

EXPOSURE TO REACH OUT AND READ AND VOCABULARY OUTCOMES IN INNER CITY PRESCHOOLERS

Iman Sharif, MD, Sarah ^{Rieber}Reiber, and Philip O. Ozuah, MD, MSED
The Bronx, New York, and Clinton, New York

To examine the association between exposure to Reach Out and Read and vocabulary outcomes in children, a consecutive sample of 200 parent/child pairs was studied at two inner-city health centers. Children at clinic A were exposed to Reach Out and Read, a clinic-based literacy intervention, for 3 years at the time of the study; children at clinic B were unexposed. Main outcome measures were the "Expressive and Receptive One Word Picture Vocabulary Tests" to measure vocabulary in the children and the "Home Literacy Orientation" scale and "READ" subscale of the STIMQ, to measure book-sharing activities.

A total of 200 subjects participated, and the mean age of children was 3.8 years. Demographic characteristics were comparable for both clinics at baseline. Exposed children scored higher on receptive vocabulary (81.5 vs. 74.3; $p = 0.005$). They also scored higher on both the Home Literacy Orientation scale (4.3 vs. 3.3; $p = 0.002$) and the STIMQ-READ (12.6 vs. 11.0; $p = 0.056$). There were no differences in expressive vocabulary scores between the two sites (79.5 vs. 77.5; $p = 0.26$).

In conclusion, we found a positive association between exposure to Reach Out and Read and better receptive vocabulary scores. We also found higher scores for Reach Out and Read-exposed children on measures of home reading activities. (*J Natl Med Assoc.* 2002;94:171-177.)

Key words: literacy ♦ inner-city ♦
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The reading proficiency of United States children has been an issue of great national concern, especially over the past decade. Ac-

ording to the National Center for Education Statistics, a full 40% of the nation's 4th graders perform below a basic level of reading ability.¹ The average 2000 4th grade reading scores were significantly lower for ethnic minority children, children attending inner-city schools, and for children eligible for free/reduced price lunch.¹

Some changes have occurred in the teaching of reading to children. In the past, educators subscribed to a reading-readiness model, where children were expected to attain specific skills before being ripe for reading instruction. More recently, experts have endorsed the theory of

© 2002. From the Albert Einstein College of Medicine/Children's Hospital at Montefiore, Bronx, New York and Hamilton College, Clinton, New York. This work was presented in part at the annual meetings of the Pediatric Academic Societies in Boston, MA, in May 2000. Requests for reprints should be addressed to Iman Sharif, MD, Montefiore Medical Center, 3544 Jerome Avenue, Bronx, NY 10467. Address e-mail to isharif@pol.net

emergent literacy, proposing that the ability to read is a developmental process that begins long before school entry.² The concepts of emergent literacy and its relationship to early print exposure have led to the development of interventions such as "Reach Out and Read" (ROR).³

The objective of ROR, a clinic-based pediatric literacy intervention, is to modify the child's home environment to promote literacy development and reading skills. While several studies have assessed the effectiveness of ROR,⁴⁻⁹ only one has directly measured vocabulary outcomes of an ROR intervention.⁶ Hence, the aim of this study was to examine the association between exposure to ROR and vocabulary in children. A secondary aim was to measure the effect of ROR on standardized measures of home reading activities.

METHODS

Design/Setting

We used a cross-sectional survey design to compare the attendees of two pediatric clinics. Both sites were federally funded health centers in the Mott Haven section of the South Bronx, NY—the poorest congressional district in the United States.

Attendees of clinic A had been exposed to a three-year ROR intervention at the time of the study. The ROR intervention was administered by 7 attending pediatricians and 12 pediatric residents; all had attended a ROR provider training. Providers counseled parents about reading to children and dispensed an age-appropriate book at each health maintenance visit. Unlike typical ROR sites, the volunteer-reader component of ROR was only a sporadic feature at this site. Attendees of clinic B had no opportunity for ROR exposure, and served as controls.

Enrollment process

A bilingual, trained research assistant approached all parents of preschoolers in the

pediatric waiting rooms to participate in a study looking at the kinds of things parents do with their children. Parents were informed that the purpose of the study was to help the health center design better programs. Our hypothesis was not disclosed.

After obtaining parental consent, a consecutive sample of eligible preschool children and their primary caretakers were enrolled at each site. Inclusion criteria were: 1) child's age 2-5.9 years; 2) child not enrolled in Kindergarten; 3) no known cognitive impairment; 4) child has lived with the caretaker continuously for more than one year; 5) caretaker identifies the health center as the "usual" site for the child's check-ups for at least one year; and 6) the caretaker is fluent in either English or Spanish.

Participants

A total of 213 subjects were approached to participate in the study; 13 declined. Reasons for refusal to participate included: "don't feel like it" (7 responses), "don't think my child is ready for a vocabulary test" (3 responses), "don't want to sign anything" (2 responses), and "can't read enough to understand the consent form" (1 response).

Immediately following enrollment, the research assistant administered a structured demographic interview. Interviews were conducted in either English or Spanish, based on parental response to the following question: "In what language are you most comfortable speaking?" Following the interview, the research assistant assessed the outcome measures as described below.

This study was approved by the Institutional Review Board of Montefiore Medical Center.

Outcome Measures

Expressive and Receptive One Word Picture Vocabulary Tests

We measured receptive and expressive vocabulary as indicators of prereading skills. We used the "Expressive and Receptive One

Table 1. Home Literacy Orientation

1. I'd like you to remember all the things you did with ____ yesterday from when he/she woke up in the morning until lunch time. . . Now from lunchtime to dinner. . . And from dinner to bedtime, (Lead parent through day step by step, probe if they say "we played")
2. What are ____'s top 3 favorite things to do, besides eating and sleeping?
3. Sometimes parents have favorite things that they enjoy doing with their children. What are your favorite three things to do with ____
4. Some parents do think it's important to do things with their children to prepare them for learning in school. Are there any special things that you do with your child now to prepare him/her for school? If yes, what are the three most important things that you do?
5. What does ____ usually do for the ½ hour before he/she goes to bed at night?
STIMQ-READ sub-scale administered at this point
6. Does anyone else at home read to your child?
7. How often does ____ get a chance to read to your child?
8. How often do you read for yourself?

For questions 1–5, a positive response is recorded if books/reading are mentioned. Questions 6, 9 and 10 score positive for a response of "yes." Question 7 is scored positively for "at least once a week" or more; question 8 is scored positively for "a lot/almost every day" vs. "once in a while/never".

Word Picture Vocabulary Tests," (EOWPVT, ROWPVT).^{10,11} The EOWPVT and ROWPVT are standardized and validated measures that have been used previously to evaluate the impact of literacy interventions.^{6,12–13} The EOWPVT has a 0.69 correlation with the overall IQ score of the Weschsler Preschool and Primary Scale of Intelligence (WPPSI); a 0.48 correlation with the Vocabulary subtest; and a 0.46 correlation with the Reading subtest of the Test of Academic Achievement Skills.¹⁴ The ROWPVT has a 0.70 correlation with the WPPSI.¹⁵

The EOWPVT and ROWPVT use the same plates for both the English and Spanish versions. In the receptive test, the child is asked to point to a picture that represents the word the examiner says. In the expressive test, the child is asked to name the picture the examiner points to. For this study, the tests were administered in the child's preferred language. For bilingual children, both language versions were used. Prior to the study, a bilingual research assistant received 10 hours of supervised training to administer the ROWPVT and EOWPVT.

The ROWPVT and EOWPVT yield raw scores, percentile ranks, and standard score equivalents. We used standard score equivalents

for all analyses. The standard score equivalent is the child's vocabulary score standardized for age; a standard score of 100 is equivalent to 50th percentile for age.

Home Literacy Orientation

We created a "Home Literacy Orientation" scale. This consisted of a structured set of ten questions about home activities, including three questions previously published by Needleman.⁴ Table 1 lists the questions and the criteria for a positive response. The open-ended questions (1 to 5) were administered first. The closed-ended questions (6 to 10) were administered immediately following the *STIMQ-READ* subscale (see description below). For each "Home Literacy Orientation" question, we recorded a value of "1" for a positive response, and "0" for a negative response. The sum of the responses to the 10 questions on the scale were then summed for each parent-child pair, yielding a possible range of scores of 0 to 10 on the entire Home Literacy Orientation scale.

STIMQ-READ subscale

We also used a standardized and validated measure of home reading activities, the

"READ" subscale of the STIMQ.¹⁶ The STIMQ is an orally administered questionnaire that assesses the cognitive aspects of the home environment. The READ subscale focuses on the number and variety of books in the home and the frequency and quality of shared reading activities. The STIMQ has been standardized with poor black and Hispanic urban families. It has a 0.55 correlation with the HOME inventory, the gold standard observational measure of the home environment.¹⁶

We recorded each parent-child pair's raw score on each of three subsets of the READ subscale of the STIMQ, as well as the composite score (sum of the subset scores). The first question on the READ scale is "Do you ever read children's books to your child or is she/he too young for that?" If the parent responds negatively, a composite score of "0" is assigned. If the parent responds positively, the remaining questions are asked. The question subsets record 1) the number books in the home, 2) the number of days per week that the parent read to the child, and 3) the variety of books in the home and variety of interactions surrounding books.

For the number of books in the home, the STIMQ assigns a value of "0" if there are no books in the home, a value of "1" for 1 to 9 books, a value of "2" for 10 to 24 books, a value of "3" for 25 to 49 books, and a value of "4" for 50 or more books. Similarly, the STIMQ assigns a value of "0" for less than 2 days/week of reading, a value of "1" for 2 to 3 days/week of reading, and a value of "2" for more than 3 days/week of reading. The subset of questions about variety of books and interactions asks yes/no questions including, for example, whether parents read funny books, or books about colors, counting, fairytales, etc. Each type of book or interaction is a separate question; the number of positive responses are then summed. The composite score for the STIMQ-READ scale, a sum of the three subset scores, has a possible range of 0 to 18.

Table 2. Demographics

	ROR-exposed group	Control group	P value
Mean age of child	3.8 yr.	3.9 yr.	.30
Child attends preschool	37 %	44 %	.30
Mean caretaker age	30.3 yr.	28.7 yr.	.10
% Medicaid recipients	73 %	75 %	.73
% caretakers reporting they "read very well"	71 %	68 %	
"read well enough"	29 %	32 %	
"do not read well"	0 %	0 %	.64
% HS completion	67 %	60 %	.30
% Latino	53 %	52 %	
% African American	45 %	46 %	.45
% usually speak English at home	80 %	67 %	.05

Statistical Analyses

Data were collected and entered into the Epi Info statistical system. The χ^2 test was used to analyze differences in proportions for categorical data. The Student's *t*-test was used to compare means for the ROWPVT, EOWPVT, Home Literacy Orientation, and STIMQ-READ scores between exposed and control children.

RESULTS

A total of 200 subjects were enrolled in the study (100 exposed and 100 controls). At enrollment, there were no major demographic differences between the groups. (Table 2) In response to the question "What language do you usually speak at home?" a greater proportion of the exposed group listed English than did controls (80% vs. 67%; $p = 0.05$).

In the assessment of vocabulary, ROR-exposed children scored higher on the ROWPVT in comparison to controls (mean standard scores, 81.5 vs. 74.3; $p = 0.005$). When English speakers were looked at alone, the differences between ROR-exposed children and controls remained significant (mean standard scores, 83.2 vs. 75.3; $p = 0.01$). EOWPVT scores were 2 points higher in ROR-exposed children as compared to controls; however, this difference was

Table 3. Results: Home Literacy Orientation Scale

	ROR-exposed group	Control Group	P value
Reading/Books (R/B) mentioned in 24-hour recall	11%	7%	.46
R/B as child's favorite activity	21%	11%	.05
R/B as caretaker's favorite activity with child	31%	23%	.20
R/B to prepare for school	31%	35%	.55
R/B at bedtime	19%	12%	.17
Someone else reads to child	80%	63%	.01
Someone else reads to child weekly	44%	32%	.80
Caretaker reads for herself	73%	53%	.003
Library card	65%	54%	.10
Library visit during preceding month	31%	28%	.64
Home Literacy Orientation composite score	Mean = 4.3	Mean = 3.3	.002

not statistically significant (mean standard score, 79.5 vs. 77.5; $p = 0.26$).

Table 3 shows the results for the Home Literacy Orientation scale. Subjects with exposure to ROR scored higher than did controls (mean score, 4.3 vs. 3.3; $p = 0.002$). Specifically, caretakers in the exposed group were more likely to report that reading/books were one of the child's three favorite activities (21% vs. 11%; $p = 0.05$), that someone else in the home reads to the child (80% vs. 63%; $p = 0.01$), and that the caretaker reads for herself (73% vs. 53%; $p = 0.003$).

Table 4 summarizes our results for the STIMQ-READ scale. While only 5% of parents of ROR exposed children reported that they never read to their child, 15% of controls reported that they never read to their child ($p = 0.03$). The ROR-exposed group also scored higher on the composite score of the READ subscale of the STIMQ (mean score, 12.6 vs. 11.0; $p = 0.056$). More specifically, caretakers in the ROR-exposed group re-

ported having more children's books in the home than controls (mean subset score, 2.63 vs. 2.14; $p = 0.01$).

DISCUSSION

Only two previous studies have demonstrated improved vocabulary in ROR-exposed children; one study used parent report of toddler vocabulary and one directly tested preschoolers.^{6,7} Our findings support a positive association between exposure to ROR and receptive vocabulary. In addition, this is the first study to show significantly higher scores for ROR-exposed children on a standardized and validated measure of home reading activities, the STIMQ-READ.

Our study has limitations. The cross-sectional design limits our ability to attribute a causative relationship between ROR exposure and the measured outcomes. It is possible that our findings represent baseline differences between the two groups. However,

Table 4. Results: STIMQ-READ

	ROR-exposed group	Control group	P value
Parent never reads to child	5%	15%	.03
Number of books in home	Mean score 2.63	Mean score 2.14	.01
Days per week parent reads to child	Mean score 1.25	Mean score 1.12	.18
Variety of books and interactions	Mean score 8.5	Mean score 7.6	.13
Composite STIMQ-READ sub-scale score	Mean score 12.6	Mean score 11.0	.056

the groups were demographically similar, even in the caretaker's self-perception of reading ability. Additionally, the two study sites serve the same population; are staffed by pediatricians from the same academic medical center, and are located within 10 minutes walking distance of each other. Finally, even after controlling for language, there remained a significant 8-point difference in receptive vocabulary between the two sites. Therefore, we are unaware of any other differences, besides ROR exposure, that would explain the observed outcomes.

We relied on parental report for our measures of home reading activities. It is possible that our findings are related to recall bias. For example, parents of ROR-exposed children may have known to give desirable responses about reading to their children. Home visits or video-taping of parent-child interactions with books may have strengthened the study. However, both the Home Literacy Orientation Scale and the STIMQ-READ yielded concordant results. Furthermore, our finding of higher receptive vocabulary in the ROR-exposed children supports the parental reports of increased home reading activities.

About 3 months before we began to enroll study subjects, clinic B instituted a ROR program. Since the ROR program provides counseling and books only at health maintenance visits, we estimated that based on the mean age of children enrolled in the study (3.8 years), children at clinic B would only have had 0 to 1 ROR contacts. However, had these children received a book through ROR, this should have served to narrow the gap in scores between the two sites. Therefore, the differences we found in receptive vocabulary, Home Literacy Orientation, and STIMQ-READ scores between the two groups are even more substantial.

Our study has several strengths. This is only the second study to directly measure vocabulary outcomes in children exposed to

ROR, using a standardized and validated test. We also used a standardized and validated test of home reading activities, the STIMQ-READ scale. Furthermore, the open-ended design of our Home Literacy Orientation scale questions diminished the possibility of obtaining socially desirable responses. Finally, our findings concur with what has been reported so far about the effectiveness of ROR.⁴⁻⁹

Reach Out and Read is an important pediatric-based literacy initiative, and is rapidly spreading across the United States. There is a growing body of evidence to support ROR's impact on increasing parent-child book-sharing activities and more recently, vocabulary outcomes in preschool children. This study adds to that body of evidence. Long-term, prospective studies are needed to study the impact of ROR on school-age reading outcomes.

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