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# Research in Developmental Disabilities



## Predicting early spelling difficulties in children with specific language impairment: A clinical perspective

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### ABSTRACT

This study focused on the precursors of spelling difficulties in first grade for children with specific language impairment (SLI). A sample of 58 second-year kindergartners in the Netherlands was followed until the end of first grade. Linguistic, phonological, orthographic, letter knowledge, memory, and nonverbal-reasoning skills were considered as precursors, as was spelling level at an earlier point in time. Spelling difficulties at the end of first grade were most accurately identified by letter knowledge at the beginning of first grade and word spelling at the middle of first grade. It is concluded that spelling development in children with SLI can be seen as an autocatalytic process in which, without intervention, poor spellers generally remain poor spellers, and good spellers remain good spellers. A focus on early spelling intervention is thus emphasized.

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## 1. Introduction

Children with specific language impairment (SLI) have a failure in their language development, despite at least average non-verbal intelligence, adequate hearing and vision, no known neurological, physical, emotional or social problems, and adequate opportunity to acquire language skills (McArthur & Bishop, 2001). The failures can be receptive and/or expressive, and arise in different areas of communication; phonology, morphology, syntax, semantics, and/or pragmatics (Botting & Conti-Ramsden, 2004). As a consequence of their language delay (Bishop, 1992; Leonard, 1998), children with SLI are at risk for the development of spelling difficulties (e.g., Naclér, 2004). A large number of children and adults with SLI indeed exhibit spelling problems that are persistent and remain stable over time (e.g., Snowling, Bishop, & Stothard, 2000; van Weerdenburg, Verhoeven, Bosman, & van Balkom, 2011). To alleviate or even prevent the development of spelling problems, early identification and intervention may provide a solution. Research on the precursors of spelling difficulties is necessary to make early identification possible.

Previous research with typically developing children indicates that letter knowledge, phonological awareness, working memory, and rapid naming are precursors of early spelling. This is shown in Table 1. Letter knowledge is one of the most important precursors of the development of spelling knowledge (Caravolas, Hulme, & Snowling, 2001; Furnes & Samuelsson, 2010; Lervåg & Hulme, 2010; Muter, Hulme, Snowling, & Taylor, 1998; Ouellette & Sénéchal, 2008), because it is frequently found in various studies. This is not surprising, because spelling in an alphabetical language requires the knowledge of all graphemes (i.e., letters or letter clusters) that represent the phonemes of the language.

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**Table 1**  
Overview of the kindergarten precursors of spelling in typically developing children.

Study	Task/precursors	Factor	R <sup>2</sup>
Bradley and Bryant (1983)	Sound categorization	Phonological awareness	.06–.08
Stage and Wagner (1992)	Sound categorization	Phonological awareness	
	Letter span	Working memory	
Muter et al. (1998)	IQ	Intelligence	.14–.18
	Phoneme identification + phoneme deletion	Phonological awareness	.16–.36
	Letter naming	Letter knowledge	.19–.30
Caravolas et al. (2001)	Phoneme isolation	Phonological awareness	
	Letter-name and letter-sound knowledge	Letter knowledge	
	Phonological spelling	Spelling	
	Word reading	Reading	
Ouellette and Sénéchal (2008)	Letter-name and letter-sound knowledge	Letter knowledge	.37–.44
	Isolating and comparing phonemic segments, elision, blending words	Phonological awareness	.36–.41
	Visual recognition of legal characters, visual recognition of permissible sequences within words	Orthographic awareness	.08–.19
	Comprehension of grammatical morphemes	Morphology	.11–.18
Furnes and Samuelsson (2010)	Syllable and phoneme blending, word elision, syllable and phoneme elision, sound matching, rhyme and final phoneme matching, phoneme identity training test	Phonological awareness	
	Receptive letter knowledge	Letter knowledge	
	Rapid naming of objects and colours	Rapid naming	
Lervåg and Hulme (2010)	Rapid naming of objects and colours	Rapid naming	
	Phoneme isolation, phoneme deletion	Phonological awareness	
	Letter naming	Letter knowledge	
	Verbal short-term memory	Working memory	

Phonological awareness is a second major precursor of spelling of typically developing children, because it is frequently found in different studies (Bradley & Bryant, 1983; Caravolas et al., 2001; Furnes & Samuelsson, 2010; Lervåg & Hulme, 2010; Muter et al., 1998; Ouellette & Sénéchal, 2008; Stage & Wagner, 1992). Phonological awareness is a broadly defined concept and the reviewed studies (see Table 1) reveal that a large number of different tasks have been used to measure phonological awareness. We define phonological awareness as the ability to segment words into their phonemes, because this phoneme segmentation is a prerequisite for spelling (Bosman, 2004). To be able to spell, one has to divide a word into its phonemes and have to connect each phoneme to its corresponding graphemes, before the words can be written down.

Working memory is a third precursor of spelling of typically developing children (Lervåg & Hulme, 2010; Stage & Wagner, 1992). Working memory is considered to include both temporary storage and processing of information. The relatively heavy demand that spelling tasks put on working memory processes might be an explanation for the predictive value of working memory (Lervåg & Hulme, 2010). To be able to spell, one has to keep track of the coupling of phonemes to graphemes in the right order. If this process does not proceed properly, spelling may be hampered.

A fourth precursor of spelling of typically developing children is rapid naming (Furnes & Samuelsson, 2010; Lervåg & Hulme, 2010). Rapid naming involves the retrieval of lexical phonological representations from long-term memory (Ramus & Szenkovits, 2008). To spell a word, lexical phonological information has to be retrieved from memory.

Not all precursors of spelling of typically developing children predict spelling of children with SLI. Vandewalle, Boets, Ghesquière, and Zink (2010) investigated the precursors of spelling of children with SLI at the end of first grade. Letter knowledge, phonological awareness (rhyme production, end rhyme identity, first sound identity task, and end sound identity task), and verbal short-term memory in kindergarten did not predict spelling performance very well at the end of first grade. Rapid, automatized naming in kindergarten, however, was strongly correlated with spelling in first grade. This shows that what is predictive for typically developing children, may not be the case for children with SLI. It is, therefore, warranted to investigate the precursors of early spelling of children with SLI.

Although letter knowledge, phonological awareness, working memory, and rapid naming predicted spelling of typically developing children, the predictive value of these skills is generally limited to the first year of formal spelling instruction. Caravolas et al. (2001) found that during the first one and a half year of education, spelling was predicted by letter knowledge and phonological awareness, whereas letter knowledge and phonological awareness had no predictive value for spelling skills when children were in second grade. Lervåg and Hulme (2010) reported similar results: rapid naming, phonological awareness, letter knowledge, and short-term memory predicted early spelling skills, but only early spelling skills predicted further growth in spelling skills.

Because the precursors of spelling in children with SLI are not yet clear, we used a large battery of possible precursors for spelling difficulties to investigate this issue. Because children with SLI generally have poor linguistic, phonological, and memory skills, we also took into account orthographic skills. Orthographic awareness is the ability to visually recognize legal symbols and patterns within printed words (Mather & Goldstein, 2001). By measuring phonological skills in kindergarten, we made sure that these skills were not yet influenced by spelling abilities. The skills that are precursors of spelling according to previous studies, most often only partially predict spelling, and the predictive value is limited to a short period of time.

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