Early reading skill profiles in typically developing and at-risk first grade readers to inform targeted early reading instruction☆

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ABSTRACT

This study identified distinct, homogeneous latent profiles of at-risk ($n = 141$) and not at-risk ($n = 149$) first grade readers. Separate latent profile analyses were conducted with each sub-group using measures of phonological awareness, decoding, linguistic comprehension, and oral reading fluency. This study also examined which measures best differentiated the latent profiles. Finally, we examined differences on two measures of reading comprehension as a function of profile membership. Results showed two latent profiles of at-risk students and three latent profiles of not at-risk students. Latent profiles were generally rank ordered with regard to achievement across measures. However, the higher performing at-risk profile and the lowest performing not at-risk profile were nearly identical across measures. Phonological awareness and decoding measures were best at differentiating latent profiles, but linguistic comprehension was also important for the lowest performing students. Oral reading fluency was limited to distinguishing the highest achieving students from the other profiles, and did not perform well with the lower achieving profiles. Most of the pairwise comparisons of reading comprehension scores were consistent across measures, but the nearly identical profiles showed a significant difference on only one reading comprehension measure. Implications for identifying at-risk first grade readers and designing targeted early reading interventions for at-risk students are discussed.

In order to comprehend written text, an individual must weave together several reading subcomponent skills; early identification and remediation of these subcomponent skills is essential to avoid later reading comprehension difficulties. Difficulty acquiring the necessary sub-skills can lead to struggles with reading comprehension that can persist throughout a student's academic career (Cain & Oakhill, 2011; Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996; Torgesen et al., 2001). In a preventative model, early identification of struggling readers allows educational practitioners to provide intervention that may ameliorate later reading difficulties or disabilities. The purpose of this study was twofold. First, a two-step process was followed to identify and screen children who were at-risk for reading difficulties; we utilized a combination of teacher referral and researcher-led screening. Next, once an appropriate at-risk group was identified, we empirically derived distinct latent profiles based on multiple reading subcomponent skills to compare the number and nature of latent profiles across an early at-risk group of students and a group not at-risk for reading difficulties. This procedure was utilized to demonstrate the heterogeneous nature of reading subcomponent skill development within

a group considered to be globally at risk of reading difficulties to help inform targeted early intervention efforts. A comparison group of not at-risk readers was utilized as a reference point for typical reading development, and also to demonstrate the range of reading profiles at first grade entry.

Multi-tiered systems of support (MTSS) models are comprehensive frameworks providing increasingly intensive academic support. In preventative MTSS reading models there are typically three tiers of instruction, each providing increasing support for students who are most in need (Fletcher & Vaughn, 2009; Fuchs & Fuchs, 2006; Fuchs, Mock, Morgan, & Young, 2003); intervention need is based on student data. In this framework, all students receive an evidence-based core reading curriculum from the general education teachers, this is also called Tier 1. When Tier 1 is deemed insufficient, based on student data, Tier 2 provides additional support, usually in the form of small-group interventions aimed at ensuring that students at-risk for reading difficulties meet grade-level benchmarks. Students with inadequate response to sufficiently intensive, evidence-based Tier 2 interventions receive more individualized and intensive Tier 3 interventions. While classroom teachers are often able to intuitively identify struggling students when their performance is starkly different from higher achieving peers (Begeny, Eckert, Montarello, & Storie, 2008; Gerber, 2005), the appropriate use of assessments enables a more nuanced picture of students' abilities and targeted intervention needs. This can inform the intervention design used within MTSS and may provide a more efficient intervention protocol. For instance, administering assessments in multiple reading domains may reveal targeted intervention needs. In terms of assessing early reading skills development, practitioners often focus on precursors of word reading such as phonological processing and letter and sound knowledge, as well as word level skills (decoding) and oral reading fluency. Linguistic comprehension has been shown to explain variance in reading comprehension in early elementary (Hoover & Gough, 1990; Kendeou, van den Broek, White, & Lynch, 2009; Storch & Whitehurst, 2002; Tunmer & Chapman, 2012), however it is not commonly assessed in early grades to determine risk status for reading. Given empirical evidence suggesting reading comprehension is a function of both decoding skills and linguistic comprehension (Hoover & Gough, 1990; Joshi & Aaron, 2000; Kendeou, van den Broek, et al., 2009; Ouellette & Beers, 2010; Tunmer & Chapman, 2012), it would seem reasonable to suggest that early readers would be screened for risk in both subcomponent skills.

The Simple View of Reading (Gough & Tunmer, 1986; Hoover & Gough, 1990) has been proposed as a useful way to categorize reading comprehension subcomponent skills, suggesting that word decoding and listening comprehension are the most significant predictors of reading comprehension. The Simple View of Reading has been utilized in two ways to help explain the development of reading comprehension. First, the framework has been used across multiple grade levels to explain the variance in reading comprehension performance (Adlof, Catts, & Lee, 2010; Adlof, Catts, & Little, 2006; Kendeou, Savage, & van den Broek, 2009; Kershaw & Schatschneider, 2012; Nation, Cocksey, Taylor, & Bishop, 2010; Tunmer & Chapman, 2012). It has also been used to describe subgroups of readers who struggle to develop the necessary sub-skills for successful reading comprehension (Catts, Adlof, & Weismer, 2006; Catts, Hogan, & Fey, 2003; Nation et al., 2010). It is imperative that school-based practitioners are able to identify students who struggle with early reading so that targeted reading intervention can be implemented.

1. Reading sub-skills

Several studies have used reading sub-skills (e.g., phonological processing, word reading, linguistic comprehension, and oral reading fluency) to differentiate readers (Catts et al., 2006; Catts, Compton, Tomblin, & Bridges, 2012; Catts, Fey, Zhang, & Tomblin, 1999; Nation et al., 2010). Other researchers have investigated how specific sub-skills predict later word reading and reading comprehension (Adlof et al., 2006; Hoover & Gough, 1990; Kendeou, Savage, & van den Broek, 2009; Kendeou, van den Broek, et al., 2009; Kershaw & Schatschneider, 2012; Roth, Speece, & Cooper, 2002; Silverman, Speece, Harring, & Ritchey, 2013; Storch & Whitehurst, 2002; Wagner & Torgesen, 1987). Since reading sub-skills can predict later reading comprehension, it follows these sub-skills can also be used to differentiate struggling readers from typically developing readers. Moreover, they may be used to identify distinct subgroups of struggling and typically developing readers. Many previous studies have treated sub-skills as independent contributors to reading comprehension, but few have examined how early reading profiles of sub-skills predict reading comprehension achievement. Examining profiles of reading sub-skills would enable researchers and practitioners to identify specific relative strengths and weaknesses that can inform tailored interventions.

1.1. Phonological processing

Prior to word reading, children must develop phonological processing skills. Phonological processing is a multifaceted construct that involves using phonological information to process oral and written language (Catts et al., 1999; Wagner & Torgesen, 1987). The contribution of phonological processing to later word reading is well documented (e.g., Roth et al., 2002; Vellutino, Tunmer, Jaccard, & Chen, 2007; Wagner et al., 1997; Wagner & Torgesen, 1987). Since it is a precursor to word and text reading, phonological processing can be used to identify potentially struggling readers during the early elementary years. Though it is foundational to decoding, it is often mastered in early reading development, limiting its ability to distinguish readers as they progress.

1.2. Decoding and reading fluency

As students develop phonological processing skills, they begin to apply these to decoding words. When students decode words, they use their knowledge of letter-sound correspondence to read individual words. The significant relations between decoding and reading comprehension have been well-established in the literature (e.g., Chen & Vellutino, 1997; Georgiou, Das, & Hayward, 2009; Hoover & Gough, 1990; Joshi & Aaron, 2000). Accurate decoding is also a precursor to proficient oral reading fluency, which is an