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The Relationship Between Expressive Vocabulary Knowledge and Reading Skills for Adult Struggling Readers

Ryan Hall[a], **Daphne Greenberg**[a], **Jacqueline Laures Gore**[a], and **Hye K. Pae**[b]

[a]Department of Educational Psychology & Special Education, Georgia State University, USA

[b]School of Education, University of Cincinnati, USA

Abstract

This study examined expressive vocabulary and its relationship to reading skills for 232 native English-speaking adults who read between the third- and fifth-grade levels. The Boston Naming Test (BNT; Kaplan, Goodglass, & Weintraub, 2001) was used to measure expressive vocabulary. Participants scored lower than the normative sample of adults on all aspects of the test; they had fewer spontaneously correct answers, and were not helped by stimulus or phonemic cues. Hierarchical regression analyses revealed that expressive vocabulary accounted for significant variance in both reading comprehension and exception word reading, but not for general word reading or nonword reading.

Keywords

adult literacy; oral language skills; reading comprehension; vocabulary; word reading

According to the 2003 National Assessment of Adult Literacy (NAAL; Kutner, Greenberg, Jin, Boyle, Hsu, & Dunleavy, 2007), approximately 93 million (or 43%) adults in the United States have very low literacy skills with many reading at levels comparable to elementary school students. Millions of these adults enroll in literacy programs each year in order to increase their reading skills (Patterson & Mellard, 2007). Many of them approach program staff with specific goals they hope to attain by learning to read better, such as attaining their General Educational Development (GED) diploma; obtaining, maintaining, or being promoted at a job; being able to help their children with their homework; or just feeling better about themselves because they are getting better at a skill they have struggled with for most of their lives. The field of adult literacy, however, suffers from a paucity of research and, in general, there is little known about the specifics of these adults' reading impairments or how their low-literacy skills are related to other language and cognitive abilities (see Kruideneir, 2002, for an overview).

Correspondence address: Ryan Hall, 1514 Sheridan Road NE, 1516, Atlanta, Georgia 30324. sryanhall@gmail.com. Phone: 678-333-5764.

Conflict of Interest
All authors declare that there are no conflicts of interest in this study.

One particular skill not studied extensively with this population is expressive vocabulary. Expressive vocabulary knowledge consists of both phonological representations and semantic information (e.g., Ouellette, 2006; Wise, Sevcik, Morris, Lovett, & Wolf, 2007). As Ouellete (2006) explains, "… expressive vocabulary tasks require the … [individual] to retrieve a specific lexical entry and activate its phonology" (p. 562). Several studies with children provide evidence that oral language, specifically expressive vocabulary, is related to some but not all reading skills (Ouellette, 2006; Nation & Snowling, 2004; Ricketts, Nation, & Bishop, 2007; Whitley, Smith, & Connors, 2007; Wise et al., 2007). The purpose of this study, therefore, was to examine the relationship between expressive vocabulary and reading skills for native English-speaking adults who read between the third-and fifth-grade levels.

Expressive vocabulary skills of adult struggling readers

While there is a considerable amount of research that looks at vocabulary and its relationship with reading skills for young children and adolescents, very little exists for adults (Curtis, 2006). In fact, a review of the literature found only a few studies that focused on the oral vocabulary skills of adult struggling readers. Not all of these studies relate to expressive vocabulary skills; however, due to the low number of studies found, they all are described in order to provide a context for what is known regarding the oral language skills of adults who have difficulty reading.

In an early study, Sticht (1982) found that on a listening comprehension test of vocabulary and prose, children who read at a fifth-grade level (based on school reports) outperformed adults with reading comprehension skills at the fourth- and fifth-grade levels (as measured by an US Armed Forces test and a job readiness task). In fact, he found the adults' oral language skills to be lower than their reading levels by one or two grade levels, whereas the children's oral language skills were usually one or two grades higher than their reading ability. Other researchers compared the receptive vocabulary skills of adults and children who identified words at the third- to fifth-grade levels as assessed by the Word Identification subtest of the Woodcock-Johnson. The adults' receptive vocabulary scores were profoundly low when compared to adult norms, with the adult struggling readers scoring in the first percentile (Greenberg, Ehri, & Perin, 1997). In a more recent study, Eme, Lacroix, and Almecija (2010) found significant differences in the oral narratives of adult literacy students who were in a program focused on basic skills (reading grade equivalency information is not provided by the authors) and proficient adult readers matched for demographic and socioeconomic variables. Narratives produced by the low-literate group contained significantly fewer clauses, total number of words, and types of words, resulting in significantly shorter narratives.

Three studies specifically examined expressive vocabulary of adult struggling readers. Gold and Johnson (1982) found that adults with a mean grade equivalency of 3.5 on the Reading Subtest of the Wide Range Achievement Test had a mean expressive vocabulary age equivalency of 11.3 (approximately the 6^{th} grade level) as measured by the Verbal Opposites Subtest of the Detroit Test of Learning Aptitude. Cantwell and Rubin (1992) compared the object-naming ability of adults with spelling difficulties with that of a control

group of adults with no written spelling difficulties. They used a list of 48 objects, and when compared to the adults without spelling difficulties, the adults with spelling difficulties named fewer objects. When the errors were analyzed based on initial phoneme and number of syllables of the target word, the adults with written language difficulties performed similarly to children with language disorders from a previous study by Rubin and Liberman (1983). Dietrich and Brady (2001) reported similar findings. They compared less skilled adult readers (mean GE 8th-grade level on the Word Identification subtest of the Woodcock-Johnson Test of Cognitive Achievement) to a group of reading-age matched children and to a group of skilled adult readers on an experimenter-designed confrontation naming task. They found that the less skilled adult readers were less accurate on this task when compared to the other two groups.

The research on adult struggling readers thus far suggests that their oral language skills are profoundly lower than expected for their age, with one study finding that they performed similarly to children with language disorders on object naming tasks (Cantwell & Rubin, 1992). Also, there is conflicting evidence as to whether or not vocabulary skills of adults are above or below what is expected for their reading skill level. Missing from the literature on adult struggling readers is the relationship between oral expressive vocabulary knowledge and reading skills. Several studies from the children's literature, however, have looked at this relationship and found expressive vocabulary to be related to some, but not all, reading skills. Below we review the children's studies that were influential in the construction of our study.

Expressive vocabulary and reading skills of children

Several studies from the children's literature have found significant relationships between expressive vocabulary and some reading skills. Wise et al. (2007), for example, looked at the contribution of vocabulary to pre-reading skills and word-identification skills for children with a reading disability. In their sample of second- and third-grade students, they found that expressive vocabularywas significantly related to word-identification skills.

Ouellette (2006) explored the potential effects of both breadth (the number of known words) and depth (the extent to which a word is known) of expressive vocabulary on the reading skills of typically-developing fourth-grade students. Neither breadth nor depth of expressive vocabulary made any significant contribution to nonword reading; however, exception word reading was explained by breadth of expressive vocabulary, while reading comprehension was explained by depth of expressive vocabulary.

Nation and Snowling (2004) found that expressive vocabulary accounted for significant variance in word-identification, exception word reading, and reading comprehension in a sample of students averaging 8.5 years old (Time 1). Four years later (Time 2), expressive vocabulary still accounted for significant variance in word-identification skills and reading comprehension. Additionally, Time 1 expressive vocabulary scores significantly explained variance in Time 2 exception word reading.

In a similar study, Ricketts et al. (2007) also found that expressive vocabulary accounted for significant variance in both exception word reading and reading comprehension for children

between eight and nine years old. Lower expressive vocabulary and exception word reading scores separated skilled from poor reading comprehenders. Ten months later, these poor comprehenders still showed significantly lower expressive vocabulary and exception word reading skills. No significant relationships were found between expressive vocabulary and nonword reading or general word reading.

Current Study

In studies with children, expressive vocabulary has been shown to contribute uniquely to reading comprehension, general word reading, and exception word reading, but not to nonword reading. However, similar studies have not been conducted with adult struggling readers. This study served to fill this void by examining the expressive vocabulary skills of adult struggling readers and to examine how their expressive vocabulary skills relate to their reading skills. Specifically, the current study addressed the following two questions: 1) What are the expressive vocabulary skills of adult struggling readers as indexed by the Boston Naming Test (BNT; Kaplan et al., 2001)? Because object-naming problems have been shown to exist in adults who have difficulty reading (Cantwell & Rubin, 1992; Dietrich & Brady, 2001), we expected the adult struggling readers in this study to perform significantly lower on the BNT than expected based on the test's published norms. 2) To what extent are the expressive vocabulary skills of adult struggling readers predictive of their reading skills? While it is clear from the literature that expressive vocabulary plays an important role in children's reading skills, much less is known about its importance for adult struggling readers. Therefore, we looked at the relationship of expressive vocabulary to nonword reading, general word reading, exception word reading, and reading comprehension.

Method

Participants

Participants in this study were 232 native-English speaking adults who attended adult literacy classes in a large southeastern city in the United States. They represent a subsample of students from a larger study.[1] To qualify for this larger study, participants read between the third- and fifth-grade levels (approximate ages of 8 to 10 years old) as assessed by the Letter-Word Identification subtest of the Woodcock-Johnson III Test of Achievement (Woodcock, McGrew, & Mather, 2001). This test measures isolated word-reading skills with items presented in increasing difficulty. As indicated in Table 1, 92% were African American and 71% were female. Their mean age was 34.89, and they reported completing an average of 10.10 years of school. There were 103 participants reading at the third-grade level, 78 at the fourth-grade level, and 51 at the fifth-grade level.

Materials

Expressive vocabulary—The participants' expressive vocabulary skills were assessed with the Boston Naming Test (BNT; Kaplan et al., 2001). The BNT is a confrontation naming test used to assess vocabulary knowledge (Halperin et al., 1989; Hawkins & Bender, 2002; Hawkins et al., 1993; Killgore & Adams, 1999; Riva, Nichelli, & Devoti, 2000). It is

often used in a clinical setting to evaluate and diagnose deficits and changes in confrontation naming ability that are associated with various neuropsychological and communication disorders (Cruice, Worrall, & Hickson, 2000; Kent & Luszcz, 2002; Kohnert, Hernandez, & Bates, 1998; Moberg, Ferraro, & Petros, 2000; Neils et al., 1995; Tombaugh & Hubley, 1997; Whitfield et al., 2000). It also has been used to predict children's cognitive and academic skills, especially in reading achievement (Wolf, 1991; Wolf & Obregon, 1992). This test has been normed on participants ages five through 79.

For this task, participants are shown line drawings of common objects (e.g., scissors) and asked to provide the name of that object. The drawings are presented in order of increasing difficulty. If an incorrect answer is given or the participant cannot name the object, a stimulus cue is given (e.g., these are used for cutting). If the participant is not able to provide a correct answer after the stimulus cue is given, a phonemic cue is given (e.g., the first sound of the word is /s/). If the participant is still unable to correctly name the object, the item is scored as incorrect and the next item is presented. Testing is discontinued after eight consecutive incorrect responses are recorded. There are various scores that one can attain from this test: total number of spontaneously correct responses, total number correct after stimulus cues are provided, total number correct after phonemic cues are provided, and the total number of incorrect responses. The total correct score is computed by adding the number of correct spontaneous responses and the number of correct responses provided after stimulus cues.

It is assumed that adults can easily identify the first 29 items; therefore, it is recommended that adults who do not present any signs of aphasia or other oral language issues that might lead to incorrect responses before item 30 begin testing with item 30 (Kaplan et al., 2001). Because two research studies have indicated that adult struggling readers have difficulty in object-naming tasks (e.g., Cantwell & Rubin, 1992; Dietrich & Brady, 2001), participants in this study began testing with the first item instead of item 30.

Reading comprehension—The participants' reading comprehension skills were assessed by the Passage Comprehension subtest of the Woodcock-Johnson III Test of Achievement (WJ-III; Woodcock, McGrew, & Mather, 2001). The WJ-III has been standardized for ages 2.0 through 90.0+. Participants silently read sentences and then provide the missing word. Because participants cannot be helped in any way on these test items, including correct pronunciation of words, successful completion of each test item also depends on the participant's word-reading skills. Participants in this study began with item 11, the suggested starting point for participants reading at the second-grade level. Following the testing manual's directions, testing was discontinued when the last six items in a set were answered incorrectly.

General word reading—The Sight Word Efficiency subtest of the Test of Word Reading Efficiency (TOWRE; Torgesen, Wagner, & Rashotte, 1999) was used to measure the participants' general word reading skills. The TOWRE has been standardized for ages six through 24. For this test, participants are given 45 seconds to read aloud a list of words as quickly and accurately as they can.

Exception word reading—Adams & Huggins' Sight Word Reading Task (Adams & Huggins, 1985) was used to measure participants' exception word reading skills. The test contains 50 words with irregular spellings. Participants are asked to read the list of words aloud. All participants start with the first item. Testing is discontinued after ten consecutive words are read incorrectly.

Nonword reading—The Phonemic Decoding Efficiency subtest of the TOWRE was used to measure participants' nonword reading skills. Participants are given 45 seconds to read aloud a list of decodable nonwords as quickly and accurately as they can.

Procedure

Participants were recruited from adult literacy centers in a large southeastern city to take part in a larger study that examined at the effects of various instructional approaches for teaching reading skills to adults with low-literacy skills. A representative from the study visited classes to explain the goals of the study, the time commitment involved, and the testing procedures that would take place. In addition, care was taken to ensure participants understood that participation in the study was voluntary. Each participant was tested individually by the project's psychometrist or by a trained graduate research assistant. The Letter-Word Identification subtest of the WJ-III (Woodcock, McGrew, & Mather, 2001) was administered first to qualify students for the study. The participants who scored between the 3.0 and 5.9 grade levels (i.e., raw scores between 42 and 57) on this subtest qualified for the study. Prior to testing the participants, the graduate research assistants received extensive training, which included sensitivity to testing adults who have difficulty reading, as well as specific instructions for administering each of the assessments to this population. Additionally, before administering the tests alone, each graduate research assistant practiced giving the tests with the psychometrist, observed the psychometrist administer the tests to one of the study participants, and then was observed by the psychometrist administering the tests to one of the study participants.

The psychometrist scored all the tests, and another trained scorer independently verified the scoring. All data were independently double-entered and compared for data entry errors. Raw scores were used for data analysis.

Results

As indicated in Table 2, the participants demonstrated low reading and reading related skills.

Expressive vocabulary skills

The first purpose of this study was to examine the expressive vocabulary skills of adult struggling readers. The mean score for correct spontaneous responses alone was 34 (SD = 7.28, Range = 14–52). When provided with stimulus cues, the mean score was 36 (SD = 7.29, Range = 14–53). The mean score after phonemic cues were provided was 39.72 (SD = 7.33, Range = 16–57). Therefore, the stimulus and phonemic cues, which are expected to help participants name the object, did not notably help the adults in our sample. Our participants' mean correct score for the entire task (spontaneous correct responses plus

correct responses after stimulus cues) of 36 (SD = 7.29, Range = 14–53) is much lower than scores reported with other non-college educated adult samples (Henderson et al., 1998; Tombaugh & Hubley, 1997).

As already mentioned, the participants were part of a larger study that included adults reading single words at the third- through fifth- grade levels. To determine whether expressive vocabulary skills differed among participants at these different word-reading skill levels (as assessed by the Letter-Word Identification subtest of the WJ-III), a BNT Total Score by word-reading level (3rd-grade vs. 4th-grade vs.5th-grade) analysis of variance (ANOVA) was conducted on their raw scores. Results showed significant group differences, $F(2, 229) = 3.22$, $p = .042$, $\eta^2 = .027$. Post hoc analyses revealed a significant difference between the 3rd and 5th grade groups with a mean difference of 2.84 ($p = .023$), with the 5th-grade group performing better on the BNT. There were no significant differences between the 3rd and 4th grade or 4th and 5th grade groups.

The participants in our study began with the first item on the BNT, instead of the suggested starting point for adults (Item 30), because previous research on adult struggling readers indicates that they have difficulty on object-naming tasks (e.g., Cantwell & Rubin, 1992; Dietrich & Brady, 2001). In order to assess our decision, we outlined the performance of Items 1–30 for our participants compared to that of the Tombaugh and Hubley (1997) normative sample of adults aged 25 to 88 years (M = 59.0, SD = 16.9) with an average of 12.9 years of education (SD = 2.3, range 9–21 years). As Table 3 shows, the adult struggling readers did perform worse than the comparison group on the first 30 items of the BNT; therefore, it appears that it was appropriate to begin administration on the first item.

Relationship of expressive vocabulary skills and reading skills

A series of hierarchical regression analyses were conducted to examine the amount of variance that expressive vocabulary explained for nonword reading, general word reading, exception word reading, and reading comprehension skills of adult struggling readers. Results indicated that expressive vocabulary did not contribute to variance in the adults' general word reading and nonword reading skills. Specifically, for nonword reading, only general word reading entered at the first step accounted for a significant proportion of the variance (36.5%). Exception word reading and expressive vocabulary (steps 2 and 3) were not significant. For general word reading, nonword reading was entered first, followed by exception word reading in the second step and expressive vocabulary in the third step. Only nonword reading and exception word reading explained 48.3% of the variance.

As Table 4 indicates, however, expressive vocabulary did contribute to the variance of exception word reading and reading comprehension skills. For exception word reading, nonword reading accounted for 9.7% of the variance in step 1. In step 2, general word reading added 16.8%, for a total of 26.5% of the variance. When entered at the final step, expressive vocabulary accounted for a small but significant ($p < .05$) additional 1.8% of the variance (see Table 4). Finally, when reading comprehension was entered into a model as the dependent variable, results indicated that nonword reading (step 1), general word reading (step 2), and exception word reading (step 3) together significantly explained 10.7% of the

variance for reading comprehension. When expressive vocabulary was added to the model in the final step, it significantly explained 16.4% of the unique variance.

Discussion

The first goal of this study was to examine the expressive vocabulary skills of adult struggling readers. Our participants' mean score of 36 (SD = 7.29) on the BNT was lower than other adult samples and, instead, resembled children's scores. As a basis for comparison, the sample of non-college educated adults (9–12 years of education) from the Tombaugh and Hubley (1997) norms had a mean score of 54.5 (SD = 3.9). In another study with 100 non-college educated participants (10–12 years of education; Henderson et al., 1998), the mean score was 51.91 (SD = 6.37). For children between the ages of seven and ten, mean scores for the BNT are reported between 36.87 (SD = 5.22) and 45.10 (SD = 4.53) (for a review of child studies, see Yeats, 1994). The approximate word-reading age range of our participants is eight to ten years old; therefore, on average, the expressive vocabulary skills of our sample is at or lower than expected for their reading grade level.

In addition, the results indicate that the spontaneous expressive vocabulary skills of struggling adult readers are not helped by stimulus and phonemic cues. Their lack of being aided by phonemic cues may be reflective of their overall difficulty with phonological tasks (e.g., Greenberg et al., 1997; Thompkins & Binder, 2003). It is unknown why they may not have been helped by stimulus cues, except that perhaps they really do not have the word in their expressive vocabulary and are not simply suffering from retrieval difficulties.

Similar to children's performance, adults reading single words at the fifth-grade level showed higher BNT scores than adults reading at the third-grade level. In a review of developmental norms on the BNT (Yeats, 1994), children's scores increased linearly with age set at one-year intervals. Greenberg et al.'s (1997) study also found that children reading single words at the third- through fifth-grade levels showed increasing receptive vocabulary skills. Unlike the adults in our study, however, the adults in their study did not show similar increases in vocabulary with word-reading level.

The second goal of this study was to examine the relationship of expressive vocabulary to nonword reading, general word reading, exception word reading, and reading comprehension skills. In our sample of adult struggling readers, expressive vocabulary explained a significant proportion of the variance for reading comprehension and exception word reading; however, no significant relationships were found between expressive vocabulary and nonword reading or general word reading. These findings are consistent with previous studies with children (e.g., Ricketts, et al., 2007).

As Ricketts et al. (2007) states, it is easy to understand how oral vocabulary skills are related to the ability to comprehend text. However, the reason why exception word reading and oral vocabulary are related is less intuitive. In all the studies reviewed, expressive vocabulary was significantly related to exception word reading skills. Findings from vocabulary training studies with both children and adults also corroborate the relationship between semantic knowledge and word reading (e.g., McKay, Davis, Savage, & Castles, 2008; Ouellette

&Fraser, 2009). Furthermore, Ouellette's (2006) study found that breadth of expressive vocabulary explained significant variance in exception word reading after controlling for other variables, including depth of expressive vocabulary. Our findings support the importance of breadth of expressive vocabulary to exception word reading. Ouellette (2006) provides a possible explanation by writing that exception words "may be explained by the ability to encode, organize, and/or retrieve underlying (word specific) phonological representations, factors that are … pertinent in expressive vocabulary tasks" (p. 562).

We are in agreement with Ricketts et al. (2007) that the triangle model of reading development (Harm & Seidenberg, 2004; Plaut, McClelland, Seidenberg, & Patterson, 1996) may help elucidate the relationship between expressive vocabulary and exception word reading skills. In this model, vocabulary knowledge is connected to word reading knowledge and, therefore, individual differences in vocabulary knowledge are related to individual variability in word reading knowledge. Simulation studies (e.g., Harm & Seidenberg, 2004; Plaut, et al., 1996) have shown that words with inconsistent-phonological mappings (e.g., ocean, island) rely more on semantic information than words with more consistent orthographic-phonological mappings.

It is important to note that no direct causal relationships can be drawn from this study. We must consider the possibility that poor oral expressive vocabulary might be the cause of poor reading comprehension and exception word reading skills, as well as the possibility that poor reading comprehension and exception word reading skills might limit expressive vocabulary growth for these adults. Just as there is a reciprocal relationship between receptive vocabulary and reading, (e.g., Beck, Perfetti, & McKeown, 1982), there may be a reciprocal relationship between expressive vocabulary and reading. Because our study only includes a single time point, it is difficult to tell whether vocabulary is boosting reading comprehension/exception word reading skills or whether reading comprehension/exception word reading skills are driving vocabulary knowledge. Longitudinal research needs to be conducted to explore the different possible causative links for adult struggling readers.

While the results of this study provide evidence for the relationship between expressive vocabulary knowledge and reading skills of adult struggling readers, we must also consider the limitations and possibilities for future research. One limitation is that we did not ensure that the adults in our sample possessed the BNT words in their receptive vocabulary. Several of the studies on confrontation naming controlled for naming performance with a receptive vocabulary test to make sure the participants possessed the words on the naming task in their lexicon (e.g., Dietrich & Brady, 2001). Future research should include a task that measures whether the adults possess the confrontation words in their receptive vocabulary.

Another limitation of this study's findings is that the BNT has not been normed on adult struggling readers and, therefore, may not be an accurate measure of their expressive vocabulary. Although there were significant relationships found between participants' scores on the BNT and measures of reading comprehension and exception word reading, the results might underestimate the strength of these relationships. Similarly, the mean age of our participants was 34.89, and the TOWRE is standardized for individuals through the age of 24.

The TOWRE also has the added complication that it is a timed measure. This aspect may explain why no significant relationships were found between expressive vocabulary and nonword reading skills or general word reading skills (both measured by the two subtests of the TOWRE). Further research should explore whether an untimed measure would have resulted in different results. An exploration of an untimed measure is warranted by this study's findings that exception word reading (measured by Adams & Huggins' Sight Word Reading Task) and nonword reading (measured by the Phonemic Decoding Efficiency subtest of the TOWRE) together explained only 48.3% of the variance in general word reading (measured by the Sight Word Efficiency subtest of the TOWRE); although, all the words on the TOWRE Sight Word Efficiency subtest can be read using whole-word recognition (tapped by the exception word reading test) or decoding (tapped by the nonword reading test). It is possible that, because it is a timed test, the TOWRE is more demanding on word recognition than the untimed exception word reading test (Adams & Huggins Sight Word Reading Task). Finally, the TOWRE Sight Word Efficiency includes some irregularly spelled words, which may explain why expressive vocabulary only added 1.8% of the variance in exception - after nonword and general word reading were entered into the model. An untimed measure of regularly spelled words would have been ideal; however, as previously noted, this study is part of a larger study for which these measures were originally chosen.

Despite the limitations noted, our study provides evidence that adult struggling readers have weaker expressive vocabulary skills than what is expected for their age. Our study also provides preliminary evidence of a relationship between expressive vocabulary knowledge and some reading skills for adult struggling readers, suggesting that expressive vocabulary knowledge is, in fact, related to both reading comprehension and exception word-reading skills for adult struggling readers. Our findings support the notion of incorporating explicit instruction in all the different reading components for adult struggling readers (e.g., McShane, 2005). Concentrating on phonemic awareness and phonics activities alone, for example, will not ensure successful reading comprehension for adults who have poor language skills (Perfetti, 2007). Similarly, teaching vocabulary skills at the expense of such word-reading skills will also impede the overall goal of reading comprehension. Instead, adult literacy instructors will want to remain mindful of a balanced approach to reading instruction that incorporates word-reading skills, fluency activities, vocabulary development, and reading comprehension strategies (e.g., Kruidenier, 2002)..

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Biographies

Ryan Hall is a doctoral student in the Educational Psychology program in the Department of Educational Psychology and Special Education at Georgia State University. Her research interests include best practices for teaching adult struggling readers and building effective adult literacy programs.

Daphne Greenberg is an associate professor in the Educational Psychology program in the Department of Educational Psychology and Special Education at Georgia State University. Her research interest focuses on adult literacy with a special emphasis on acquisition of oral and written language skills, reading instruction and assessment.

Jacqueline Laures-Gore is an associate professor of Communication Disorders at Georgia State University. Her research interests include acquired language and speech impairments in adults.

Hye K. Pae is an assistant professor in the Literacy and Second Language Studies program in the School of Education at the University of Cincinnati, Ohio, U.S.A. Her research centers on children’s and adults’ biliteracy development, assessment, and psycholinguistics.

Table 1

Participant Characteristics

		Reading grade level[a]		
Characteristic	**Total Sample (N = 232)**	**Third (n = 103)**	**Fourth (n = 78)**	**Fifth (n = 51)**
Race				
African American (%)	215 (92.7)	98 (95.1)	70 (89.7)	47 (92.2)
Caucasian (%)	9 (3.9)	3 (2.9)	4 (5.1)	2 (3.9)
Hispanic (%)	3 (1.3)	0 (0)	2 (2.6)	1 (1.9)
Other/Mixed (%)	5 (2.2)	2 (1.9)	2 (2.6)	1 (1.9)
Gender				
Female (%)	166 (71.6)	78 (75.7)	59 (75.6)	29 (56.9)
Male (%)	66 (28.4)	25 (24.3)	19 (24.4)	22 (43.1)
Age				
M	34.89	36.44	34.97	31.69
SD	15.60	15.64	16.16	14.43
Range	16–72	16–67	16–68	17–72
Education[b]				
M	10.10	10.16	10.03	10.10
Range	5–14	6–14	5–12	5–12

[a] Reading grade level was measured by the Letter-Word Identification subtest of the Woodcock Johnson III Test of Achievement (Woodcock, McGrew, & Mather, 2001).

[b] Education = self-reported years of schooling completed by age 21.

Table 2

Means, Standard Deviations, and Ranges on all Tasks (n =232)

	Raw Scores				Grade Equivalent			
Assessment	**Mean**	**SD**	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**
Expressive vocabulary[a]	35.97	7.29	14	53				
Reading comprehension	26.06	4.19	12	36	3.51	1.35	1.20	10.10
Word reading	63.85	11.38	35	91	4.79	1.84	2	10.8
Exception word reading[a]	28.42	7.63	8	44				
Nonword reading	16.56	10.60	0	53	2.60	1.53	1	11

[a]Grade equivalencies are not provided for Boston Naming Test or Adams & Huggins Sight Word Reading. To provide a context for those scores, the Boston Naming Test has a maximum of 60 items, and the Adams and Huggins Sight Word Reading Task has a maximum of 50 items.

Table 3

Comparison of First Thirty Items with Tombaugh & Hubley (1997) Norms

Item	Our Group (N=232) % Correct	Norms Group (N=219) % Correct
1. Bed	100	100
2. Tree	100	100
3. Pencil	100	100
4. House	99	100
5. Whistle	99.1	99.5
6. Scissors	100	100
7. Comb	100	100
8. Flower	98.7	100
9. Saw	97.8	100
10. Toothbrush	99.5	100
11. Helicopter	93.5	99.1
12. Broom	100	100
13. Octopus	90.9	90
14. Mushroom	93.9	99.5
15. Hanger	98.7	100
16. Wheelchair	99.1	100
17. Camel	92.2	99.1
18. Mask	96.5	98.6
19. Pretzel	89.6	92.2
20. Bench	95.5	99.5
21. Racquet	80.1	100
22. Snail	92.2	95.4
23. Volcano	92.2	97.7
24. Seahorse	70.2	84.9
25. Dart	71.9	98.6
26. Canoe	75.8	100
27. Globe	90.0	96.8
28. Wreath	69.3	99.5
29. Beaver	65.5	97.5
30. Harmonica	56.4	96.8

Note. % Correct = Correct Spontaneous Response + Correct Stimulus Response.

Table 4

Hierarchical Regressions Predicting Exception Word Reading and Reading Comprehension (N = 232)

Step and Predictor	B	SEB	β	R^2	ΔR^2	ΔF
Exception word reading						
1Nonword reading	.010	.051	.014	.097***	.097***	24.820***
2 Word reading	.342	.047	.510***	.265***	.168***	52.198***
3 Expressive vocabulary	.141	.059	.135*	.283***	.018*	5.740*
Reading comprehension						
1 Nonword reading	.022	.028	.057	.032**	.032**	7.588**
2 Word reading	.067	.029	.183*	.075***	.043**	10.770**
3 Exception word reading	.072	.037	.131	.107***	.031**	7.969**
4 Expressive vocabulary	.237	.033	.411***	.270***	.164***	20.879***

* $p < .05$

** $p < .01$

*** $p < .000$