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Examining the Mediational Role of Writing Motivation in the Writing Development of Elementary-Aged Students

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Abstract

Motivational variables, such as writing self-efficacy and writing attitudes, are not emphasized in writing frameworks for developing writers. The purpose of this research study was to extend the research literature on elementary-aged students' writing development by examining the potential mediational role of writing self-efficacy and writing attitudes between foundational academic skills (e.g., handwriting, spelling, and executive functioning/working memory skills) and written performance. Measures of spelling, handwriting, executive function/working memory skills, writing self-efficacy, writing attitudes, and written expression were administered to 140 third-grade and fifth-grade students. In this correlational research study, a parallel mediational analysis was conducted to examine whether writing self-efficacy and writing attitudes functioned as mediating variables between transcription skills (i.e., handwriting and spelling), executive functioning/working memory ability, and students' subsequent writing performance. Results demonstrated that neither writing self-efficacy or writing attitudes mediated the relationship between variables associated with students' writing development. Implications of this study and directions for future research of writing self-efficacy and writing attitudes within writing development are discussed.

Keywords: writing self-efficacy, writing attitudes, spelling, handwriting, written performance

EXAMINING THE MEDIATIONAL ROLE OF WRITING MOTIVATION IN THE WRITING DEVELOPMENT OF ELEMENTARY-AGED STUDENTS

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Examining the Meditational Role of Writing Motivation in the Writing Development of Elementary-Aged Students

Writing is defined as "a complex, multifaceted, and purposeful act of communication that is accomplished in a variety of environments, under various constraints of time, and with a variety of language resources and technological tools" (National Center for Education Statistics, 2011, p. 4). Writing is an arduous task that requires the writer to balance many demands, such as spelling words correctly and thinking of ideas simultaneously (Kent & Wanzek, 2016). To illustrate how consuming the process of writing can be, Hayes and Flower (1980) once described the writer as a "thinker on cognitive overload." For a developing writer, the writing process can be especially difficult because they are still trying to acquire the ability to write fluently. Although it is hard, developing writers must cultivate good writing skills, because writing is an essential and versatile educational tool that is often used in several subjects such as language arts, social studies, and science (Graham, Capizzi, Harris, Hebert, & Morphy, 2014).

Writing is a foundational skill of learning and has even been called an essential component of the K-12 experience (Troia & Olinghouse, 2013). Writing skills are so highly valued that the Common Core State Standards (CCSS), which are state-level academic standards created to prepare college and career-ready students, placed an even greater emphasis on standardizing the different aspects of writing that constitute good written performance (i.e., a finished product demonstrating students' competence in grammar, syntax, and idea organization). However, Troia and Olinghouse (2013) noted that although the CCSS does emphasize the importance of writing and demands higher expectations for it, the standards did neglect some important aspects of writing, such as spelling and motivational constructs (e.g., writing self-efficacy). This is an oversight, given research has shown that the written

performance in the developing writer can be predicted by several factors such as spelling ability (Graham & Santangelo, 2014), handwriting (Santangelo & Graham, 2016), writing self-efficacy (Pajares & Valiante, 1997), and writing attitudes (Ekholm, Zumbrunn, & DeBusk-Lane, 2017). Given writing's utility in schools, it is disheartening that many students are not writing at the level expected of them. In the United States, approximately 72% of fourth-grade students are writing at or below the basic level (i.e., exhibit only partial mastery; Persky et al., 2003) and this trend continues in the eighth grade (74%) and twelfth grade (73%; Persky et al., 2012). It seems that students may not be developing the foundational writing skills needed to become good writers.

To help extend our understanding of how writing skills develop, it is important that research continues to examine all variables relevant to writing. Research has long established the importance of academic skills (i.e., handwriting skills and spelling ability) and cognitive variables (e.g., working memory and executive functioning skills) for the developing writer and even conceptualized these variables in writing models explicitly created for the developing writer (e.g., Not-So-Simple View of Writing; Berninger & Amtmann, 2003). However, motivational variables such as writing self-efficacy and writing attitudes have not been placed in writing models for developing writers, despite research consistently demonstrating a relationship to written performance in developing writers (e.g., Graham, Kiuhara, Harris, & Fishman, 2017; Pajares and colleagues,1997; 1999; 2007). If these models were expanded to include writing attitudes and writing self-efficacy, then we could examine aspects such as mediational roles, predictive value, and intercorrelations between all these variables (i.e., handwriting, spelling, writing self-efficacy, and writing attitudes) together and potentially have a more comprehensive idea of these factors in writing development. In addition, if we were to examine the relationships

between these variables and written performance, it could inform how we conceptualize developing writers to evolve and this information could be used to help inform classroom instruction. Given how important writing is in the school setting, it would be beneficial to have a better grasp of how writing develops. The purpose of the proposed study is to extend the research literature on writing development by examining the potential mediational role of motivational variables (i.e., writing self-efficacy and writing attitudes) between foundational academic skills (e.g., handwriting and spelling), cognitive skills (e.g., working memory and executive functioning), and written performance in elementary-aged students.

Theoretical Conceptualization of the Developing Writer: The Not-So-Simple View of Writing Model

Prominent writing frameworks, which focused on the writing process, began to emerge in the 1980s. Hayes and Flower (1980) outlined a theoretical model of writing with three main sequential steps: planning (i.e., generating information, organizing information, and goal-setting), translating (i.e., writing), and reviewing (i.e., reading and editing work). Although it was influential and informed research, this model was inappropriate for developing writers because it highlighted higher-level skills that developing writers did not yet have automatized. For example, developing writers are not yet proficient enough with writing to be able to plan or revise their written work. They are still trying to master translation (i.e., the physical act of writing), which was glossed over in the Hayes and Flower (1980) model. Instead of focusing on higher-level adult skills like revising, later frameworks for developing writers focused on lower-levels, like spelling, that students needed to master (Kent & Wanzek, 2016).

A more developmentally-appropriate writing framework emerged from studies conducted by Juel (1986; 1988). Juel (1986; 1988) hypothesized that spelling ability (i.e., the phonological-

to-orthographic translation of words; Berninger et al., 2002) and ideation (i.e., generating and organizing ideas) were the foundational skills of writing. Results from her studies provided evidence for this hypothesis. It was found that spelling explained 57% of the variance in written performance for first-grade students (29% after ideation was controlled for), 30% of the variance in written performance in second-grade students, and 10% of the variance in fourth grade after controlling for ideation. In addition, ideation explained 22% of the variance in written performance for first-grade students (8% after controlling for spelling), 54% of the variance for second-grade students, and 30% of the variance in fourth-grade students after controlling for spelling. Juel's research not only provided evidence that spelling and ideation are foundational skills in writing, but it created one of the first developmentally-appropriate frameworks for developing writers with spelling and ideation as components. The model was referred to as the Simple View of Writing.

An interesting finding from Juel's work was that the relative impact of spelling and ideation on students' written performance changes over time. Although spelling significantly impacted students' writing performance, its relative influence decreased as students advance through school. For example, spelling had a more significant role in second-grade students' writing outcomes than the writing outcomes of third-grade students. In addition, the relative influence of ideation on students' writing increased as students advanced through the elementary grades. One of the potential reasons associated with this finding relates to the automatization of spelling. As students gain more practice with writing, spelling becomes automatized and then there are more cognitive resources available for generating ideas.

The work created by Hayes and Flower (1980) and Juel (1986; 1988) was helpful to conceptualize the process of writing; however, these models were not adequate to give a

comprehensive view of the developing writer. The Hayes and Flower (1980) model was more appropriate for the fully-developed adult writer, because it contained processes that developing writers had not yet mastered (i.e., planning and reviewing) and there was no depth to translation, which is arguably the most utilized stage for beginning writers (Berninger et al., 1997). Although Juel's work was developmentally-appropriate for beginning writers and highlighted the importance of early literacy skills (e.g., spelling), the model was somewhat limited because it only consisted of spelling and ideation. This model did not account for other writing variables that may affect writing development. Given that spelling decreases in its relative impact on students' written performance as they advance in elementary school, there are likely other unaccounted factors that affect students' writing development.

To improve our conceptualization of the writing process for the developing writer, Berninger and colleagues (1992; 2002; 2003) modified the Hayes and Flower model to be developmentally-appropriate and used the ideas from Juel's work as the foundation for their expanded Simple View of Writing. Specifically, the Simple View of Writing expanded the translational component of the Hayes and Flower (1980) model and incorporated additional skills that young writers are developing based on empirical research in the fields of education and neuropsychology. Translation was emphasized and further broken into two sub-processes: text generation and transcription. Text generation is the transfer of ideas into linguistic representation in working memory (i.e., similar to ideation described by Juel, 1986), while transcription is the transfer of linguistic representation into motor output (Berninger et al., 2002). In other words, transcription is the process of externalizing language into written words on paper (Alves, Limpo, Fidalgo, Carvalhais, Pereira, & Castro, 2016). Additional components added to the model were

working memory and executive functions (i.e., consists of conscious attention, planning, reviewing, revising, and strategies for self-regulation).

As part of their conceptualization, Berninger and Amtmann (2003) illustrated the model as a triangle with working memory was positioned in the center. Transcription was positioned at the bottom-left vertex, and executive functions were positioned at the bottom-right vertex. Text generation was positioned at the top vertex of the triangle. Working memory was placed in the center of the model, because of its connection to long-term memory and short-term memory, which are both used in writing process. In addition, each of these model components (text generation, transcription, and executive functioning) function in a working memory environment and each relies on working memory resources during the writing process. For developing writers, transcription skills typically tax working memory resources the most, because transcription skills, such as handwriting and spelling, are relatively new skills for emerging writers that require attention in order to be performed correctly. In fact, according to the Simple View of Writing model (Berninger et al., 2002), handwriting and spelling are salient transcription skills that students must become automatized, in order for cognitive resources to be reallocated for text generation. This idea is in line with Juel's (1988) previous findings that ideation (i.e., text generation) becomes more influential as students age and automatize transcription skills, such as handwriting and spelling.

More recently, the Simple View of Writing was updated by Berninger and Winn (2006) based on advances in brain imaging research and consideration of technology's impact on writing. The model was renamed the Not-So-Simple View of Writing (see Figure 1), to emphasize the complexity of the writing process. This newer version of the model was designed to represent the multiple components of the internal writing system within the writer's mind

(Berninger & Winn, 2006). The basic components of the model were the same as the Simple View of Writing with text generation, transcription, executive functioning, and working memory skills maintaining their positions in the model. However, within this updated model, there were three modifications: 1) the role of working memory was expanded to include the activation of long-term memory and short-term memory in the writing process, 2) the components of working memory used in the writing process were expanded, and 3) a greater description of supervisory attention (i.e., a component under executive functions) was added. For the first modification, it was theorized that working memory activates long-term memory during the planning, composing, reviewing, and revising components of the writing process and it also activates short-term memory during the reviewing and revising of written work. For the second modification, it was proposed that the components of working memory include the verbal information storage units (i.e., phonological, orthographic, and morphological), a phonological loop for learning and maintaining verbal information, and executive supports that connect verbal working memory with both the various executive functions in the model and non-verbal working memory which is stored in the visual-spatial sketchpad. For the final modification, supervisory attention replaced conscious attention and was described as a complex system that regulates conscious attention (metacognitive and metalinguistic awareness), focused attention (staying on task), cognitive presence, and cognitive engagement (Berninger and Winn, 2006).

Although the Not-So-Simple View of Writing model has been useful to conceptualize the writing process associated with young students and is arguably the most thorough model to date, it has mostly focused academic skills (i.e., transcription skills such as handwriting and spelling) and cognitive factors (i.e., working memory and executive functioning skills). It has not given much attention to motivational aspects of writing, such as writing self-efficacy and writing

attitudes. Both variables have been found to influence the written performance of developing writers (Graham et al., 2017; Graham et al., 2007; Pajares, Miller, & Johnson, 1999; Pajares & Valiante, 1997). Incorporating these influential writing-related variables into the Not-So-Simple View of Writing may help to enhance the model and expand our understanding of the writing process for developing writers, particularly for two foundational academic skills: handwriting and spelling.

Foundational Academic Skills: Handwriting and Spelling

With the aim of improving our understanding of how writing develops, Kent and Wanzek (2016) conducted a meta-analysis to synthesize the literature on the relationship between writing-related skills (i.e., spelling, handwriting, reading, and oral language) and written performance in students from kindergarten through high school. Among the four variables, which were chosen based on their prominence in theories of writing development (Berninger et al., 2002; Fitzgerald & Shanahan, 2000; Juel, 1986), Kent and Wanzek (2016) found that handwriting and spelling were the variables most strongly correlated to writing quality. Overall, for the relationship between handwriting and writing quality, the 17 reported correlations were positive (range of *r*s = .07 - .82) and the average effect size was moderate (*M* ES = .49, $p < .0001$). Overall, for the relationship between spelling and writing quality, the eighteen reported correlations were mostly positive (range of *r*s = -.09 to .67) and the average effect size was moderate (*M* ES = .49, $p < .0001$).

Further exploration of the relationship across key developmental periods indicated that the relationship between spelling and writing quality, the average effect size was moderate for lower-elementary students (ES= .47, $p < .0001$ for Grades K-3) and upper-elementary students (ES= .41, $p < .05$ for Grades 4-6). For the relationship between handwriting and writing quality,

the average effect size was moderate for lower elementary students (ES= .59, $p < .0001$ for Grades K-3) and low for upper elementary students (ES= .29, $p < .05$ for Grades 4-6). Results from this systematic review of the literature provide evidence for a positive relationship between handwriting, spelling, and writing quality in elementary students. In addition, the authors of the meta-analysis suggested that handwriting and spelling could account for as much as 25% of the variance, independently, on written performance. Kent and Wanzek (2016) also wanted to examine if grade level was a moderating variable for the relationship between writing skills and written performance. It was found that grade level did not moderate the relationship between spelling and writing quality ($Q_{between} = 0.05$, p = .83) or the relationship between handwriting and writing quality ($Q_{between} = 2.66$, p = .10).

Although grade level was not found to be a moderator, it is still worth noting that there was a decreasing trend of spelling's influence on writing as students age. For example, studies that have examined spelling's influence on written performance (with no controlling variables) by each elementary grade level has been shown to account for 57% of the variance in first-grade students, 30% of the variance in second-grade students, 17.7% of the variance in third-grade students, and 10% of the variance in fourth-grade students (Eggleston, 2017; Juel, 1988; Juel et al., 1986). No research studies have explicitly examined the variance of written performance accounted for by spelling in a sample that included typically-developing fifth-grade students.

In total, the studies demonstrate that handwriting and spelling skills are predictive of students' writing performance and demonstrate the foundational role these skills play in the development of writing (Eggleston, 2017; Kent & Wanzek, 2016; Juel, 1988; Juel et al., 1986). The information from the meta-analysis was particularly helpful because it summarized and condensed many studies examining the relationship between handwriting, spelling, and writing

performance. However, it should be noted that all studies included in the Kent and Wanzek (2016) meta-analysis were correlational in nature and intervention studies were excluded from the analyses. Correlational studies are limited because they can only really assess whether variables are related, and no causality can be drawn from these studies. Therefore, it is also helpful to review findings from intervention studies, because we can examine causality by assessing whether spelling and handwriting directly affect the written performance of elementary-aged students. In the following section, relevant information from a meta-analysis on spelling instruction (Graham & Santangelo, 2014), a meta-analysis on handwriting instruction (Santangelo & Graham, 2016), and a meta-analysis on writing instruction will be discussed (Graham, McKeown, Kiuhara, &Harris, 2012).

Spelling and handwriting interventions. It is theorized that spelling and handwriting can have a significant impact on the written performance of developing writers (Berninger et al., 2002). In a meta-analysis on writing instruction, Graham, McKeown, Kiuhara, and Harris (2012) found that teaching handwriting and spelling can moderately enhance the writing quality of students in first grade through third grade (M ES = 0.55, p = 0.02). Considering these findings (i.e., handwriting and spelling's moderate effect on writing), Graham et al. (2012) recommended that there should be explicit instruction on handwriting and spelling within the classroom. Graham et al. (2012) also recommended that more research should be conducted examining what skills contribute to writing development and at which developmental point are these skills salient. Later, Graham and colleagues (2014; 2016) would conduct meta-analyses on the influence of handwriting and spelling on writing separately.

In a meta-analysis of experimental and quasi-experimental studies involving explicit spelling instruction, Graham and Santangelo (2014) sought to examine whether spelling

instruction produced greater gains in spelling generally, greater gains in spelling within the context of writing, and whether spelling gains maintained over time. To be included in the meta-analysis, all studies had to have a treatment condition that contained a spelling instruction component. The results of the analysis showed that formal spelling instruction produced greater spelling gains in comparison to groups with no spelling instruction (M ES = 0.70; $p < 0.01$), produced gains in correctly spelled words while writing (M ES = 0.94; $p < 0.05$), and produced spelling gains that maintained across time (M ES = 0.53; $p < 0.001$). However, it was found that the influence of spelling instruction on written performance was not statistically significant.

This finding was surprising given that a meta-analysis with correlational studies (Kent and Wanzek, 2016) found a significant relationship between spelling and writing quality in younger elementary students (M ES = 0.47 for Grades 1-3) and upper-elementary students (M ES = 0.41 for Grades 4-6). However, it should be noted that Kent and Wanzek (2016) were able to accumulate eighteen effect sizes from the literature and Graham and Santangelo (2014) were only able to accumulate six empirical studies that examined the effect of spelling instruction on writing quality in elementary students. In addition, none of the six studies had fifth-grade participants and only one study had third-grade students. Given the small number of studies, information about spelling's impact on writing should be interpreted cautiously. However, the findings from Graham and Santangelo (2014) were in line with Kent and Wanzek (2016) because they both found that grade level did not moderate the impact of spelling instruction on writing.

In a meta-analysis on handwriting instruction, Santangelo and Graham (2016) sought to examine whether handwriting instruction improved the written performance of students in grades K-12 by assessing experimental and quasi-experimental studies. In addition, by examining the effects of handwriting instruction on written performance in younger students, they aimed to

examine a major theoretical tenet of the Not-So-Simple View of Writing (Berninger & Winn, 2006), which proposes that handwriting is crucial to writing development. To be included in the meta-analysis, all studies had to have a handwriting intervention within the study. In comparison to groups with no handwriting instruction, the results of the analysis showed that formal handwriting instruction produced greater writing gains in writing length (*M* ES = 1.33, $p < .01$), writing quality (*M* ES = 0.64, $p < .01$), and writing fluency (*M* ES = 0.48, $p < .01$). It should be noted that data was used from mostly first-grade through third-grade samples. Clearly, handwriting instruction has positive effects on several different aspects of writing for developing writers. The researchers concluded that their findings support the Not-So-Simple View of Writing: written performance improved as handwriting improved, because less cognitive resources were being utilized by handwriting (Santangelo & Graham, 2016).

The results of this meta-analysis of the empirical research found greater effect sizes on the relationship between handwriting and written performance than in the Kent and Wanzek (2016) meta-analysis on correlational research. This proves further evidence that there is a relationship between handwriting and written performance (Kent & Wanzek, 2016) and handwriting instruction improves written performance (Berninger et al., 2002; Santangelo & Graham, 2016;). Similar to the results of Kent and Wanzek (2016), Santangelo and Graham (2016) found that handwriting's effect on written performance was not moderated by grade level. In addition, most of the results of the meta-analyses (Graham et al., 2012; Kent & Wanzek, 2016; Santangelo & Graham, 2016) support the notion that promoting spelling and handwriting skills help to improve students' written performance positively.

Summary: Handwriting, spelling, and the Not-So-Simple View of Writing. Research has shown that there is a relationship between handwriting and written performance (Kent &

Wanzek, 2016), and that handwriting enhances writing quality, writing fluency, and writing length (Santangelo & Graham, 2016). In addition, research has shown a moderate relationship between spelling and writing as well (Kent & Wanzek, 2014) and spelling instruction has a positive influence on correctly spelled words during writing (Graham & Santangelo, 2014). Although, spelling instruction does not seem to significantly enhance written performance (Graham & Santangelo, 2014). Researchers hypothesized that students might have trouble generalizing the learned spelling skills into a context where it is needed like during essay writing. Collectively, these findings support the Not-So-Simple View of Writing (Berninger & Winn, 2006), which theorizes that handwriting and spelling are foundational skills in writing development.

Lastly, these skills are important across all elementary grade levels given that three meta-analyses (Graham & Santangelo, 2014; Kent & Wanzek, 2016; Santangelo & Graham, 2016;) found that the handwriting and spelling positively influenced writing and grade level was not a moderating variable. These findings may suggest that handwriting and spelling continue to be important skills beyond lower elementary. Although handwriting and spelling influence the writing quality in developing writers, they are not the only variables to do so. In the Not-So-Simple View of Writing, there are some important cognitive components that are theorized to play an influential role in the writing process: working memory and executive functioning (Berninger & Amtmann, 2003).

Cognitive Components of Writing: Working Memory and Executive Functioning

All components of the writing process are heavily reliant on working memory resources (Dehn, 2015). Working memory has long been thought of as the ability to temporarily hold information while simultaneously processing and/or manipulating the same or different

information for a short period of time (Dehn 2015; Jackson, Linden, Roberts, Kriegeskorte, & Haenschel, 2015). In addition, it is usually conceptualized as a distinct type of memory entity that interacts with other memory processes, such as short-term memory and long-term memory. Although this seems to be a long-standing definition and conceptualization of working memory, there have been several different models created over the years and each model differs in its conceptualization (Baddeley & Hitch, 1974; Cowan, 2005; Daneman & Carpenter, 1980; Ericsson & Kintsch, 1995; Kane, Bleckley, Conway, & Engle, 2001). Arguably, the most widely known and predominant model of working memory has come from the work of Baddeley and colleagues (1974, 1986, 2006). According to Baddeley and colleagues (2006), working memory has various subcomponents, which include the phonological loop, visuospatial sketch pad, and the central executive. The primary responsibility of the phonological loop is to process verbal and auditory information, while the visuospatial sketchpad processes visual and spatial information. The central executive pulls information from long-term memory and coordinates the activity of the phonological loop and the visuospatial sketchpad. The episodic buffer works by providing extra storage capacity and connecting the central executive to long-term memory. In addition, working memory is thought to be separate and distinct, but related to other memory entities, such as long-term memory.

Although research from Baddeley and colleagues (2006) informed the predominant working memory model, other researchers have differed in their conceptualization. For example, Daneman and Carpenter (1980) hypothesized that working memory ability is more dependent on processing efficiency and their model minimizes the role of storage capacity. That is, working memory is more dependent on how fast one processes a task, not whether they can hold information. Others, such as Ericsson and Kintsch (1995) argued that working memory and

long-term memory are not distinct entities (i.e., working memory is the capable utilization of information within long-term memory). However, Kane et al. (2001) distinguished working memory and short-term memory as separate entities and conceptualized working memory as a type of executive function – whose primary ability is to control one's attention towards a task in order to maintain the information. Similarly, Cowan (2005) argued that working memory is embedded within long-term memory and argues that attention, expertise, and levels of activation are necessary components of working memory.

The most integrated model of working memory, conceptualized by Dehn (2015), incorporates components from previous models in order to provide clinicians with useful information during the assessment and subsequent intervention of working memory skills, such as creating accommodations for working memory weaknesses or deficits. Within this model, short-term memory, long-term memory, and working memory are considered separate but interrelated systems. The over-arching working memory system is called executive working memory, which is further broken down into verbal working memory and visuospatial working memory. Verbal working memory is further broken down into active verbal long-term memory and phonological short-term memory, while visuospatial working memory is further broken down into visual-spatial short-term memory and active visual-spatial long-term memory.

In relation to writing, the activation of working memory components depends on student's writing development. For example, Dehn (2015) stated that phonological short-term memory, visual-spatial short-term memory, visual-spatial working memory, verbal working memory, and executive working memory are most highly related to the written expression skills of younger students. For older students, the working memory components most related to written expression skills are verbal working memory and executive working memory. Although

the research studies do not delineate the ages for young writers and older writers, Dehn argues that students 8 years (i.e., the average age for third-grade) and up constitute older writers. However, given that approximately 73% of students in the United States are not proficient in writing (The Nation's Report, 2011), which is the *majority* of students, it is likely that older students continue to utilize working memory components associated with younger writers, due to the lack of proficiency and automaticity in their writing. Dehn (2015) also argued that when students automatize basic writing skills, executive working memory skills becomes the primary component involved in written expression as it is essential for helping to translate ideas into writing. This conceptualization aligns with the Not-So-Simple View of Writing (Berninger & Amtmann, 2003), which posits that basic writing skills (e.g., handwriting and spelling) need to be automatized in order for students to use working memory resources for translating ideas.

Dehn (2015) highlighted that educators have largely ignored the importance of working memory and its relation to academic learning. In writing, there is substantial evidence demonstrating the relationship of working memory to written expression skills. For example, on the Woodcock-Johnson – Fourth Edition (WJ – IV; Schrank, Mather, & McGrew, 2014), the relationship between working memory and basic writing skills (r = .59) is more highly correlated than other academic domains, including basic reading skills (r = .49), reading comprehension (r = .46), and math computation skills (r = .48).

The strong relationship between working memory and written expression has been evidenced by a number of empirical studies (e.g., Adams, Simmons, & Willis, 2015; Berninger et al., 2010; Swanson & Berninger, 1996). For example, in a study on working memory and writing development, Adams, Simmons, and Willis (2015) examined gender differences associated with how memory components (i.e., visual-spatial short-term memory, verbal short-

term memory, visual-spatial working memory, and verbal working memory) support different writing processes (i.e., alphabet transcription; writing fluency; writing quality) in a sample of 90 children, between the ages of five and eight-years. Overall, it was found that there was not a statistically significant group effect of gender on writing performance, which adds to an inconsistent literature of studies that either finds no gender difference in writing performance (e.g., Cameron, Lee, Webster, & Monroe, 1995) or that girls demonstrated greater writing performance (e.g., Bourke & Adams, 2011). However, there were differences in the specific memory components that male and female students used. Of the three writing processes assessed, alphabet transcription (i.e., a measure of orthographic-motor integration) offered the largest gender difference in the utilization of memory components. It was found that alphabet transcription was not related to any memory measure in girls, but it was related to both measures of short-term memory (verbal short-term memory and visual-spatial short-term memory) in boys. That is, visual-spatial short-term memory predicted 18.1% of the variance in alphabet transcription skills for boys, but only 2.3% of the variance for girls.

Similarly, verbal short-term memory predicted 48.4% of the variance in boys, but only 4.8% of the variance in girls. When all the memory variables were combined, these memory variables accounted for 52.6% of the variance in alphabet transcription for boys, but only 6.3% for girls. The authors concluded the short-term memory might predict alphabet transcription skills in boys but not girls. In addition, it was found that verbal working memory skills predicted writing fluency (but not writing quality) among males, whereas visual-spatial short-term memory skills predicted writing fluency for females. The authors noted that there has been a consistent relationship between verbal working memory and writing quality and since this relationship was not seen in boys – it may reflect boys' greater reliance on verbal memory skills for basic skills

due to a lack of effortless transcription skills in boys. Cognitively, it appears that developing writers may be utilizing different aspects of their working memory and these differences may be accounted for by gender.

In another study assessing aspects of working memory and writing development, Berninger et al. (2010) used structural equation modeling to examine whether sentence-level working memory and word-level working memory skills predicted performance on measures of handwriting, spelling, and written expression in a sample of second, fourth, and sixth-grade students. For second-grade, it was found that word-level working memory significantly predicted performance on all measures, but sentence-level working memory did not. In fourth grade, word-level working memory skills significantly predicted handwriting, spelling, and written expression. Sentence-level working memory did not predict any of these measures. For sixth grade, only word-level working memory predicted spelling performance. Given these findings, Berninger et al. (2010) argued that word-level working memory contributes directly to writing through transcription and transcription's constraints on working memory may impact sentence-level working memory. In addition, the authors argued that working memory contributes to students' written performance as early as second-grade.

In another study related to working memory and writing, Swanson and Berninger (1996) examined the unique contribution of verbal working memory, visual-spatial working memory, executive working memory, and phonological short-term memory on measures of handwriting, spelling, and written performance (i.e., written performance was broken down into writing fluency, writing micro-organization, and writing quality) using regression in a sample of 100 fourth-grade students and 100 sixth-grade students. It was that found phonological short-term memory accounted for 18% of the variance in spelling performance, 12% of the variance in

handwriting, and 5% of the variance in writing quality. However, phonological short-term memory did not explain variance in writing fluency or writing micro-organization. Executive working memory accounted for 6% of the variance in writing fluency, 9% of the variance in writing quality, and 6% of the variance in writing micro-organization. Swanson and Berninger concluded that working memory measures better predicts text-generation (i.e., related to writing quality or fluency), while short-term memory measures better predict transcription measures. In addition, this study shows that working memory is a significant predictor of writing. These findings, in conjunction with the Not-So-Simple View Writing, emphasize the role working memory plays in students' writing development.

Another cognitive component of the Not-So-Simple View of Writing is executive functioning skills. Broadly speaking, executive functioning skills have been described to encompass the cognitive processes used to regulate and control one's thoughts and behaviors in order to plan and achieve a goal (Jackson et al., 2015). Within the context of the Not-So-Simple View of Writing model (Berninger & Winn, 2006; see Figure 1), executive functioning serves a supporting structure, along with transcription skills, to text generation in the writing model. Specifically, within this writing model, executive functioning consists of many sub-skills that are relevant to writing, which include planning, reviewing, revising, strategies for self-regulation, strategies for self-monitoring, goal-setting, and supervisory attention (Berninger & Amtmann, 2003). It should be noted that it is difficult for beginning writers to use executive function skills effectively until they have automatized basic skills (e.g., spelling and handwriting) – as these basic skills continue to utilize working memory resources (Berninger & Amtmann, 2003). When transcription skills are not automatized, beginning writers utilize a *knowledge-telling approach* to writing (Bereiter & Scardamalia, 1987), which involves only writing what the writer knows

about the topic and not using executive functioning such planning and revising to improve the text (Jackson et al., 2015). Once basic writing skills are automatized, writers can move into the *knowledge-transforming approach* to writing (Bereiter & Scardamalia, 1987) and utilize executive functioning skills (i.e., editing, revising, and reviewing) to create more complex text (Jackson et al., 2015). Therefore, in developing writers, executive functioning skills may not play as significant a role as other factors, such as transcription skills (e.g., Drijbooms, Grown, & Verhoeven, 2015). This is evidenced by studies from Juel (1986; 1988), who found that the relative impact of spelling decreased over time and the impact of ideation (i.e., generating and organizing ideas) increased as students became older as there were more cognitive resources (i.e., working memory) becoming available for generating ideas.

There is a small, but growing, number of research studies that specifically examined the relationship between executive functioning skills and writing outcomes for developing writers (Jackson et al., 2015). For example, Hooper, Swartz, Wakely, deKruif, and Montgomery (2002) examined the relationship between executive functioning skills (e.g., set shifting, sustaining, inhibition, and initiation) and the written expression skills in 55 elementary-aged students with and without writing problems. Using analysis of covariance (ANCOVA), they found a statistically significant difference between the two student groups on their initiation and set shifting skills. However, the researchers noted that the effect sizes were small (ES range, .09 to .16). Given the contrary findings, the authors proposed that executive functioning skills may become more important as students move into higher grades (i.e., specifically after 5th grade), because younger writers are more likely to depend on orthographic and phonological skills. The researchers argued that additional variables need to be assessed to understand better all the variables that contribute to the writing process, because there may be other variables that explain

writing development better than executive functioning skills. For example, in these studies that included neurocognitive variables such as executive functioning skills, social-cognitive variables such as writing motivation were not considered. Specifically, two subtypes of writing motivation such as writing self-efficacy and writing attitudes are often overlooked even though research has found that they have positive associations with writing (e.g., Graham et al., 2017; Knudson, 1995).

Other studies have examined the contribution of executive functioning skills to different types of writing prompts. For example, Balioussis et al. (2012) examined whether measures of executive functioning skills (i.e., *shifting* as measured by the Contingency Naming Task and *updating* as measured by the Letter Memory Task) and working memory (i.e., referred to as *mental-attentional capacity* as measured by the Direction Following Task) predicted the written performance on narrative and persuasive writing prompts among 35 third-grade and 35 fifth-grade students. Results indicated that shifting accounted for 5.9% of the variance in both narrative writing and persuasive writing. Updating accounted for 6.9% of the variance in both narrative writing and persuasive writing. Working memory accounted for 8.2% of the variance in narrative writing and 13.8% of the variance in persuasive writing. This study showed the executive functioning skills tended to contribute the same amount of variance in both narrative and persuasive writing prompts consistently. However, working memory contributed more variance in persuasive writing prompts, which may indicate that working memory is utilized more when more utilization of critical thinking skills is needed. In addition, this study shows that there is a larger amount of unexplained variance in narrative writing, which aligns with Hooper et al. (2002)'s argument that additional variables need to be studied.

In another study examining the relationship between executive functioning skills and writing, Arán-Filippetti and Richaud (2015) examined the amount of variance that different types of executive functioning skills accounted for in students' narrative writing and expository writing, after controlling for age, reading comprehension, and verbal intelligence. The results of the study found that working memory and spontaneous flexibility contributed 13% of the variance in narrative writing, while spontaneous flexibility, working memory, and inhibition accounted for 24% of the variance in expository writing. This study is in line with the results of Balioussis et al. (2012) who found that neurocognitive factors, like working memory and executive functioning skills, contributed more variance in expository writing than narrative writing. In addition, as in Balioussis et al. (2015), there is more unexplained variance in the students' narrative writing. In addition, these findings align with Hooper et al. (2002)'s argument that other variables may be just as important as executive functioning skills during this developmental period of writing. Also, similar to a study conducted by Balioussis et al. (2012), Arán-Filippetti and Richaud (2015) did not examine writing motivation variables, such as writing self-efficacy and writing attitudes.

In a study with 121 fourth-grade students, Drijbooms, Grown, and Verhoeven (2015) examined the contribution of different executive functioning skills to various aspects of narrative writing (i.e., text length, syntactic complexity, and story content) in a model that included transcription skills and language skills using hierarchical regression analyses. Results indicated that the updating and inhibition skills of executive functioning contributed 8% of the variance in text length, while transcription skills accounted for 13% and language skills accounted for 3%. The results of this study showed that transcription accounted for more variance than executive functioning skills in students' narrative writing. Therefore, in developing writers, executive

functioning skills may not play as big a role as other factors, such as transcription skills. However, Olive (2012) stated that is important for research to also investigate how social and motivational factors impact writers' cognitive functioning, specifically their working memory, and their transcription skills. No study to date has examined how executive functioning skills, transcription skills, working memory ability, and motivational variables (e.g., writing self-efficacy and writing attitudes) affect students' writing development.

Overall, all these studies (Balioussis et al. 2012; Drijbooms, Grown, & Verhoeven, 2015; Arán-Filippetti & Richaud, 2015; Hooper et al., 2002) demonstrate that executive functioning skills play a role in the writing process and can influence the quality of students' written performance. However, it seems that the role of executive functioning skills play in developing writers is limited. Balioussis et al. (2012) and Drijbooms, Grown, and Verhoeven (2015) found that the amount of variance in students' writing explained by executive functioning skills was between 6 – 8 %. In addition, Balioussis et al. (2012) found that the amount of variance explained by executive functioning was consistent across narrative writing prompts and more extensive writing prompts, such as persuasive writing. When working memory is added into the model, it explains more of the variance in writing prompts that seemingly require more critical thinking skills, like expository writing and persuasive writing (Balioussis et al., 2012). Transcription skills have also been examined with executive functioning skills and their subsequent relationship to writing. Drijbooms, Grown, and Verhoeven (2015) found that executive functioning contributed 8% of variance in text length, while transcription skills accounted for 13%. The results of this study showed that in developing writers, executive functioning skills may not play as big a role as other factors, such as transcription skills. In addition, Hooper et al. (2002) found significant, but small, group differences in the executive

functioning skills of developing writers. These results prompted Hooper et al. (2002) to suggest that additional variables need to be assessed to better understand all the variables that contribute to the writing process. For example, none of these studies assessed whether additional variance could be explained by motivational factors such as writing attitudes and writing self-efficacy. Both variables, especially writing self-efficacy, have been consistently found in the research literature to predict the writing performance of developing writers (e.g., Graham et al., 2017; Knudson, 1995; Knudson, 1992).

Motivational Components of Writing: Writing Attitudes and Writing Self-Efficacy

The Not-So-Simple View of Writing was created to try to encompass the relevant factors that affect writing development. Although the model includes many important factors, it does not include social-cognitive variables that would fall under the category of motivation. Olive (2012) stated that is important for research to investigate how social and motivational factors impact writers' cognitive functioning, specifically their working memory, and their transcription skills. Motivational variables, such as writing attitudes and writing self-efficacy, have consistently been found to be associated with the written performance of elementary-students (Graham et al., 2017; Pajares et al., 1999; Pajares and Valiante, 1997) and should be examined to see whether these variables contribute to students' writing performance.

In a variety of academic domains, motivation is an important component for growth (Alexander, 2004). In a systematic review of the literature on writing attitudes, Ekholm, Zumbrunn, and DeBusk-Lane (2017) examined correlational, experimental, and quasi-experimental research that assessed writing attitudes in relation to writing achievement, gender, and age. In the review, there were thirteen studies that contained a sample of elementary-aged students, but only four studies examined the writing attitudes of students as a predictor of written

performance in typically-developing children (Graham, Berninger, &Fan, 2007; Graham, Berninger, & Abbott, 2012; Graham et al., 2017; Olinghouse & Graham, 2009). The results of the review highlighted that most studies found students' writing attitudes to predict different aspects of written performance (e.g., writing quality, writing length) positively in elementary-aged students (e.g., Graham et al., 2012; Graham et al., 2017). For example, in the Graham, Berninger, and Abbott (2012) study, first-grade and third-grade students were given a self-report measure of writing attitudes and then asked to write a narrative story. It was found that writing attitudes predicted 18% of the variance in writing quality, 14% of the variance in writing length, 14% of the variance in the longest writing sequences in third-grade students. However, the writing attitudes of first-grade students did not predict any metric (e.g., writing quality, writing length, etc.) of written performance.

In another study, Graham, Berninger, and Fan (2007) sought to examine the structural relationship between writing attitudes and written achievement in first-grade and third-grade students using structural equation modeling. Students were given a self-report measure to assess their writing attitudes and then they were administered the essay composition subtest from the WIAT- II, which gives information about writing quality, writing length, and longest word sequence. The results of the study found writing attitudes to predict written performance in a unidirectional manner. They also examined whether the relationship between writing attitudes and writing performance was reciprocal but found it to be not significant. In addition, there was no statistically significant difference between the writing attitudes of first-grade students and third-grade students, although third-grade students wrote better. In addition, although girls did have better writing attitudes, their writing achievement was not significantly different from the

boys. This last finding aligns with other research (Graham et al., 2012; Knudson 1992) finding that girls consistently have more positive writing attitudes than boys do.

Although not included in the literature review, Knudson (1995) examined the relationship between different variables (i.e., writing attitudes, writing experiences) and written performance in 430 students in first-grade through sixth-grade using stepwise multiple regression. Attitudes were measured using a student self-report measure, writing experiences were captured through an interview with a subsample of the students (i.e., 12 students per grade), and written performance was measured through a writing sample. The results of the analysis showed that grade level accounted for 40.6% of the variance in written performance, writing attitudes accounted for 3.8% of the variance in written performance, and gender accounted for 1.7% of the variance in written performance. The results of the study highlighted the importance of grade level and writing attitudes for written performance. However, it would have been more interesting if the author had reported how writing attitudes differed across the different grade levels. It was unclear how the influence of writing attitudes and writing experiences on writing performance changed across grade level. The qualitative information gleaned from interviewing students captured some interesting findings about third-grade students. The author referred to third-grade as the "turning point" for writing attitudes. For example, in third-grade, students began to place greater emphasis on the writing process instead of the writing product. In addition, although most students in the study stated that writing is important for success in school, this point was particularly emphasized by third-grade interviewees. While this qualitative information is interesting, it should only be taken at face-value given that only twelve students were interviewed in each grade.

The results of these studies (Graham et al., 2012; Graham et al., 2007; Knudson, 1995) demonstrate a predictive relationship between writing attitudes and written performance in third-grade students. However, the inconsistent findings with first-grade students may suggest that the predictive value of writing attitudes may vary as a function of grade level. For example, Olinghouse and Graham (2009) found a statistically significant difference in writing attitudes between second-grade students and fourth-grade students, favoring second-grade. In fact, results from the systematic review of writing attitudes found that writing attitudes tend to decrease as students move into higher grades. In her studies on developing writing attitudes measures, Knudson (1992; 1991) found that younger students tended to have more positive writing attitudes than older students (e.g., first-grade students tended to have more positive attitudes toward writing than third-grade students). There seem to be some inconsistencies between studies regarding the relationship between grade level and writing attitudes.

Although there have been some consistent findings in writing attitudes, such as its predictive value in relation to written performance, Ekholm et al. (2017) have pointed out gaps in the writing attitude literature. For example, there are no studies that have examined writing attitudes in the context of a writing framework (e.g., Not-So-Simple View of Writing). In addition, there is not much research about how writing attitudes relate to other motivational constructs such as writing self-efficacy. Except for Graham et al. (2017), no other study has examined writing self-efficacy and writing attitudes in the same study, which seems like an oversight given that writing self-efficacy is a variable that has been heavily studied in the literature.

In general, self-efficacy beliefs are created by gleaning information from the following four sources: mastery experiences (i.e., experience with the task), vicarious experiences, verbal

messages and social persuasion, and physiological states at the time of the task (Bandura, 1997). Pajares, Johnson, and Usher (2007) sought to examine whether these sources inform writing self-efficacy and determine whether they varied as a function of gender and grade level using multiple regression analyses. Students completed a self-report of writing skills self-efficacy (i.e. items asked about their confidence to perform certain skills related to writing), a sources of self-efficacy self-report, and a writing sample. Teachers judged the written abilities of students through a teacher-report. Mastery experiences were the best predictor of writing self-efficacy among elementary-aged students ($\beta = .490$, $p < .0001$), followed by anxiety/stress (i.e., physiological states; $\beta = -.257$, $p < .0001$). Vicarious experience and social persuasion were not significant. In addition, elementary students reported higher writing self-efficacy than older students did. Girls reported having higher writing self-efficacy reports than boys and gender was significantly correlated with writing self-efficacy ($r =. -10$, $p < 0.0001$). The teachers also reported girls to be better writers.

These findings are in line with other correlational research (e.g., Pajares, Miller, & Johnson, 1999; Pajares &Valiante, 1997; ; Shell, Colvin, Bruning, 1995) finding that writing skills self-efficacy (i.e., confidence to perform specific writing skills like spelling and grammar), which is most closely related to mastery experiences, to be a good predictor of written performance in developing writers. The findings from this study are important because they help to illustrate the predictive value of writing skills self-efficacy (i.e., confidence in writing skills).

In one of the first studies to examine the relationship between writing self-efficacy and written performance with elementary students in their sample, Shell et al. (1995) found writing skills self-efficacy (e.g., confidence to spell a word) to be a statistically significant predictor of written performance in fourth-grade students, while writing tasks self-efficacy was not. This is

an important finding because it showed that writing skills self-efficacy (e.g., confidence to spell a word, punctuate a paragraph) was particularly helpful to predict written performance in younger writers. In another study, Pajares and Valiante (1997) examined the impact of the following variables on fifth-grade students' written performance: writing self-efficacy, writing apprehension, writing aptitude, and perceived usefulness of writing. Students completed self-report measures (e.g., writing skills self-efficacy scale) to examine these variables and subsequently, wrote an essay as a measure of written performance.

The results of the study found that writing self-efficacy (β=.356) and writing aptitude (β=.601) to be significant predictors, and it was found that writing self-efficacy partially mediated the effect of writing aptitude on written performance. Perceived usefulness of writing and writing apprehension had no effects and researchers hypothesized that these variables may be a by-product of writing self-efficacy. The results of these studies (Pajares & Valiante, 1997; Shell et al., 1995) demonstrated that writing skills self-efficacy (i.e., confidence in performing specific writing skills) predicts writing. The skills assessed on the measure are usually lower-level writing skills and the development of lower-level writing skills is hypothesized to be important for the improvement of written performance in developing writers (Simple View of Writing; Berninger et al., 2002).

Another interesting finding in Pajares and Valiante (1997) was that the difference between girls' writing self-efficacy scores and boys' writing self-efficacy scores was statistically significant. Girls' writing self-efficacy scores were higher. This finding was not in line with the findings reported by Shell et al. (1995). Specifically, girls' writing self-efficacy scores were higher; however, the difference was not statistically significant. To bring clarity to the inconsistent gender differences reported in writing self-efficacy, Pajares, Miller, and Johnson

(1999) examined whether writing-related variables' relationship to written performance differed according to gender among elementary-aged students (i.e., third grade through fifth grade). They examined the following variables: writing self-efficacy, writing self-concept, perceived usefulness of writing, writing aptitude, and self-efficacy for regulated learning. Students were given self-report measures for writing self-efficacy (i.e., writing skills self-efficacy scale), writing self-concept, perceived usefulness of writing, and self-efficacy for regulated learning. Afterward, students completed an essay and teacher-reports served as a measure of writing aptitude.

The results of this study indicated that although girls had higher self-efficacy scores and were judged as better writers by their teachers, the differences were not statistically significant. In addition, the results of their multiple regression analysis found that writing self-efficacy (β=.397) and writing aptitude (β= .387) were statistically significant in relation to written performance, but the other variables were not. In addition, a path analysis found that the relationship between writing aptitude and written performance was partially mediated by writing self-efficacy (β= .130). The results of this study provided further evidence that writing skills self-efficacy predicted written performance and further corroborated those studies indicating no role of gender. Another contribution of this study was that it demonstrated that the relationship between writing self-efficacy and written performance could be reliably examined in students as young as third-grade. Besides the work of Pajares, Miller, and Johnson (1999), no other published study has examined the relationship between writing self-efficacy and written performance among third-grade students.

After being used in years of research, Pajares (2007) validated the writing skills self-efficacy scale and demonstrated that the measure was a statistically significant predictor of

students' written performance. However, a drawback of the measure is that it was not developed in the context of a theoretical writing model, although some researchers (Limpo & Alves, 2013) used this measure and then subsequently framed their results in the context of the Simple View of Writing. For example, Limpo and Alves (2013) published a study that examined the contribution of planning, revision, handwriting, spelling, and writing self-efficacy to writing quality of younger students (i.e., grades 4-6) and older students (i.e., grades 7-9) using the writing skills self-efficacy measure (Pajares, 2007).

Using multiple-group structural equation modeling, researchers found that the model accounted for 82% of the variance of their writing quality in older students. For younger students, it was found that the model accounted for 76% of the variance in writing quality and both handwriting, and spelling contributed directly to text generation. The latter finding makes sense, because according to the Not-So-Simple View of Writing, text generation is usually constrained by lack of handwriting and spelling automaticity in younger students. In addition, it is important to note that writing self-efficacy was influenced by handwriting and spelling ability in all grades, which may suggest that students across grade levels may gauge their writing confidence by their handwriting and spelling ability. This study was important, because it showed that much of variance in developing writers' written performance was accounted for by the components found within the Not-So-Simple View of Writing (e.g., planning, revising, handwriting, and spelling) in conjunction with writing self-efficacy. However, there were some limitations in the study. First, the researchers did not examine younger students such as third-grade and Pajares et al. (1999) found the relationship between writing self-efficacy and written performance to be significant in that population. Second, they examined the results of their study within the context of the Not-So-Simple View of Writing for the younger students;

however, the writing skills self-efficacy measure used was not developed in the context of that writing framework. Third, other influential writing-related variables, such as writing attitude, were not included. Fourth, although not a limitation, this study was conducted in Portugal and it is unknown how these results would generalize to children in the United States.

In a related study, Graham, Kiuhara, Harris, and Fishman (2017) attempted to examine whether writing-related variables (i.e., planning, writing attitudes, and writing self-efficacy) predicted the writing quality of fourth-grade students. In this study, Graham et al. (2017) took most of the items from the writing self-efficacy scale used in work by Bruning et al. (2013), who developed a scale in the context of the Hayes and Flower (1980) model and revised them so that they were developmentally-appropriate. Items were specifically about writing skills and ideation, which aligns with the components of the Not-So-Simple View of Writing. Students were asked to complete the writing self-efficacy measure, along with other self-report measures (i.e., planning and writing attitudes). Then they were given 35 minutes to write an essay. In their analysis, they controlled for gender and found that planning, writing self-efficacy, and writing attitudes predicted writing quality in fourth-grade students. Although writing self-efficacy and writing attitudes predicted writing quality in this study, it only accounted for 5.2% of the variance, which is less than the researchers expected.

It is important to note that the writing samples used in Graham et al.'s (2017) study were retyped and all spelling errors were corrected. Although Graham and colleagues argued poor spelling and handwriting ability would impede the participants' ideas from being expressed and impact writing quality, given that spelling and handwriting account for much of the variance in written performance (Graham & Santangelo, 2014; Santangelo & Graham, 2016), this may have impacted the outcome measure (i.e., written performance) and its relationship with writing self-

efficacy. In addition, most elementary-aged students may not be able to spell check their words in class or during a test; therefore, it may be more helpful to examine writing samples that have not been altered so the results may generalize better. The results of these studies (Graham et al., 2017; Limpo & Alves, 2013) illustrate the importance of examining how different variables can affect written performance in developing writers. However, the Graham et al. (2017) study could be expanded by taking the variance of spelling and handwriting into account and the Limpo and Alves (2013) could be expanded by using a writing skills self-efficacy measure created in the context of a writing model. In addition, Graham et al. (2017) recommended that other studies examine the relationship between writing self-efficacy, writing attitudes, and written performance in younger and older students.

The Importance of Examining Academic Skills, Cognitive Skills, and Motivational Skills within the Context of the Not-So-Simple View of Writing

One of the major theoretical tenets of the Not-So-Simple View of Writing is that lower-level writing skills, like handwriting and spelling, must be automatized for students to become proficient writers (Berninger et al., 2002). Meta-analyses have shown that handwriting and spelling both moderately enhance the written performance of elementary-ages students' writing (Kent et al., 2016; Santangelo & Graham, 2016) and has been hypothesized to account for as much as 25% of the variance each in the writing performance (Kent et al., 2016). Graham et al. (2012) found an average effect size of 0.55 for teaching handwriting and spelling and subsequently recommended that handwriting and spelling be explicitly taught in the classroom. In addition, research has showed that working memory and executive functioning skills are related to writing outcomes among elementary-aged students (Adams et al., 2015; Balioussis et

al. 2012; Berninger et al., 2010; Drijbooms et al., 2015; Arán-Filippetti & Richaud, 2015; Hooper et al., 2002; Swanson and Berninger, 1996)

Although the Not-So-Simple View of Writing has a place for these writing-related skills, it does not account for motivational variables that affect writing such as writing attitudes and writing self-efficacy, even though both have been found to predict written performance (e.g., Graham et al., 2017; Pajares et al., 1999). Research assessing the relationship between writing skills self-efficacy and writing (Limpo &, 2013; Pajares et al., 2007, Pajares et al., 1999; Pajares et al., 1997; Shell et al., 1995) consistently demonstrates that students' confidence in performing lower-level writing skills predicts written performance. Interestingly, other researchers have argued that writing self-efficacy should be an explicit goal of classroom instruction (Bruning & Kauffman, 2016), similar to the Graham et al. (2012) recommendation regarding explicit classroom instruction in spelling and handwriting. As a result, it is easy to see how writing skills self-efficacy could fit in the Not-So-Simple View of Writing. For example, writing skills self-efficacy measures measure lower-level skills that students need to master to become proficient writers, which aligns with some of the theoretical tenets of the Not-So-Simple View of Writing (Berninger & Winn, 2006; Graham et al., 2017; Pajares, 2007). In addition, without considering the role of writing skills self-efficacy, the model may not accurately portray all the factors associated with students' written performance.

For example, Kent and Wanzek (2016) argued that spelling and handwriting independently seem to only account for 25% of the variance in written performance. Therefore, research needs to examine additional factors that could impact writing performance. Perhaps, writing self-efficacy and writing attitudes could help to improve that amount of variance by examining all these variables together. Previous research (Graham et al., 2017; Limpo & Alves,

2013) has demonstrated how viable these variables are to examine in students as young as fourth-grade. These variables together have not been examined often in students younger than fourth grade and more research is needed in this area. In addition, if we examine all these variables together, we can examine if an individual variable's predictive validity changes when it is put in a model with other variables.

The intercorrelations between variables can be further examined if they are placed within the same model. Some research has found support for these associations. For example, Rankin, Bruning, and Timme (1994) examined the relationship between spelling self-efficacy and spelling performance in 221 fourth-grade students. It was found that spelling self-efficacy was significantly correlated with spelling performance ($r = 0.31$, $p < .001$) and accounted for 10.5% of the variance in spelling performance. In a second study, Limpo and Alves (2013) found that writing self-efficacy significantly correlated with various spelling measures (range of rs = .26 - .40, $p < .001$) and one handwriting measure (i.e., alphabet task; $r = .15$, $p < .01$) among a sample of 171 fourth-grade through sixth-grade students. Further, Graham et al. (2017) found writing attitudes and writing self-efficacy to significantly correlate ($r = .37$, $p < .01$) among 227 fourth-grade students.

Examining Writing Self-Efficacy Among Emerging Writers with Self-Report Measures

Although the previously reviewed studies (Graham et al., 2017; Limpo and Alves, 2013) suggest that there are significant associations between writing and motivational skills; limited studies examined the association among younger students, who are emerging writers. In fact, most research on writing self-efficacy has been with older students, particularly fifth-grade students (e.g., Pajares & Valiante, 1997) and only two studies have examined writing attitudes among third-grade students (Knudson, 1995; Knudson, 1992). The lack of research may be due

to the concern that developing writers cannot form accurate self-efficacy beliefs (Schunk & Pajares, 1995) and during early childhood development (i.e., ages 2 to 5), children may not have the ability to assess their abilities accurately. However, Broderick and Blewitt (2015) argued that in middle childhood (i.e., ages 6 to 11), students' cognitive abilities become more developed and they can think about their abilities more abstractly (i.e., integrate positive and negative aspects). They can complete self-assessments, as their conceptualization of their abilities have been influenced by outside influences at this point (e.g., school grades, parent comments, teacher comments).

In addition to concerns about when self-report measures are age-appropriate, there have also been important concerns raised regarding the reliability and validity of self-report measures. Within the field of psychology, self-report measures are a highly relied upon and widely-used measure of personality characteristics (Olino & Klein, 2015), which allow individuals to give their perceptions of their abilities in a standardized manner. Critics of self-report measures have cited the following as limitations of the measure: having reliability issues with repeated measures of the construct over time and that perceptions of social-emotional characteristics are likely to be affected by situational factors, response bias, and error variance (Merrell, 2008). Although these concerns about the use of self-report measures do have validity, precautions can be taken to help overcome these limitations. For example, with response bias, there are sometimes concerns that children may engage in a type of response bias known as acquiescence (i.e., tendency to give one answer consistently, Merrell, 2008), which could affect the validity of a study. However, questions can be worded to work as validity checks (e.g., wording questions for reverse scoring) and/or outliers can be assessed through statistical means. To help with reliability, researchers could use the measure with students in the same environment each time (e.g., give the writing

self-efficacy during writing time in the morning). In addition, another concern is the extent to which self-report measures accurately assess underlying constructs. However, a measure can be validated by seeing how well it correlates with other measures that assess the same construct (i.e., assess its convergent validity).

Although there are concerns about the age-appropriateness of self-report measures and the validity and reliability of self-report measures, many diagnostic self-report measures (e.g., BASC-III SRP, CDI-II, MASC-II), have been developed for use with children as young as 8 years of age. In the writing literature, self-report measures of writing self-efficacy have been used in empirical studies with elementary-aged students and have been found to be positively associated with writing performance (Graham et al., 2017; Kim & Lorsbach, 2005; Pajares et al., 1999; Pajares & Valiante, 1997).

To examine whether developing writers can reliably describe their writing self-efficacy beliefs, Kim and Lorsbach (2005) conducted a longitudinal study with kindergarten and first-grade students by conducting classroom observations over the course of two years, conducting interviews, giving self-efficacy questionnaires through an interview, and having students complete two writing samples per semester. Observations and interviews notes were categorized to find themes and commonalities. It was found that if students had higher writing development (e.g., better apply conventional writing rules), they reported higher writing self-efficacy.

After examination of the observational data and interviews regarding writing self-efficacy, it was also found that there were specific behavioral characteristics of students with high writing self-efficacy, such as risk-taking, spending longer on writing tasks (i.e. hypothesized to be due to enjoyment), and displayed an eagerness to write. Some behavioral characteristics of low writing self-efficacy children were avoiding writing tasks, taking a lot or

little time to write (i.e., indicated difficulty and/or giving up), and/or wandering around the classroom during writing time. The behavioral commonalities for students with moderate writing self-efficacy were not discussed. The results of this study suggest that students as young as kindergarten can describe their writing self-efficacy and there could potentially be outward behavioral indicators of writing self-efficacy.

In addition to Kim and Lorsbach (2005), other research studies have found writing self-efficacy and writing attitudes to be constructs that we can examine in younger, developing writers. It was found that students in first-grade through fifth-grade can evaluate their own writing attitudes (Knudson 1995; 1992). Writing attitudes can predict written performance in fourth-grade (Graham et al., 2017) and writing self-efficacy predict writing in third-grade through fifth-grade (Pajares et al., 1999; Pajares & Valiante, 1997). Not only do these motivational variables have predictive value, but they are sensitive to writing interventions. Research has shown writing self-efficacy beliefs to improve in second-grade, fourth-grade, and fifth-grade after receiving a performance feedback intervention (Hier & Mahoney, 2017; Schunk & Swartz, 1993). Writing self-efficacy and writing attitudes seems to be involved in the writing process and examining its potential role in writing development can perhaps give us a clearer picture of these variables and their evolution. However, the primary means of gaining information about internalized beliefs or behaviors is through self-report measures (Whitcomb, 2018) and therefore, the pros and cons of using this method should be discussed.

In summary, several studies assessing students' writing attitudes and self-efficacy have used self-report measures that were created by piloting questions on same-aged peers and using subsequent statistical techniques (e.g., confirmatory factor analyses) to assess if the items on the measure were related to construct (Bruning et al., 2013; Graham et al., 2017; Pajares, 2007, etc.).

In addition, these writing self-efficacy measures and writing attitude measures have been found to be a statistically significant predictor of students' subsequent writing performance in the past (Graham et al., 2017). These findings suggest that students can assess their writing skill; however, more research is needed regarding how students' writing self-efficacy and writing attitudes fit in the context of writing development models (e.g., the Not-So-Simple-View-of-Writing model), using reliable and valid measures of writing self-efficacy and writing attitudes.

Purpose of the Proposed Study

The purpose of the proposed study is to extend the research literature on writing development by examining the potential mediational role of writing self-efficacy and writing attitudes between foundational academic skills (e.g., handwriting and spelling), cognitive skills (i.e., working memory and executive functioning) and written performance in elementary-aged students. The primary aim is to examine whether writing-efficacy and writing attitudes can further expand the relationship between variables conceptualized in the Not-So-Simple View of Writing and build upon research conducted by Graham, Kiuhara, Harris, and Fishman (2017). In addition, this study will further build upon the work of Graham et al. (2017) by including the variance accounted for by handwriting and spelling, which researchers essentially eliminated in the Graham et al. (2017) study by writing student essays in Word and spell checking them. In the proposed study, the influences of students' spelling ability and handwriting skills on written performance will be taken into account by not modifying students' written work.

Further, researchers have noted that motivational variables (i.e., writing self-efficacy and writing attitudes) have not been frequently studied in developing writers because it is thought that elementary students do not yet have the cognitive skills to make judgments about their writing confidence or conceptualize their writing confidence (Schunk & Pajares, 2005). This

notion has persisted, despite prior studies finding writing self-efficacy and writing attitudes to be significant predictors of written performance in developing writers (e.g., Graham et al., 2017). In addition, several measures designed to measure internal processes (e.g., BASC-III; CDI-II; MASC-II, etc.) are normed for students as young as 8-years-old, which negates the idea that young students cannot conceptualize their internal processes with validity. This proposed study aims to extend the literature by further teasing apart how these variables are related to each other and to examine the mediational role of writing self-efficacy and writing attitudes between academic skills and written performance, while controlling for executive functioning skills in third-grade and fifth-grade students. Third grade was chosen because there is limited research with students as young as third grade. It would extend that literature, given that only a few studies have examined the writing self-efficacy beliefs and writing attitudes of students younger than fourth grade. Fifth grade was chosen because it is one of the most frequently studied grades in writing self-efficacy literature (e.g., Pajares, Miller, & Johnson, 1999).

If the results of this study find that the writing self-efficacy and writing attitudes variables had a mediational role, then an argument could possibly be made that writing self-efficacy and writing attitudes can be examined in students younger than fourth grade. In addition, it would provide some evidence for the potential inclusion of writing self-efficacy and writing attitudes in Not-So-Simple View of Writing model (Berninger & Amtmann, 2003). It is hypothesized that writing self-efficacy and writing attitudes will have a significant mediational role between academic skills (i.e., handwriting and spelling) and written performance, while controlling for executive functioning skills.

Method

Participants and Setting

Approval from the Institutional Review Board of Syracuse University and the participating school district was obtained prior to the beginning of the study. After approval was granted, consent forms were sent home to parents of third- and fifth-grade students asking their permission for the students to participate in the study. After parental consent was received, the participants were invited to participate in the study and subsequently asked to sign an assent form in order to participate. The exclusionary criteria for the study was: a) no serious motor deficits that will impede a student's ability to write; b) not eligible for special education services except for students identified with a speech and language impairment; c) primary language spoken is English; and d) not eligible to receive an instructional aide or classroom accommodations. Eligibility for the study was assessed by reviewing students' records and interviewing teachers.

After combining the data from both grades (i.e., 77 third-grade students and 63 fifth-grade students), there were 140 participants in the study (see Table 1) and the average age was 9 years, 3 months. The majority of the sample was male (51.4%) and most students identified as Black or African-American (44.3%). In addition, more students identified their ethnicity as Not Hispanic or Latino (91.4%) than Hispanic (8.6%).

A series of chi-square tests of independence was performed to examine the relation between grade and: gender, ethnicity, and race (see Table 3). There was no statistically significant association between grade and gender, $x^2(1) = 2.24$, $p = .135$, grade and ethnicity, $x^2(1) = 0.133$, $p = .716$, or grade and race, $x^2(6) = 12.39$, $p = .054$.

The recruited participants attended a public elementary school located in a moderately-sized city in the northeastern section of the country. The school was located close to the university; therefore, it was a sample of convenience. All sessions during the study took place in the classrooms within the school.

Experimenters

The experimenters were doctoral-level students in psychology and advanced undergraduate research assistants. Prior to the beginning of the study, the experimenters and research assistants were trained to administer and score dependent measures, conduct procedural integrity observations, and input data into Microsoft Excel and SPSS. In addition, experimenters and research assistants were required to complete formal training in research ethics by completing the Collaborative Institute Training Initiative (CITI), which contains several courses concerned with the protection of human research participants. Lastly, experimenters and research assistants were required to demonstrate 100% proficiency in scoring dependent measures and conducting procedural integrity observations.

Measures

Several measures were administered over the course of the study. The measures administered to students were a writing self-efficacy measure (Graham et al., 2017), a writing attitudes measure (Graham et al., 2017), the Essay composition subtest from the Wechsler Individual Achievement Test – Third Edition (WIAT-III; Pearson, 2009), the Spelling subtest from the Wechsler Individual Achievement Test – Third Edition (WIAT-III; Pearson, 2009), and the Test of Handwriting Skills-Revised (Milone, 2007). The teachers were asked to complete the Behavior Rating Inventory of Executive Function – Teacher Form (Screening Version), Second

Edition (BRIEF-2; Gioia, Isquith, Guy, & Kenworthy, 2015) for each student in their classroom. The raw scores from each measure were used in the data analysis.

Wechsler Individual Achievement Test – Third Edition. The Wechsler Individual Achievement Test-Third Edition (WIAT-III; Pearson, 2009) is a standardized achievement measure designed to be used with students in pre-kindergarten through twelfth grade. The test is comprised of 16 subtests designed to assess students' speaking, listening, reading, writing, and math skills. For this study, only the raw scores from the Essay Composition subtest and Spelling subtest were used. The students' WIAT essay raw score derived from the Essay Composition subtest was used as a measure of their written performance and the WIAT spelling raw score from the Spelling subtest was used as a measure of their current spelling ability.

The WIAT essay composition raw score was used as a measure of student's writing quality. The WIAT essay composition raw score was derived from the following scored components: 1) Word Count, 2) Theme Development and Text Organization, and 3) Grammar and Mechanics. Word count measures productivity, or the number of words written, whereas Theme Development and Text Organization measure idea elaboration and clarification as well as organization of ideas (WIAT-III; Pearson, 2009). Grammar and Mechanics measure students' grammatical skills and mechanics by subtracting their number of correct word sequences from their number of incorrect word sequences. The grade-based test-retest reliability coefficient for the Essay Composition subtest is .83. The raw scores from the WIAT Spelling subtest were used as a measure of a student's spelling ability. Students were asked to spell words that were read aloud to them by the experimenter. The test-retest reliability coefficient for the Spelling subtest is .92.

Test of Handwriting – Revised (Abbreviated Assessment). The Test of Handwriting Skills-Revised (THS-R) was used as a measure of students' handwriting. The THS-R is a standardized measure that was designed to detect neurosensory issues that are often noticeable in handwriting and has been used as a progress-monitoring tool for handwriting. In addition, the THS-R can be used with any student between the ages of six through eighteen and can be used for small groups. There are ten subtests in this measure, which can be used to examine skills such as writing lower case letters, uppercase letters, copying letters, and/or recalling how to write letters from memory in either cursive or manuscript. In order to assess handwriting for this research study, the raw scores from the abbreviated assessment of the THS-R were used which consists of the sixth subtest (i.e., copying selected lower-case letters) and seventh subtest (i.e., copying selected upper-case letters) in manuscript format. The internal consistency coefficient for the sixth subtest is .74, and the internal consistency coefficient for the seventh subtest is .70.

Writing Self-Efficacy Measure. A writing self-efficacy measure (see Appendix D) was used to assess the writing self-efficacy of the participants. The measure was developed by Graham et al. (2017) and it was designed to examine students' confidence in their ability to complete specific tasks related to writing (e.g., I can spell my words correctly). Specifically, the items on the measure asked students to assess their confidence to cultivate ideas for writing, and apply writing conventions like spelling, grammar, and punctuation. Students were asked to rate their confidence to complete certain tasks writing tasks by using a Likert scale that ranges from 0 (no chance) to 100 (completely certain) for each item. Cronbach's alpha coefficient for the measure is 0.87.

Writing Attitudes Measure. A writing attitudes measure (see Appendix E) was used to assess students' attitudes toward the writing process. The measure was developed by Graham et

al. (2017) and it was designed to examine students' attitudes toward writing both inside school and outside school (e.g., I like to write at home.) Students were asked to rate how much they agree with statements about writing by using a Likert scale that ranges from 1 (strongly disagree) to 5 (strongly agree) for each item. Cronbach's alpha for the scale is 0.83.

Behavior Rating Inventory of Executive Function – Teacher Form (Screening Version), Second Edition (BRIEF-2). The Teacher Form (Screening Version) from the Behavior Rating Inventory of Executive Function – Second Edition (BRIEF-2) was used as a measure of students' executive functioning and self-regulatory ability. The BRIEF-2 is a standardized measure designed to measure students' executive functioning skills. The BRIEF-2 measures executive functioning skills such as cognitive regulation (i.e., working memory, planning/organization ability, etc.), emotional regulation (i.e., emotional control, etc.), and behavioral regulation (i.e., inhibition and self-monitoring). The screening version of the BRIEF-2 contains twelve questions and they asked to answer questions about students' behaviors related to their executive functioning by using a Likert scale that ranges from 1 (Never) to 3 (Often). The measure was developed by Gioia et al. (2015) and Cronbach's alpha coefficient for the scale is 0.87.

Procedures

Third-grade administration procedures. All assessment measures were given in a group format in the students' classroom over the course of four 20-minute sessions, which included: (a) WIAT Essay Composition subtest; (b) the WIAT spelling subtest, (c) the Test of Handwriting Skills-Revised, (d) a writing self-efficacy measure, and (e) a writing attitudes measure. During the administration of the measures, there was an experimenter and at least one research assistant present in the room and they both followed a procedural script. For each

measure, the experimenter read directions aloud to the students while the research assistant followed along to conduct a procedural check and answer any questions that the students may have. Ineligible students completed an assignment assigned by their teachers.

During the first session, the WIAT spelling subtest and the Test of Handwriting-Revised (Abbreviated Assessment; THS-R) was administered. To complete the WIAT Spelling subtest, students were asked to attempt to correctly spell words read to them aloud by the experimenter. For the Test of Handwriting-Revised (Abbreviated Assessment), students followed the instructions of the researcher and completed the measure, which involves writing lowercase and uppercase letters. The total time for administration was ten minutes for the WIAT spelling subtest and five minutes for the THS-R. During the second session, a writing self-efficacy measure was given. For the writing self-efficacy, the experimenter read the items from the measure aloud and students subsequently rated their confidence using a Likert-type scale. The total administration time for the writing self-efficacy was five minutes. During the third session, the writing attitudes measure were administered. For the writing attitudes measures, students were asked to rate their agreement with statements related to writing attitudes on a Likert scale. Administration of the writing attitudes measure took approximately five minutes. During the fourth session, the WIAT Essay Composition subtest was administered. To complete the WIAT essay composition subtest, students were required to write an essay for ten minutes in response to a story starter. Administration of the measure with time for student response took approximately ten minutes for the WIAT essay composition. Academic measures (i.e., THS-R, WIAT) were given on separate days than the motivation measures (i.e., writing self-efficacy, writing attitudes), so that performance on academic measures would not impact their self-efficacy or attitudes toward writing. Finally, the BRIEF-2 was given to teachers at the beginning of the

second session. Teachers were asked to complete the screening version of the BRIEF-2 Teacher Form for each student in their homeroom. It was estimated that it took approximately five minutes to complete the BRIEF-2 screening for each student.

Fifth-grade administration procedures. All assessment measures (except the BRIEF-2) were given in a group format in students' English and Language Arts (ELA) classroom over the course of two sessions. Thirty minutes was allotted for each session. During the first session, students were administered all academic skills measures (i.e., THR-S, WIAT spelling subtest, and WIAT essay subtest). During the second session, the writing self-efficacy measure and writing attitudes measures were administered. During the administration of all the measures, there was an experimenter and at least one research assistant present in the room and they both followed a procedural script. For each measure, the experimenter read directions aloud to the students while the research assistant followed along to conduct a procedural check and answered any questions that the students had. Ineligible students completed an assignment that was assigned by their teachers. Lastly, the BRIEF-2 was given to teachers at the beginning of the second session. Teachers were asked to complete the BRIEF-2 for each student in their homeroom.

Experimental Design

The experimental design was correlational. A parallel mediational analysis was conducted to examine whether the relationship between predictors variables (i.e., handwriting, spelling, executive functioning) was mediated by writing self-efficacy and writing attitudes in their relationship to written performance. An a priori power analysis was conducted using G*Power, Version 3.1 (Faul, Erdfelder, & Buchner, 2007). The sample size was calculated by

setting α to .05, power to .80, and number of predictors to 5. Results from this power analysis indicated that 92 participants in total were required for there to be enough power.

Procedural Integrity

During the administration of measures, procedural integrity was assessed in two ways. First, the primary experimenter followed a procedural script during each phase of the study procedure to help maintain procedural integrity. Second, there was a research assistant present during at least 25% of the sessions. The research assistant followed the script along with the experimenter. In addition, the research assistant checked off every step that the primary experimenter completed correctly to maintain procedural integrity. For the administration of the measures with third-grade students, the procedural integrity was 91.67% for all of the sessions. For fifth grade, procedural integrity was 100%.

Results

Data Preparation

Data input and consistency checks. The researcher inputted the raw data into Microsoft Excel. The data inputted into Microsoft Office was double-checked for consistency by the primary researcher using double data entry. After the consistency check was completed, the data were then transferred into SPSS version 24 (IBM Corp., 2016) to conduct the descriptive and major analyses. For the parallel mediation analysis, PROCESS macro was installed (Hayes, 2018). In addition, there was some missing THS data (i.e., 1.4%), WIAT Essay Composition data (i.e., 4.2%), and writing attitudes data (i.e., 1.4%). Missing data was handled by replacing the missing data points with the overall average score of that variable.

Data inspection. Data were analyzed to assess for any violations of assumptions. For mediational analyses, the data were analyzed to test for the assumptions of linearity (i.e., when a

normal P-P plot was examined, all the residuals were close to the line), normality (i.e., residuals were normally distributed and centered around 0), multicollinearity (i.e., as the variables were significantly correlated, but all were less than 1), autocorrelation (i.e., the Durbin-Watson value was 1.54, which is considered acceptable), and homoscedasticity (i.e., after examining a scatterplot of the data, the data points were centered around 0 in both directions and were clustered). All of the assumptions were met.

Descriptive Analyses

The descriptive summaries of the students' performance on the measures are presented in Table 3. For the total sample, students rated their writing self-efficacy in a more positive manner on average (M = 929.70, SD = 239.70). For writing attitudes, it appears that the mean score and standard deviation for the total sample (M = 16.05, SD = 5.48) align with what is expected for a normal distribution. For THS raw scores, approximately 80% (n = 111) of the students in the sample obtained handwriting scores at or above the Average range. For the WIAT subtests, approximately 70% (n = 98) of the sample scored in the Average range for the essay subtest, and almost 80% (n = 111) of the sample scored in the Average range for the spelling subtest. For the WIAT essay composition subtest, although most students scored in the Average range, it is important to note that this measure was normed on students in the United States and as previously mentioned, the majority of students are writing at or below the basic level (National Center for Educational Statistics, 2012). Therefore, it was normed on below average writing samples. For executive functioning skills, approximately 60% of the sample was reported by their teachers to have, at minimum, some difficulty with executive functioning skills in comparison to their same-age peers.

Results of an independent samples t-test demonstrated that there was a statistically significant difference between female (M = 31.9, SD = 4.3) and male students (M = 29.04, SD = 5.7) in BRIEF-II raw scores; $t(138) = 3.35$, $p \leq 0.01$ as well as a significant difference between female students (M = 17.81, SD = 5.1) and males students (M = 14.4, SD = 5.36) in writing attitudes raw scores; $t(138) = 3.87$, $p \leq 0.001$. There were no statistically significant gender differences in THS raw scores, WIAT spelling raw scores, WIAT essay composition raw scores, or writing self-efficacy raw scores (see Table 2.

In addition, results of an independent samples t-test demonstrated significant differences between grades among the following variables: THS raw scores, WIAT spelling raw scores, WIAT essay composition raw scores, and writing attitudes raw scores. For handwriting raw scores, the mean difference between third-grade students (M = 47.62, SD = 12.6) and fifth-grade students (M = 55.22, SD = 8.13) was significant; $t(138) = -4.14$, $p \leq 0.001$. The difference in spelling raw scores between third-grade students (M = 18.5, SD = 5.42) and fifth-grade students (M = 24.9, SD = 6.45) was significant; $t(138) = -6.34$, $p \leq 0.001$. For WIAT essay composition raw scores, the difference was third-grade students (M = 207.9, SD = 27.2) and fifth-grade students (M = 182.9, SD = 19.96); $t(138) = 6.08$, $p \leq 0.001$. Lastly, the difference between writing attitudes raw scores for third-grade students (M = 17.12, SD = 5.43) and fifth-grade students (M = 14.75, SD = 5.3) was significant; $t(138) = 2.59$, $p \leq 0.01$. There were no statistically significant differences between the two grades in BRIEF-2 (executive function) raw score or writing self-efficacy raw scores (see Table 3).

A summary of the intercorrelations between variables can be found in Table 4. Writing self-efficacy had statistically significant small, positive correlations with WIAT essay spelling raw scores (r = .342, $p \leq .001$) and BRIEF – 2 raw scores (r = .253, $p \leq .01$). For the WIAT

essay raw score, there were statistically significant small, positive correlations with writing attitudes ($r = .172$, $p \leq .05$) and BRIEF – 2 raw scores ($r = .316$, $p \leq .001$). There were also statistically significant small, positive correlations between WIAT spelling raw score and THS raw scores ($r = .269$, $p \leq .01$) and BRIEF – 2 raw scores ($r = .296$, $p \leq .01$), respectively. In addition, there was a statistically significant small, positive correlation between THS raw scores and BRIEF – 2 raw scores ($r = .243$, $p \leq .001$). For writing attitudes, there were statistically significant small, negative correlations with WIAT spelling raw scores ($r = -.238$, $p \leq .001$), and THS raw scores ($r = -.195$, $p \leq .05$). In addition, although the following correlations were not statistically significant, there was a negative correlation between WIAT essay raw scores and THS (handwriting) raw scores ($r = -.107$) and between WIAT essay raw scores and WIAT spelling raw ($r = -.102$) in the overall sample (Table 4). Neither correlation aligns with previous research (e.g., Kent & Wanzek, 2016). These correlations may be due to third-grade students providing more effort on their essays and scoring higher, while fifth-grade students performed better on spelling and handwriting measures.

Major Analyses

A parallel mediational analysis was conducted using SPSS version 24 (IBM Corp., 2016) and the PROCESS macro for SPSS (Hayes, 2018), in order to examine whether writing self-efficacy and writing attitudes mediated the relationship between handwriting, spelling, executive functioning skills/working memory, and the subsequent written performance of elementary students. Using the PROCESS macro (Hayes, 2018) in SPSS, WIAT spelling raw scores were entered as an independent variable. THS scores and BRIEF – 2 scores were entered as covariates because the PROCESS macro only permits one independent variable (IV). It is considered inconsequential which variable is entered as the independent variable because

independent and covariate variables are given equal weight in the model. For the purpose of the major analyses, WIAT essay raw scores were put into the model as the dependent variable. Writing self-efficacy and writing attitudes were put into the model as mediators. Bootstrapping was set to 5000 and Model #4 was chosen as the mediation model with a confidence interval of 95%. The results of the mediation analysis are reported below and in Tables 7 and 8. Figure 2 illustrates the mediation analysis.

Writing self-efficacy. Results of the analysis demonstrated that writing self-efficacy did not mediate the relationship between handwriting, spelling, executive functioning skills, and writing performance in third- and fifth-grade students (see Figure 2). Although spelling, handwriting, and executive functioning skills did account for approximately 14% of the variance in writing self-efficacy, most of the variables did not significantly predict writing self-efficacy. Although spelling did predict writing self-efficacy scores ($a_1 = 10.05$, $p \leq .01$), handwriting ($a_2 = 1.06$, $p = .54$) and executive functioning ($a_3 = 7.23$, $p = .06$) did not. In addition, writing self-efficacy did not predict written performance ($b = 0.009$, $p = 0.332$). A bootstrap confidence interval for the indirect effect ($ab = 0.09$) based on 5,000 bootstrap samples included zero within the confidence interval (-0.31 to 0.13), indicating no mediation.

Writing attitudes. Results of the analysis demonstrated that writing attitudes did not mediate the relationship between handwriting, spelling, executive functioning skills, and writing performance in third- and fifth-grade students (see Figure 2). Spelling, handwriting, and executive functioning skills accounted for approximately 12% of the variance in writing attitudes. In addition, spelling ($a_1 = -0.20$, $p \leq .001$), handwriting ($a_2 = -0.08$, $p \leq .05$), and executive functioning skills ($a_3 = 0.23$, $p \leq .01$) each significantly predicted writing attitudes. However, writing attitudes did not predict written performance ($b = 0.23$, $p = 0.57$). A bootstrap

confidence interval for the indirect effect (ab = -0.04) based on 5,000 bootstrap samples included zero within the confidence interval (-0.3 to 0.13), indicating no mediation.

Discussion

The majority of elementary-aged students in the United States are performing below expectations in writing (Persky, Daane, & Jin, 2003). Given this critical need to help improve students' writing proficiency, more research studies are needed to create a more comprehensive understanding of all relevant factors in writing development. Previous research has found several skills predict written performance in developing writers such as spelling ability (Graham & Santangelo, 2014), handwriting (Santangelo & Graham, 2016), writing self-efficacy (Pajares & Valiante, 1997), executive functioning/working memory skills (Balioussis, Johnson, & Pascual-Leone, 2012), and writing attitudes (Ekholm, Zumbrunn, & DeBusk-Lane, 2017). Of these variables, the academic skills variables (i.e., handwriting and spelling) and cognitive variables (i.e., executive functioning skills and working memory) have been given prominent placement in writing frameworks that conceptualize writing development, such as the Not-So-Simple View of Writing (Berninger & Amtmann, 2003). However, this writing framework does not account for motivational variables (i.e., writing self-efficacy and writing attitudes).

The primary aim of this study was to extend the literature by further teasing apart how all these academic, cognitive, and motivational variables are related to each other and to examine the mediational role of writing self-efficacy and writing attitudes between academic skills and written performance, while controlling for executive functioning skills in third- and fifth-grade students. It was hypothesized that writing self-efficacy and writing attitudes would have a significant mediational role between academic skills (i.e., handwriting and spelling) and written performance, while controlling for executive functioning skills. Although it was found that many of these variables were positively interrelated, the results of the current study did not

support the hypothesis that motivation variables, such as writing self-efficacy and writing attitudes, acted as mediators.

Meditational Role of Writing Attitudes and Writing Self-Efficacy in Writing Development

Previous research has demonstrated the predictive nature of writing attitudes and writing self-efficacy (Graham et al., 2017; Pajares & Valiante, 1997) in relation to developing writers' written performance. Similarly, academic skills (i.e., handwriting and spelling) and cognitive skills (i.e., working memory and executive functioning) have been found to predict writing performance (Santangelo & Graham, 2016; Graham & Santangelo, 2014; Balioussis et al., 2012) and have been theorized to be tenets of writing development in the Not-So-Simple View of Writing model (Berninger & Winn, 2006). However, writing self-efficacy and writing attitudes are not accounted for in the model, although it could be assumed that writing self-efficacy and writing attitudes play a role in writing development given their predictive nature. As a result, it was hypothesized that writing self-efficacy and writing attitudes would serve as mediators within the model. The results of this study indicated that although, there were small, positive correlations between several academic and cognitive variables and writing self-efficacy and writing attitudes, these variables did not subsequently predict writing or act as mediators.

Although the results of the mediation analyses were not significant, previous research has consistently found significant, positive relationships between the motivational variables (i.e., writing self-efficacy and writing attitudes) and the written performance of elementary students. Specifically, for writing attitudes, several studies have found writing attitudes to predict written performance (Graham et al., 2007; Graham et al., 2012; Graham, et al., 2017; Knudson, 1995). For example, Graham et al. (2012) found self-reports of writing attitudes to predict 18% of the variance in writing quality, 14% in writing length variance, and 14% of the variance in the

longest writing sequences in third-grade students. In addition, Knudson (1995) found writing attitudes to predict 3.8% of the variance of written performance. Similarly, Limpo and Alves (2013) found writing self-efficacy, along with variables associated with the Simple View of Writing (i.e., planning, revision, handwriting, and spelling) to predict 76% of the variance of the written performance of students in fourth- through sixth-grades. In addition, for writing self-efficacy, previous research studies provided preliminary support for a mediational role. In their studies, Pajares and colleagues (1997; 1999) demonstrated that writing self-efficacy acted as a partial mediator of the relationship between writing aptitude and written performance among third-, fourth-, and fifth-grade students.

The current study attempted to build upon the work of these previous studies. For example, the present study used student-produced measures of aptitude (i.e., spelling and handwriting measures) instead of the teachers' estimations of student aptitude in the Pajares studies (1997; 1999) and examined the mediational role of an additional motivational variable (i.e., writing attitudes). Given the significant findings of the Pajares (1997; 1999) studies, the difference in findings may be that writing self-efficacy may better mediate one relationship (i.e., teacher's perceptions of student competence and written performance) than the other (i.e., basic writing skills and written performance). In addition, this current study expanded on the Pajares et al. (1999) study by examining the relationship between writing self-efficacy and written performance in a sample that contained third-grade students (i.e., only one published study has examined writing self-efficacy in third-grade students; Pajares, Miller, & Johnson, 1999). This study also examined writing self-efficacy and writing attitudes as constructs related to written performance in the same study, which appears to have only been done once before (Graham et al., 2017). However, unlike Graham et al. (2017), spelling and handwriting samples were not

corrected for clarity, which allowed for a more realistic representation of the relationship between those academic variables and the motivational variables (i.e., writing self-efficacy and writing attitudes). Another key difference between this study and previous research on writing attitudes (Graham et al., 2007; Graham et al., 2012; Graham, et al., 2017; Knudson, 1995) is that the current study examined writing attitudes' potential role as a mediator instead of examining only examining its predictive value. Taken together, the research hypothesis of the current study was created based on these studies.

There are several potential reasons why writing self-efficacy and writing attitudes may not have played a mediational role. One factor may be related to the executive functioning skills of the sample. More than 60% of students had at least some difficulty with executive functioning skills in comparison to their same-age peers. Previous research has demonstrated a significant, moderate relationship ($r = .51$, $p \leq 0.001$) between executive functioning and metacognitive ability (i.e., understanding and awareness of one's own thought processes) in elementary-aged children (Roebers, Cimeli, Rothlisberger, & Neuenschwander, 2012). Metacognitive ability requires students to be cognizant about their perceptions, which would seemingly relate to judging one's own self-efficacy and attitudes. If students in the current study were experiencing more difficulties with their executive functioning, then there may be more difficulties with their metacognitive ability and their perceptions of their writing self-efficacy and attitudes. However, there is minimal empirical research on the relationship between metacognition, writing self-efficacy, and writing attitudes. Another reason for the lack of mediation may be related to how writing self-efficacy and writing attitudes were conceptualized in the study. However, writing self-efficacy and writing attitudes could be conceptualized as an underlying process of the model, similar to the position of executive functioning skills and

transcriptions as bottom apexes in the Not-So-Simple-View of Writing model (Berninger & Winn, 2006). This perception of writing self-efficacy and writing attitudes may be more appropriate given that previous research has shown consistently that writing self-efficacy and writing attitudes predict students' written performance (Graham et al., 2017; Knudson, 1995; Pajares & Valiante, 1997), similar to executive functioning skills and transcription skills.

Role of Executive Functioning Skills in Writing Development

Executive functioning skills have been described to encompass the cognitive processes used to regulate and control one's thoughts and behaviors in order to plan and achieve a goal (Jackson et al., 2015). In addition, executive functioning has been found to have a predictive relationship with writing performance (Adams, Simmons, & Willis, 2015; Berninger et al., 2010; Hooper et al., 2002; Swanson & Berninger, 1996). The present study sought to expand previous research by examining executive functioning skills with understudied motivational variables (i.e., writing self-efficacy and writing attitudes). Although it was found that neither writing self-efficacy or writing attitudes mediated the relationship, executive functioning skills were found to be significantly related to many of the variables (i.e., writing self-efficacy, handwriting, spelling, and writing performance) examined in this study.

Executive functioning skills predicted writing attitudes and writing performance in the present study. There has been scarce research examining the relationship between executive functioning skills and writing attitudes, although the results of the present study may suggest that aspects of executive functioning may inform writing attitudes. For written performance, the predictive relationship between executive functioning skills and writing performance aligns with previous research (e.g., Adams et al., 2015; Hooper et al., 2002). These results provide support for the Not-So-Simple View of Writing model, which posits that executive functioning acts as a

tenet of writing development. However, the results of the study may provide some evidence that executive functioning skills may be as important as transcription skills in developing writers, given that one of the transcription skills (i.e., handwriting) was found not to predict written performance and executive functioning skills was predictive. This finding is contrary to the popular notion that children's transcription skills are more vital to written performance, as these skills need to develop first in order to free working memory space for other executive functioning skills.

Results suggest that executive functioning may be as vital as transcription skills at this developmental point. This idea aligns with results of Limpo and Alves (2013), which found planning, revision, handwriting, spelling, and writing self-efficacy to account for 76% of the variance in writing quality among fourth-, fifth-, and sixth-grade students. It may be beneficial to incorporate measures related to executive functioning (e.g., planning and revision), when examining factors in writing development in future research. Although students may have difficulty with executive functioning as new writers, these variables may still account for a significant amount of variance in writing development. Furthermore, findings from the present study may indicate that examining the relationship between different executive functioning skills (i.e., the BRIEF – 2 screener queried about areas such as shifting and inhibition) and writing performance among developing writers may be an avenue of further research.

Additional Significant Paths in Analyses

The Not-So-Simple View of Writing Model encompasses many writing-related factors, such as spelling, handwriting, and executive functioning, which were all examined in the present study. The findings suggest some significant relationships between these variables and other variables assessed in the study such as writing self-efficacy, writing attitudes, and writing

performance. Results indicated that spelling raw scores predicted both students' perceptions of their writing self-efficacy and attitudes raw scores. These findings are consistent with previous research that reported spelling self-efficacy to correlate and predict spelling performance (Rankin et al., 1994). In addition, Limpo and Alves (2013) found students' spelling and writing self-efficacy to positively correlate. Further, both handwriting (THS) raw scores and executive functioning (BRIEF-2) raw scores predicted writing attitudes raw scores. However, these results appear to provide a unique contribution to the existing literature given that these areas have been understudied with elementary-aged students.

Impact of Technology on Handwriting and Writing Attitudes

As technology advances, it is common for students to utilize word processing systems to create their writing samples. There are benefits to using word processing programs, such as providing (a) spelling correction, (b) an alternative to writing through pen and paper, and (c) improved legibility of writing. The last benefit appears to have particular importance as legibility of writing may have an impact on its perceived quality. In a report on formative assessment in writing (Graham, Harris, & Hebert, 2011), it was reported that teachers and teachers in training tended to score less legible samples of writing more harshly. However, it should be noted that in the current study, students' handwriting should not have negatively impacted the results. Quality of handwriting was not assessed and the abbreviated assessment of handwriting (i.e., THS-R) only examined whether students could write their letters appropriately.

Additionally, given students are likely using technology for writing, technology use may have impacted students' attitudes towards writing. In a study that consolidated the results of several focus groups, Lenhart, Arafeh, Smith, & Macgill (2008) found that 59% of teenagers thought computer use made the process of writing easier because it made editing easier.

However, 73% of teenagers reported that writing on a computer made no difference in their writing quality (Lenhart et al., 2008). Despite these findings, there appears to be limited research examining the impact of technological changes on elementary-aged students' writing, perhaps because developing writers are likely to also be developing typers. As a result, it is unlikely that technology use impacted the writing attitudes of the students in the sample. Additionally, there were no computers in the classrooms of the students who participated in this study. Therefore, students may not have had frequent access to computers in the classroom.

Although today's increased use of technology undoubtedly affects writing, the purpose of the current study was to examine the relationship between handwriting and writing-related tasks. In the present study, handwriting had small, but statistically significant correlations with executive functioning skills and spelling.

Limitations of the Current Study

Although the current study aimed to expand the research literature, several limitations are noted. First, given the present study was correlational, no statements regarding causality can be drawn. Second, there may have been a threat to internal validity as participants in the study were administered writing self-efficacy and writing attitudes measures in a group format. That is, it cannot be said with certainty that students understood the items that they were expected to answer. Students may have been more likely to ask clarification questions if the measures were administered individually. Third, a possible threat to external validity exists. Participants in the study were from one school located in a mid-size city in the Northeastern part of the United States. It is unknown how well these results will generalize to students outside this demographic. Fourth, although the writing self-efficacy and writing attitudes measures were found to be statistically valid (Graham et al., 2017), they were not standardized on a normative

sample. Therefore, raw scores were correlated. Use of standardized measures may have helped with generalization of the results, as standardized measures are normed. Fifth, it is possible that increased use of technology in today's society could have impacted students' handwriting and attitudes toward writing and this was not examined in the study. Sixth, cultural differences in writing attitudes and access to technology were not assessed and these could have potentially been factors.

Directions for Future Research

There are several potential directions for future research. The current study served as an exploration of the different variables that impact the writing development of elementary-aged students and to further assess the role of writing self-efficacy and writing attitudes as mediators. Results suggested that neither writing attitudes or writing self-efficacy served as mediators for writing. Previous research has consistently found these variables to be predictors of written performance and the current study sought to examine their role as mediators. Although there was no mediation, there were some interesting findings such as a predictive relationship between executive functioning skills and writing attitudes. However, the research examining this relationship appears to be scarce. It may be beneficial for future research to examine what aspects of executive functioning inform writing attitudes. Also, in the current study, working memory and executive functioning were studied as one variable through a screener, given teacher time constraints and that working memory is viewed generally as a type of executive functioning. Future research could potentially examine how working memory specifically correlates with other variables in the Not-So-Simple View Writing model (e.g., spelling).

Third, measures in the current study were given in a group format. Therefore, it cannot be said with certainty if the students understood the items that they were completing. If possible,

future studies could try to administer the self-reports individually as students may be more likely to ask clarification questions in an individual format, rather than a group format. Fourth, it may be beneficial for future research to examine the role of executive functioning skills in writing development. For example, in the present study, a screening measure of executive functioning skills (i.e., BRIEF – 2) was given to minimize teachers' time. It may be beneficial for future studies to utilize the full BRIEF – 2 Teacher Form in order to get scores for specific areas of executive functioning (e.g., working memory, inhibition, etc.) and to assess if specific aspects of executing functioning correlate with spelling, handwriting, writing self-efficacy, and writing attitudes. In addition, more information appears to be needed about the progression of executive functioning skills' role in writing development as students move into higher grades. Fifth, implementing experimental research would enable to assess the cause and effect aspect of these statistically significant correlational relationships (e.g., does providing an efficacious spelling intervention subsequently improve writing self-efficacy?). Lastly, in order to assess if the results generalize, it would be beneficial to assess the correlational relationships between these variables in younger and older students in order to yield a more comprehensive view of writing development.

Conclusions

Given that the majority of elementary-aged students in the United States are performing below expectations in writing (Persky, Daane, & Jin, 2003), more research studies need to be conducted in order to create a more comprehensive understanding of all relevant factors associated with students' writing development. The primary purpose of the current study was to extend the literature by further teasing apart how all these academic, cognitive, and motivational variables are related to each other in the context of the Not-So-Simple View of Writing model

and to examine the mediational role of motivational variables (i.e., writing self-efficacy and writing attitudes). Although the results from the present study did not demonstrate that writing self-efficacy and writing attitudes functioned as mediators in the writing model, there were noteworthy conclusions to be drawn from this study. First, the results of this study added information to the writing development literature. It provided further evidence that variables within the Not-So-Simple View of Writing are related to each other (i.e., executive functioning skills and spelling; executive functioning skills and writing; spelling and writing; handwriting and spelling; handwriting and executive functioning skills). It also added more evidence for established predictors, such as executive functioning and spelling skills, which corroborates previous research (e.g., Kent & Wanzek, 2016; Drijbooms, Grown, & Verhoeven, 2015). Results of the present study also demonstrated that executive functioning skills, spelling, and handwriting are significant predictors of students' writing attitudes. The study also expanded upon previous research by including third-grade students and demonstrating a relationship between writing self-efficacy and spelling in students as young as third grade. Overall, the present study provided evidence for previous findings and expanded in new areas. In order to continue to improve the conceptualization of students' writing development, future research should attempt to further examine different factors related to writing development in younger and older students.

Table 1

Student Demographic Information

	Total Sample (n = 140)		Third-Grade Participants (N = 77)		Fifth-Grade Participants (n = 63)	
Characteristics	%	(n)	%	(n)	%	(n)
Gender						
Female	48.6%	(68)	42.9%	(33)	55.6%	(35)
Male	51.4%	(72)	57.1%	(44)	44.4%	(28)
Race						
American Indian or Alaska Native	0.7 %	(1)	1.3%	(1)	0.0%	(0)
Asian	7.9%	(11)	11.7%	(9)	3.2%	(2)
Black or African-American	44.3%	(62)	49.4%	(38)	38.1%	(24)
Hispanic or Latino	7.9%	(11)	6.5%	(5)	9.5%	(6)
Native Hawaiian or Other Pacific Island	1.4%	(2)	2.6%	(2)	0.0%	(0)
Other	1.4%	(2)	0.0%	(0)	3.2%	(2)
White	36.4%	(51)	28.6%	(22)	46.0%	(29)
Ethnicity						
Hispanic or Latino	8.6%	(12)	7.8%	(6)	9.5%	(6)
Not Hispanic or Latino	91.4%	(128)	92.2%	(71)	90.5%	(57)
	M	*SD*	*M*	*SD*	*M*	*SD*
Age	9.03	1.02	8.03	0.04	10.06	0.05

Table 2

Descriptive Analyses by Variable and Gender

	Total Sample (n = 140)		Female Participants (n = 68)		Male Participants (n = 72)	
Variable	*M*	(*SD*)	*M*	(*SD*)	*M*	(*SD*)
Writing Self-Efficacy Raw Score	929.70	(239.70)	931.54	(229.65)	927.95	(250.42)
Writing Attitudes Raw Score	16.05	(5.48)	17.81	(5.08)	14.39	(5.36)
WIAT Essay Raw Score	196.66	(27.17)	198.87	(26.47)	194.58	(27.84)
WIAT Spelling Raw Score	21.36	(6.70)	21.68	(7.3)	21.07	(6.15)
THS Raw Score	51.04	(11.41)	52.57	(11.88)	49.6	(10.83)
BRIEF – 2 Raw Score	30.43	(5.23)	31.9	(4.31)	29.04	(5.65)

Table 3

Descriptive Analyses by Variable and Grade

Variable	Total Sample (n = 140)		Third-Grade Participants (n = 77)		Fifth-Grade Participants (n = 63)	
	M	(*SD*)	*M*	(*SD*)	*M*	(*SD*)
Writing Self-Efficacy Raw Score	929.70	(239.70)	910.16	(265.61)	953.57	(203.17)
Writing Attitudes Raw Score	16.05	(5.48)	17.12	(5.43)	14.75	(5.3)
WIAT Essay Raw Score	196.66	(27.17)	207.92	(27.20)	182.90	(19.96)
WIAT Spelling Raw Score	21.36	(6.70)	18.49	(5.41)	24.87	(6.48)
THS Raw Score	51.04	(11.41)	47.62	(12.56)	55.22	(24.87)
BRIEF – 2 Raw Score	30.43	(5.23)	29.9	(5.78)	31.1	(4.43)

Table 4

Summary of Intercorrelations between Variables (Overall Sample)

Variable	1	2	3	4	5
1. Writing Self-Efficacy	-				
2. Writing Attitudes	.094	-			
3. WIAT Essay Raw Score	.093	.172*	-		
4. WIAT Spelling Raw Score	.342***	-.238**	-.102	-	
5. THS (Handwriting) Raw Score	.165	-.195*	-.107	.269**	-
6. BRIEF – 2 Raw Score	.253**	.104	.316***	.296**	.243**

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < .001$

Table 5

Summary of Intercorrelations between Variables (3rd Grade)

Variable	1	2	3	4	5
1. Writing Self-Efficacy	-				
2. Writing Attitudes	.056	-			
3. WIAT Essay Raw Score	.169	.113	-		
4. WIAT Spelling Raw Score	.430***	-.080	.155	-	
5. THS (Handwriting) Raw Score	.234*	-.244*	.098	.235*	-
6. BRIEF – 2 Raw Score	.346***	.193	.544***	.225*	.257*

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < .001$

Table 6

Summary of Intercorrelations between Variables (5th Grade)

Variable	1	2	3	4	5
1. Writing Self-Efficacy	-				
2. Writing Attitudes	.218	-			
3. WIAT Essay Raw Score	.115	.037	-		
4. WIAT Spelling Raw Score	.241	-.241	.151	-	
5. THS (Handwriting) Raw Score	-0.80	.072	-.059	-.11	-
6. BRIEF – 2 Raw Score	.370	.035	.142	.362**	.130

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < .001$

Table 7

Association of Independent Variables with Possible Mediators

	Dependent Variables											
	Writing Self-Efficacy						Writing Attitudes					
Independent Variables	Coeff	*SE*	*t*	*p*	LLCI	ULCI	Coeff	*SE*	*t*	*p*	LLCI	ULCI
WIAT Spelling	10.05	3.03	3.30	.001	4.04	16.06	-.209	.070	-2.96	.003	-.348	-.069
THS (Handwriting)	1.06	1.75	.603	.547	-2.41	4.53	-.086	.040	-2.12	.035	-.167	.006
BRIEF – 2 (Executive Functioning)	7.23	3.87	1.86	.063	-.421	14.88	.234	.089	2.60	.010	.056	.411

Table 8

Association of Possible Mediators with Written Performance

Independent Variables	Written Performance					
	Coeff	*SE*	*t*	*p*	LLCI	ULCI
Writing Self-Efficacy	.009	.009	.943	.347	-.010	.028
Writing Attitudes	.245	.421	.583	.560	-.587	1.07

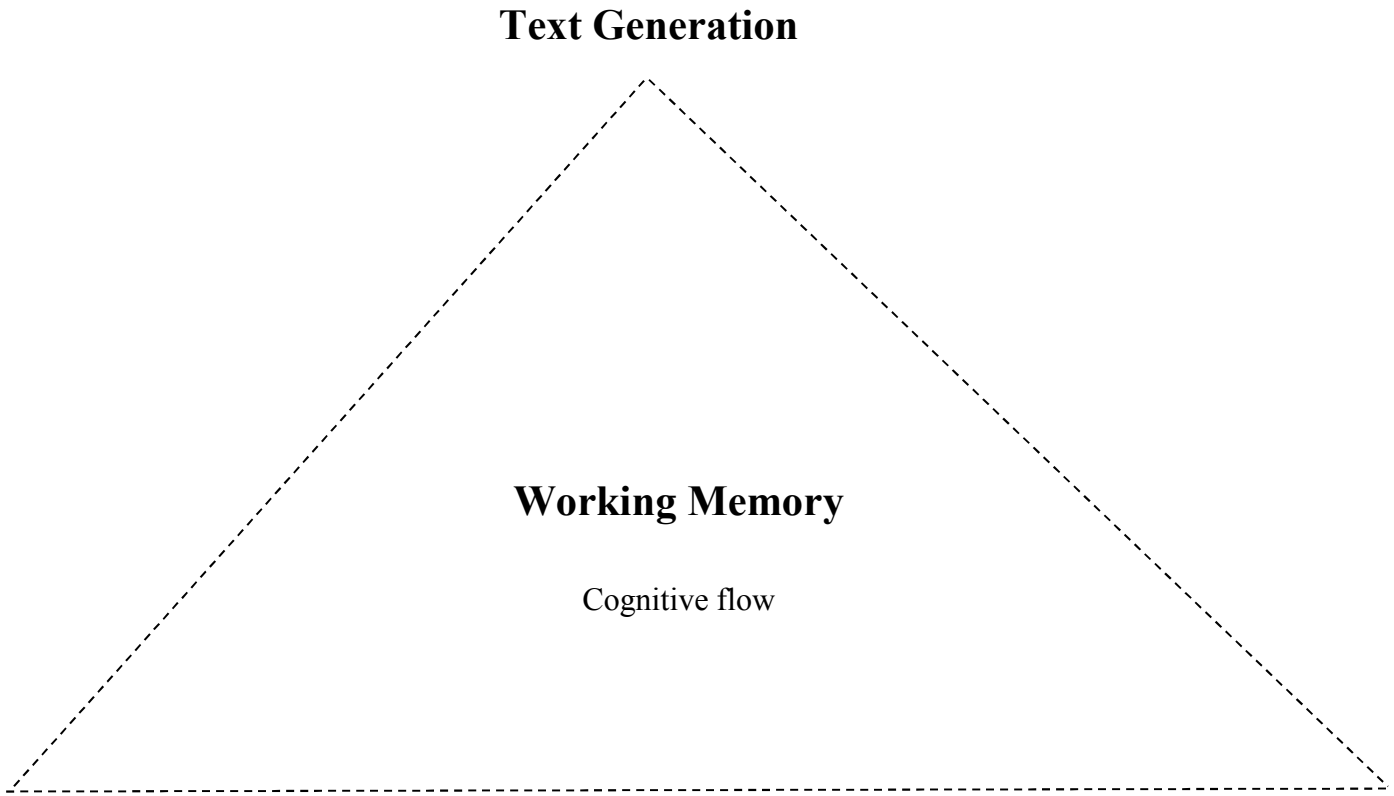


Figure 1. Not-So-Simple View of Writing (Berninger & Winn, 2006)

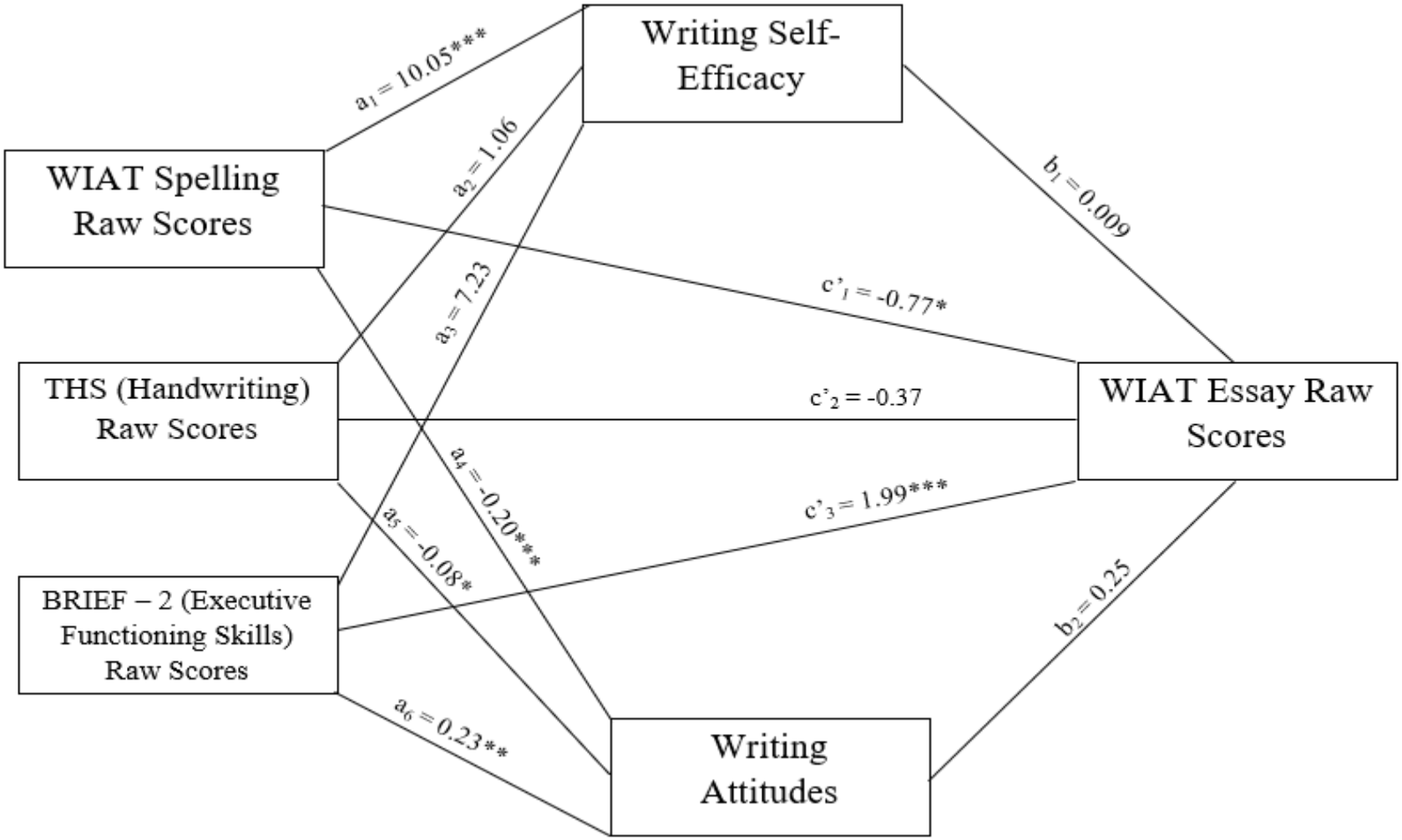


Figure 2. This figure depicts standardized regression coefficients for the relationship between spelling, handwriting, and executive functioning skills to the written performance of elementary-aged students as mediated by writing self-efficacy and writing attitudes.
Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

List of Appendices

Appendix A

Parent Consent

Syracuse University
College of Arts & Sciences
Psychology

PARENT CONSENT FORM

Examining the Influence of Writing Motivation on the Story Writing Skills of Elementary-Aged Students

Lead Investigator: Dr. Tanya Eckert
Dept. of Psychology, Syracuse University
Phone: (315) 443-3141
Co-Investigators: Brittany Eggleston, Natalie Williams, and Narmene Hamsho
Dept. of Psychology, Syracuse University
Phone: (315) 443-1050

Dear Parent or Guardian,

My name is Tanya Eckert and I am a faculty member in the department of Psychology at Syracuse University. I am working on a research study in your child's school in an attempt to better understand how to improve children's writing skills. I would like to learn if aspects of students' writing motivation, such as their writing attitudes or writing confidence, can influence their writing performance.

Taking part in this study is completely voluntary, so you can choose to say 'yes' or 'no' to this invitation. Your decision will **NOT** affect your child's grades or your child's educational program. This consent form will explain the project to you. Please feel free to call me (315-443-3141) if you have any questions. I will be happy to answer any questions you might have.

Description of Procedures

First, if you agree to allow your child to participate, we ask that you sign this form and return it to school with your child. If you choose not to have your child participate in the study, please indicate that on the form and return it to school with your child. You should feel free to call me to ask any questions you may have. In May, our group from Syracuse University will be working with your child's classroom on one occasion for 20 minutes. During this time, students will be asked to write a story as well as complete a writing task, spelling task, and handwriting task. In addition, they will be asked to evaluate their own writing motivation by answering a short questionnaire.

Benefits of Participation

By participating in this study, teachers will learn about ways to improve students' writing performance by identifying important areas to focus on. These areas may include improving aspects of student's writing motivation.

Risks of Participation

The risks of participating in this study are minimal and are similar to the risks your child may experience on a daily basis at school. For example, your child may experience discomfort, such as becoming mildly frustrated or tired, while participating in the project. We will attempt to reduce these risks by working with you child for a small amount of time (20 minutes), and allowing all children to withdraw from the study without penalty.

Number of Participants

All of the third-grade and fifth-grade students at your child's school are being asked to participate in this study. This will result in a total of approximately 100 third grade students and 100 fifth-grade students participating in the study.

Duration of Participation

We will be working with your child during one occasion in a group setting (20-25 students per group) for about 20 minutes.

Confidentiality of Records

Any information obtained in this study will be kept confidential. That is, the work that your child produces when working with us, will not be shared with anyone. Your child's work will be kept in a locked office at Syracuse University and only our research team will have access to it. Your child's work will not be shared with school staff. Furthermore, your child's school grades will not be based on the work he/she does while working with us. Please note that this promise of confidentiality does not apply if your child discloses (a) an intention to harm himself/herself or another person, and (b) an incident of child abuse or neglect. In the event of a disclosure, we are mandated by the state of New York to notify the appropriate agencies.

At the completion of this study we will be writing a report about the results. This report will not include any identifiable information about your child. All information in this report and the summary that is presented to your child's school will be in the form of group averages, with each group containing approximately 20-25 students.

Cost and Payment

Participation in this study does not involve any cost to you or your child. At the conclusion of the study, your child will receive a small writing journal and writing instrument for participating in the study. If you withdraw your child from the study at any point in time, or if your child decides

to withdraw from the study at any point in time, your child will still receive the writing journal and writing instrument.

Contact Persons

If you have any questions, concerns, or complaints about the research, please contact the primary investigator: Dr. Tanya Eckert at Syracuse University, 430 Huntington Hall, Syracuse, NY 13244 by telephone: (315) 443-3141 or email: taeckert@syr.edu. If you have any questions about your rights as a research participant, if you have questions, concerns, or complaints that you wish to address to someone other than the investigator, or if you cannot reach the investigator, please contact the Syracuse University Institutional Review Board at 315-443-3013 or 116 Bowne Hall, Syracuse, NY 13244.

Voluntary Participation

Your child's participation in this study is voluntary. You are free to choose not to have your child's work included in this study. You may also withdraw your child from the study at any time, for whatever reason, without risk to your child's school grades or relationship with the school. You can discontinue your child's participation in this study at any time by contacting us or your child's teacher. In the event that you withdraw consent for your child to participate in the study, your child's work will be immediately destroyed and not used in the study. If your child does not participate in the study, your child's teacher will choose an educationally relevant activity for your child during the time your child's classmates are participating in our study. By signing this consent form, you give permission to allow your child to participate in the study.

You are being provided with two copies of this letter. Please sign the next page of this letter indicating if you consent to have your child participate in our study or if you do not consent to have your child participate.

Please return the signed copy to school with your child and keep the second copy of this letter for your records.

Syracuse University
College of Arts & Sciences
Psychology

PARENT CONSENT FORM

Examining the Influence of Writing Motivation on the Story Writing Skills of Elementary-Aged Students

I, _____ give my consent for my child, _____
(please print your name) (print child's name)

to participate in this project.

_____ _____
Parent/Guardian signature Date

OR

I, _____do **NOT** give my consent for my child, _____
(please print your name) (print child's name)

to participate in this project for.

_____ _____
Parent/Guardian signature Date

Appendix B

Teacher Consent

Syracuse University
College of Arts & Sciences
Psychology

TEACHER CONSENT FORM

Examining the Influence of Writing Motivation on the Story Writing Skills of Elementary-Aged Students

Lead Investigator: Dr. Tanya Eckert
Dept. of Psychology, Syracuse University
Phone: (315) 443-3141
Co-Investigators: Brittany Eggleston, Natalie Williams, and Narmene Hamsho
Dept. of Psychology, Syracuse University
Phone: (215) 694-0226

April 2018

Dear Teacher,

My name is Tanya Eckert and I am a faculty member in the Department of Psychology at Syracuse University. I would like to investigate students' writing motivation and how it relates to their written performance. This project will require students to complete several brief measures. Teachers will complete one brief rating scale for each student about their executive functioning skills. The goal of the study is to examine how writing motivation relates to students' written performance. In addition, I would like to learn more about writing motivation's role in written performance, when other important writing-related factors such as spelling ability, handwriting skills, and executive functioning are taken into account. The results of this project could help us better understand how students' motivation to write influences their subsequent written performance.

I am asking for your consent to participate in this study. You will be asked to complete one brief rating scale for each student in your classroom whose parents agree to allow him/her to participate in this study. The rating scale is estimated to take 5 minutes to complete per student. By participating in this project, you will be advancing our knowledge of how students' writing motivation affects their written performance.

If you agree to participate in this project, a graduate student in school psychology along with some advanced undergraduate research assistants will be working with your class for one 20-minute period for this project in May. The graduate student and the research assistants will be working with your class as a group. Students will be asked to complete a brief spelling test, handwriting

exercise, and written essay. Then we will ask students to answer questions about their confidence in their writing skills as well as ask some questions about their attitudes toward writing on a questionnaire. This information will be used to understand whether writing motivation has a prominent influence on writing, when all of the other writing-related factors (i.e., handwriting ability, spelling ability, and executive functioning skills) are taken into account.

You may choose to participate in this research study. Participation in this study is voluntary. In addition, you may choose to withdraw from the project at any time without negative results. If you choose to participate in this project, all of the information from this project will be kept confidential. I will not be sharing any of this information with the school. I will not be including any specific information in a written report. However, I may summarize the results of all the participating teachers and all of the participating children in a summary of the project's results. Your name or any other identifying information would not be included in this written summary. Once this project has been completed, all of the materials will be contained in a locked filing cabinet that only I will have access to.

The potential risks of participating in this project include increased time demands (i.e., completing one five-minute rating scale per student). These potential risks will be minimized by providing you with information on how to complete each measure prior to the onset of the study, which should reduce the amount of time needed to complete the measure and address any questions you may have regarding it.

Attached to this letter is a signature page. Please review the attached page and indicate whether you are willing to participate in this project. Please return the attached page in the accompanying stamped, self-addressed envelope. This letter is for your records and you do not need to return it. If you have any questions regarding this project, you may contact me, Dr. Tanya Eckert (315-443-3141), or my graduate research assistant, Brittany Eggleston (215-694-0226). In addition, you may contact Syracuse University's Institutional Review Board with questions at 315-443-3013. Anyone you contact will be glad to answer questions or address any concerns. Thank you for your time and consideration.

Sincerely,

Tanya L. Eckert, Ph.D.
Associate Professor
Department of Psychology
School Psychology Program

Syracuse University
College of Arts & Sciences
Psychology

TEACHER CONSENT FORM

Examining the Influence of Writing Motivation on the Story Writing Skills of Elementary-Aged Students

Instructions: *Please complete this form and return it in the stamped, self-addressed envelope. Thank you!*

Your name: _____

I hereby consent to participate in the study, following the procedures and guidelines described above. I also certify that I am eighteen years or older.

☐ I hereby consent to participate in the study, following the procedures described in the letter.

_____ _____
Signature of Participant Date

☐ I do not consent to participate in the study, following the procedures described in the letter.

_____ _____
Signature of Participant Date

Appendix C

Student Consent

Important Question

I would like to work with you on a research project that is looking at what teachers should focus on in their instruction to improve their students writing.

I would be working with you today only for about 20 minutes. You will be asked to write stories during this time and you will be asked to answer some questions as well.

Your teachers have said that it would be okay if I worked with you on this project and I will be sending home a letter to your parents as well. However, I want to make sure that it is okay with you. If you change your mind, it is okay for you to stop working with me at any time. Your grade at school will not be affected if you choose not to work with me.

If you would like to talk more about this project or if you have any questions about the project, I can speak with you at the end of class. Also, you can always talk with your classroom teacher about this project. Your teacher knows what I will be doing and can answer any questions you may have.

ID #: BERNNW1718:_____ TRAC 17-18

Would it be okay if I worked with you on your writing?

Yes No

Name: _____

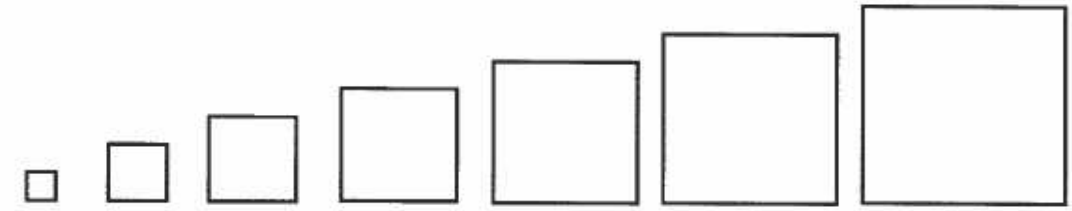
Date: _____

ID #: BERNNW1718: _____ TRAC 17-18

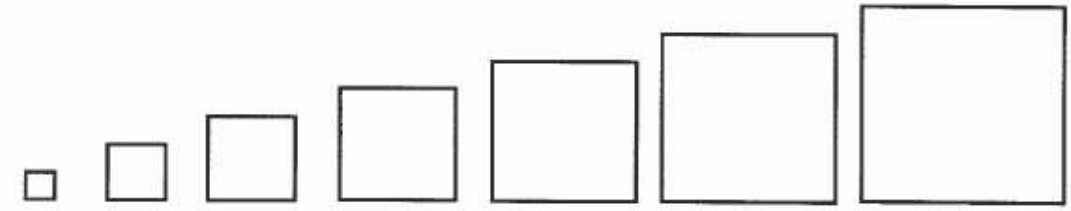
Appendix D

Writing Self-Efficacy Measure

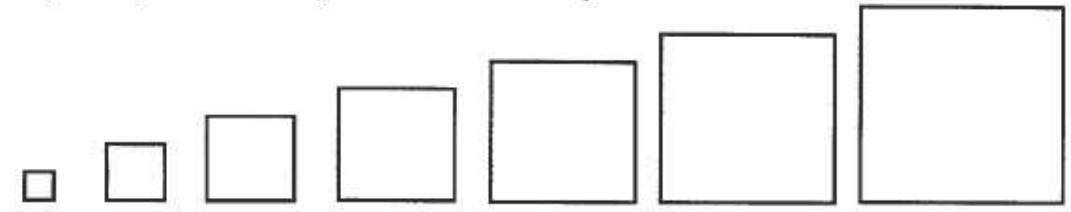
1) I can spell my words correctly.



2) I can write complete sentences.



3) I can punctuate my sentences correctly.



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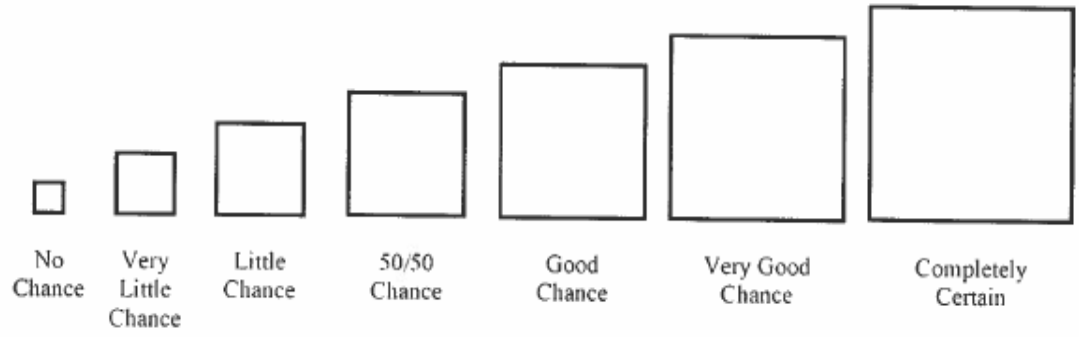
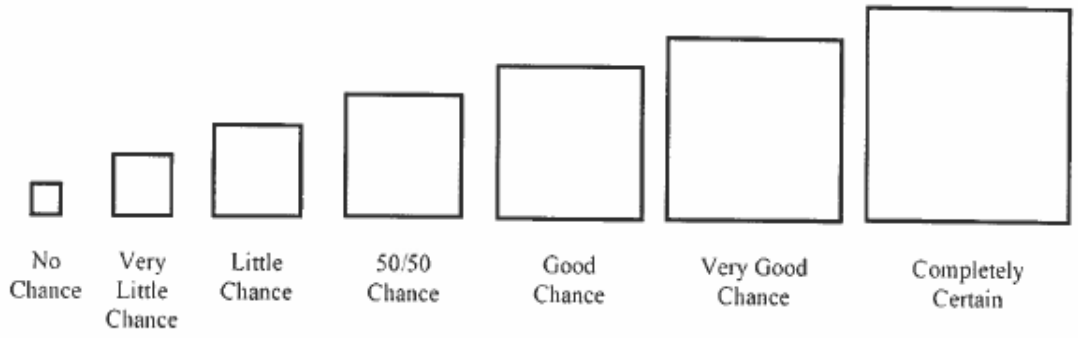
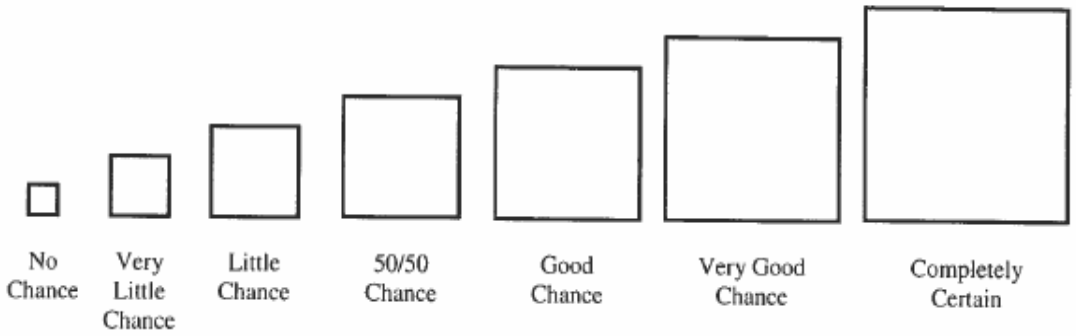
4) I can write grammatically correct sentences.



5) I can begin my paragraphs in the right spots.



6) I can quickly think of the perfect word.



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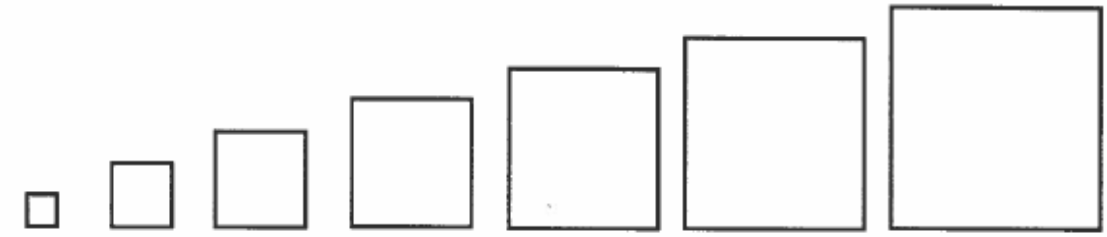
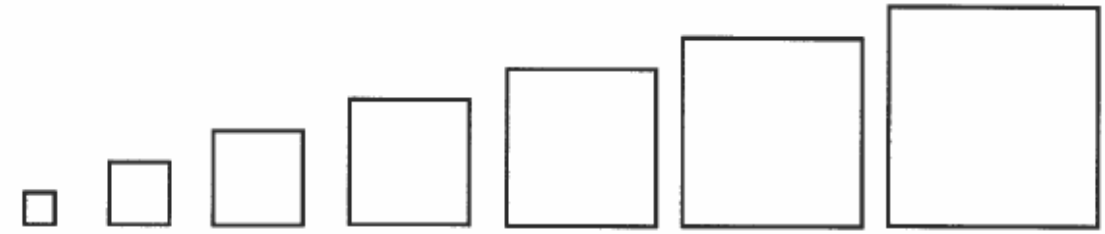
7) I can think of many ideas for my writing.



No Chance | Very Little Chance | Little Chance | 50/50 Chance | Good Chance | Very Good Chance | Completely Certain

---

8) I can think of a lot of original ideas.



No Chance | Very Little Chance | Little Chance | 50/50 Chance | Good Chance | Very Good Chance | Completely Certain

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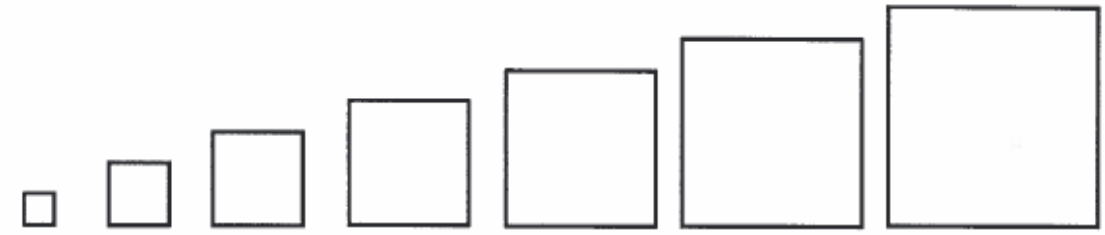
9) I know exactly where to place my ideas in my writing.



No Chance | Very Little Chance | Little Chance | 50/50 Chance | Good Chance | Very Good Chance | Completely Certain

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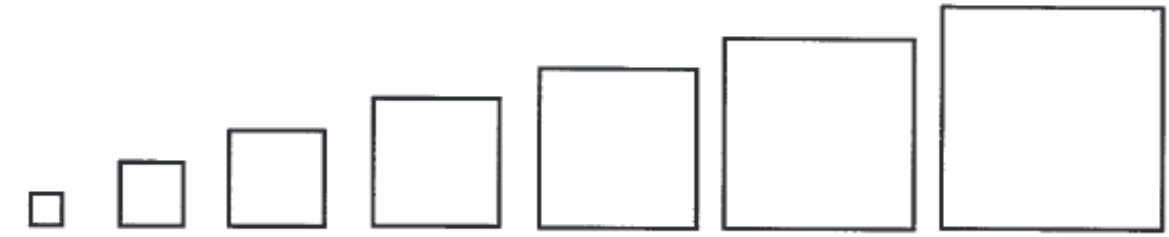
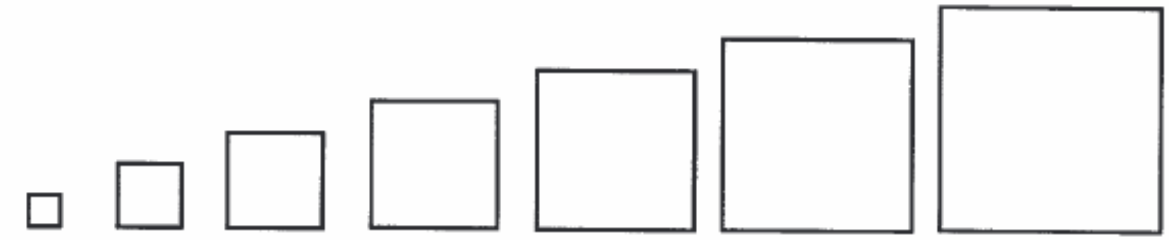
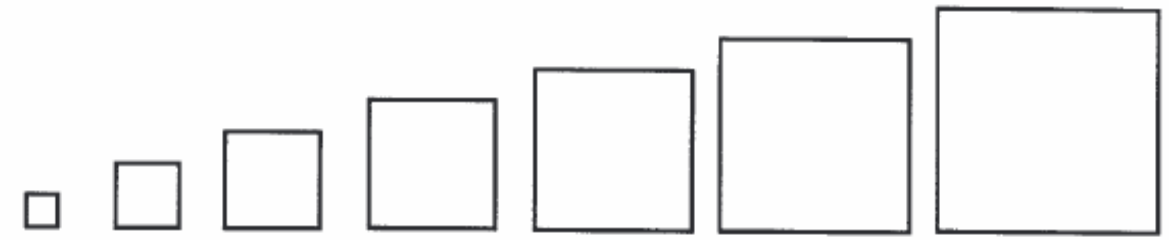
10) I can focus on my writing for at least 10 minutes.



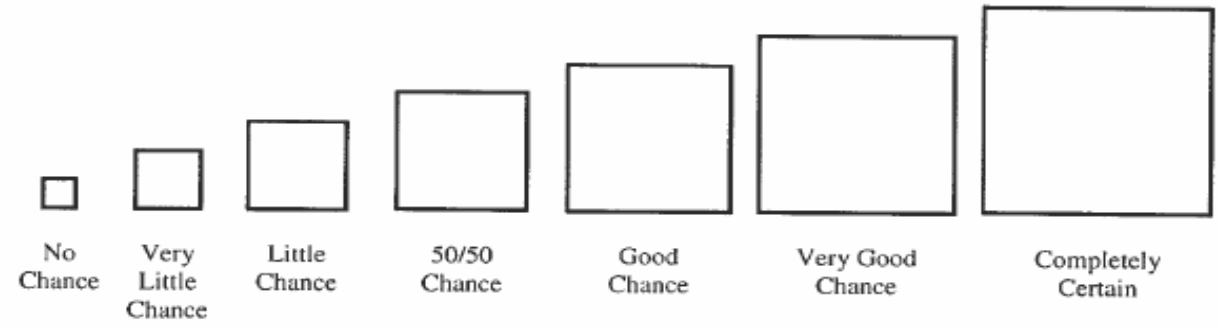
11) I can avoid distractions while I write.



12) I can start writing assignments quickly.

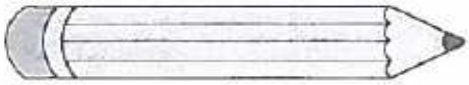


13) I know when and where to use writing strategies.



Appendix E

Writing Attitudes Measure



1) I enjoy writing.

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2) Writing is fun.

---

3) I like to write at school.

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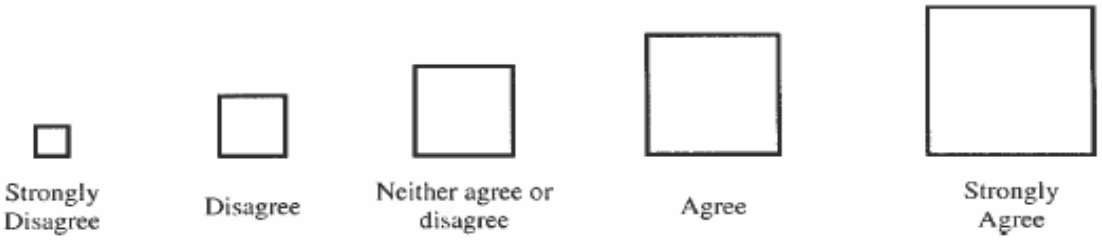
4) I like to write at home.



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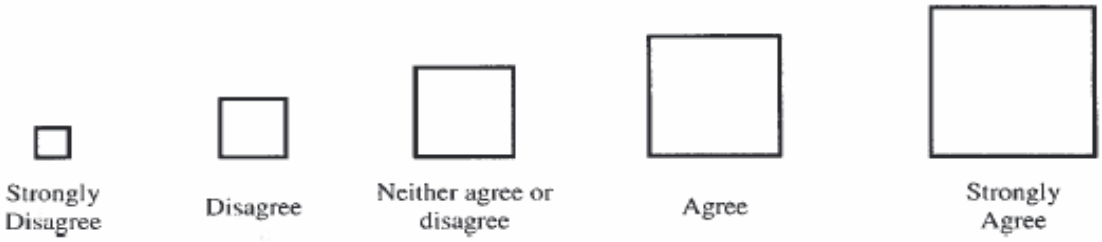
5) Writing is a good way to spend my time.



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