Effectiveness of a Clinic-Based Early Literacy Program in Changing Parent-Child Early Literacy Habits

Jonathan Fricke, MD, MPH; Dipesh Navsaria, MD, MPH, MSLIS; Karin Mahony, MEd, MSW

ABSTRACT

Background: Reach Out and Read (ROR) improves children's development and kindergarten readiness by encouraging parents to routinely share books with their children. Primary care providers give age-appropriate books and anticipatory guidance on reading at each well-child visit. This study evaluated parent attitudes and behaviors of early literacy related to ROR participation in Wisconsin clinics.

Methods: A survey of early literacy attitudes and behaviors was administered to parents of children ages 6 months to 5 years in 36 Wisconsin clinics. Ten clinics were established ROR sites (intervention group) and 26 clinics had applied to become ROR programs but had not yet initiated the program (control group).

Results: Parents at clinics with ROR programs were more likely to read with a child under the age of 6 months (OR=1.58, 95% CI, 1.05-2.38). Other literacy metrics trended toward improvement but none reached statistical significance. Paradoxically, the odds of parents reporting reading as a bedtime habit were decreased among those who participated in ROR.

Conclusions: Our study finds mixed support of the effectiveness of ROR outside of academic settings. The apparent discrepancy between these results and those from national studies on ROR may be related to differences in respondent demographics and educational attainment or differences in program implementation and fidelity. We believe that the results will become clearer with future study as clinics are prospectively evaluated over time rather than being compared to non-ROR clinics in a cross-sectional snapshot.

BACKGROUND

Reach Out and Read (ROR) is a national clinic-based early literacy program that provides anticipatory guidance on the importance of reading aloud, targeting children from age 6 months to 5 years old. At each health supervision visit, a child receives a new book, and age-appropriate reading techniques are briefly taught to the parents.[1] ROR is a widespread, evidence-based intervention with programs in all 50 states and efficacy demonstrated in over a dozen peer-reviewed journal articles.[1-10] The American Academy of Pediatrics recently recommended that literacy promotion should be a routine part of every well-child visit.[11]

Several factors influence reading habits at home. Nationally, wealthy families are nearly twice as likely to read to children daily as families below the poverty line.[12] In Wisconsin, 60% of parents with more than a high school education report reading to their children every day, compared with the nationwide average of 56%. However, only 38% of Wisconsin parents with a high school education or less report the same. There are also significant racial disparities in reading habits. Sixty-three percent of white families in Wisconsin report reading every day, but only 34% of African American and 40% of Hispanic families report the same.[12] Ultimately, more than 1 in 3 children in Wisconsin starts kindergarten without the language skills they need to learn to read.[13]

Parents who participate in ROR are up to 4 times more likely to read aloud to their children, and children who participate have higher vocabulary scores.[2,6-9] These effects are most pronounced among nonwhite and less educated families.[2-6] The largest study, a 19-center study from 10 states (not including Wisconsin) showed parents to be approximately 1.5 times more likely to read aloud at bedtime, read at least 3 times per week, have picture books in the home, and consider reading aloud to be a favorite activity.[6]

Reach Out and Read Wisconsin was organized in 2010 with 55 participating clinics and has now expanded to more than 160 sites (Figure).[13] In 2014, ROR reached 13% of Wisconsin children, including 18% of those who live at or below 200% of the

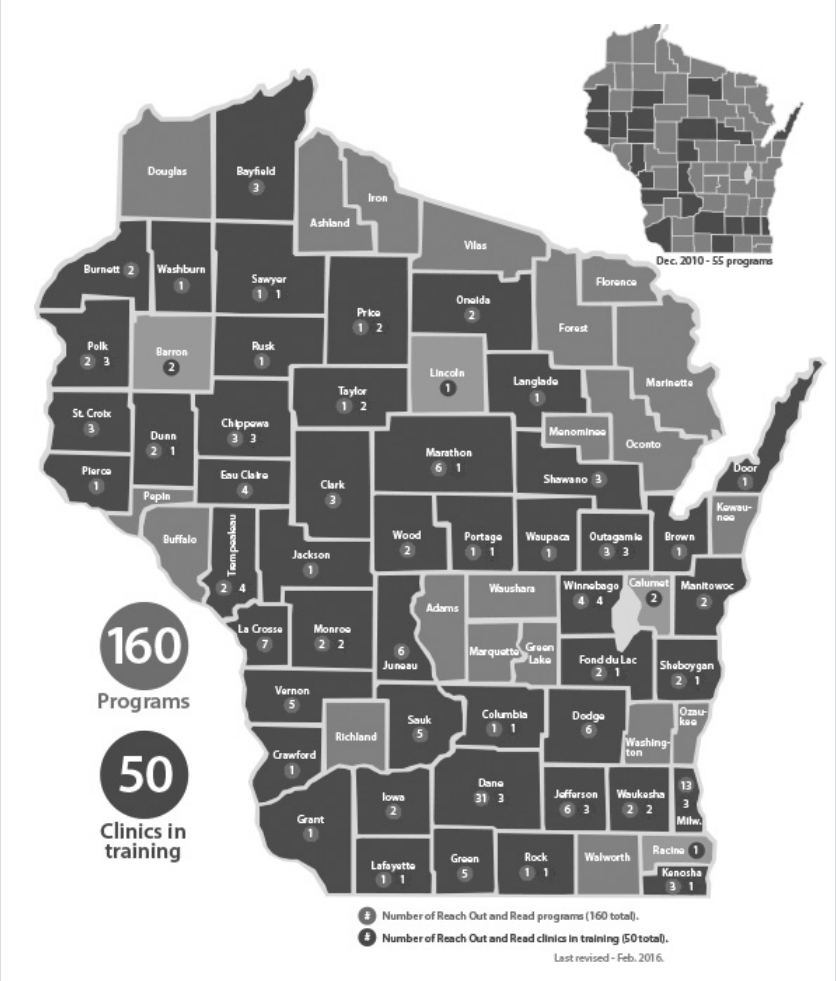
• • •

Author Affiliations: Department of Family Medicine, University of North Carolina School of Medicine, Chapel Hill, NC (Fricke), University of Wisconsin School of Medicine and Public Health, Madison, Wis (Navsaria), Reach Out and Read Wisconsin, West Allis, Wis (Mahony).

Corresponding Author: Jonathan Fricke, MD, MPH, Resident Physician, Department of Family Medicine, University of North Carolina School of Medicine, Chapel Hill, NC; phone 608.467.0891; e-mail jonathan.fricke@unchealth.unc.edu.

Federal Poverty Level.[13] To date, there have been no studies published that evaluate Reach Out and Read in Wisconsin. Here we present preliminary findings from a survey evaluating changes in parental early literacy attitudes and behaviors associated with ROR participation.

Figure. Reach Out and Read Wisconsin Programs



METHODS

Reading habits of families at 36 clinics throughout Wisconsin were compared utilizing a cross-sectional survey. Methods were adapted from an earlier national study of ROR effectiveness by Needlman et al.[6] The intervention group consisted of 10 clinics with current ROR programs, while the control group was comprised of 26 clinics applying to become ROR programs. Clinics in the application process had committed to implementing ROR but had not yet trained their providers in the program model and were not currently providing books or routine anticipatory guidance on reading at well-child visits. All 10 intervention clinics were participants in a grant and were asked to participate in this study as part of the evaluation process of that grant.

Enrollment was conducted by the staff of each clinic. At check-in, parents or guardians (hereafter referred to collectively as parents) of children ages 6 months through 5 years were asked to participate in the survey. To best capture the natural conditions at a clinic, parents in both groups were asked to complete surveys regardless of exposure to ROR. Surveys were available in English, Spanish, and Hmong. Clinics were asked to distribute surveys for 1 month or until they had collected a total of 50 completed surveys, whichever came first. No potentially sensitive or intrusive questions were included on the survey, and subjects were reminded to not include their names or other identifying information on the survey. A waiver of full Institutional Review Board (IRB) approval was obtained via the University of Wisconsin-Madison.

Data were collected by a 1-page, 2-sided paper survey given to parents at patient registration and collected after the clinic visit. Parents were instructed to complete the survey while waiting to be roomed. Surveys included demographic information and 6 core questions based on those used by Needlman et al.[6] The first 3 questions were scored as "1" if the respondent mentioned "reading" or "books" and "0" if the respondent did not. The second 3 questions were based on the StimQ, a 3-question questionnaire that has been validated for internal consistency, test-retest reliability, criterion-related validity, and predictive validity in low-income urban Hispanic/Latino and African American families.[14] Days reading per week was dichotomized as <3 versus ≥3 days per week, and number of books in the home was dichotomized as <10 versus ≥10 days per week.

Control and intervention clinics were compared with univariate analysis followed by multivariate analysis to assess the difference after adjusting for child gender, race/ethnicity (white vs nonwhite), home language (English vs non-English), urban/rural, and parental education level. For binary outcomes, logistic regression model with random effect was fitted using SAS PROC GLIMMIX. Odds ratio, 95% confidence interval, and *P*-value were reported. For continuous outcomes, mixed effect model was fitted using SAS PROC MIXED. LSEANS, 95% CI, and *P*-value were reported. The analysis was conducted using SAS 9.4. (SAS Institute, Cary, North Carolina).

A secondary analysis was carried out after excluding the 11

Table 1. Descriptive Statistics of Survey Respondents and Their Children

	Control	Intervention	Wisconsin[15-17]
Relationship to Child			
Father	13.2%	13.2%	--
Mother	85.6%	85.1%	--
Grandparent	1.0%	0.8%	--
Nonrelative caregiver	0.1%	0.1%	--
Respondents With College Education or Higher	54.5%	59.9%	37.8%[a]
Average Age of Child (Months)	25.3	24.1	--
Percent Female (Child)	47.3%	48.3%	--
Race or Ethnicity of Child			
White	84.5%	74.2%	69.7%[b]
Black or African American	2.2%	4.0%	8.9%
Hispanic or Latino	3.3%	2.3%	12.1%
American Indian or Alaska Native	0.9%	5.9%	1.2%
Asian	4.3%	6.0%	3.7%
Native Hawaiian or Pacific Islander	0.0%	0.3%	<0.5%
Multiple races	4.8%	7.4%	4.3%
Primary Language Spoken in the Home			
English only	91.6%	93.8%	88.5%[c]
Speak Spanish	3.7%	1.4%	6.8%
Speak Hmong	1.4%	2.5%	--
Other	3.1%	2.3%	4.6%

[a]2014 American Community Survey (ACS) 5-year estimate of Wisconsin residents. >25 years old with a college degree or higher, regardless of parenthood status. ACS Table S1501.
[b]2014 estimate of Wisconsin children ages 0-4.
[c]2013 ACS 3-year estimate of Wisconsin children ages 5-17. The ACS does not assess primary language spoken for children ages 0-4. Home language is reported as "English only," "Spanish," and "all other languages." ACS Table C16007.

Table 2. Results of Univariate Analysis

Outcome	Odds Ratio (Established vs New)	95% CI	*P*-value
Reading as favorite thing to do	0.95	0.72, 1.26	0.7308
Reading to prepare for sleep	0.71	0.53, 0.94	**0.0183**
Reading to prepare for kindergarten	1.29	0.97, 1.72	0.0824
Appropriate to start reading at <6 mo.	1.30	0.90, 1.88	0.1569
More than 5 books at home	1.03	0.60, 1.78	0.9016
More than 10 books at home	1.03	0.69, 1.52	0.8956
Read 3 or more days a week	1.53	0.84, 2.79	0.1611
Read 5 or more days a week	0.96	0.71, 1.30	0.7813

Statistically significant results are bolded.

clinics in Dane County. Madison, the state capital and home to the University of Wisconsin-Madison, is a community with high socioeconomic and education levels. Additionally, in the years leading up to this study, there had been significant publicity in the city related to early literacy and ROR. For these reasons, it was determined to be possible that parents at Dane County clinics may be more familiar with the concepts of early education and early literacy, thereby affecting the survey results.

RESULTS

Overall, 1,025 surveys were collected from 36 clinics (an average of 28.5 surveys per clinic, min=5, max=51). The control group consisted of 670 surveys from 26 clinics in the process of implementing ROR programs. The intervention group contained 355 surveys from 10 clinics with programs established for more than a year.

The control group had a higher proportion of clinics located in Dane County (38.5% vs 10.0%), as well as a higher percentage of clinics in rural counties (39.0% vs 25.6%). Respondents in the control and intervention groups were similarly likely to have completed college and report visiting the library. In both groups, the majority of respondents were mothers (Table 1).

The average age and gender of children was similar for both control and intervention groups. The control group had a higher proportion of white children compared with the intervention group (84.5% and 74.2%). English was the language most commonly spoken at home, with Spanish (3.7% and 1.4%) and Hmong (1.4% and 2.5%) being the most common other languages spoken (Table 1).

After univariate analysis, the only statistically significant difference was that parents participating in ROR were paradoxically less likely to report reading as a part of a bedtime routine (OR=0.71) (Table 2). Parents also were more likely to see reading together as helping to prepare their children for kindergarten, although this neared, but did not reach, statistical significance (OR=1.29, *P*=0.082).

After multivariate analysis, parents were more likely to list an age of ≤6 months as an "appropriate age to begin reading" (OR=1.58) (Table 3). Increases in other metrics trended toward, but did not reach, statistical significance. After excluding Dane County clinics and repeating multivariate analysis, the likelihood of parents listing an age of ≤6 months as "appropriate age to begin reading" increased (OR=1.77).

Multivariate analysis also showed that parent education, ethnicity, and home language were associated with home reading habits. Parents with a college education or higher were more likely to read as a part of the bedtime routine, mention reading as a step to prepare children for kindergarten, and list an age of ≤6 months as "appropriate age to begin reading." These parents had more books in the home and read more often than those with less than a college education (Table 3). Similar correlations with ethnicity and home language were noted, with whites and English-speakers being more likely to report proliteracy habits at home.

DISCUSSION

At present, there are well over a dozen peer-reviewed studies demonstrating the efficacy of ROR. This study contributes by assess-

Table 3. Results of Multivariate Analysis

Outcome	Variable	All Clinics				Excluding Dane County Clinics			
		Odds Ratio	95% CI		*P*-value	Odds Ratio	95% CI		*P*-value
Reading as Favorite Thing to Do	Established vs new	1.01	0.76	1.35	0.9332	1.10	0.76	1.58	0.5984
	Female vs male	1.12	0.85	1.47	0.4180	1.06	0.76	1.49	0.7127
	White vs non-white	1.31	0.87	1.97	0.1943	1.29	0.77	2.16	0.3120
	English vs non-English	1.25	0.67	2.34	0.4601	1.28	0.57	2.86	0.5313
	Rural vs non-rural	1.09	0.81	1.48	0.5441	1.17	0.81	1.68	0.3776
	High school vs college	1.25	1.00	1.43	0.0512	1.47	1.04	2.06	**0.0305**
Reading to Prepare for Sleep	Established vs new	0.77	0.57	1.03	0.0783	0.84	0.58	1.22	0.3350
	Female vs male	1.14	0.86	1.52	0.3621	1.17	0.83	1.65	0.3535
	White vs non-white	1.45	0.95	2.19	0.0802	1.25	0.75	2.09	0.3726
	English vs non-English	1.47	0.79	2.74	0.2179	1.90	0.86	4.21	0.1054
	Rural vs non-rural	1.16	0.85	1.59	0.3415	1.34	0.92	1.95	0.1144
	High school vs college	1.47	1.28	1.60	**0.0002**	1.82	1.28	2.58	**0.0022**
Reading to Prepare for Kindegarten	Established vs new	1.33	0.97	1.81	0.0733	1.43	0.98	2.08	0.0645
	Female vs male	0.85	0.64	1.14	0.2758	0.96	0.68	1.36	0.8272
	White vs non-white	1.36	0.89	2.07	0.1453	1.25	0.74	2.10	0.3893
	English vs non-English	1.39	0.75	2.59	0.2840	1.35	0.61	2.97	0.4355
	Rural vs non-rural	0.85	0.62	1.16	0.2958	0.94	0.65	1.36	0.7251
	High school vs college	1.49	1.32	1.62	**<.0001**	1.68	1.18	2.39	**0.0064**
<6 Months Appropriate to Start Reading	Established vs new	1.58	1.05	2.38	0.0285	1.77	1.09	2.88	0.0237
	Female vs male	0.87	0.60	1.26	0.4521	0.81	0.52	1.26	0.3321
	White vs non-white	2.20	1.35	3.59	**0.0026**	2.57	1.43	4.61	**0.0032**
	English vs non-English	1.55	0.78	3.08	0.2014	1.60	0.69	3.69	0.2530
	Rural vs non-rural	1.03	0.69	1.54	0.8701	1.11	0.69	1.77	0.6570
	High school vs college	1.54	1.32	1.68	**0.0003**	1.80	1.14	2.83	**0.0146**
More Than 5 Books at Home	Established vs new	1.21	0.66	2.20	0.5197	0.98	0.48	2.01	0.9544
	Female vs male	0.97	0.55	1.71	0.9145	1.04	0.54	2.02	0.9018
	White vs non-white	1.99	0.98	4.05	0.0579	1.99	0.84	4.70	0.1107
	English vs non-English	6.16	2.65	14.32	**0.0002**	5.47	2.00	14.96	**0.0024**
	Rural vs. non-rural	1.53	0.81	2.87	0.1782	1.38	0.68	2.80	0.3490
	High school vs college	1.85	1.70	1.92	**<.0001**	5.30	2.25	12.44	0.0006
More Than 10 Books at Home	Established vs new	1.14	0.73	1.78	0.5588	1.28	0.75	2.18	0.3425
	Female vs male	1.21	0.79	1.85	0.3739	1.27	0.78	2.08	0.3223
	White vs non-white	2.90	1.73	4.88	**0.0002**	2.94	1.59	5.43	**0.0016**
	English vs non-English	4.23	2.11	8.49	**0.0003**	3.32	1.43	7.70	0.0080
	Rural vs non-rural	0.68	0.43	1.05	0.0786	0.78	0.46	1.32	0.3370
	High school vs college	1.46	1.02	1.70	**0.0447**	2.63	1.55	4.44	**0.0011**
Read 3 or More Days a Week	Established vs new	1.47	0.77	2.80	0.2296	1.11	0.50	2.48	0.7858
	Female vs male	1.12	0.62	2.02	0.6940	1.14	0.55	2.36	0.7088
	White vs non-white	1.05	0.44	2.46	0.9160	0.77	0.24	2.44	0.6444
	English vs non-English	5.17	2.01	13.27	**0.0015**	9.36	2.76	31.71	**0.0012**
	Rural vs non-rural	1.37	0.71	2.66	0.3362	1.28	0.58	2.82	0.5207
	High school vs college	1.46	1.02	1.70	**0.0447**	1.70	0.79	3.64	0.1651
Read 5 or More Days a Week	Established vs new	1.05	0.75	1.47	0.7514	1.24	0.82	1.86	0.2881
	Female vs male	0.84	0.61	1.15	0.2657	0.93	0.64	1.36	0.7069
	White vs non-white	2.19	1.43	3.35	**0.0008**	2.15	1.27	3.63	**0.0065**
	English vs non-English	2.23	1.18	4.18	**0.0151**	2.85	1.25	6.50	**0.0157**
	Rural vs non-rural	0.87	0.62	1.21	0.3883	1.05	0.70	1.57	0.8153
	High school vs college	1.48	1.29	1.63	**0.0002**	1.73	1.18	2.54	**0.0070**

The first group, "All clinics" is comparison of 1,025 surveys from 26 control and 10 intervention clinics.
The second group, "Excluding Dane County Clinics" is 705 surveys from 25 clinics after excluding all control and intervention clinics from Dane County.
Statistically significant results are bolded.

ing ROR outside academic clinical settings and in Wisconsin specifically. The results offer support of previous studies, showing parents participating in ROR to be more likely to display healthy attitudes and behaviors related to early literacy. Parents participating in ROR were more likely to read with their kids before age 6 months compared with parents who had not participated in ROR (OR=1.58), and these results were strengthened after exclusion of Dane County clinics (OR=1.77). Parents also were more likely to see reading as preparing their children for kindergarten, read more often with their children, and have more books in the home, although these increases did not reach statistical significance. Paradoxically, the odds of parents reporting reading as a bedtime habit were decreased among those who participated in ROR.

The benefits of ROR were not demonstrated as consistently or dramatically as in previous studies. It is likely that comparing 2 different groups of clinics introduced confounding variables. This study is an initial report from the first stage of a larger study that will longitudinally study parent survey responses before and after implementation of ROR programs in clinics. This prospective model will minimize the challenges posed by comparing 2 different groups of clinics.

Of note, the percentage of respondents with college education or higher (54.5% and 59.9% of control and interventional groups, respectively) is notably higher than the Wisconsin state average of 37.8%.[15] As previous studies have noted, ROR has its most dramatic impact among families with lower educational attainment. It is possible that our sample captured a disproportionately high percentage of Wisconsin.

Approximately 80% of respondents in this study were white, compared to 72% of the US population and 86% of the general population Wisconsin.[17] Needlman et al found impact of ROR among African-Americans and Latinos, but not whites, participating in ROR.[6] The small number of nonwhite participants in our surveys limits sub-analysis based on race. However, given the large percentage of whites in our population relative to the study by Needlman, results from this study would be expected to be less pronounced than those results.

It is likely that control group clinics had not implemented ROR programs until now because the need was not as great or apparent as it was for early adopters of the program, many of which were community health centers or located in poorer communities.

Despite being a statewide survey, the sample was not comprehensive and only included a small portion of the more than 150 ROR programs in Wisconsin. The rate of parents declining to participate is unknown. It is likely that the written format of the survey discouraged or prevented some parents from participating — particularly those with low literacy skills.

This study raises the question of whether paper surveys are sufficient and effective tools in evaluation of the impact of ROR in nonacademic settings. Although imperfect, the paper survey offers significant convenience and cost savings when compared with use of trained interviewers; however, their validity needs to be evaluated.

CONCLUSION

Reach Out and Read has been shown to be successful on the national level in changing parent attitudes and behaviors toward reading with children. The results of this preliminary report from an ongoing study offer some support of previous studies, demonstrating that parents participating in ROR are more likely to read with their children before they are 6 months old. Other literacy metrics trended toward improvement but did not reach statistical significance. We believe that the results will become clearer when clinics are prospectively evaluated over time rather than being compared to other clinics in a cross-sectional snapshot. Future studies of ROR programs in nonacademic settings should pay particular attention to the fidelity of programs to the ROR program model. Additionally, studies should also focus on assessing the effects of parental education, language spoken in the home, and ethnicity on home literacy habits.

Funding/Support: None declared.

Financial Disclosures: None declared.

REFERENCES

1. Klass P, Needlman R, Zuckerman B. Reach Out and Read Program Manual. 2nd ed. Boston, MA: Reach Out and Read National Center, Boston Medical Center; 1999.

2. Needlman R, Fried LE, Morley DS, Taylor S, Zuckerman B. Clinic-based intervention to promote literacy. A pilot study. *Am J Dis Child*. 1991;145(8):881-884.

3. Klass P, Dreyer BP, Mendelsohn AL. Reach out and read: literacy promotion in pediatric primary care. *Adv Pediatr*. 2009;56:11-27.

4. Sanders LM, Gershon TD, Huffman LC, Mendoza FS. Prescribing books for immigrant children: a pilot study to promote emergent literacy among the children of Hispanic immigrants. *Arch Pediatr Adolesc Med*. 2000; 154(8):771-777.

5. Silverstein M, Iverson L, Lozano P. An English-language clinic-based literacy program is effective for a multilingual population. *Pediatrics*. 2002;109(5):E76-6.

6. Needlman R, Toker KH, Dreyer BP, Klass P, Mendelsohn AL. Effectiveness of a primary care intervention to support reading aloud: a multicenter evaluation. *Ambul Pediatr.* 2005;5(4):209–215.

7. Mendelsohn AL, Mogilner LN, Dreyer BP, et al. The impact of a clinic-based literacy intervention on language development in inner-city preschool children. *Pediatrics.* 2001;107(1):130–134.

8. High PC, LaGasse L, Becker S, Ahlgren I, Gardner A. Literacy promotion in primary care pediatrics: can we make a difference? *Pediatrics*. 2000;105(4 Pt 2):927-934.

9. Sharif I, Reiber S, Ozuah PO. Exposure to Reach Out and Read and vocabulary outcomes in inner-city preschool children. *J Natl Med Assoc*. 2002;94:171–177.

10. Diener ML, Hobson-Rohrer W, Byington, CL. Kindergarten readiness and performance of Latino children participating in Reach Out and Read. *J Community Med Health Edu*. 2012;2:133.

11. Council on Early Childhood; High, PC, Klass, P. Literacy promotion: an essential component of primary care pediatric practice. *Pediatrics*. Aug. 2014.;134(2):404-409.

12. Data Research Center for Child and Adolescent Health. 2011/12 National Survey of Children's Health. http://www.childhealthdata.org/browse/survey/results?q=2284&r=1&r2=51&g=470. Accessed November 28, 2016.

13. Children's Health Alliance of Wisconsin. Early literacy: Resources. http://www.chawisconsin.org/early-literacy.php?pg=38. Accessed November 28, 2016.

14. Dreyer BP, Mendelsohn AL, Tamis-LeMonda CS. Assessing the child's cognitive home environment through parental report: reliability and validity. *Early Dev Parent*. 1996;5:271- 287.

15. US Census Bureau. 2011-2015 American Community Survey 5-Year Estimates. Table S1501: Educational Attainment. 2015. https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_14_5YR_S1501&prodType=table. Accessed Dec 15, 2016.

16. Child population by race and age group. KIDS COUNT Data Center. Annie E. Casey Foundation. http://datacenter.kidscount.org/data/tables/8446-child-population-by-race-and-age-group?loc=51&loct=2#detailed/2/51/false/869,36,868,867,133/68,69,67,12,70,66,71,13|/17077,17078. Updated August 2016. Accessed November 29, 2016.

17. US Census Bureau. 2011-2013 American Community Survey 3-year estimates. Table C16007: Age by Language Spoken at Home for the Population 5 Years and Over. 2013. http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_13_3YR_C16007&prodType=table. Accessed Dec 15, 2016.

advancing the art & science of medicine in the midwest

WMJ

WMJ (ISSN 1098-1861) is published through a collaboration between The Medical College of Wisconsin and The University of Wisconsin School of Medicine and Public Health. The mission of *WMJ* is to provide an opportunity to publish original research, case reports, review articles, and essays about current medical and public health issues.

Visit www.wmjonline.org to learn more.