessment provides a comprehensive estimation how children interact in their daily environment.

Background

The work of being children is explained as attending school, playing, learning, and participating in the social roles that are the building blocks of adulthood. Appraisal of children should stem from estimations of how children carry out the work of being children. Vohr (2007) noted that outcomes of interest for children born prematurely include neurologic status, gross motor function, developmental status, language, functional/adaptive status, behavior, growth, health status, health-related quality of life, and resource utilization. Aylward (2005) suggested that high-prevalence/low-severity conditions, such as mild learning disabilities, low-normal IQ scores, behavior problems, and visuomotor integration problems, are of particular concern because they necessitate school modification and services. Some deficits may not become evident until children are challenged by the increasing academic and social expectations of middle childhood (Aylward, 2005; Saigal et al., 2003; Vohr, 2007). Children who fail to master basic skills early in development are unlikely to be successful with tasks that build upon those skills. Middle childhood (8 to 12 years old) was selected for its potential to capture the challenges of increased social and academic demands placed on children.

The list of tools used to measure outcomes related to functional status in the reviewed research is vast; the research used at least 25 scales in various stages of revision, subscale inclusion, or exclusion (Table 1). Much of the research used multiple measurement tools, adding further difficulty to categorize the results in a cohesive manner. This review categorizes the research with the following headings: neurodevelopmental and academic outcomes, motor outcomes, and growth outcomes. An attempt was made to highlight comorbidities that influenced outcomes (e.g., bronchopulmonary dysplasia [BPD], intraventricular hemorrhage [IVH], and retinopathy of prematurity [ROP]). Most of the studies included in this review used the Wechsler Intelligence Scale for Children in its various revisions (e.g., WISC-III; Wechsler, 1991), a cognitive function scale that yields verbal and performance IQ scores and full-scale IQ scores. Other commonly used scales were the Woodcock–Johnson Test of Academic Achievement (Woodcock & Mather, 1987), the Wide Range Achievement Test (WRAT3; Wilkinson, 1993), the Movement Assessment Battery for Children (Henderson & Sugden, 1988), the Visual Motor Integration (VMI; Berry, 1989), the Child Behavior Checklist (CBCL; Achenbach, 1991), the Bruininks–Oseretsky Test of Motor Proficiency (Bruininks, 1978), and the Vineland Adaptive Behavior Scale (VABS; Sparrow, Balla, & Cicchetti, 1984). Many of the publications did not specifically list the reliability or validity of the measurement tool or tools USED, but most publications did list primary references for them.

Table 1 Measures of Functional Status

Scale	Description	No. of Studies Used in:
Bruininks–Oseretsky Test of Motor Performance	Measures motor skills and yields a gross motor, fine motor and total battery score.	5
CBCL	Measures social competencies and behavior problems of children 4–18 years of age based on parent report.	6
Movement Assessment Battery for Children (Movement ABC)	Measures gross motor skills, ball handling, and manual dexterity.	2
VABS	Measures adaptive behavior of children with and without disabilities birth to 18 years, based on domains of daily living skills, motor, communication, socialization based on parent report.	3
VMI	Measures visual perception and motor planning through reproducing geometric forms.	3
WISC-III	Measures cognitive ability. Provides full-scale IQ and index scores to examine specific elements of cognitive function.	9
WRAT3	Measures educational skills. Includes 3 subscales: reading, spelling, and arithmetic	4
Woodcock–Johnson Test of Achievement	Measures academic achievement in recognition, comprehension, calculation, and problem solving skills.	5