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Investigating Interactions Among Component Reading Skills in Struggling Adult Readers

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Abstract

A large portion of adults struggle to read at a basic level. While foundational component reading skills (e.g., decoding, vocabulary, morphology, sentence processing) are known to account for a large portion of variance in reading comprehension, this study used the Reading Systems Framework to explore potential interactions between component reading skills. Results suggest that word-level processes interact with lexical knowledge in predicting comprehension among struggling adult readers.

Investigating Interactions among Component Reading Skills in Struggling Adult Readers

Approximately one fifth of adults in the United States struggle to read at a basic level (OECD, 2018). Research suggests that reading difficulties in this population of readers are strongly related to important foundational skills such as decoding and vocabulary (Tighe & Schatschneider, 2016). Although foundational component reading skills (decoding, fluency, morphological knowledge, vocabulary, efficiency in sentence processing) account for a large portion of variance in comprehension (e.g., Barnes et al., 2017), additional research is needed to understand how these foundational component skills interact with one another when constructing a mental model for a text. Given that many adult basic education programs targeted at improving adult literacy skills have limited success (Lesgold & Welch-Ross, 2012), understanding how foundational skills relate to each other may provide insights into improving these programs.

In this study, we explored comprehension among struggling adult readers using the Reading Systems Framework (RSF; Perfetti & Stafura, 2014), which is a view that emphasizes and specifies relations between component reading skills, rather than combining multiple components reading skills into a single factor (e.g., Gough & Tunmer, 1986). RSF assumes comprehension arises through word-to-text integration, which requires direct linkages between the systems that support word identification (i.e., decoding, word recognition), word knowledge (i.e., vocabulary, morphology), and local discourse level processes (i.e., constructing accurate representations of sentences, and establishing connections between sentences). In addition to emphasizing the existence of complex interaction among component reading skills, RSF suggests that certain "pressure points" exist in the reading system. For example, lexical knowledge is thought to serve as

a “pressure point” in the reading system, sitting between lower-level processes at one end (e.g., decoding, word recognition, etc.) and higher-level processes at the other (e.g., integration, inferencing). Thus, lexical activation requires both word activation (i.e., decoding, word recognition) and semantic knowledge (i.e., lexical knowledge). According to RSF, comprehension is dependent on the ability to activate word meanings (through decoding and word recognition) and the semantic knowledge one has for lexical items (Perfetti, 2007).

The purpose of this study was to explore the relations between decoding, lexical knowledge (vocabulary, morphology), and sentence-level processing in predicting reading comprehension among struggling adult readers. Based on RSF, we hypothesized that word-level processes (i.e., decoding/word recognition) would interact with lexical knowledge and/or sentence-level processes in predicting reading comprehension.

Methods

Participants

Participants were 169 individuals enrolled in adult literacy classes targeting third to eighth grade reading levels. The sample included 120 women and 49 men between the ages of 17 to 73 years ($M = 42.11$; $SD = 14.38$). Most participants identified as Black or African American (77%) and a much smaller group identified as White (17%). All participants were native speakers of English.

Measures

Participants completed the Reading Inventory and Scholastic Evaluation (RISE; Sabatini et al., 2015). RISE is a web-based measure consisting of a series of subtests intended to measure the component reading skills listed below.

Decoding/Word Recognition

Participants determined whether a stimulus was a word, non-word, or pseudohomophone.

Vocabulary

Participants selected the appropriate synonym or topically related words to match a target word.

Morphology

Participants read sentences and filled in the blank with the morphologically correct word.

Sentence Processing

Participants read sentences and filled in the blank with the appropriate word.

Reading Comprehension

Participants read short passages and answered multiple-choice questions. Questions focused on students' ability to locate information in the text and make inferences.

Results

To test for interactions between component reading skills, a hierarchical regression analysis was conducted with reading comprehension as the dependent variable. Component reading skills were entered as predictors in the first step, followed by each of the interaction terms in the second step (WRDC x VOCAB, WRDC x MORPH, WRDC x SENT; see Table 1). Results indicate that vocabulary and sentence processing were significant predictors of reading comprehension in each of the analyses. The interaction between word recognition/decoding and vocabulary was a significant predictor of comprehension. The interaction between word recognition/decoding and vocabulary is depicted in Figure 1. This interaction shows that as proficiency in word recognition/decoding increases, so does the positive relation between vocabulary and

comprehension performance. The interaction between word recognition/decoding and morphology was nonsignificant, as was the interaction between word recognition/decoding and sentence processing.

Table 1
Hierarchical Regression Model for Reading Comprehension

	β	*SE*
WRDC	.11	.08
VOCAB.	.23**	.07
MORPH.	.07	.09
SENT. PROC.	.25*	.10
WRDC x VOCAB	.02*	.01
WRDC x MORPH	-.02	.01
WRDC x SENT	.01	.01

**$p < .001$, *$p < .05$

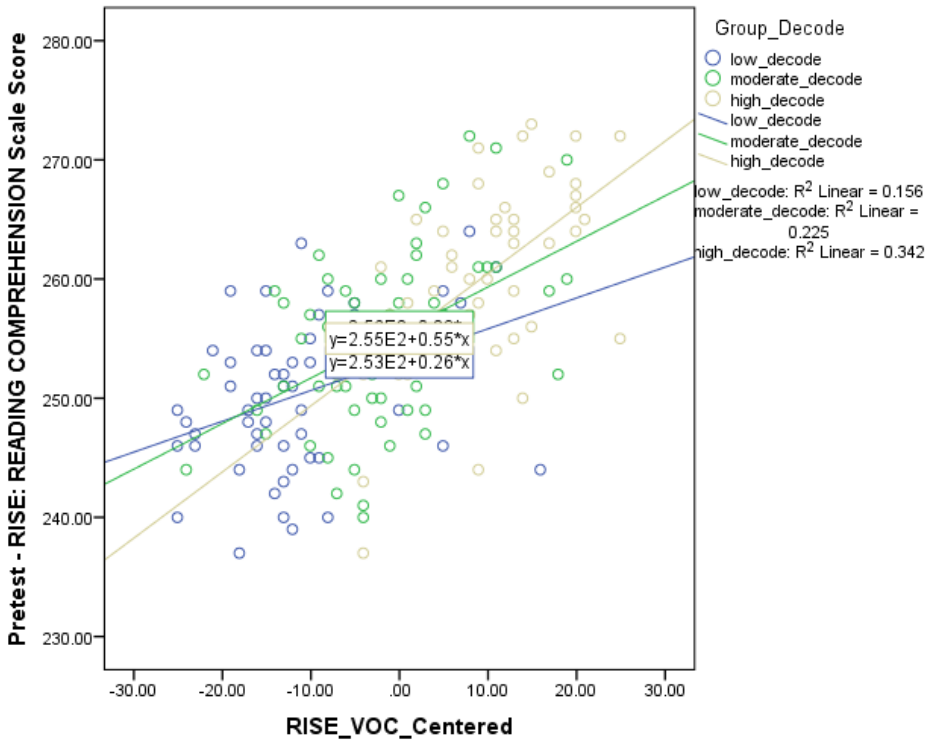

Figure 1. Interaction between word recognition/decoding and vocabulary.

Discussion

The present study investigated the extent to which interactions among foundational component skills were predictive of reading comprehension among struggling adult readers. Results indicated that both vocabulary and sentence processing were significant predictors of comprehension. Interestingly, as hypothesized, the interaction between word recognition/decoding and vocabulary was also a significant predictor of comprehension. This result is consistent with RSF and suggests a connection between the systems that support word identification and word knowledge (Perfetti & Stafura, 2014); word-level processes appear to interact with lexical knowledge in predicting comprehension in struggling adult readers. A closer look at the interaction (see Figure 1) suggests that the relation between vocabulary and reading comprehension is strongest for those who are more proficient decoders. This makes sense in that semantic knowledge would have the strongest positive relationship with comprehension outcomes for readers who are successful in recognizing words. Thus, this finding is consistent with other research suggesting that words must be accurately recognized for higher-level lexical knowledge to have strong, positive impact on comprehension outcomes (Perfetti & Hart, 2002; Wang et al., 2019).

Interestingly, the interaction between decoding/word recognition and vocabulary was significant while the interaction with morphology was not. It may be that morphological awareness contributes to reading comprehension indirectly through vocabulary knowledge (Fracasso et al., 2016). Additionally, the interaction between decoding/word recognition and sentence processing was nonsignificant. While word identification processes undoubtedly contribute to one's ability to process sentences, the effects may be indirect through lexical knowledge. Future research should continue to

explore how different aspects of lexical knowledge and sentence processing relate to one another and to decoding among struggling adult readers.

This research may have important implications for interventions targeting struggling adult readers. Intervention and instruction among struggling adults has proved challenging with limited success (Greenberg et al., 2011; Lesgold & Welch-Ross, 2012; Scarborough et al., 2013). Findings from this study suggest that adults enrolled in adult basic education programs may have limited progress in terms of reading comprehension until they are able to quickly and accurately engage word-level processes (Perfetti & Hart, 2002; Wang, 2019). Moreover, efficient word-level processes may be necessary, but not sufficient, in terms of activating lexical knowledge. It may be that struggling adult readers have lower vocabulary knowledge due to a lack of print-exposure (e.g., Ari, 2013). With this in mind, it is possible that struggling adult readers need instruction specific to decoding until a minimal level has been reached (Wang et al., 2019). Once sufficient word-level skills have been obtained, vocabulary and other higher-level processes may become important targets for intervention (e.g., Gray et al., 2018). Ultimately, this study underscores the need for additional evidence-based research in understanding struggling adult readers and the challenges they face.

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