

Health Resources and Services Administration
Maternal and Child Health Bureau

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Predicting African American Children's School Success: Role of Child, Family, Childcare, and School Factors

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Outline

- Ready for School Success
 - Otitis media
 - Family literacy environment & parenting
 - Childcare Quality
 - Infant/Preschool Risk Factors
- School Competence
 - Entry language skills
 - Family
 - School quality & characteristics
 - Ethnic socialization & racial beliefs
 - Implications

Study Population

- Race: 83 African American children
- Gender: 44 female & 39 male
- Recruitment: 9 community childcare programs in 2 small southern cities, entered 6 - 12 mos (M = 8.1)
- SES: Study Entry 74% families in poverty range
K Entry 60% families in poverty range
- Maternal Education: Study Entry M = 12.5 yrs (2.1)
K Entry M = 13.1 yrs (2.0)

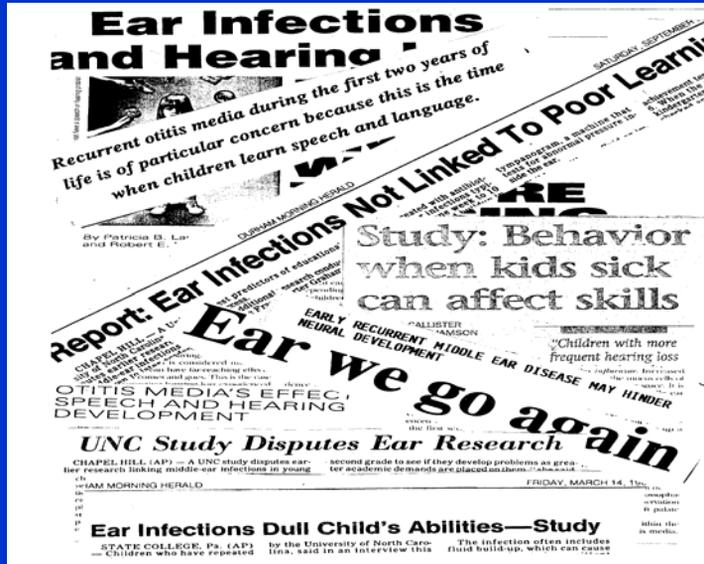


Ready for School Success

Why is Otitis Media a Concern?

- Otitis media - ear infection
- Most frequent physician diagnosis in children
- Tympanostomy tube insertion most common minor surgery in children
- Healthcare costs = \$5.8 billion in 1998
- Hearing loss during critical years of language learning

Does OME Cause Language/Learning Sequelae?



Carolina Otitis Media Project

Early Childhood

Preschool/School Age Outcomes

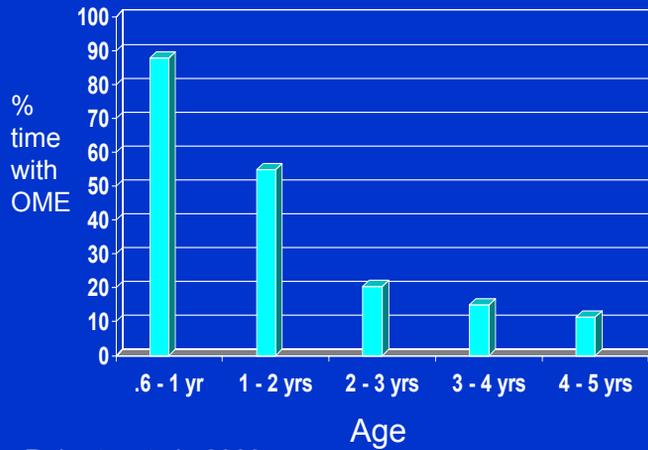
OME History
Hearing Loss
Other child & environmental factors



Auditory Processing
Language
Literacy

Mean % Time with OME per Child

(M = 85.9 ear exams/child)



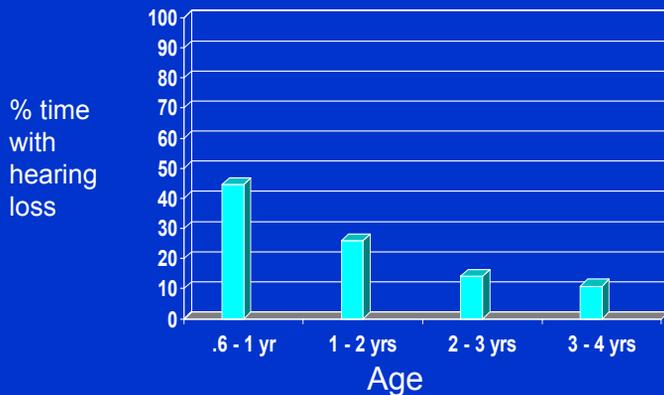
Children attending childcare had considerable OME until 2 years

Roberts, et al., 2000



Mean % Time with Hearing Loss

(M = 22.1 tests/child)



Children attending childcare had some hearing loss due to OME

Roberts, et al., 2000

OME & Infancy/Preschool Language Development

- No direct association OME/HL & language development 1 to 4 years (Roberts et al., 95,98,2000)
- Indirect association OME/HL & language 1 to 2 years, not 3 to 4 years
 - Children with more OME/HL had less responsive home/child care, home/child care linked to lower language at 1 & 2 years (Roberts et al., 95,98)

CELF Receptive Language for Children with High & Low Levels of OME



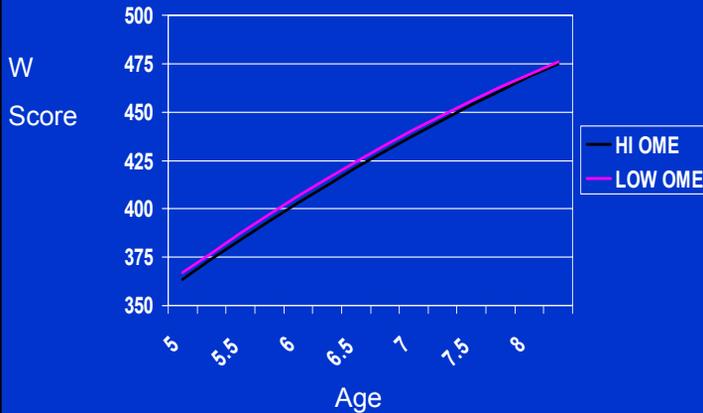
No association between OME history & children's receptive language during elementary school

Roberts, et al., 2002

Measures

- 75 children
- Administered battery language & academic measures K entry – 2nd grade
- Receptive & expressive language - CELF (Clinical Evaluation of Language Fundamentals)
- School Achievement – WJ (Woodcock Johnson) Letter Word Identification

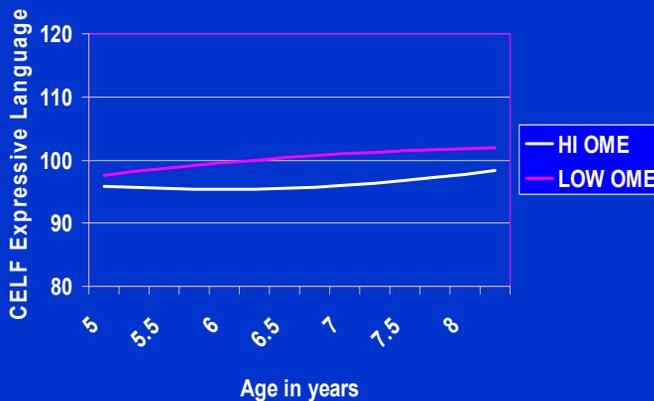
WJ Letter Word for Children with High & Low OME



Roberts, et al., 2002

No associations between OME history & children's reading during elementary school

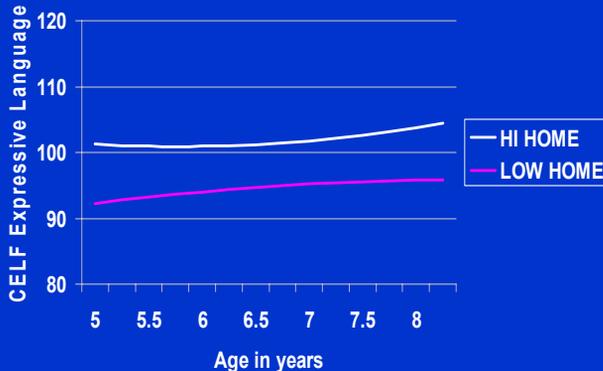
CELF Expressive Language for Children with High & Low OME



Roberts, et al., 2002

Expressive language over time related to early OME but children caught up by 2nd grade (partial $r = -.02$ - $-.25$; $M = -.10$)

CELF Expressive Language for Children with High & Low Levels of HOME



Home environment more strongly related to expressive language ($r = .24-.54$; $M = .32$) than OME or HL

OME & Language & Literacy Summary

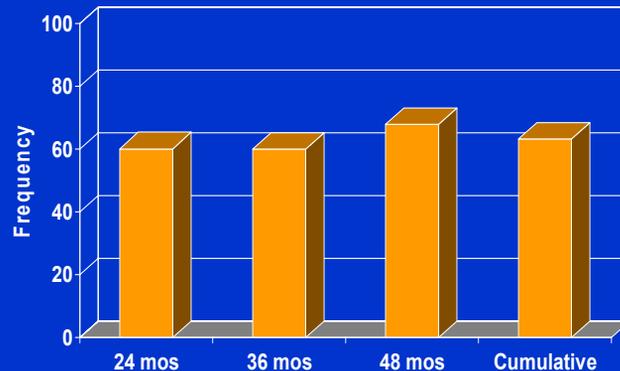
- Children in childcare experienced considerable OME
- No associations between OME/ HL & receptive language or reading
- Expressive language over time related to early OME, but children caught up by 2nd grade
- **Home environment** more strongly related to language than OME or HL
- Conclusion: OME prevalent in childcare, limited impact on children's development; home environment much more important

Home Literacy Environment & K Entry Language & Literacy

- Does the home literacy environment predict children's language &/or emergent literacy skills at K entry?
- What is best predictor within the home literacy environment of children's language & literacy skills at K entry?

Maternal Reading Strategies

(N=74) # Descriptions, Links to world,
Inferences, Book Concepts,
Letters/Sounds/Words, Recite Text



Mean Home Literacy Scores (2, 3, & 4 years)

	Mean	Range
Book reading frequency (times/week)	4.2	0-7
Child reading enjoyment rating	4.2	2.3-5
Maternal sensitivity rating	3.8	2.4-5
Maternal intonation rating	2.5	1-4
Maternal reading strategies	63.1	14-196

Language & Emergent Literacy Outcomes

- Receptive language – CELF (Clinical Evaluation of Language Fundamentals)
- Expressive language – CELF
- Receptive vocabulary – PPVT (Peabody Picture Vocabulary Test)
- Emergent literacy – TERA (Test of Early Reading Ability)

Partial Correlations^a between Home Literacy Environment & Language & Literacy at K Entry

	TERA	CELF Receptive	CELF Expressive	PPVT
Book reading frequency	.21	.25	.21	.12
Child reading enjoyment	.23	.27*	.18	-.01
Maternal sensitivity	.13	.24	.16	-.08
Maternal intonation	.27*	.19	.12	.04
Maternal read strategies	.18	.23	.28*	.15

^apartial gender, maternal education, maternal reading level

* $p < .05$; ** $p < .01$; *** $p < .001$

Summary: Home Literacy Environment & Later Language & Literacy

- Overall home literacy environment predicted vocabulary & receptive & expressive language at K entry
- Do not get much more prediction from global measure (e.g., intonation) & specific reading strategies
- Only maternal reading strategies predicted receptive vocabulary when all home literacy variables considered
- Conclusion: increases in home literacy environment relate to language outcomes, mild association

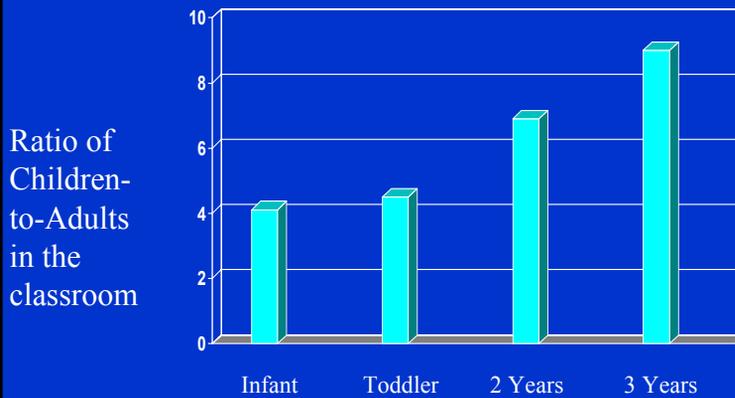
Childcare Quality & Infant/Preschool Language Development

- Childcare is a common experience for young children
- Over half of infants & over 75% of preschoolers are in childcare
- Childcare quality is one of the most consistent predictors of language & cognitive development

Childcare Quality & Infant/Preschool Language Development

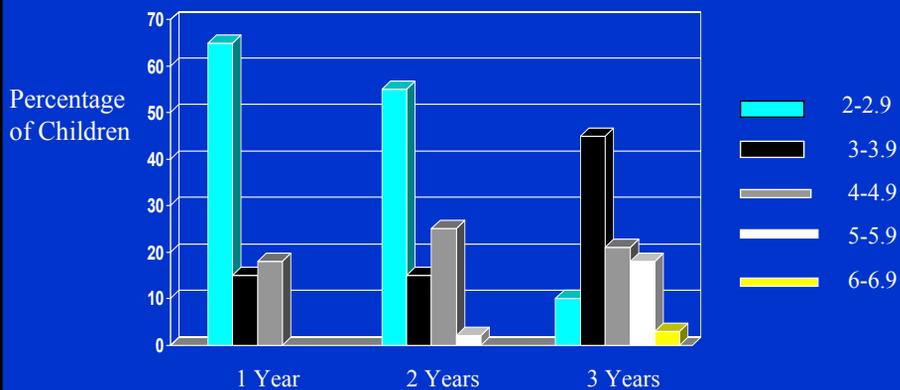
- Structural measures
 - Class size
 - Number of adults
 - Number of children/adults
 - Teacher education/year
- Process measures
 - ITERS
 - ECERS

Ratio of Children to Adults in 1, 2, & 3 year Classes



Burchinal et al., 2000

Percentage of Children 1, 2, & 3 Years in Classes with Varying Levels of Childcare Quality

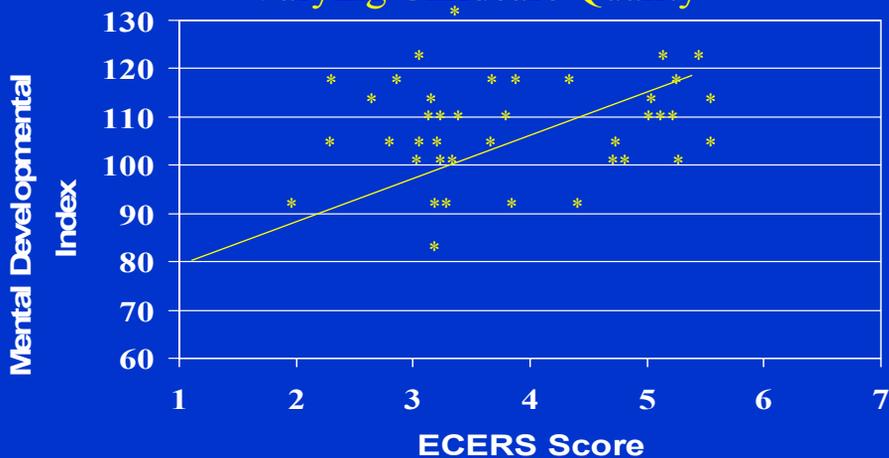


Burchinal et al., 2000

Language/Cognitive Outcomes (N=89)

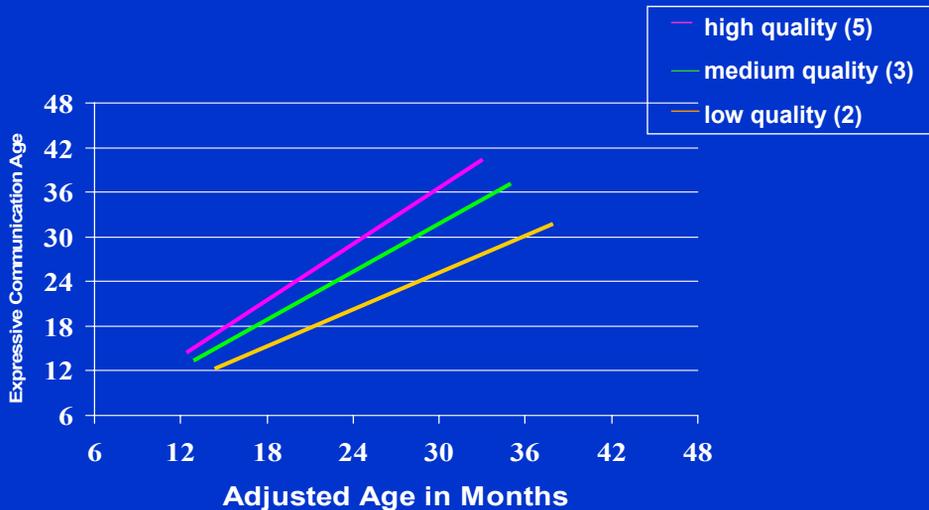
- Receptive communication – SICD Sequenced Inventory of Communication Development
- Expressive communication - SICD
- Cognitive development - Bayley MDI

Children's Observed & Predicted Mental Development Index (MDI) at 3 years for Varying Childcare Quality



Burchinal, et al., 2000

Children's SICD ECA between 1 & 3 Years for High Quality, Medium Quality, & Low Quality Childcare



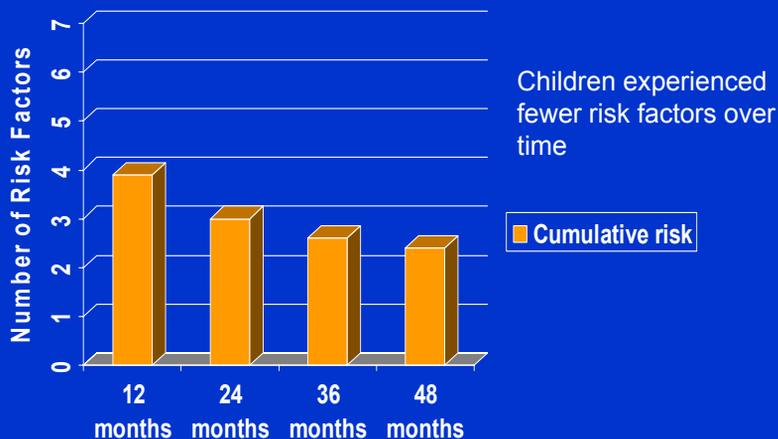
Summary of Childcare Quality & Infant/Preschool Language Development

- Higher cognitive & language development for children with higher quality childcare 6 - 36 months
- More advanced language skills when child-to-adult ratios met professional recommendations
- Conclusion: quality childcare can enhance children's early development

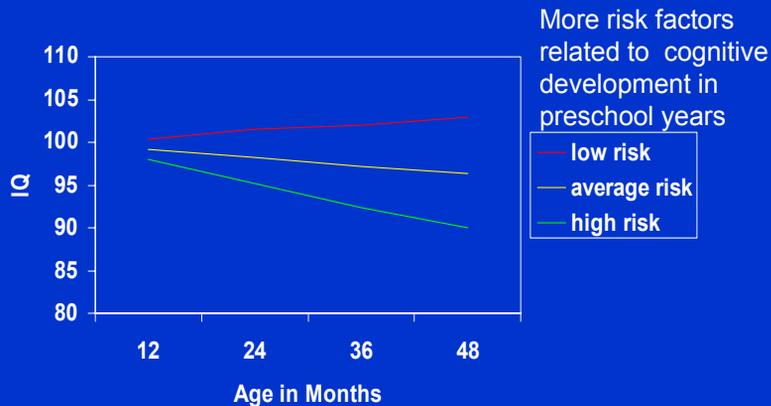
Infant/Preschool Risk Factors

- Maternal education < High School
- Single Parent
- Family income in poverty range
- Large household (>4 people)
- High life stress
- Maternal depression
- Low maternal responsiveness during play with child
- Low levels of stimulation in family household
- Low quality childcare

Mean Risk Factors During Early Childhood



Social Risk Factors & Cognitive Development



Infant/Preschool Risk Factors & Preschool & K Entry Language Development

- Children with fewer risk factors acquired cognitive & language skills more quickly during preschool years
- Most influential risk factors were:
 - Maternal responsiveness & quality of family environment
 - Child care quality
 - Household size

Ready for School Success: Summary

- Otitis media: limited impact on development
- Family literacy environment & parenting: can enhance language development
- Childcare Quality: can enhance early development
- Risk Factors: Fewer risk factors acquire cognitive & language skills more quickly

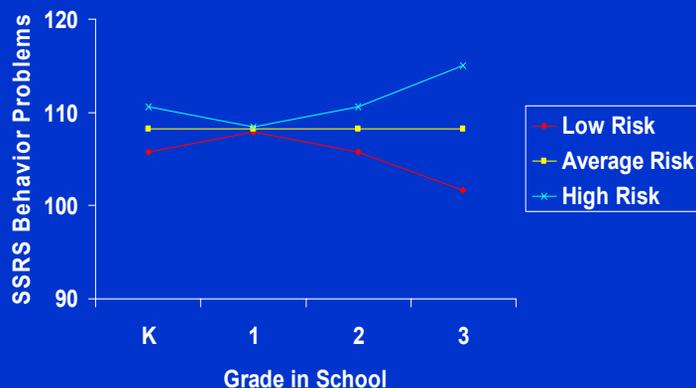


School Competence

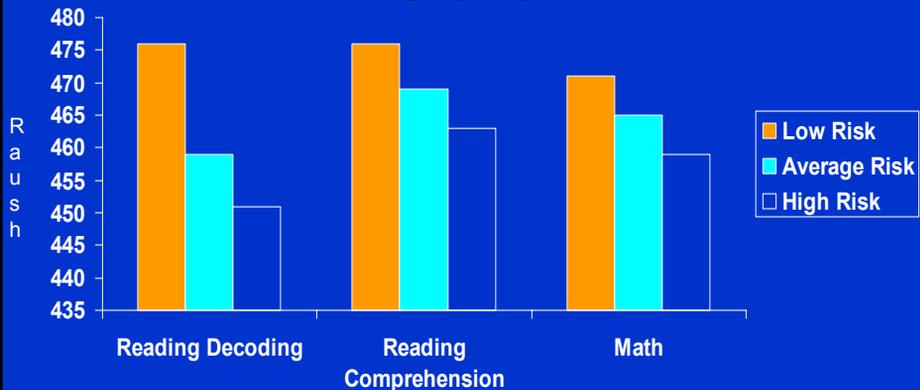
Predictors of School Competence

- Predictors:
 - Entry language & social skills
 - Family risk factors
 - School quality & characteristics
 - Ethnic socialization & racial beliefs
- Children's school outcomes from Kindergarten to Grade 3:
 - Reading (decoding & comprehension), math
 - Social skills, behavior problems

Family Risk & Problem Behaviors



Early Childhood Family Risk & Academic Achievement in 2nd Grade

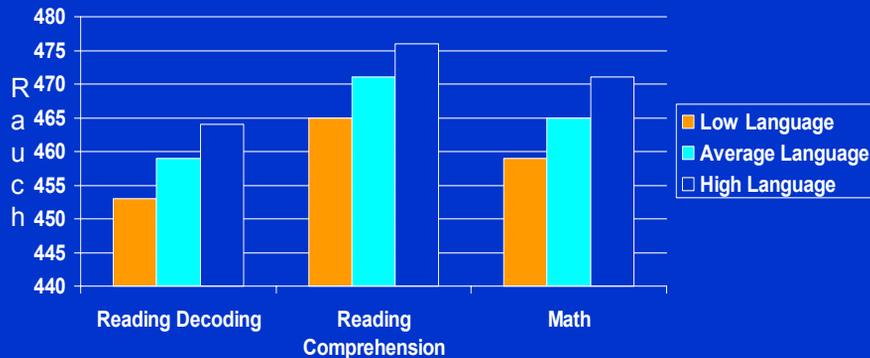


Low, Average, & High Risk defined by one standard deviation above or below the mean. Outcome is W-Raush score (age equivalency measure)

Family Risk Factors as Predictors of School Competence

- Children with fewer family risk factors in early childhood showed more advanced skills in reading, math, & social skills, & fewer behavior problems

Entry Language Skills & Academic Achievement: 2nd Grade

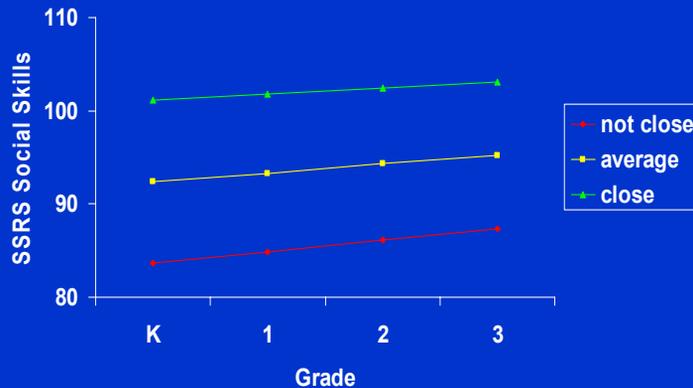


Low, Average, & High Language defined by one standard deviation above or below the mean. Outcome is W-Raush score (age equivalency measure)

Entry Language Skills as Predictors of School Competence

- Children who entered school with higher language skills showed higher levels of math & reading skills consistently across time from K to 3rd grade
- Children who entered school with poorer language skills did not appear to catch up from K to 3rd grade

Social Skills & Teacher-Child Closeness



Student-Teacher Relationship as Predictor of Academic Competence

- More prosocial skills & fewer behavior problems reported when teachers reported closer relationship with a child
- Higher reading (passage comprehension) when teachers reported closer relationship with a child

School Factors as Predictor of Academic Competence

- Children with an African-American teacher showed fewer behavior problems, but less skilled at decoding
- Children who attended schools with high levels of poverty had more problem behaviors over time as reported by teachers

Racial Identity & Ethnic Socialization

- Parent racial socialization of children & perception of discrimination
- Parent & child racial identity
- Child racial expectations & coping strategies
- Parent & child Afro-cultural beliefs & practices

Racial Identity & Ethnic Socialization Data

- Parent ethnic socialization practices related to children's racial identity ($r = -.23$) & children's race related social expectations ($r = .23$ to $.32$)
- Children's racial identity related to their race related social expectations ($r = -.24$ to $-.33$)

Social Expectations as Predictor of Academic Competence

- Children who reported that prejudice accounted for negative outcomes proportionately more often during the social expectation interview tended to have higher reading & math skills

School Competence Summary

- Family & childcare experiences linked to language skills at school entry
- Entry language skills are best predictor of school competence
- Other factors that contribute to school competence:
 - School quality & characteristics
 - Ethnic socialization & racial beliefs

Directions: Teens in School (2003-2007)

- Follow study youth through 8th grade to understand sociocultural factors that affect school performance of African American youth
- Role of peer relations in mediating relationship between child & family & school competence
- Role of racial/ethnic similarities & differences & impact on school competence
- Identify child, family, & school factors that impact trajectories for middle school success

Multigenerational Pathways to Competence in Minority Families

Principal Investigator: Frances A. Campbell
Co-Principal Investigator: Elizabeth P. Pungello
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- Other sources of support for earlier follow-up work include the David and Lucile Packard Foundation and the Office of Educational Research and Improvement

Original Investigators

- Craig Ramey, Ph. D., Principal Investigator
- Joseph Sparling, Ph. D., Investigator
- Albert Collier, M. D., Investigator
- Frank Loda, M. D., Investigator
- Floyd Denney, M. D., Investigator
- Barbara Wasik, Ph. D., Investigator (CARE)

Statement of the problem

- Individuals who grow up in poverty are at high risk for developmental delays, school failure, a lesser degree of economic self-sufficiency, and more socially maladaptive behaviors.
- Enhancing the quality of the early environment of poor children should increase the degree to which they develop to their full potential and lead productive lives.

Statement of the problem

- For a variety of reasons, the early years are believed to be the most efficacious period to intervene in the lives of poor children.
 - Development appears to be more malleable in the early years.
 - Children who arrive at kindergarten lacking basic readiness skills tend to fall further behind in later years.
 - Massive attempts to prepare poor children for school success, such as Head Start, were initially disappointing.
 - Research was needed to learn whether intensive early intervention that began in the infancy period could make more lasting difference for poor children.

Two early studies of intensive early childhood educational intervention

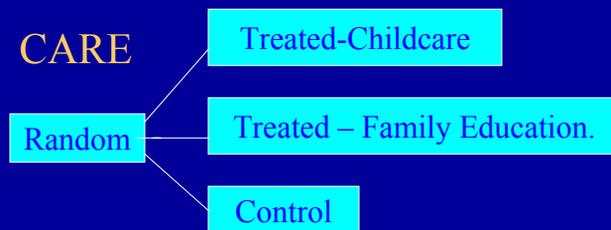
- Contiguous randomized studies of early educational intervention were conducted at the University of North Carolina during the 1970's and 1980's
- Abecedarian Project
 - Four cohorts of infants born between 1972-1977
- Carolina Approach to Responsive Education (CARE)
 - Two cohorts of infants born between 1978-1980

Early Childhood Study Designs

- Abecedarian Study



CARE



Important features

- Both studies were randomized trials
 - minimizes self-selection bias
 - permits outcomes to be attributed with more confidence to intervention itself
- Enrolled families had to qualify on a High Risk Index containing 13 socio-demographic factors
 - parental education
 - family income
 - intactness of family
 - evidence of developmental delays in other family members

Number of participants in Abecedarian and CARE studies combined

Group	Male	Female	Total
Abecedarian			
Childcare	29	28	57
Control	23	31	54
CARE			
Childcare +	9	7	16
Family ed.	17	9	26
Control	13	10	23
Total	90	80	176

Family demographics at study entry

Family Characteristic	%	M	SD
Maternal age (years)		20.3	4.8
Maternal education			
Less than H.S.	62		
H. S. grad	33		
More than H. S.	5		
Maternal IQ		84.8	10.2
Marital status			
Married	19		
Single	75		
Divorced/separated	6		

Description of studies

- Childcare treatment was full-day, year round
- Staff-child ratios were low
- Learning games curricula were designed specifically for the programs
- CARE childcare model differed from Abecedarian in that center teachers visited the homes to demonstrate the curriculum for parents
- Family education model used the same curricula but did not provide childcare
- Children in control groups may have had childcare in other local centers or daycare homes.

Features of Abecedarian and CARE studies

- Attrition has been low.
- Study samples have been followed up into early adolescence in both studies
- Abecedarian study has later adolescent and young adult data.
- Longitudinal data exist on parents as well as on participants in the early childhood phases of the study.

Early Childhood Findings

- Abecedarian: Treated children outscored controls on cognitive and academic measures from 18-96 months.
- CARE: Children treated in childcare outscored controls from 12-36 months
- Children treated in childcare outscored children treated in family education from ages 12-54 months.

School-age findings

- Abecedarian students with preschool treatment outscored preschool controls in reading and math through age 15.
- Fewer students with preschool treatment were retained in grade or placed in special education.
- CARE students with preschool childcare treatment outscored those with family education through age 12, but not controls.
- If Abecedarian and CARE samples are combined, those with childcare preschool treatment significantly outscore controls on reading and math through age 12.

Three current studies based on Abecedarian young adult findings

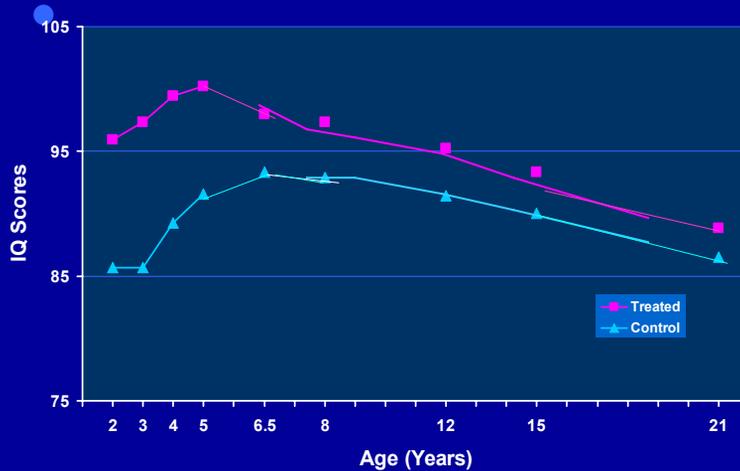
- Longitudinal data on cognitive development from age 2 to age 21 years, examining the role of early intervention and other factors.
- Longitudinal data on academic achievement in reading and math from 8 to 21 years and mediators of early treatment effects on academic test scores.
- Examination of other possible mediators of early treatment effects on educational attainment.

First Study: Long-Term effects of early childhood intervention on intellectual development

- Data base
 - Stanford-Binet scores age 2-4, age-appropriate Wechsler scales at later ages up to age 21 years
 - Examiners were always independent of treatment program
 - Examiners were blind to treatment/control status from age 8-21
 - Two group model tested longitudinally because earlier analysis showed no effect of school-age treatment on intellectual development
 - Once randomized, always analyzed rule allowed all data to be used at each age.
 - Missing cases are estimated in these models.

Long-Term Effects on intellectual development

Adjusted IQ Trajectory, Ages 2 to 21 Years



Important points about longitudinal cognitive development

- Treated children earned higher scores across time
- Treatment/control group difference was greater during the early, treatment years
- Slopes differ in treatment/post-treatment phases
- Treated children differed from control children in rates of change during treatment years but *not* during post-treatment years
- Both groups showed upward trends during the early years and declines in post-treatment years
- Up to young adulthood, the group with early treatment maintained an advantage over controls.

Moderators of long-term effects: child gender

- Adding child and family characteristics to the prediction model
 - No significant effect for child gender
 - No significant treatment \times gender interaction
 - Gender \times time² interaction reflects complex pattern of change in intellectual test performance of males and females over time

Age \times gender interaction

- Females change more rapidly in early childhood
- Females decline more sharply than males in early adolescence
- Males decline more sharply than females in later adolescence

Moderators of long-term effects: maternal factors

- There is a main effect for Maternal IQ
- ✿ Effect is moderated by a Maternal IQ x age² interaction
- ✿ Slopes vary in the treatment and post-treatment periods

Moderators of long-term effects: the early home environment, maternal attitudes and mother's marital status

- There is a main effect for the HOME score
 - Main effect is moderated by a HOME x age interaction
 - Effect of HOME is stronger in the early years
- Parental attitudes in early life did not have a significant effect on intellectual test performance.
- No significant effects of mother's marital status.

Can we identify mediators of long-term treatment effects on cognitive development?

- Early task orientation mediated effects of early treatment on test scores but effect size did not show much change when this factor was entered into the model.
- Early verbal development accounted for much of the treatment effect on test performance, and in later years, wholly accounts for it.

Effect sizes and adjusted mean differences for longitudinal cognitive test scores in Abecedarian treated and control groups

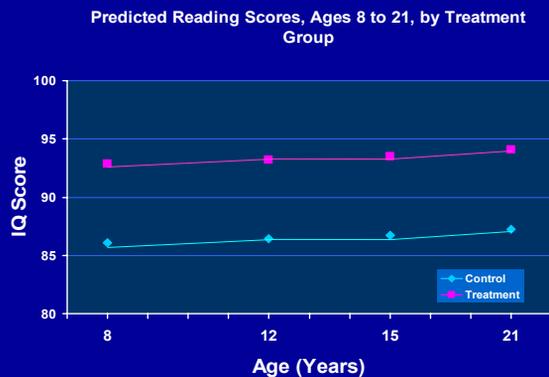
Effect Sizes (difference)	Treatment Alone	Treatment + Family	Task Orientation Added as Mediator	Verbal Added as Mediator
3 years	0.96 (11.7)	1.10 (12.0)	1.07 (11.3)	0.76 (6.3)
6.5 years	0.38 (4.6)	0.43 (4.7)	0.40 (4.3)	0.10 (-0.8)
12 years	0.31 (3.8)	0.34 (3.7)	0.31 (3.3)	-0.21 (-1.7)
21 years	0.19 (2.3)	0.20 (2.1)	0.17 (1.8)	-0.38 (-3.2)

Second study

- An examination of longitudinal academic test scores in reading and math
- Examination of how early treatment affects academic test scores
- Data base
 - Woodcock-Johnson Psycho-educational Battery standardized scores at ages 8, 12, 15, and 21 years.

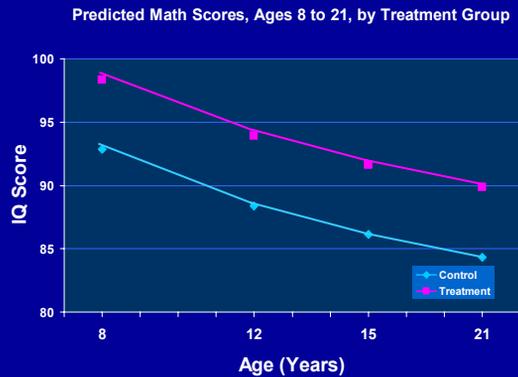
Long-term effects on reading scores

- Early treatment was associated with significantly higher scores on reading from age 8 to age 21



Long-term effects on math scores

- Early treatment was associated with significantly higher scores on math from age 8 to age 21



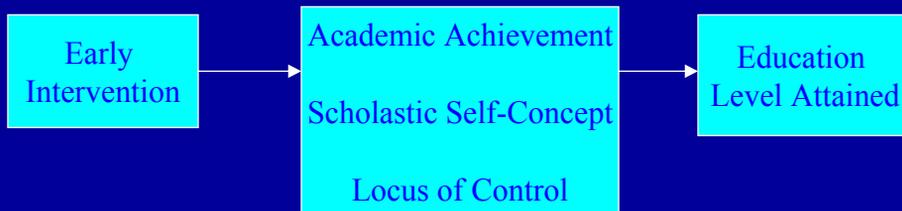
Evidence of mediation of treatment effect on academic achievement

Model	Adjusted Means		Difference	Effect Size	
	Treated	Control		Pooled sample d^2	Test d^2
Reading					
Model without IQ	93.5	86.7	6.8	1.40	0.45
Model with IQ	91.9	88.1	3.8	0.79	0.26
% Reduction				44	42
Math					
Model without IQ	91.6	86.1	5.6	0.85	0.37
Model with IQ	91.7	89.1	2.6	0.40	0.17
% Reduction				53	54

Third Study

- An examination of possible mediators of treatment effects on the educational attainments of Abecedarian young adults
- Possible mediators include:
 - Academic achievement
 - Personal characteristics
 - Locus of control
 - Scholastic self-concept

Possible Mediators



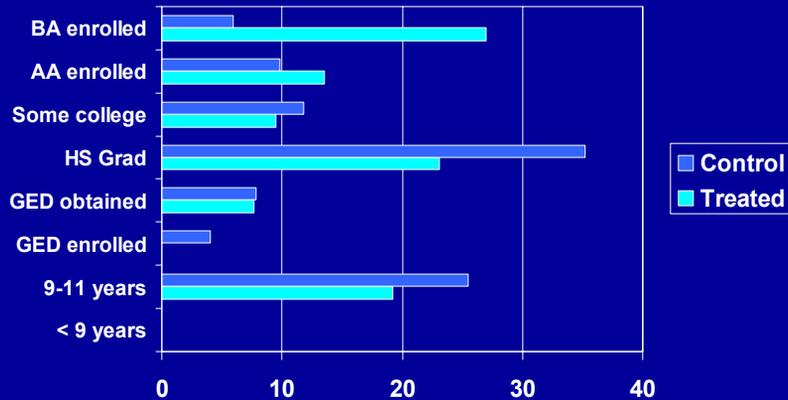
Measures

- Academic Achievement: age-standardized total skills score on the Woodcock-Johnson at age 15
- Scholastic Self-Concept: Harter Perceived Competence Scale at age 15
- Locus of Control: Intellectual Achievement Responsibility Scale and the Nowicki-Strickland Scale for Adolescents at age 15
- Education Level: at age 21, coded into 8 levels:
1: less than 9 years 5: high school graduate
2: 9 to 11 years 6: some college / no degree
3: GED enrollee 7: enrolled in AA program
4: GED graduate 8: enrolled in BA program

Variables by Group

Construct	Treated		Control	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Academic achievement	93.3	12.4	88.2	10.6
Scholastic self-concept	2.79	0.55	2.75	0.61
Academic locus of control	11.0	1.57	10.6	2.11
General locus of control	8.60	3.82	9.51	4.01
Education level at 21	5.52	2.16	4.57	1.86

Educational attainment by treated and control groups (%)



Prediction Models

Variable	<i>B</i>	<i>SE B</i>
Model 1		
Intercept	4.77	0.68
Gender	-0.13	0.40
Treatment	0.94	0.40*
Model 2		
Intercept	5.02	0.68
Gender	-0.23	0.40
Treatment	0.75	0.41 ⁺
Achievement	0.04	0.02*

Effect Sizes

- Model 1 (without achievement): .94
- Model 2 (with achievement): .75
- in each of the subsequent models in which scholastic self-concept, academic locus of control, and general locus of control were entered into the prediction model, the effect size for treatment was not reduced

Summary of Main Age-21 Findings (Abecedarian)

- **Benefits of high-quality educational childcare were still apparent in early adulthood**
 - More years of education attained
 - More likely to attend a 4-year college or be employed in a skilled job
 - Delayed childbearing
 - Modest cognitive benefits persisted
 - Academic benefits persisted - mediated by cognitive benefits
 - Educational attainment was mediated by academic achievement. Locus of control and academic self-concept did not appear to mediate effects of early treatment on educational attainment.

Statement of the questions currently addressed

- The present study is designed to expand the previous study of young adults by extending it to the CARE sample, consisting of comparable young adults who experienced similar early education but who had different models of service delivery.

Current aims for young adult study

- To learn if long-term benefits seen in the Abecedarian study replicate in CARE.
- To learn if the family education model may have had long-term effects not evident in earlier years.

Intergenerational focus of current research

- A second goal of the present MCH study is to learn if any benefits of early childhood programs can be detected in children born to the participants in the early intervention programs.

Specific intergenerational questions

- Will the educational quality of the homes provided by adults who experienced early childcare treatment differ from those provided by control parents?
- Will treated adults exhibit greater efficacy as parents to their own children?
- Will children of treated parents have higher scores on measures of academic readiness or achievement?
- Will socioemotional development differ for children of adult parents who experienced the early childhood treatment?

Methods for current study

- CARE young adults
 - Face to face interview covering
 - Independent living (own home, transportation, self support, medical care)
 - Education attained
 - Vocational status
 - Marital status
 - Community involvement
 - Maladjustment (crime, substance abuse)
 - Risk Taking Survey
 - Brief Symptom Inventory

Methods for intergenerational study

- Child Measures
 - Woodcock-Johnson Psycho-Educational Battery
 - Child Behavior Checklist and Profile (by parent)
 - Child Report of Parent Behavior
- Parent Measures
 - Interview version of Home Observation for Measurement of the Environment
 - Parent Efficacy Scale

Period of Current Award and Investigators

- September 1, 2001 to August 31, 2005
- Other Investigators
 - Oscar Barbarin
 - Margaret Burchinal
 - Martie Skinner
 - Barbara Wasik
- Subcontractor: Georgetown University
 - Principal Investigator: Craig T. Ramey