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Literacy Practices Among Adult Education Participants

Daryl Mellard, Ph.D., Margaret Becker Patterson, Ph.D., and Sara Prewett, M.A.
University of Kansas

Daryl Mellard, Center for Research on Learning, University of Kansas; Margaret Becker Patterson, Center for Research on Learning, University of Kansas; Sara Prewett, Center for Research on Learning, University of Kansas.

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Correspondence should be directed to Daryl Mellard, Center for Research on Learning, University of Kansas, Joseph R. Pearson Hall, Room 604, 1122 W Campus Rd, Lawrence, KS 66045-3101. E-mail: dmellard@ku.edu.

Abstract

Readers' individual literacy practices involve a variety of materials such as books, newspapers, magazines, technical materials and work documents. This study explored the relationship between readership (reading as a form of communication, an advancement of culture, and the development of the individual) and readers' choice of materials for participants in adult education, whose skills varied from very low literacy to high school/General Education Development (GED) levels. In this study we reviewed adult education participants' pattern of reading materials and the frequency of usage among participants. A representative sample of 273 adult education participants was recruited from 12 Kansas adult education programs. Their literacy practices were evaluated in terms of age, education level, and reading skill levels. Our results pointed to differences based on age but not educational completion level. The implications are discussed in terms of matching curricular materials used in instruction to salient learner characteristics. Recommendations for literacy instructors are provided that could enhance the learners' persistence and success.

Literacy Practices Among Adult Education Participants

"How do adults decide if and what they are going to read?" "How do they make that selection?" "Are adult education participants active readers?" For a variety of reasons, the answers to these questions certainly make a difference to instructors who work with adults to improve literacy skills, as well as assist active readers in an adult education setting. The variation in both the reading frequency and practice of adults contributes to adults' literacy proficiency (Smith, 1996). This variation is formally described as "readership," defined as "individual literacy practices with different print contents, such as books, newspapers, magazines, and brief documents of various kinds" (Smith, 1996, p. 196). Various demographic characteristics and factors such as age, educational attainment, and print content exposure affect both reading opportunity and ability, and therefore shape readership (Guthrie, Seifert, & Kirsch, 1986). In this study, we were concerned with a specific population segment—adults attending adult education programs who had limited educational levels. This study explored the contribution of both age and education level to literacy practice patterns and literacy proficiencies among adult education participants.

Literacy practices. Adult literacy practices provide important evidence about literacy proficiency. Kirsch and Guthrie (1984) observed that literacy practice occurs when people use reading skill within a specific context for a specific purpose. Smith (1996) suggested that "social context" guides reading practice by determining what and when a person reads. Education level tends to affect readership and reading ability as well as occupational ability and attainment, thus affecting income level and quality of life (Kirsch & Guthrie, 1984; Guthrie et. al., 1986; Kirsch, Jungeblut, Jenkins, & Kolstad, 1993; Finn, 2001; Corcoran, 1995).

Some studies show that patterns of literacy practice can provide important clues about adult literacy proficiency (Kirsch, et. al, 1993; Smith, 1996). In 1992, the National Adult Literacy Survey (NALS) included a nationally representative sample of 26,091 adults, ages 16 and older, in the United States (Kirsch, et. al., 1993). The NALS collected information on literacy practices, literacy proficiency levels, and demographic characteristics. The NALS results indicated that adults who scored in the lowest levels of literacy were less likely to read a daily newspaper while adults who scored in the highest proficiency levels were more likely to read a daily newspaper (Kirsch, et. al., 1993). Furthermore, 18% of NALS participants responded that they rarely (less than once a week or never) engage in literacy practices and over 50% of the participants who rarely engage in literacy practices did not complete high school or the General Education Development (GED) (Finn, 2001). Smith (1996) found that adults who had high reading activity in at least one print content per week had scores higher in the NALS five literacy levels than adults who rarely read. Furthermore, frequent book and work document reading were strongly associated with higher literacy proficiency (Smith, 1996). Thus, Smith (1996) found that adults who engaged in weekly reading activity had higher literacy levels than adults who rarely read; however, literacy practice also correlates with other variables such as educational background and age.

Respondents who scored in the lowest two of five literacy levels on the NALS demonstrated similar literacy practices and demographic characteristics as adults who participate in adult education programs. Nationally, adults attending adult education tend to be under 25

years of age and tend to have low levels of educational attainment (Moore & Stavrianos, 1995). Prior studies indicate that common predictors of learner outcomes in an adult education program include education and age (Alamprese, 2003; Edwards, 2003; Wayman, 2001; Snow C. & Strucker, J., 2000; Boudett & Friedlander, 1997; Fitzgerald & Young, 1997; Moore & Stavrianos, 1995).

Education. The NALS results implied that education level had an especially strong impact on literacy proficiency levels. College graduates were more likely to score in the highest two of the five proficiency levels, while only 10% to 13% of high school graduates scored in the highest levels (Kirsch, et. al., 1993). In addition, 95% of adults who did not begin high school and 80% who did not complete high school had prose proficiencies in the lowest two levels: "One of the strongest findings of the NALS is that education is vitally important for literacy proficiency" (Johnson, 2001, p. 99). Smith (1996) also found that that educational level helps predict literacy proficiency: "Poorly educated adults who do not read perform worse than educated adults who do not read" (Smith, 1996, p. 215). Furthermore, Smith's statistical analyses found a highly significant interaction between education level and reading practice (Smith, 1996).

Age. Both Smith (1996) and Kirsch, et. al., (1993) reported that literacy proficiency increases with age until age 55, after which literacy levels start to drop. Kirsch et. al., (1993) suggested age may be associated with educational attainment as the NALS data showed that adults older than 55 completed fewer years of schooling than younger adults. Smith (1996) found that literacy performance increased with each additional print content as age increased, thus adults 65 and older who read four or five content areas performed similarly to younger adults who read only one content area. Smith (1996), however, showed that more than 25% of adults 65 years and over read very few or no print contents.

Variance in age results in diverse learner characteristics, which have potentially significant implications for literacy programs' recruitment and retention strategies. Younger adults are likely to participate more often in adult education programs; however, older adults are more likely to persist in such programs (Moore & Stavrianos, 1995). Concerning literacy achievement, Boudett and Friedlander (1997, p. 581) found that, "It appears that the greater the initial achievement level, the more likely an individual was to benefit academically from enrollment..." Younger adults—who have generally been away from school for less time—may have an advantage in achievement level: "Older adults scored lower [on NALS literacy surveys] on average than younger or middle aged adults" (Byers, 1993, p. 1). Finally, age may be closely related to community size or "ruralness" (Cotton, 1996, p. 6). Byers noted "Rural states in the Midwest and Northeast have disproportionately more older adults than other areas…," (1993, p. 1).

In summary, multiple studies illustrated that both age and education level make significant contributions to literacy practices and literacy proficiencies. We sought to understand more about the literacy practices and proficiencies of adult education participants with limited education levels. Our findings could have important implications for recruiting adult education participants and matching them to appropriate curricular materials.

Research questions for this study were:

1. How are literacy practice patterns and individual literacy practices associated with reading performance, education level, and age?
2. Adjusting for participant age and education level, does an adult's reading performance, as measured by WRMT-R Passage Comprehension, CASAS Reading, and NAEP reading subtests, predict literacy practice pattern?
3. How does reading performance on the same reading measures, after controlling for age and education level, differ by literacy practice pattern?

Methods

Setting

The population of Kansas was nearly 2.7 million in 2000, and its community size varied from 13 residents in Oak Hill to 329,211 in Wichita (Kansas Department of Transportation, 2001; U.S. Census Bureau, 2004). Kansas' population is also highly mobile. Of 2.2 million Kansans over age 5, nearly half (46%) moved from 1995 to 2000 (U.S. Census Bureau, 2003). In addition, Kansas ranked third in the Midwest, behind Illinois and Minnesota, for its immigration rate of foreign-born persons into the state from 1995 to 2000.

The U.S. Census Bureau (2002) reported that, of approximately 1.7 million adult Kansans 25 years and older in 2000, 14% did not graduate from high school; 88,124 completed less than ninth grade (5.2%), and 149,675 completed eighth yet less than twelfth grade (8.8%). In addition, 98,207 speakers of languages other than English (2.7% of an estimated 2.5 million Kansans age 5 and older) speak English "less than 'very well'" (U.S. Census Bureau, 2002). Many of these who are 16 and older are likely to be in need of adult education services provided to approximately 12,000 Kansans annually (Kansas Board of Regents [KBOR], 2004b).

Based on 2004 data, adult education programs in Kansas were generally small, ranging in size from 67 to 1,745 participants, with a median number of 194 participants served annually (M = 324.56, SD = 360.21) (KBOR, 2004a). Statewide, programs served 60% adult basic education (ABE) and adult secondary education (ASE) learners, and 40% English as a Second Language (ESL) learners; many programs served at least 80% ABE and ASE participants (KBOR, 2004a). Kansas adult education programs assess incoming students using the Comprehensive Adult Student Assessment System (CASAS). Adult education students are placed into one of six levels of reading ability based on their CASAS score. The percentages of adults entering at the four highest ABE and ASE levels were: ABE Low Intermediate (level 3), 24.06%; ABE High Intermediate (level 4), 33.46%; Low ASE (level 5), 9.65%; and High ASE (level 6), 7.40% (U.S. Department of Education [USDOE], 2004).

Participants

We collected learner-level data from 273 adults participating in 12 Kansas adult education programs. This sample represented adults from more than one-third of the 31 adult education programs awarded state and federal *Adult Education and Family Literacy Act* (AEFLA) funding through Kansas Board of Regents and the US Department of Education Office of Vocational and Adult Education (OVAE).

Study participants were learners in adult education programs sponsored by Kansas community colleges, a four-year university, or unified school districts. We initially stratified the number of potential participants from individual adult education programs by entry reading level proportionate to the reading levels of the subpopulation in Kansas adult education programs. Adults who agreed to participate in the study were then entered into a pool of potential learners. About 75% of participants were in the intermediate or high levels. Since there were very few level three participants in the study, we accepted adults at level three immediately. Separately, we randomly selected adults in levels four, five, and six, and we contacted them for participation in the study. The average entry level for participants in this project was ABE high intermediate (M = 4.2, SD = 1.4), which is roughly equivalent to the skill level of a ninth-grader. Table 1 compares demographic characteristics of study participants with characteristics of participants in Kansas AEFLA programs and AEFLA programs nationally.

Table 1
Demographic Characteristics of Adult Education Participants in 2004

Characteristic	United States N (Percent)	Kansas N (Percent)	Study Participants N (Percent)
	N = 2,677,208	N = 9,788	N = 239
Age in Years			
16-18	372,584 (14)	2,104 (21)	56 (23)
19-24	677,499 (25)	2,784 (28)	81 (34)
25-44	1,200,608 (45)	3,999 (41)	66 (28)
45-59	328,558 (12)	749 (8)	27 (11)
60 and Over	97,779 (4)	152 (2)	9 (4)
	2,677,028 (100)	9,788 (100)	239 (100)
Race/Ethnicity			
African American	535,489 (20)	1,019 (10)	65 (27)
Asian	189,734 (7)	778 (8)	15 (6)
Hispanic	1,157,568 (43)	3,972 (41)	31 (13)
White	737,529 (28)	3,777 (39)	105 (44)
Other	56,708 (2)	247 (3)	22 (10)
	2,677,028 (100)	9,788 (100)	239 (100)
Gender			
Male	1,223,883 (46)	4,270 (44)	91 (38)
Female	1,435,145 (54)	5,518 (56)	148 (62)
	2,677,028 (100)	9,788 (100)	239 (100)

More than half of the 239 participants' were female (62%). In addition, 56% considered themselves members of a non-white race or ethnic group, which is a smaller percentage than the national average, due in part to the fact that this study did not sample data from adults in ESL classes. Fifty-three participants (23%) reported diagnosis of a learning disability. Twenty-seven adults (11%) spoke Spanish while growing up, and 20 (8%) spoke another language besides English or Spanish. Twenty-six (11%) adults had participated in ESL instruction before

receiving adult education services. Participants tended to be young; while the mean age was nearly 29 years (M = 28.86, SD = 13.62), the median age was 22 years.

Table 2
Characteristics of Adult Education Participants (N = 239)

Characteristic	Number	Percent of Characteristic
Gender (female)	148	62
Race/Ethnicity		
African-American	65	27
Asian	15	6
Hispanic	31	13
White	105	44
Other	22	10
Spanish Language Spoken	27	11
Urban	171	72
Employed in Previous 12 Months	185	77
Education Level Completed		
Less than high school diploma or GED	204	85
High school diploma or GED	27	11
Some college	8	3
Current Reading Level		
Low Intermediate ABE	61	26
High Intermediate ABE	59	24
Low Advanced ASE	59	24
High Advanced ASE	60	26
Learning Disabilities	53	23

Most lived in an urban area (72%), had been employed in the previous year (77%), and had not received a high school diploma or GED before attending adult education (85%). We further categorized adults as having less than a high school diploma or GED (n = 204), received a high school diploma or GED (n = 27), or participated in some college coursework (n = 8). About half had never married and were childless. On average their household income was estimated at $19,000, close to the federal poverty level for a family of four. The household income group with the highest number of participants earned no more than $9,999 annually, placing their income at or below the federal poverty level for an individual (U.S. Health and Human Services, 2005).

Instruments and Procedures

Our project staff orally administered structured interviews with participants as well as a written and oral battery of 14 measures of literacy. The structured interview, referred to as the Background Questionnaire, included demographic characteristics, education, health, occupation, and family histories. Most participants completed the Background Questionnaire within 20 minutes. The literacy battery included three measures of fluency, three measures of decoding skills, two measures of vocabulary, two measures of general language ability, and four measures of reading comprehension. From this battery of tests, we chose the 1998 edition Woodcock

Reading Mastery Test—Revised (WRMT-R) Passage Comprehension (Woodcock, 1998), the Comprehensive Adult Student Assessment System (CASAS) Reading test (CASAS, 2001), and the National Assessment of Educational Progress (NAEP) (National Center for Educational Statistics [NCES], 1990) reading subtest as our summary measures of literacy.

Nearly all (i.e., 230) study participants completed the WRMT-R Passage Comprehension subtest. This subtest measures participants' ability to read and comprehend short passages of two to three sentences using a cloze procedure (Woodcock, 1998). The WRMT-R Passage Comprehension takes an average of 30 to 35 minutes to administer, and contains 68 items arranged in order of difficulty (Woodcock, 1998).

The adult's entry reading level was determined from the most recent score on the CASAS Reading test. CASAS was developed for adults with low skill levels, and assesses reading, writing, and math competencies by measuring attainment of specific competencies related to workplace and survival needs, such as reading technical manuals, tax forms, or prescription labels. CASAS is a standardized assessment used throughout Kansas adult education programs as well as in numerous other states. Each test item is associated with curriculum materials from a variety of published sources for instruction. Test items match students to curriculum content for instruction. Students have 45 minutes to complete 39 questions arranged in order of difficulty (CASAS, 2001). Adults' scores were converted into the reading levels as described in the National Reporting System for adult education (USDOE, 2004).

The NAEP reading section assesses reading comprehension at fourth, eighth, and twelfth grade levels. The assessment used in this study contained five passages from the 1990 eighth-grade exam. Participants had 30 minutes to answer 24 multiple-choice questions about the reading passages (NCES, 1990).

Dependent Variables

We selected four dependent variables for analysis: (a) literacy practice pattern, (b) WRMT-R Passage Comprehension, (c) CASAS Reading, and (d) NAEP. The first dependent variable, literacy practice pattern, represents the sum of participant responses on eight items of individual reading practice on the Background Questionnaire that were administered orally. In the first four items, participants were asked, with each item in parentheses representing a separate query, "At home or at work, how often do you read (newspapers) (magazines) (books) (letters, notes, and e-mails) in English?" Participants were then asked an additional four items: "As part of your current, or most recent, job, how often have you read or used information from (memos or letters other than email) (manuals or reference books, including catalogs or parts lists) (directions or instructions for medicines, recipes, or other products) (diagrams or schematics)?"

We structured possible responses to individual items in a Likert-like scale: every day (5), a few times a week (4), once a week (3), less than once a week (2), or never (1). Participants who read all eight types of reading materials every day had the potential to score up to 40 (i.e., 8 types times a score of 5) in the summed scale. Those persons who indicated that they "never" read any of the eight types of reading materials had a score of 8. Adults who had not worked in a paid job were not asked the four work-related items, and adults in this situation who indicated they

"never" read any of the first four types of reading materials might score as low as 4 on the summed scale.

The remaining three dependent variables measured reading performance: WRMT-R Passage Comprehension raw score, CASAS Reading diagnostic raw score, and NAEP reading raw score.

Independent Variables

The Background Questionnaire collected demographic and participation data from adults. Independent variables used in both analyses were age in years and education level completed before entering adult education. Literacy practice pattern and the three measures of reading proficiency functioned as independent variables in one analysis and dependent variables in another analysis.

Data Analysis

Variables were checked to ensure they met assumptions of normal distribution, central tendency, and multicollinearity. All variables were then plotted with another relevant variable in scatter plots for visual inspection following the procedures recommended by Tabachnick and Fidell (2001). Variables that could not be transformed or lacked sufficient data or variability were omitted from analysis. For univariate and bivariate analyses, ages were grouped according to categories in use nationally for adult education (USDOE, 2004), and WRMT-R raw scores were not transformed. For the regression and MANCOVA procedures, age in years was transformed as a mathematical inverse to adjust for the youthfulness of adult education participants in the sample. The WRMT-R raw score was re-calculated with a square root transformation to adjust for the sample's wide variability of raw scores.

Analysis procedures included univariate and bivariate statistics, multiple regression, and MANCOVA. At the univariate level, we identified descriptive numbers and percentages for characteristics of study participants. In addition, means of literacy practice pattern and scores on the three measures of literacy were calculated for groups differing in age, education level, and reading level. Mean scores were compared, with ω^2 as a measure of effect size for significant group differences (Stevens, 1999). Occurrences of eight individual literacy practices were also cross-tabulated by age group, education level, and reading level in a bivariate analysis, with Goodman and Kruskal lambda serving as a measure of strength of association for categorical variables (i.e., education level completed and current reading level) and Cochran-Armitage trend for ordinal age group.

We were interested in examining the relationship of learners' reading performance levels (as reflected by the WRMT-R, NAEP, and CASAS scores) to their literacy practices, controlling for age and completed education level. Multiple regression procedures, using a sequential model (Osborne, 2000) were developed separately and entered in three sequential blocks, with literacy practice pattern as a dependent variable.

The first block of variables controlled for a potential demographic confounder (Smith, 1996), age in years (as transformed). The second block included the education level completed (Smith, 1996), with a reference group of "some college". Reading comprehension measures were

added in the third block: WRMT-R Passage Comprehension raw score (as transformed), CASAS Reading raw score, and NAEP raw score.

We used the MANCOVA to test whether reading performance on the three selected measures of reading comprehension differed by literacy practice pattern, adjusted for education level and age in years. Education level was entered as a factor and age in years and literacy practice pattern were entered as covariates in the MANCOVA procedure. We decided a priori to follow up the MANCOVA with a multiple regression for each of the reading measures for three reasons: (a) to determine whether education level or age in years might be eliminated if either one contributed minimally to variance, (b) to acknowledge that the ordinal literacy practice pattern variable functions as a continuous variable, and (c) to confirm the findings of the MANCOVA with the individual tests (i.e., WRMT-R Passage Comprehension, CASAS Reading, and NAEP) (Patterson, Decker, Eckert, Klaus, Wendling, & Papanastasiou, 2003).

Results

Results of the univariate and bivariate analyses are presented in Tables 3 and 4. Scores for the literacy practice patterns variable ranged from 6 to 39 (M = 23.61, SD = 7.01), with the most frequently occurring scores at 19 and 27. Scores between 23 and 27 represent someone who read materials across eight items about "once a week". A score of 19 approximates the reading practices of someone reading them "less than once a week."

WRMT-R raw scores ranged from a low of 13 (1.4 grade equivalency [G.E.]) to a high of 62 (16.9 G.E.) correct out of 68 possible items (M = 42.55, SD = 9.97). Scores of 49 (8.5 G.E.) and 45 (7.2 G.E.) occurred most frequently, and the median score was 44 (6.8 G.E.). Participants with high reading levels tended to have high raw scores on WRMT-R Passage Comprehension. Study participants who were non-white, lacked a high school diploma or GED, or self-reported LD tended to have low WRMT-R raw scores. Scores tended to increase as reading level increased: most CASAS level 3 participants scored in the lowest 25th percentile on WRMT-R (grade equivalency between 1.4 and 4.2), most CASAS level 4 and 5 participants scored in the middle 50th percentile (grade equivalency between 4.4 and 8.5), and most CASAS level 6 participants scored in the upper 25th percentile (grade equivalency between 9.0 and 16.0).

CASAS Reading raw scores ranged from a low of 7 to a high of 36 correct out of 39 possible items (M = 20.90, SD = 7.11). The most frequently occurring CASAS Reading score was 15, followed by 20, which was also the median score. The mean score for NAEP was 13.89 (SD = 4.82) correct out of 24 items, and scores ranged from a low of 2 to a high of 24, with the most frequently occurring scores 18 and 13, which was also the median score.

Question 1: How are literacy practice patterns and individual literacy practices associated with reading performance, education level, and age?

Means and standard deviations of literacy practice pattern and of scores on WRMT-R, CASAS, and NAEP subtests by age group, education level, and reading level are shown in Table 3. In young adult learners (i.e., under 25 years), the literacy practice pattern was 22.73 (SD = 6.82), less than the overall mean. The literacy practice pattern was 23.81 (SD = 7.81), greater than the overall mean in mature adult learners (i.e., 25 years and older). Older learners tended to

read formal materials (e.g., books, references, and manuals) more than participants under age 25. No differences in literacy practice pattern were evident by education level completed before attending adult education. When considered by current reading level, the average literacy practice pattern gradually increased as reading level increased, and adults with higher reading levels tended to read more. However, no mean differences in overall literacy practice pattern by age, education level, or reading level were statistically significant.

Table 3
Means and Standard Deviations of Literacy Practice Pattern and Raw Scores for WRMT-R, CASAS, and NAEP by Age Group, Education Level and Reading Level

Level	N	Literacy practice pattern		WRMT-R Passage Comprehension Raw Score		CASAS Raw Score		NAEP Raw Score	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
All Examinees	239	23.61	7.01	42.55	9.97	20.90	7.11	13.89	4.82
Age									
16 – 18 Years	56	22.48	6.81	44.09	7.69	21.02	6.81	14.02	4.21
19 – 24 Years	81	23.01	6.87	44.38	8.17	22.01	6.78	14.82	4.23
25 – 44 Years	66	24.89	7.40	41.13	11.23	20.83	7.35	13.97	5.05
45 – 59 Years	27	23.89	6.64	40.22	13.06	19.37	7.39	12.70	5.41
60 Years and Over	9	25.67	7.14	34.56	11.39	15.56	7.23	8.33	5.98
Education Level									
< h.s. diploma or GED	204	23.83	6.79	42.89	9.29	21.10	7.10	13.97	4.82
h.s. diploma or GED	27	21.96	7.59	40.62	12.64	19.44	7.32	13.08	4.65
some college	8	23.50	10.20	40.63	15.97	21.00	7.07	14.63	5.71
Reading Level									
Low intermediate ABE	61	22.98	7.97	33.95	9.55	15.24	5.28	10.00	3.75
High intermediate ABE	59	22.97	7.32	40.91	7.47	17.95	5.09	12.13	4.01
Low ASE	59	23.29	6.37	43.77	7.64	23.07	5.79	15.05	3.74
High ASE	60	25.18	6.12	51.69	5.41	27.75	4.92	18.30	3.17

Question 2: Adjusting for participant age and education level, does an adult's reading performance, as measured by WRMT-R Passage Comprehension, CASAS Reading, and NAEP reading subtests, predict literacy practice pattern?

Mean scores in reading performance differed significantly by age group for WRMT-R, $F(4, 225) = 3.24$, $p = .013$, $\omega^2 = .037$; and for NAEP, $F(4, 220) = 4.38$, $p = .002$, $\omega^2 = .057$. Younger adult learners tended to score higher on WRMT-R and NAEP, with learners age 19-24 having the highest scores on both tests, and scores on both tests for mature learners dropped as age increased. While CASAS scores followed a similar pattern, differences by age group lacked statistical significance. No significant differences in reading performance by education level were noted. Reading performance in all three measures tended to rise steadily as current reading level increased, for WRMT-R, $F(3, 226) = 53.52$, $p < .001$, $\omega^2 = .407$; for CASAS, $F(3, 225) = 62.53$, $p < .001$, $\omega^2 = .446$; and for NAEP, $F(3, 221) = 54.62$, $p < .001$, $\omega^2 = .417$.

Table 4
Significant Individual Literacy Practices by Age and Reading Level (N = 239)

Level	N	Measure of Association	*p*	Strength of Association	Never	Less than once a week	Once a week	A few times a week	Every day
				Newspapers					
Age		4.70*	.030	2.17*					
16 – 18 Years	56				12	11	10	19	4
19 – 24 Years	81				6	17	20	21	17
25 – 44 Years	66				5	20	15	11	15
45 – 59 Years	27				1	5	6	6	9
60 Years and Over	9				0	2	3	2	2
				Magazines					
Age		6.32*	.012	2.51*					
16 – 18 Years	56				4	10	6	23	13
19 – 24 Years	81				10	22	15	21	13
25 – 44 Years	66				10	20	11	13	12
45 – 59 Years	27				7	6	5	4	5
60 Years and Over	9				1	4	1	0	3
				Books					
Age		10.50*	.001	3.24*					
16 – 18 Years	56				11	18	11	6	10
19 – 24 Years	81				10	28	6	21	16
25 – 44 Years	66				8	10	5	23	20
45 – 59 Years	27				4	7	3	3	10
60 Years and Over	9				0	2	0	3	4
				Work Memos or Letters					
Age		3.91*	.048	1.98*					
16 – 18 Years	56				14	12	9	7	9
19 – 24 Years	81				25	12	10	15	14

Level	N	Measure of Association	*p*	Strength of Association	Never	Less than once a week	Once a week	A few times a week	Every day
25 – 44 Years	66				13	9	6	13	21
45 – 59 Years	27				8	5	1	2	9
60 Years and Over	9				0	3	1	1	3
			Work Manuals or Reference Lists						
Age		5.60*	.018	2.37*					
16 – 18 Years	56				16	12	7	10	6
19 – 24 Years	81				23	17	12	13	11
25 – 44 Years	66				15	15	6	17	9
45 – 59 Years	27				7	3	0	5	10
60 Years and Over	9				0	4	0	1	1
			Magazines						
Reading Level		21.37**	.045	.045**					
Low Intermediate ABE	61				14	12	7	13	15
High Intermediate ABE	59				6	12	15	13	13
Low ASE	59				9	16	9	18	7
High ASE	60				3	22	7	17	11

Note: * M^2 and *M*. ** X^2 and λ..

Question 3: How does reading performance on the same reading measures, after controlling for age and education level, differ by literacy practice pattern?

Individual reading practices tended to vary by age group yet varied little by education level or reading level (see Table 4). Significant variations in reading practices by age, with a reference group of age 60 and over, occurred for readers of newspapers, magazines, books, work memos or letters other than e-mail, and work manuals or reference lists. Newspaper readership fluctuated significantly by age, M^2 (1, N=239) = 4.70, p = .030, Cochran-Armitage Trend M = 2.17. The age group most likely to "never" read a newspaper was 16-18 years (50% of "never" newspaper readers), yet 19-24 year olds were most likely to read a newspaper "every day" (36% of "every day" newspaper readers). Adults who "never" read a newspaper also tended to have lower levels of education and reading skills than participants who read at least occasionally.

Magazine readership decreased significantly as age group rose, M^2 (1, N=239) = 6.32, p = .012, Cochran-Armitage Trend M = 2.51. While 16-18 year olds are most likely to read magazines "a few times a week", older groups generally read magazines less frequently. Reading level is also associated negatively with magazine readership, X^2 (12, N=239) = 21.37, p = .045, λ

= .045: low intermediate ABE (level 3) readers tend to read magazines "every day", and high ASE (level 6) readers are most likely to read magazines "less than once a week."

Three more formal types of readership—books, work memos or letters other than e-mail, and work manuals or reference lists—were positively associated with age. Mature readers read books more frequently, M^2 (1, N=239) = 10.50, p = .001, Cochran-Armitage Trend M = 3.24, while readers under 25 tended to read books "less than once a week." Readers under 25 read work memos and letters less frequently, M^2 (1, N=222) = 3.91, p = .048, Cochran-Armitage Trend M = 1.98, yet readers age 25-44 tended to read them "every day". Mature readers were more likely to refer to work manuals or reference lists, M^2 (1, N=222) = 5.60, p = .018, Cochran-Armitage Trend M = 2.37.

Although we noted no other significant associations by age, education level, or reading level, a few patterns of general interest emerged. First of all, learners participating in adult education tend to value reading materials. The percentages who read materials at home or work are high for a subpopulation with typically low literacy skill levels: for newspapers (90%), for magazines (87.6%), for books (87.2%), and for letters, notes, and e-mails (89.5%). Another pattern of interest is the prevalence of reading letters, notes, and e-mails. On average almost 75% of all participants read them at least a few times per week or daily, regardless of age, education level, and reading level. While adults 45-59 years old (18.5%) and 60 years and over (22.2%) had higher percentages who "never" read them than did 16-18 year olds (5.4%), evidence that adult learners do tend to read letters, notes, and e-mails regularly is clear. These documents (e.g., notes, letters and emails) are important in their demonstration of communication patterns with others.

Correlations for all dependent and independent variables are presented in Table 5. As expected, a significant positive association existed among literacy practice pattern and the three measures of reading performance. Because of the transformation of the age variable, the relationship occurs in the opposite direction than the sign of the correlation suggests. Therefore, we find that a young learner had high scores on the reading measures and a more mature learner had a lower score. Finally, a negative association existed between age and education level. A young learner was more likely to have a higher education level and a more mature learner was likely to have a lower education level.

Table 5
Correlation Matrix for Dependent and Independent Variables

Variable	1	2	3	4	5	6
1. Literacy Practice Pattern	--					
2. WRMT-R Passage Comprehension subtest	.15*	--				
3. NAEP Reading	.12	.72**	--			
4. CASAS Reading	.16*	.70**	.74**	--		
5. Age in Years (as transformed) ∇	-.10	.21**	.16*	.13	--	
6. Education Level	-.06	-.08	-.02	-.05	.24**	∇--

Note: * p < .05. ** p < .01. ∇ A difference in the direction of the correlation results from the transformation of the age variable.

In the sequential regression model, WRMT-R Passage Comprehension, CASAS Reading, and NAEP reading scores did not account for a significant proportion of variance (p = .059, adjusted R^2 = .03) in literacy practice pattern after adjusting for age and education background. We noted that the only significant association in the model was between age and literacy practice pattern. The effect of age (as transformed) was significant in the MANCOVA, (Wilks' Λ (3, 216) = .960, p = .031) yet moderate in the effect size, partal η^2 = .04. Null hypotheses for equality of covariance matrices, F (12, 1668.91) = .895, p = .551, and equality of error variances across groups were retained. The MANCOVA model accounted for small-to-medium proportions of between-subjects variance in WRMT-R Passage Comprehension subtest scores (as transformed, adjusted R^2 = .05), NAEP scores (adjusted R^2 = .04), and CASAS Reading scores (adjusted R^2 = .04). The effects of age for all three subtests were small: for WRMT-R, F(1, 218) = 6.33, p = .013, partial η^2 = .03; for NAEP, F(1, 218) = 8.73, p = .003, partial η^2 = .04; and for CASAS, F(1, 218) = 4.27, p = .040, partial η^2 = .02. The effects of literacy practice pattern were comparable among all three subtests: for WRMT-R, F(1, 218) = 6.77, p = .010, partial η^2 = .03; for NAEP, F(1, 218) = 5.54, p = .019, partial η^2 = .03; and for CASAS, F(1, 218) = 5.57, p = .019, partial η^2 = .03. Education level did not contribute to the effects on the subtests.

On the basis of the sequential regression model and MANCOVA findings, we planned to include age and eliminate education level in follow-up regression models after the MANCOVA. Results from the three follow-up regression models are shown in Table 6. After adjusting for age (as transformed), literacy practice pattern accounted for 5% of the variance in WRMT-R Passage Comprehension raw scores (as transformed), 4% in CASAS Reading raw scores, and 4% in NAEP raw scores. Following cross-validation, coefficients were strong between a standardized regression equation from a random 70% sample applied to a second standardized 30% sample.

Table 6
Best-Fitting Multiple Regression Equations and Adjusted R^2 for Three Measures of Literacy

	Original Equation		Cross-Validated Sample A (70%)		Cross-Validated Sample B (30%)
Variable	Beta+	Adjusted R^2	Beta+	Adjusted R^2	R (A,B)
WRMT-R Passage Comprehension		.05**		.04	.72
Age in Years	-.179∇**		-.228∇**		
Literacy Practice Pattern	-.188∇**		-.117∇		
NAEP Reading		.04*		.06	.62
Age in Years	.183**		.262**		
Literacy Practice Pattern	.142*		.073		
CASAS Reading		.04**		.03	.75
Age in Years	.152*		.168*		
Literacy Practice Pattern	.173**		.146		

Notes: ∇ a negative sign resulted from transformation of the variables. +Betas are standardized coefficients. * p < .05. **p < .01. ***p < .001.

Discussion

Multiple personal and contextual dimensions influence adults' reading behaviors. Smith (1996) enumerated how adults' literacy practices (i.e., the variety of reading materials and the frequency with which they are read), varies with their age, literacy proficiency, and educational level. Guthrie et al. (1986) showed the connection between employment and school contexts and reading for work and leisure. In this study we further explored these relationships among adults (median age 22) with a history of limited educational attainment (i.e., no high school diploma) yet who had made a commitment to improve their skills by participating in adult education.

The reading practices of this sample of lower literate adults paralleled Smith's (1996) national sample. In general, our sample showed little connection to reading prose, but older adults did report reading more formal materials (e.g., employment-related materials), a tendency that may be explained by their higher employment rates. Reading practice increased with age for formal (books, references, and manuals) reading materials. Furthermore, adults with higher reading levels tended to read these formal materials more frequently. Our youngest participants, ages 16 to 18, seldom read a newspaper, but the 19-to-24-year-olds were most likely to read a daily paper. Younger persons were more likely to read magazines and newspapers weekly. The picture is complex in that individuals with lower literacy levels were more likely to read magazines daily and higher-level readers less so. Smith (1996) also found that adults who only read magazines tended to have lower literacy proficiency. Thus, the task for adult education and literacy providers is to recognize the variation in reading materials across the age groups. Our sample of older employed participants engaged in literacy practices with employment materials. At the other end of our age grouping, the younger participants actively read periodicals (e.g., newspapers and magazines).

As instructors consider curricular materials, the relevance of the material is critical and to some degree likely moderates the textual difficulty. A motivated reader is likely to work with a difficult text. Rather than relying on hardcover books as source material, periodicals may be the primary material on which lessons are planned and around which groups of lessons could be organized into units. Access to the internet can make searching and retrieving such documents a simpler task.

Age was a significant independent variable in our MANCOVA on WRMT-R, NAEP, and CASAS scores. Younger adult learners—in the 19-24 age range—had the highest scores on the WRMT-R and the NAEP. Furthermore, scores decreased on these assessments as age increased. Although the younger adult learners had higher literacy levels, they have also had more recent educational experience than the older learners. This finding further reminds instructors that age differences should not be ignored, just as the preceding paragraph suggests. Further exploration is needed to determine whether the recency of educational experience best explains these differences or whether underlying maturational changes occurring in the persons' information processing (e.g., vocabulary retrieval, information organization, or speed of processing) better account for these differences. As Smith (1996) suggested, longitudinal and cross-sectional research designs each have a role in addressing such questions.

Dissimilar to Smith's (1996) findings, education level was not a significant predictor of literacy proficiency or literacy practices. Since this sample was fairly homogenous, as all

participants have very low educational attainment, we likely did not have enough variation in education level to find this association. Although education level does not appear to play a significant role in reading proficiency, the younger adults, who had likely recently attended formal education, out-performed older adults. For instructors the implication is that a person's completed educational level or even functional level, such as from an adult education placement test, may be too imprecise for instructional planning. The staff will be wise to invest in more specific measures of reading components (e.g., phonemic awareness, vocabulary, comprehension strategy selection, and comprehension monitoring) to pinpoint specific skills on which instruction should focus (Kruidenier, 2002).

An encouraging finding of our study is the sample of adult education participants contained active readers. Despite their lower literacy proficiency, most members of the sample were actively engaged in some form of reading almost daily. Smith (1996) found that only 20% of all adults were nonreaders. Those persons who did not participate in some form of reading performed at the lowest literacy levels. We can conclude that a remarkable number of similarities exist between Smith's (1996) national sample and our adult education participants. The implications for adult education and literacy providers create an important opportunity for reviewing their organizations' structures, curricular decisions, and instructional practices for developing a closer coherence to their participants' interests and needs.

Our study's sample, especially the level of skills, was comparatively narrow in comparison to other adult literacy studies such as Smith (1996), so our recommendations should be considered as especially focused on an adult education population or on other persons with similar skill levels. A better frame of reference might be for literacy and adult education practitioners to consider these observations as testable hypotheses with their adult participants. From that perspective we hypothesize that because adult education participants in general have interests in the selection of textual materials, adult educators will want to consider available strategies to maximize the amount of learner reading. As Guthrie (2002) noted, the amount of reading is a strong predictor of reading comprehension. The general principle is that our instructional and fluency reading activities should incorporate current periodical materials (e.g., newspapers and magazines). We are not clear what features are so attractive about these materials (e.g., that they are current, they have broad appeal, they are relevant to their everyday life, they are readily available, or that they provide a social connection to a larger group). We are, however, inclined to direct at least some of the practice or application of reading skills to such materials. For example, periodicals and their stories would be suitable for developing fluency, increasing vocabulary, and practicing reading comprehension strategies (e.g., finding the main idea, paraphrasing, summarizing, and identifying supporting details).

Another advantage of this "periodical" approach is that the materials cover such a plethora of topics. Instructors should be able to find materials that cover the span of interests based on age, occupation, family role, and hobbies. Periodicals provide the potential to bridge other resources such as books or internet sources that could provide greater in-depth elaboration. We can imagine that using periodicals would be a great opportunity for expanding on adults' background knowledge and vocabulary both of which are important to reading comprehension levels.

Instructors could also take advantage of readability formulas such as lexile scores as a basis for examining the text's difficulty level. We know that a variety of materials are available on most any topic, but matching the materials to learners' skill level can be challenging. We have found that lexile scoring tools (www.lexile.com/) are very valuable in identifying a text's difficulty and matching it to learners' skills. In time, after developing a clearer understanding of the readability of periodicals, instructors could make a better match of a reader's skills with materials that are both of interest and suitable for comprehension.

In summary, the literature is clear that reading proficiency and amount of reading are highly related to reading comprehension. Our data from adults with higher reading skills also showed that pattern. On the other hand, adults with lower skill levels were also inclined to read daily, but the type of materials varied. Segments of the adult education population were more likely to engage in literacy practice patterns with particular materials. We suggest that these patterns can be valuable to adult education and literacy providers as they consider curricular materials for reading acquisition and generalization related activities.

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