

# **THE RELATIONSHIP BETWEEN HEALTH STATUS, LANGUAGE DEVELOPMENT, AND BEHAVIOR IN YOUNG CHILDREN**

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## **ABSTRACT**

*The study investigated whether young children's health status is significantly related to their performance on measures of intelligence, language, and behavior, as well as parents' concerns, stress, and perceptions of their children's development. One hundred twelve 3 to 5 year-old children, recruited from a large pediatric practice and three developmental preschools, were assigned to groups based on their health status. A series of Analyses of Variance (ANOVAs) were used to examine differences between groups. The results showed that health status was strongly related to children's cognitive and language development, parents' stress, and parents' concerns. Children with special health care needs demonstrated poorer cognitive and language skills in comparison to healthy peers. Parents of children with special health care needs also experienced greater stress and had more concerns about their children's development than parents of healthy children. The results suggested that health status should be included as part of early identification screening programs and taken into account when developing Individualized Family Service Plans (IFSPs) and Individualized Education Programs (IEPs) for children with special needs.*

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Language and behavior problems have been found to co-occur so frequently as to suggest that one contributes to the other or some common factor gives rise to both. An estimated forty to seventy percent of students with behavior disorders have been found to have concurrent language disorders (Donahue, Cole, & Hartas, 1994; Harrison, Gunter, Lee, & Reed, 1996; Prizant et al., 1990; Sanger, Maag, & Shapera, 1994). Similarly, children referred for language problems have been shown to have significantly higher rates of inappropriate behaviors (Camarata, Hughes, & Ruhl, 1988; Ruhl, Hughes, & Camarata, 1992; Ylvisaker & Feeney, 1994).

In the study reported here we hypothesize that a factor likely to have a significant impact on young children's language and behavior development may be "special health care needs." "Special health care needs" is a term that refers to about 200 chronic conditions (e.g., asthma, diabetes, sickle cell anemia, cerebral palsy) that affect children physically, socially, and cognitively (Newacheck & Stoddard, 1994). Children with special health care needs are defined as those who have a chronic physical condition and who also require health and related services of a type or amount beyond that required by children generally (Newacheck et al., 1998). It is reported that almost 20 million children nationwide, or about 31% of children under 18 years of age, have one or more chronic health conditions (Newacheck & Halfon, 1998).

There have been very few studies examining the linkages between young children's health, language, and behavior. Epidemiological studies indicated that children with special health needs are 1.5 to 3.0 times more likely to experience educational, emotional, and/or behavioral difficulties than their healthy peers (Gortmaker, Walker, Weitzman, & Sobol, 1990). Twenty-five percent had two or more behavioral symptoms by age fifteen in contrast to seventeen percent in the general population (Bauman, Drotar, Leventhal, Perrin, & Pless, 1997). This suggests that language and behavior problems may be the result of the health condition, a secondary outcome of medication and treatment, or significant others' responses to digressions in developmental pathways. It is unfortunate that the relationship between health status and the development of language and behavior problems among young children has received scant attention because early child development can be seriously compromised by health problems (Shonkoff & Phillips, 2000).

However, "special health care needs" is an umbrella term that includes many different conditions and great variability within each condition. In

order to explore relationships between health and other aspects of development it is necessary to subcategorize the wide range of types and severity of health problems. Several efforts have been made to systematically classify these problems by diagnosis and function (Neff, Sharp, Muldoon, Graham, Popalisky, & Gay, 2002; Stein & Jessop, 1989). The problem with this approach is that two children with the same diagnosis may be affected differently and require different treatments. A child with a chronic diagnosis may walk, speak well, attend public school, and may or may not need adaptive or medical equipment. Others with the same diagnosis may be non-ambulatory, non-verbal, and need special education, medical and adaptive equipment.

To address the problems inherent in systems based on diagnosis, the Hirsch Complexity Level (CL) code appears to be a more promising approach (Burstein, Bryan, Chao, Berger, & Hirsch, in press). In the CL code, each child is rated based on the number of organ systems affected by the underlying condition coupled with a psychosocial rating as necessary. At the first visit to the physician's office, each child is assigned a CL code which is updated in subsequent visits. The CL code is easy to explain to patients and parents. It also can be used by education professionals as a means of improving understanding the health factors that may influence the child's development.

Family responses to a child's chronic illness have long been considered an important influence affecting children's health and psychosocial well-being (Goldberg, Morris, Simmons, Fowler, & Levison, 1990). Although the effects of a child's illness on the family have been extensively studied (Hamilton, Hammen, Minasian, & Jones, 1993; Steinhausen, Schindler, & Stephan, 1983), this literature has focused primarily upon retrospective impressions concerning family coping and stress when infants with life-threatening conditions (e.g., cystic fibrosis) were diagnosed. Little information is available on the impact of chronic, but non-life threatening conditions, on parental perceptions or behavioral responses to these children. Furthermore, the studies have been limited by the absence of comparison groups. Although the extant data base has demonstrated that children's development is correlated with a host of family factors, including level of mothers' education, parents' beliefs, goals, values, and parenting behaviors (Bernheimer & Keogh, 1995; Dunst, 2000), we do not know whether or how young children's health problems affect the child's cognitive, linguistic, and behavioral development, nor how the child's health problems affect family dynamics.

The study reported here was designed to examine young children's health status in relation to language development, behavior, and family concerns

and stress. The following research questions were posed: (1) Do children with special health care needs differ from healthy children on measures of intelligence, language, and behavior at 3–5 years of age? (2) Do parents of children with special health care needs differ from parents of healthy children on measures of parents' concerns and stress? (3) Are parents' concerns and stress related to children's intelligence, language, and behavior?

## METHOD

### SUBJECTS

One hundred twelve children (67 boys, 45 girls), ages 3 to 5 years ( $M = 3.80$ ,  $SD = .75$ ), were recruited from a large pediatric practice ( $n = 84$ ) and three development preschools ( $n = 28$ ) in the Phoenix metropolitan area. Children with special health needs were identified using pediatricians' ratings on the Hirsch Complexity Level (CL) code (American Academy of Pediatrics, 2003; Burstein et al., in press; Center for Medical Home Improvement, 2001). The CL code is a 1-item scale (0–4) in which the child's rating is based on the number of organ systems affected and complications that result from the systems involved (see Table 1). Children rated "0" are healthy. Children rated at levels "1" to "4" qualify as special health care needs. In the study reported here, only levels 1 and 2 were included as these levels represent children with chronic but not severe conditions. At levels 3 and 4, children's medical conditions precluded the normal development of patterns of language, cognition, and behavior.

Based on CL code ratings, children were assigned to two groups: (1) healthy children and (2) children with special health care needs. The healthy group numbered 65 children (36 boys, 29 girls) coded "0." The special health care needs group numbered 47 children (31 boys, 16 girls) coded "1" or "2."

Children's ethnicity varied: Anglo American ( $n = 88$ ), Hispanic ( $n = 15$ ), African American ( $n = 6$ ), Asian ( $n = 2$ ), Native American ( $n = 1$ ). This distribution reflects the demographics of the State of Arizona. All participants spoke English as a primary language. The health problems of children classified as having special health needs included asthma ( $n = 9$ ), allergies ( $n = 8$ ), seizures ( $n = 8$ ), chronic ear infections ( $n = 7$ ), gastro intestinal problems ( $n = 7$ ), cardiac problems ( $n = 3$ ), mental health prob-

**TABLE 1.**  
**Hirsch Complexity Level Code**

Level	Description	Examples (many are possible)
0	Well child, no significant chronic medical/behavioral/psychosocial problems	Well child
1	One moderate or severe medical/behavioral/psychosocial problem involving one organ system <i>without</i> medical/behavioral complications	Moderate asthma or mental retardation or cerebral palsy (i.e., one of the ICD-9 <sup>a</sup> codes) with intact supportive family and no financial stress
2	One moderate or severe medical/behavioral/psychosocial problem involving one organ system <i>with</i> medical/behavioral complications, or involvement of two organ systems <i>without</i> complications	Cerebral palsy with contractures Autism with aggressive behaviors Moderate mental retardation and single parent/financial stress Cerebral palsy and epilepsy both controlled
3	Two moderate or severe medical/behavioral/psychosocial problems involving two organ systems <i>with</i> complications, or involvement of three organ systems <i>without</i> complications	Cerebral palsy, epilepsy, and mental retardation Autism, epilepsy, and severe aggressive behavior Cerebral palsy, mental retardation, family discord, and financial stress
4	Three moderate to severe medical/behavioral/psychosocial problems involving three organ systems <i>with</i> medical/behavioral complications, or involvement of four or more organ systems <i>without</i> complications	Epilepsy, brochopulmonary, dysplasia, tracheostomy, mental retardation, ventilator dependent with or without family/social stresses

Note. <sup>a</sup>ICD-9 indicates International Classification of Disease-9th Edition.

lems ( $n = 2$ ), hearing problems ( $n = 1$ ), pituitary deficiency ( $n = 1$ ), and urinary problems ( $n = 1$ ).

#### MEASURES

*Wechsler Preschool and Primary Scale of Intelligence—Revised (WPPSI-R; Wechsler, 1989)*. The WPPSI-R is a measure of intellectual ability in children aged 3 years to 7 years, 3 months. It yields a performance score and a verbal score that combine to yield the IQ score. The WPPSI-R verbal, performance, and full scale IQ scores have a mean of 100 and a standard deviation of 15. The internal consistency reliabilities of the WPPSI-R subscales and total scale ranged from .90 to .97; test-retest reliabilities ranged from .87 to .91. Numerous studies have indicated that the WPPSI-R has adequate construct and concurrent validity.

*Test of Early Language Development—Third Edition (TELD-3; Hresko, Reid, & Hammill, 1999)*. The TELD-3 is a standardized instrument for assessing receptive, expressive, and overall spoken language in children aged 2 to 7 years. The TELD-3 produces scores with a mean of 100 and standard deviation of 15 for each subtest and the overall composite score. Internal consistency coefficients for the TELD-3 subscales and total scale ranged from .80 to .97; test-retest correlations were reported from .80 to .94. Criterion validity showed that the TELD-3 was highly correlated with a variety of widely recognized measures of language, intelligence, and academic ability.

*Eyberg Child Behavior Inventory (ECBI; Eyberg & Pincus, 1999)*. The ECBI is a 36-item, parent-rating scale that assesses typical externalizing or conduct problem behaviors reported by parents of children and adolescents ages 2 through 16 years. Each behavior is rated on two scales: a 7-point intensity scale (1 = never, 7 = always) that indicates how often the behaviors occur and a yes-no problem scale that identifies whether the child's behavior is problematic or not for the parent. Psychometric features for the ECBI have been reported to be: .88 to .95 for internal consistency and .86 to .88 for test-retest reliabilities. Its criterion validity was assessed and found to be adequate.

*Parenting Stress Index—Third Edition (PSI-3; Abidin, 1995)*. The PSI-3 is a 120-item measure of level of stress in parent-child systems in families with children aged 1 month to 12 years. It is intended to identify parent-child systems at-risk for the development of dysfunctional parenting behaviors and/or child behavior problems. The scale produces 4 scores: child related stress, parent related stress, total stress, and life stress. Internal consistency coefficients of the PSI-3 ranged from .80 to .91 for the subscales and total scale and

between .87 and .94 for subscale to total correlations. The PSI-3 is known to have good concurrent validity.

*Parents' Concerns Survey (PCS; Bryan & Burstein, 2001)*. The PCS is a 10-item, 4-point Likert scale (1 = not at all, 2 = some, 3 = much, 4 = a lot) that assesses parents' concerns about their child's development (e.g., gross motor development, language, fine motor skills, behavior, independence, preschool skills). The internal consistency reliability of the PCS was .87; test-retest reliability was .64. Its concurrent validity was assessed and found to be acceptable.

#### PROCEDURES

Prior to testing, consent forms were read to parents who were told that they could withdraw from the study at any time, that all information was confidential, and that their relationship with the preschool or practice was unaffected by their decision. After signing the consent form, the assessments were then administered to the child and parent separately in different rooms at Arizona State University.

Children and parents were tested during two 2 1/2 hour sessions by two examiners who were unaware of the child's health status. During the first session, one examiner administered the TELD-3, while a second interviewed the parent on demographic variables (e.g., child's age, gender, primary language, health) and administered the PCS. During the second session, the children were administered the WPPSI-R, and parents completed the ECBI and PSI-3 scales.

#### DATA ANALYSIS

Prior to conducting group comparisons, descriptive analyses were performed to summarize data. A series of one-way analyses of variance (ANOVAs) were then employed to examine whether groups significantly differed on the child and parent measures administered in the study. Correlation coefficients were also computed among the scales.

### RESULTS

All children/parents completed the measures administered in the study. Descriptive statistics including means and standard deviations on the five child and parent measures for healthy children and children with special health care needs are presented in Table 2.

**TABLE 2.**  
**Means and Standard Deviations of All Child and Parent Measures**  
**for the Healthy Children and Children with Special Health Care**  
**Needs**

Measure	Healthy Children ( <i>n</i> = 65)		Children with Special Health Care Needs ( <i>n</i> = 47)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<b>WPPSI-R</b>				
Performance IQ	103.35*	19.05	96.69	14.85
Verbal IQ	104.10*	20.32	96.00	16.10
Full scale IQ	104.57*	20.29	96.28	15.34
<b>TELD-3</b>				
Receptive language quotient	107.25*	21.45	97.87	20.87
Expressive language quotient	103.22**	19.44	93.24	18.18
Spoken language quotient	106.22**	22.99	94.52	21.47
<b>ECBI</b>				
Intensity T-score	54.40*	10.15	61.13	22.21
Problem T-score	48.63*	8.07	51.94	7.91
<b>PSI-3</b>				
Child domain	100.28	21.25	107.30	18.83
Parent domain	115.17*	21.82	125.34	22.87
Total stress	215.45*	36.05	232.64	36.58
Life stress	10.12	8.21	10.43	7.81
<b>PCS</b>	15.31*	5.71	17.83	5.79

Note. Mean significantly differs from the mean of children with special health care needs (\* $P < .05$ ; \*\* $P < .01$ ).

*WPPSI-R*. An ANOVA indicated significant group differences: Performance IQ,  $F(1, 110) = 3.98$ ,  $p = .048$ , Verbal IQ,  $F(1, 110) = 5.13$ ,  $p = .026$ , and Full Scale IQ,  $F(1, 110) = 5.55$ ,  $p = .020$ . Healthy children scored significantly higher than children with special health care needs on all three scales.



*TELD-3.* An ANOVA indicated significant group differences on Receptive,  $F(1, 110) = 5.33, p = .023$ , Expressive,  $F(1, 110) = 7.58, p = .007$ , as well as Spoken Language Quotients,  $F(1, 110) = 7.45, p = .007$ . Healthy children again demonstrated higher scores on both subscales and total scale than children with special health care needs.

*ECBI Intensity and Problem Scales.* Statistically significant differences were also found on the Intensity,  $F(1, 110) = 4.64, p = .033$ , and Problem Scales,  $F(1, 110) = 4.65, p = .033$ . Parents of the healthy children scored their children significantly lower (i.e. better child behavior) than parents of children with special health care needs.

*PSI-3.* Parents of healthy children scored lower than parents of children with special health care needs on Parent Domain Stress,  $F(1, 110) = 5.69, p = .019$  and Total Stress,  $F(1, 110) = 6.14, p = .015$ . No significant group differences were found on Child Domain Stress and Life Stress.

*PCS.* On the PCS analysis, results showed that parents of children with special health care needs reported significantly more concerns than parents of healthy children,  $F(1, 110) = 5.62, p = .024$ .

Correlation coefficients among the five child and parent measures were computed based on each instrument's total score except for the ECBI. The mean score of the ECBI Intensity and Problem subscales was used for the correlation analysis. A p-value of less than .005 ( $.05/10 = .005$ ) was required for significance using the Bonferroni approach to control for Type I errors across the 10 correlations. The results of the correlational analyses showed that 5 out of the 10 correlations were statistically significant and the effect sizes were greater than or equal to .25. Significant positive correlations were found between the WPPSI-R and TELD-3 ( $r = .65, p < .001$ ), between ECBI and PCS ( $r = .41, p < .001$ ), and between PSI-3 and PCS ( $r = .32, p = .001$ ), whereas negative correlations were observed between the WPPSI-R and PCS ( $r = -.25, p = .008$ ), and between TELD-3 and PCS ( $r = -.37, p < .001$ ).

## DISCUSSION

Three questions were posed in the study. The first asked whether 3–5 year-old children with special health care needs differ from healthy children on measures of intelligence, language, and behavior. Results suggested that health condition was a factor contributing to children's cognitive, linguistic, and behavioral performance. Consistent with the findings derived from previous research (Gortmaker et al., 1990), the present study showed that children with health issues demonstrated poorer intellectual and language abilities and had more behavioral problems in comparison to their healthy

peers. It is important to note that although children with health problems scored discrepantly lower than their health peers, both groups scored within what is considered the normal range (one standard deviation above or below the mean) on both the WPPSI-R and the TELD-3. This pattern corresponds to many studies that have found students with learning disabilities to score significantly lower than higher achieving students on measures of IQ and language, yet to score within the assessment's normal range. To the extent that 3–5 years old children's scores on the WPPSI-R and the TELD-3 are reliable and valid predictors of academic achievement and that discrepancies from peers is a contributing and salient indicator, children with special health needs are at risk for experiencing academic difficulties and being classified as learning disabled.

The second question asked whether parents of healthy children differed from parents of children with special health needs on concerns about their children and family stress. Results indicated that parents differed on both measures. These concerns were specifically related to questions about their children's development. Parents of children with health problems expressed more concerns regarding their children's development and reported a higher degree of total stress level than parents of healthy children.

The third question asked whether parents' concerns and stress are related to children's intelligence, language, and behavior. Results suggested that parents' concerns are related as there were negative correlations between parents' ratings and children's performance on the intelligence and language measures. The more concerns parents expressed, the poorer children's performance on measures of intelligence and language. Furthermore, parents' concerns based on the PCS were negatively correlated with the ECBI and PSI-3. This indicates that increases in parents' concerns are related to increases in children's behavior problems.

The study was limited insofar as the children with special health needs group was diverse. There were too few children with each type of health problem to allow for analyses by diagnosis. But this is basically the reason the CL code was developed. Functional status based on organ systems appears to be a more reliable and useful approach than simply the use of primary diagnosis. Thus children who share CL levels 1 and 2 are more alike than not, irrespective of diagnosis. Because school diagnostic teams focus on academic performance, the relatively mild health conditions of the children in this study may go undetected. Research is needed to clarify whether one diagnosis rather than another would account for the differences found here and the relationship to future academic learning.

Overall, the results of the study confirmed the importance of listening to parents' descriptions and concerns about their children. Their concerns should be the starting point for developing individualized prevention programs. Theory and practice can benefit from the first-hand data families provide. Based on the parent and child data, prevention efforts need to connect early language and cognitive development to health status and take into account parents' knowledge base. Public policy-makers and practitioners should promote cross-disciplinary assessments that integrate information about the child and the family.

The results underscore the broad conclusion reached by others concerning the importance of information about young children's health. There has been minimal attention to the health status of children with learning disabilities. The results of this study indicated that health status should be included as part of early identification screening programs and taken into account when developing Individualized Family Service Plans (IFSPs) and Individualized Education Programs (IEPs). Future research should expand the age base to consider the relationship of relatively mild health problems in children identified as having learning disabilities and behavior disorders.

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