The effects of a "motivationally-enhanced" reading program on struggling readers' reading performance and reading motivation

Miriam McBreen

Department of Educational and Counseling Psychology

McGill University, Montreal

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Abstract

Research increasingly suggests that reading development is influenced not only by students' skills and knowledge, but also by how motivated they are to read. It has been found that interventions that focus only on cognitive (i.e., knowledge and skills-based) components of reading do not usually increase reading motivation and may in some cases contribute to more negative attitudes towards reading. This highlights the need for novel approaches to reading instruction that comprehensively addresses the needs of students at risk for reading difficulties. The research presented in this dissertation aimed to explore more efficient ways of designing reading instruction that supports the needs of these students, by examining the efficacy of a cognitive and motivational reading intervention. A secondary aim of this research was to explore the pathways through which motivation may impact reading development, by examining the impact of motivational reading instruction on a wide range of reading skills (i.e., phonological awareness, fluency, accuracy, comprehension).

In the first and second study, theoretical and empirical recommendations that could guide the development of a motivational reading intervention were identified. In the first study, a narrative review and thematic analysis were conducted to identify commonly cited theories of motivation in empirical K-12 reading research. Based on a critical analysis of the current theoretical landscape, it was argued that a unifying framework of reading motivation is needed to drive the field forward, and that such a framework is provided by Ford's Motivational Systems Theory (MST). A preliminary set of instructional guidelines based on MST was proposed. In the second study, a systematic review of the literature was conducted to identify evidence-based practices in motivational reading instruction. A range of practices were identified, including self-regulatory instruction, autonomy-supportive practices, interest-based practices and

attribution/goal orientation training. The impact of motivational reading practices was summarized through a meta-analysis of identified effect sizes. The practices identified were used to complement the preliminary guidelines outlined in the previous study and propose a comprehensive motivational reading program.

The third and fourth studies sought to examine the effectiveness of supplementing cognitive reading instruction with the motivational program designed through the process described above. In both studies, the effects of a Cognitive plus Motivational reading intervention were compared to those of a standard Cognitive-Only reading intervention. Cognitive components of the intervention were based on evidence-based practices in cognitive reading instruction, while motivational components were based on the program designed in studies one and two. In the third study, findings from a multiple-baseline pilot study were presented. Results tentatively suggested that the Cognitive plus Motivational intervention led to greater gains in reading fluency, interest, and self-efficacy beliefs than a Cognitive-Only intervention. In the fourth study, a more rigorous evaluation was conducted using a pre-test/post-test quasi-experimental efficacy trial. Findings indicate that students who received Cognitive plus Motivational intervention made greater gains in phonological awareness and reading comprehension than students who received Cognitive-Only intervention. The results presented here provide support for the hypothesis that targeting both cognitive and motivational components of reading during intervention has a positive effect on the reading achievement of students at risk for reading difficulties. It further suggests that motivational instruction may have a positive impact on a range of reading skills, and may impact reading through multiple pathways. This research has implications for theories of reading and reading motivation, teaching practice, and future research.

Keywords: Reading motivation, Reading intervention, Motivational instruction

Résumé

La recherche suggère que le développement de la lecture dépend non seulement des connaissances et habiletés que les élèves acquièrent, mais également de leur motivation à lire. Des résultats indiquent que les interventions qui visent seulement les composantes cognitives de la lecture (ex., connaissances, habiletés) ne mènent généralement pas à des gains en motivation et peuvent même engendrer des attitudes d'avantage négatives envers la lecture. Ceci met en évidence la nécessité de repenser notre approche à l'enseignement de la lecture afin de mieux supporter les besoins d'élèves à risque pour des difficultés. La recherche présentée dans cette thèse visait à explorer des manières de créer des interventions de lecture qui répondent mieux aux besoins de ces élèves, en examinant l'efficacité d'une intervention cognitive et motivationnelle de lecture. Un deuxième objectif était d'explorer les mécanismes à travers lesquels la motivation à lire affecte le développement de la lecture, en examinant l'impact d'une intervention motivationnelle sur une gamme d'habiletés de lecture (i.e., conscience phonologique, fluidité, précision, compréhension).

Les deux premières études visaient à identifier des recommandations théoriques et empiriques pouvant guider le développement d'une intervention de lecture motivationnelle. Dans la première étude, les résultats d'une revue de la littérature des théories de motivation les plus fréquemment citées dans la recherche empirique en lecture chez les élèves d'âge scolaire sont présentés. Suite à une analyse critique, il est avancé qu'une théorie unificatrice de la motivation à lire est nécessaire afin de faire avancer le champ de recherche et qu'une telle théorie est offerte par la Motivational Systems Theory (MST) de Ford. Une série préliminaire de recommandations pratiques dérivées de la MST est proposée. Dans la deuxième étude, une revue systématique de la littérature a permis d'identifier plusieurs pratiques motivationnelles d'enseignement de la

lecture empiriquement soutenues, incluant des pratiques qui supportent l'autorégulation, l'autonomie, l'intérêt ou qui reformulent les attributions de performance. L'impact de ces pratiques fut synthétisé à travers une méta-analyse des effets identifiés et les pratiques identifiées ont été intégrées aux recommandations mises de l'avant dans l'étude précédente afin de proposer un programme motivationnel de lecture.

La troisième et quatrième étude cherchaient à évaluer les bénéfices de supplémenter une intervention de lecture cognitive avec le programme motivationnel décrit ci-haut. Dans les deux études, les effets d'une intervention de lecture Cognitive et Motivationnelle ont été comparés aux effets d'une intervention Cognitive. Dans la troisième étude, les résultats d'un projet pilote avec un devis à niveaux de bases multiples suggèrent que l'intervention Cognitive et Motivationnelle a mené à de plus grands gains en fluidité et en motivation que l'intervention Cognitive. Dans la quatrième étude, une évaluation plus rigoureuse a été réalisée à travers une étude pré-/post-essai quasi-expérimentale. Les résultats indiquent que les élèves ayant reçu l'intervention Cognitive et Motivationnelle ont fait de plus grands gains en conscience phonologique et en compréhension que les élèves ayant reçu l'intervention Cognitive. Les résultats présentés ici appuient l'hypothèse qu'un enseignement de lecture qui vise les composantes cognitives et motivationnelles de la lecture peut avoir un impact positif sur les habiletés de lecture d'enfants à risque pour des difficultés de lecture. De plus, ils appuient l'idée que l'enseignement motivationnel peut avoir un impact positif sur une gamme d'habiletés de lecture, et suggèrent que la motivation peut avoir un impact sur le développement de la lecture à travers divers mécanismes. Cette recherche possède des implications pour les théories de lecture et de motivation à lire, les pratiques d'enseignement, et la recherche future.

Mots clés : Motivation à lire, Intervention de lecture, Enseignement motivationnel

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Preface and Contribution of Authors

I am the primary author of each manuscript, and wrote each manuscript independently. Pr. Robert Savage is the co-author of each manuscript, as he provided guidance and feedback on all initial drafts and during the conceptualization and execution of each study. I wrote all chapters independently with feedback from Pr. Robert Savage. All portions of this dissertation are original contributions.

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Introduction

Research increasingly suggests that reading motivation contributes to learning to read (e.g., Bates, d'Agostino, Gambrell, & Xu, 2016). Intuitively, this makes sense: for students to learn how to read, they must not only have the requisite cognitive skills, but also the will to invest time and effort into reading (Fox, 2009). Findings from correlational research support this view. For example, higher reading motivation has been linked to greater use of reading strategies, engagement during instruction, and reading comprehension (Guthrie & Wigfield, 2000). It is notable then that as students who struggle with reading get older, their motivation to read tends to decline (Fletcher, Grimley, Greenwood, & Parkhill, 2011). Indeed, students who struggle with reading are more likely than typically developing readers to feel disinterested or helpless during reading instruction (Polychroni, Koukoura, & Anagnostou, 2006). This, in turn, may make them less likely to benefit from instruction (e.g., Sideridis, 2003), and provide fewer opportunities for them to improve their vocabulary, reading strategy repertoire, decoding, fluency, and comprehension skills (Morgan & Fuchs, 2007). Consistent with this, it has been proposed that reading motivation and reading achievement co-vary, whereby reading failures decrease reading motivation, and lower reading motivation increases the likelihood of future reading failures (Morgan, Fuchs, Compton, Cordray, & Fuchs, 2008; Onatsu-Avrilommi & Nurmi, 2000). This may lead to a snowballing of negative outcomes, as exemplified by the fact that most students who struggle with reading in the third grade continue to do so throughout their lives (Bruhn & Watt, 2012; Gunter, Coutinho, & Cade, 2002).

Correlational research has further shown that students' motivation to read is moderated by characteristics of their classroom. For example, students have been found to be more motivated to read in classrooms that promote self-efficacy (i.e., students' confidence in their reading abilities), positive attribution beliefs (i.e., where students attribute success/failure to

effort, not innate ability; Niemiec & Ryan, 2009), task value (i.e., where students are provided with interesting or personally-relevant tasks; Assor, Kaplan, & Roth, 2002), autonomy (i.e., opportunities for choice and independence; Kirschner, Sweller, & Clark, 2006), and mastery goals (i.e., self-referenced progress goals, rather than other-centered performance goals; Guthrie, 2001), than in classrooms that do not promote these things. To date, most reading research has focused on the cognitive factors involved in reading, seeking to identify the knowledge and skills students need to be able to read successfully. However, a growing body of research on reading motivation suggests this approach may not fully address the needs of developing readers. On one hand, the close relationship between reading motivation and reading achievement strongly suggests that any efforts to improve reading must approach the issue holistically, rather than from a purely cognitive or a purely motivational standpoint. On the other, the impact of classroom structures on motivation to read suggests that reading motivation may be responsive to changes in students' learning environments. Taken together, this suggests that targeting both cognitive and motivational components of learning during reading instruction may lead to better outcomes than targeting cognitive factors alone, especially for students in a cycle of low motivation to read and low reading achievement.

In part, the implementation of such supports for reading motivation may be limited by a dearth of concrete instructional recommendations. Many teachers believe motivation to read is important, but feel they lack the practical tools to support motivation in their teaching (Guthrie, 2004). Three important factors likely contribute to this. First, within the literature on motivational reading interventions, most studies lack a unifying theoretical framework to guide teachers in their implementation. Instructional design relies on theories of learning to solve learning and achievement problems (Sandoval, 2004; Tabak, 2004). To derive instructional

recommendations, a solid theoretical understanding of how theories of motivation apply to reading acquisition is needed. Second, methodological weaknesses in existing intervention research on motivational reading instruction, further discussed in Chapters 1 and 3, have limited researchers' ability to propose concrete instructional recommendations. Finally, while a growing body of intervention research has examined the impact of motivational reading interventions on reading comprehension and motivation, few studies have examined their effect on a broader range of reading skills, including phonological awareness, accuracy, and fluency, and even fewer studies have conducted mediation analyses that examine whether gains in achievement are mediated by gains in motivation. Investigations that assess the impact of motivational reading interventions on multiple reading skills and that conduct mediation analyses are needed to fully evaluate the effectiveness of such approaches, and to gain more insight into the specific mechanisms through which reading motivation and motivational instruction may contribute to reading development.

Research Aims and Questions

The research presented in this dissertation aims to contribute to the reading instruction literature by addressing the gaps outlined above. Its first aim was to explore avenues for designing reading instruction that more effectively addresses the needs of students at risk for reading difficulties. It is argued here that one such avenue is instruction that addresses both cognitive and motivational components of reading. Intervention research provides the strongest test of effectiveness of instructional tools. Thus, to evaluate the potential of an approach to reading instruction that addresses both cognitive and motivational components of reading, an intervention study examining the impact of such a program on the reading outcomes of students at risk for reading difficulties was conducted. It is further argued that effective instructional

design should build upon both theory and practice, i.e., a theoretical understanding of the factors that contribute to reading development and knowledge of evidence-based practices in reading instruction. On one hand, a theoretical understanding of the different components involved in reading development is needed to design intervention that comprehensively addresses the needs of developing readers. On the other hand, an understanding of existing evidence-based practices is needed to build upon effective practices in the field. Thus, integrating theoretical and evidence-based recommendations during instructional design is likely to lead to the development of more effective and comprehensive approaches to supporting reading development than approaches that consider either theory or practice alone. Finally, examining the impact of theoretically driven interventions contributes to refining the understanding of theory and its practical implications. Thus, to design the intervention assessed here, recommendations from the theoretical and empirical literatures of reading and reading motivation were integrated. A second aim of this research was to further the understanding of the precise mechanisms through which reading motivation may contribute to reading development. Different reading skills are thought to involve different processes. For example, development of reading fluency is thought to rely on large amounts of practice (Guthrie & Cox, 2001), while development of reading comprehension is thought to rely on strategy use, background knowledge, and self-regulation (Ahmadi & Pourhosein, 2012). Understanding how motivational instruction affects different reading skills may thus provide insight into its relationship with reading achievement. To address this aim, the impact of the present intervention was assessed for a broad range of reading skills, including phonological awareness, accuracy, fluency, comprehension, and motivation.

To address the research aims outlined above, a comprehensive literature review and four empirical studies were conducted. The first two studies, described in Chapters 2 and 3

respectively, aimed to identify theoretical and practical recommendations that would guide the design of the motivational components of a combined cognitive and motivational reading intervention. The first study sought to identify a theoretical framework to guide the design of the intervention, while the second study sought to identify effective practices in motivational reading intervention. In the bridge after manuscript 2, theoretical and empirical recommendations were merged to propose a motivational reading intervention. The work presented in these chapters was guided by the following research question and sub-questions:

1. Which motivational components should be included within a cognitive and motivational reading intervention?
    a. Which theoretical framework best addresses the role of motivation in reading development?
    b. What recommendations does this framework provide for instructional practice?
    c. What is the impact of motivational reading instruction on reading?
        i. What are the characteristics of studies assessing motivational reading interventions (e.g., sample type, content approach, theoretical frameworks, etc.)?
        ii. What is the impact of motivational reading interventions on reading achievement?
        iii. What is the impact of motivational reading interventions on reading motivation?
        iv. Which characteristics of motivational reading interventions moderate their impact on reading achievement and reading motivation?

d. How can recommendations from theory and practice be integrated to comprehensively support reading motivation during reading instruction?

The aim of studies three and four, described in Chapters 4 and 5 respectively, was to examine the impact of a reading intervention that addresses both cognitive and motivational components of reading on the reading outcomes of students at risk for reading difficulties. A secondary aim was to assess whether any gains in achievement observed were due to changes in students' motivation. The work presented in these chapters was guided by the following research question and sub-questions:

2. What are the effects of a Cognitive plus Motivational reading intervention on the reading outcomes of students at risk for reading difficulties?
    a. Compared to a Cognitive-Only reading intervention, how does supplementing cognitive reading instruction with supports for reading motivation impact different components of reading achievement (phonological awareness, accuracy, fluency, comprehension)?
    b. Compared to a Cognitive-Only reading intervention, how does supplementing cognitive reading instruction with supports for reading motivation impact different components of reading motivation (i.e., reading self-efficacy, value for reading)?
    c. If gains in reading motivation and achievement were present, were gains in reading achievement mediated by gains in reading motivation?

It was hypothesized that, compared to a Cognitive-Only reading intervention, a combined Cognitive plus Motivational reading intervention would lead to greater gains in reading achievement and reading motivation for students at risk for reading difficulties. It was further

hypothesized that gains in reading achievement would be mediated by gains in reading motivation.

Chapter Overviews

To address the research aims and questions stated above, a comprehensive literature review and four empirical studies were conducted. The components in this multi-step programmatic research are described in the following chapters:

Chapter 1 consists of a comprehensive review of the theoretical and empirical considerations guiding this research. Contributions from theories of development and of reading on the development of practice recommendations are described. This is followed by an overview of the current state of research into reading instruction, which was used to create the cognitive components of the intervention assessed in Chapters 3 and 4. Chapter 1 concludes with an overview of the relationship between reading motivation and reading achievement, and of important gaps in the literature that support the need for this research.

Chapter 2 presents results from a narrative review and thematic analysis of the main theoretical frameworks of motivation cited in empirical reading research. Based on this review, a theoretical framework of motivation based on Motivational Systems Theory (MST; Ford, 1992) was adopted to guide the development of a preliminary set of guidelines for a motivational reading intervention.

In Chapter 3, findings from a systematic review and meta-analysis of existing intervention research on motivational reading instruction are presented. The review aimed to identify effective practices in motivational reading instruction that could complement the theoretical framework outlined in Chapter 3. In the bridge between Chapters 3 and 4, the process by which theoretical and empirical recommendations were merged is described, along with a

detailed overview of the resulting guidelines. These guidelines formed the basis for the motivational components of the intervention assessed in Chapters 4 and 5.

In Chapter 4, results from a pilot study assessing the proposed Cognitive plus Motivational reading intervention are presented. A concurrent multiple-baseline AB design was used to assess the impact of the intervention on the reading outcomes of four grade three students at risk for reading difficulties. Effects on reading fluency, interest, and self-efficacy were assessed using probes administered throughout the course of the intervention. The findings presented in this chapter provide preliminary support for the benefits of a cognitive plus motivational reading intervention based on MST. This justified the need for a larger-scale investigation into the intervention's effectiveness.

Chapter 5 extends upon Chapter 4 to provide a stronger causal test of the proposed intervention. Using a quasi-experimental pre-test/post-test efficacy intervention trial design, the growth in reading achievement and reading motivation of students who received either a Cognitive-Only reading intervention or a combined Cognitive plus Motivational reading intervention was compared. Effects of the intervention on phonological awareness, reading accuracy, reading fluency, reading comprehension, value for reading, and reading self-efficacy are described.

In Chapter 6, a summative review of the previous chapters is presented, as well as a critical consideration of this research in light of its limitations. Implications of the findings presented here for reading theory, instructional practice, and future research are discussed. Finally, a synthesis of the original contributions made by this dissertation are provided.

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Chapter 1: Comprehensive Literature Review

The first aim of this thesis was to provide avenues for designing more effective interventions for struggling readers. More specifically, the research presented here sought to evaluate the effectiveness of reading instruction that targets both cognitive (e.g., reading skills, strategies) and motivational (e.g., self-efficacy beliefs, learning emotions) components of reading, compared to instruction that targets only cognitive components of reading. Evaluating the effectiveness of such a program also addressed this thesis' second aim, which was to further the understanding of the mechanisms through which reading motivation may impact reading achievement. It is argued here that effective instructional design should be guided by a theoretical understanding of reading development and by knowledge of evidence-based instructional reading practices. On one hand, to design instruction that comprehensively addresses the needs of developing readers, a theoretical understanding of the different components that contribute to reading development is needed. On the other, drawing upon existing evidence-based practices makes it more likely that instruction will be effective (Snowling & Hulme, 2011). Thus, instruction designed by integrating theoretical and empirical recommendations is more likely to comprehensively support reading development than instructional design that considers either theory or practice alone. Additionally, evaluating the impact of interventions that are driven by an understanding of theory contributes to refining theory and its practical implications. It is further argued that this should be situated within a broader understanding of the factors that contribute to human development. This chapter aims to provide a comprehensive review of the broad theoretical and empirical considerations guiding this research. To do so, it is organized in three sections:

1. In the first section, to situate this work within a broader understanding of human development, an overview of developmental theories is presented. This section

considers several influential theories of development, which factors they suggest are important to learning, and how this should inform reading instruction. It is argued that to comprehensively support the needs of learners, a holistic approach to designing instruction should be adopted, i.e., one that considers the various individual, environmental, and transactional components of development.

2. In the second section, to situate this work within an understanding of reading development, theories of reading development and empirically-supported practices in reading instruction are considered. The purpose of this section is to identify theoretically- and empirically-supported approaches to cognitive (i.e., skills- and knowledge-based) reading instruction. The evidence-based instructional practices identified here are used as the basis for the cognitive components of the intervention evaluated in Chapters 4 and 5.
3. In the final section of this chapter, one important component of a holistic understanding of reading development is discussed, namely reading motivation. In this thesis, it is argued that to design effective reading instruction, both cognitive and motivational components of reading should be addressed. To provide support for this argument, an overview of how reading motivation contributes to reading development, and the implications this has for reading intervention, are presented. Finally, gaps in the reading literature that justify the need for the present research are discussed.

Theories of Development

To design instruction that comprehensively addresses learners' needs, it is first necessary to possess an understanding of the components involved in human development and learning.

Theories of development provide insight into the multiple mechanisms that contribute to learning, and as such represent a useful starting point towards designing effective instruction in a range of subjects, including reading. In this thesis, it is argued that to fully understand development, a holistic approach is needed, i.e., one that considers the various individual, environmental, and transactional factors that influence learning. Thus, rather than adhering to a single theory of development, the work presented here builds upon commonalities among influential holistic theories of development. In this section, a range of modern holistic theories of development, their contributions to understanding development and learning, and how they complement one another, are discussed. Finally, how holistic theories of development can be used to guide instructional design is considered.

An influential early view of development was constructivism. Constructivists proposed that learning occurs through a process of exploration, in which learners actively construct meaning and knowledge through interactions between themselves, their prior knowledge and skills, and their environment (Fosnot, 1996). Early constructivists (e.g., Piaget, 1936) argued that children progress through universal stages, and that development is shaped by how individuals interact with their environment during these stages (Kingir, Tas, Gok, & Vural, 2013). While early forms of constructivism proposed a template for understanding interactions between individual and environmental factors, they were criticized for being too rigid and for neglecting to consider the impact of both contextual factors, such as culture, and individual factors, such as affect (Mascolo, 2015). In response to these critiques, social-constructivist and Neo-Piagetian theories emerged. Social-constructivist theories echo the emphasis placed on recurring interactions, but argue that the most important interactions are those that take place between individuals, societies, and cultures (Vygotsky, 1978). Here, development and learning are

thought to result from a process by which children internalize knowledge gained from interactions with more competent adults (Tinajero & Pàramo, 2012). Similar to earlier constructivist theories, neo-Piagietian theorists argue that recurring patterns of engagement with the environment gradually become integrated within an individual's cognitive scheme, but further argue that emotions and context play a central role in this process (e.g., Chapman, 1991). Modern approaches to constructivism thus understand learning in a more holistic way, arguing that it results from the interplay between the learning environment, people therein, and the cognitive skills, metacognitive skills, and the emotions children bring to that environment (Zimmerman, 1989). Applied to the context of reading instruction, constructivist approaches propose that students' recurring patterns of engagement with reading activities orient their future approach to reading. These patterns of engagement are thought to depend on the interplay between the individual (e.g., prior ability, background knowledge, metacognitive knowledge, emotions), their reading environment (e.g., classroom climate, book type, difficulty), and the people in that environment (e.g., relationship with teachers, peers).

Ecosystems theory (Bronfenbrenner, 1976) considers a broader scope of environmental influences, by taking into account contributions from both the proximal (e.g., family, classroom) and distal (e.g., society, culture) contexts in which development takes place. Its proponents posit that development is a transactional process, wherein the way children grow, and learn, results from a dynamic process of interaction between the different levels of their ecosystem (Bronfenbrenner, 1976). This ecosystem finds the individual at its center, and considers how the objects, symbols, culture, and events that occur both in their proximal and distal environments influence them (Bronfenbrenner, 1994). While early versions of ecosystems theory tended to view the individual as passive in this process, later iterations were revised to argue that the

individual plays an active role in shaping their environment and their development. This led to the emergence of bioecological systems theory (Bronfenbrenner, 2005). Bioecological systems theory maintains the earlier focus on both proximal and distal environmental influences, but extends upon ecosystems theory by arguing that how the environment impacts an individual depends on the interplay of factors that are both internal (e.g., genetic dispositions, affect, perceptions) and external (e.g., classroom climate, family environment) to the individual. Bioecological models thus argue that to understand development, we must consider how genes and environments interact, i.e., different contexts may evoke different responses depending on a child's genetic baggage. They further propose that the way in which an individual makes sense of the events, persons, and objects in their environment mediates the impact of the environment on their development (Bronfenbrenner, 2005). Similar to constructivist approaches to development, bioecological models propose that to understand learning, it is important to consider the role of components both inside the individual (e.g., genes, affect) and outside the individual (e.g., classroom environment, culture). Within a bioecological systems perspective, reading development depends on the interaction between individual reading factors (e.g., genetic predisposition for reading difficulties, prior ability, affective responses to reading tasks) and environmental reading factors (e.g., difficulty of tasks, personal relevance of texts). Here, an ideally-supportive environment would be one that allows students to develop to their full genetic potential, which would in turn shape the way that they approach future reading tasks.

Finally, dynamic systems theory (Thelen & Smith, 1994), like neo-constructivist and bioecological theories of development, views development as transactional (i.e., resulting from a complex interplay of individual and external factors). Proponents of dynamic systems theory argue that development is the result of systemic, emergent, and self-organizing processes. Here,

similar to constructivist theories, recurring interactions between individual and environmental factors are thought to give rise to patterns which shape the course of growth (Tinajero & Pàramo, 2012). This process is thought to involve complex interactions between multiple levels, including genetic, neural, behavioral, psychological, and social factors. Recurring interactions between these spheres lead to the emergence of patterns that shape development. These patterns are in turn influenced by the individual's perception of the process (Lewis, 1995). For example, during learning, cognitive (e.g., concepts learned, beliefs about ability) and emotional (e.g., affect) factors interact with the feedback provided from the environment (e.g., feedback from teachers, performance on assessments) to give rise to dispositions towards learning, which subsequently affect future learning. As in constructivist or bioecological models of development, dynamic systems theory proposes that learning, and reading, results from iterative interactions between the individual and different aspects of their environment. In all three theories, the individual both shapes and is shaped by the environments they find themselves in.

Analysis of the theories reviewed above reveals several common themes and complementary recommendations. While each position is distinct, social-constructivist, neo-Piagetian, bioecological, and dynamic systems theories of development share the view that individuals develop through a holistic process, i.e., that development is influenced by characteristics of the individual, their environment, their relationships with others, and interactions between these spheres (Magnusson & Cairns, 1996). Another common theme throughout the theories outlined above is that this process of development is modulated by individuals' perceptions and emotions. In the context of reading instruction, this supports the view that how children learn to read is influenced by individual characteristics (e.g., cognitive abilities, genetics), characteristics of their environment (e.g., quality of teaching, school culture),

and transactions within these spheres (e.g., whether classroom tasks match skill level, feedback from teachers and assessments). Further, holistic views of development argue that the interactions between the environment and individual characteristics are affected by several psychological factors which both result from learning and impact future learning. These include self-appraisals of ability (Bandura, 1995), learning emotions like pride or anxiety (Carver & Scheier, 2000), interest in the subject at hand (Cartwright, Marshall, & Wray, 2016), learning goals (Anderman, Anderman, Yough, & Gimbert, 2010), and learning motivation.

The research presented in this thesis sought to evaluate one prediction of a holistic approach to development, which is that to fully understand reading acquisition, a conceptual model incorporating both cognitive (e.g., skills, knowledge of strategies) and psychological (e.g., motivation, emotions) factors is needed. Holistic models of development predict that such a conceptual model would better account for individual differences in reading development than models that consider only cognitive components of reading or only psychological components of reading. Based on this approach, it is argued that for instruction to be maximally effective, it should not only address the skills and content that are taught, but also how this interacts with individual characteristics, including a child's motivation. The validity of such a model is examined in Chapters 4 and 5, through the evaluation of a reading intervention designed to address both cognitive and motivational components of reading. To design maximally effective reading instruction, this broad holistic approach should further be situated within a more specific understanding of reading development, and knowledge of empirically-validated practices in reading instruction. Both are discussed in the following section.

Reading Development and Practice

Theories of Reading Acquisition

In line with a holistic view of development, a holistic view of reading must consider the role of individual, environmental, and transactional influences on reading development. Research finding that both genetic and environmental factors contribute to reading ability supports the validity of this approach. On one hand, findings suggest that reading ability is both determined by genetic background and stable over time (Olson, Keenan, Byrne, & Samuelsson, 2014). Genetic variance has been found to explain large amounts of the variance in reading comprehension (Keenan, Betjemman, Wadsworth, deFries, & Olson, 2006) and in decoding skills for phonologically consistent words (Castles, Datta, Gaya, & Olson, 1999). On the other hand, findings from twin studies have shown that the classroom environment may account for up to 8% of additional variance in individual reading ability than that predicted genetically (Byrne et al., 2010). Consistent with bioecological systems theory, the impact of biological and environmental factors is probably best understood as the result of interactions between both spheres, where maximally supportive environments support children to reach their full genetic potential (e.g., Bronfenbrenner, 2005).

Beyond broad individual and environmental influences, reading development is thought to be constrained by the development of specific cognitive process. For example, the Simple View of Reading (SVR), one influential view of reading development, posits that reading comprehension depends upon two necessary (but not necessarily sufficient) factors: decoding and linguistic comprehension (Hoover & Gough, 1990). Decoding refers to the ability to rapidly and accurately recognize words. In alphabetic languages, direct instruction in phonics (i.e., instruction in which students are taught phonological patterns explicitly and systematically) is thought to be important to developing decoding skills, in that it allows students to become self-

teachers (i.e., to generalize learned phonics patterns to new words). For example, in English, research suggests that children can infer word patterns when they are first provided with three consistent clues and then asked to generalize this pattern to new words (e.g., "sea", "team", "meal" → "eat") (e.g., Savage, Deault, Daki, & Aouad, 2011). This is consistent with the idea of a "self-teaching" strategy, where students store information about letter-sound correspondences (referred to hereon as Grapheme-Phoneme Correspondences, or GPCs) gained from decoding one word and then transfer this knowledge when decoding novel words (Share, 2004). Linguistic comprehension, for its part, is thought to involve a more complex interplay of cognitive factors, including vocabulary, working memory, response inhibition, listening comprehension, parsing, bridging, and discourse building (Hoover & Gough, 1990; Quinn & Wagner, 2018). However, different underlying processes are likely to be involved in different reading skills. Proficient reading requires accuracy, fluency and comprehension (e.g., National Reading Panel, 2000). While it is thought that reading comprehension depends on the interplay of decoding ability and linguistic comprehension, as outlined by the SVR, fluency is thought to rely mainly on large amounts of practice needed to develop automaticity (Guthrie & Cox, 2001).

While decoding ability and linguistic competence may represent necessary cognitive processes for reading acquisition, both are likely to be modulated by the environment and by characteristics of the reading task itself. For instance, different spelling systems, or orthographies, require different skills for proficient reading. In transparent orthographies, such as Finish or Italian, the relationship between graphemes and phonemes is consistent. Thus, learners can rely on phonological strategies to decode most words. Conversely, in opaque orthographies such as English, the relationship between graphemes and phonemes is inconsistent. Thus, relying on phonological strategies alone is insufficient to read all words (Seymour, Aro, & Erskine,

2003). Yet other languages contain large amounts of "linguistic distance", meaning that oral and written language are not strongly related. This is the case in abjads such Hebrew or Arabic, where only consonants are represented in writing, and morpho-syllabic languages such as Chinese, where symbols containing minimal phonological cues represent language. Similar to opaque orthographies, relying on phonological skills in these languages is insufficient for accurate reading. In each of these language systems, then, the strategies and skills required for proficient reading are constrained by the specific task demands of the language, which influences the cognitive processes involved when learners attempt to read, as well as the profile of reading difficulties of students who struggle with reading.

A more holistic alternative to the SVR argues that the process of reading and understanding text is multidimensional, influenced by characteristics of the reader, text, and task (Snow, 2002). Such a holistic view can accommodate SVR's proposal that decoding and linguistic skills constrain text comprehension, while extending upon this to include additional factors that moderate reading, such as personal interests, preexisting knowledge, and characteristics of the language or task itself. The Componential Model of Reading (CMR; Joshi & Aaron, 2012) further extends this to consider the influence of psychological (e.g., attitudes, perception, motivation) and ecological (e.g., family systems, SES, school) factors that influence reading development. This is in line with the view adopted in this thesis, which argues that understanding reading development requires us to consider both cognitive (e.g., skills, knowledge of strategies) and psychological (e.g., motivation) components of reading. Support for the validity of holistic models of reading development comes from analysis of 2006 PISA international literacy tests. Analysis of results indicates that the strongest variation factors in reading levels were ecological, i.e., country (61%) and classroom (30%), while 8% were

psychological (attitudes towards reading, self-concept, gender, learning style) and 1% were cognitive (i.e., early literacy skills) (Chiu, McBride-Chang, & Lin, 2011).

Modern theories of reading are in line with holistic theories of development. They emphasize the need to consider the various individual (e.g., genes, pre-existing knowledge), environmental (e.g., language context, task demands), and transactional factors (e.g., attitudes towards reading, self-concept) involved in reading, and how these interact with one another. Similar to a holistic view of development, a holistic view of reading proposes that an individual's characteristics (cognitive and psychological) both shape and are shaped by their learning environment. Theories of reading development further provide insight into the key cognitive processes that are necessary for proficient reading, such as the ability to recognize common GPCs and linguistic comprehension skills. This implies that when designing reading instruction, both the specific knowledge and skills students need to be able to read proficiently, as well as how characteristics of the environment interact with students' individual characteristics, including their pre-existing knowledge and motivation, should be considered. It was argued above that instructional design should be guided both by a solid understanding of theory and by knowledge of the most effective instructional tools. Thus, in the following section, approaches to reading instruction that have gained empirical support are considered. These are used to design the cognitive components of the intervention assessed in Chapters 4 and 5.

Evidence-Based Reading Instruction

The reviews of developmental and reading theories presented above suggest that to thoroughly understand reading development, a holistic approach is needed. Intervention research provides a path towards evaluating the validity of a holistic model of reading development. In this thesis, one such model is evaluated by proposing and assessing a reading intervention

designed to address both cognitive and motivational components of reading acquisition. To guide the design of the cognitive components of this intervention, a review of prominent approaches to reading instruction and their empirical support was first conducted.

A central debate within the field of reading research has concerned the benefits of "whole language" reading instruction versus more targeted phonics instructions. Proponents of "whole language" models of reading instruction argue that learning should focus on discovering meaning within a literacy-rich environment (Goodman, 1967). Here, reading is thought to result from a type of "guessing game", where students apply graphic, semantic, and syntactic knowledge to identify word pronunciations. Within this view, focusing on detailed word-level information, such as phonetically decoding words, detracts from the ability to grasp a text's meaning. On the other hand, proponents of phonics approaches argue that explicitly teaching phonological patterns and rules to students enables them to learn most efficiently (Bond & Dykstra, 1967; Savage & Cloutier, 2017). Results from ten meta-analyses of phonics approaches to reading instruction provide strong evidence that they have a significant, positive effect on the reading performance of both typically-developing readers and students who struggle with reading (Savage & Cloutier, 2017). Further, research provides support for the benefits of direct, systematic and cumulative phonics instruction, in which students are taught to "sound out" GPCs and blend them to make words (e.g., /b/+/a/+/g/ = bag) (Ehri, Nunes, Stahl, & Willows, 2001). Given the large amount of empirical support for such an approach, direct and systematic phonics instruction was included in the intervention evaluated in Chapters 4 and 5.

Beyond an understanding of the skills required for proficient reading, research has also sought to identify the most efficient ways to teach students these skills. Notably, the simplicity principle approach to reading instruction posits that there is an optimally efficient number of

words and phonological patterns students should learn to be able to read efficiently. This view draws upon the work of Masterson, Stuart, Dixon, & Lovejoy (2010) and Vousden, Ellefsen, Solity, & Chater (2011). Masterson et al. (2010) collected a database of 995,927 occurrences, or "tokens", contained in 1011 children's books for kindergarten to grade three. They observed that 50% of these tokens were made up of the 100 most frequent words, while the other 50% contained words that occurred only once or twice throughout all texts. Vousden et al. (2011), for their part, collected a database of all words contained in 685 popular books for children aged five to seven, and coded the frequency of GPCs within these texts. They report that teaching approximately 60-70 of the most common GPCs and 100 of the most frequent words enabled children to successfully decode approximately 80% of all texts. This view suggests that teaching students the most common GPCs in combination with the most frequently occurring words may enable them to rapidly become proficient readers. This may also have a positive impact on their motivation. It has been argued that enabling students to identify underlying statistical probabilities of print helps them to rapidly experience reading success, thereby building confidence in their reading abilities (Chen & Savage, 2014). For example, Chen and Savage (2014) compared a reading program that taught children according to the simplicity principle with a reading program that taught word usage. They found that students in the simplicity group made greater gains in spelling, word recognition, and reading motivation than students in the word usage group. Additionally, teaching of common GPCs may be more effective when combined with shared book reading (e.g., Shapiro & Solity, 2016). For example, in a study comparing grade two students who received phonics instruction delivered alone or combined with storybook reading, students who received the combined instruction showed greater gains in reading (Tse & Nicholson, 2014). Shared book reading activities, in which a child reads a book

along with an adult or a peer, have been found to lead to modest gains in a wide range of reading abilities, including vocabulary (Farrant & Zubrick, 2011), print awareness (Justice & Ezell, 2004), and phonological awareness (Lefebvre, Trudeau, & Sutton, 2011).

One mechanism through which combining teaching of GPCs with storybook reading may be most effective is through direct mapping, which refers to the process of decoding real text by applying knowledge gained from learning a new GPC directly after the new GPC has been learned (e.g., Savage, Georgiou, Parrila, & Maiorino, 2018). A study by Yeung and Savage (2019) provides support for the efficacy of the direct mapping approach, through an intervention study comparing students with English as an Additional Language in Hong Kong who received one of two reading interventions teaching GPCs. In one condition, students' attention was directed to the application of graphemes taught that day on text reading, while in another condition students learned GPCs without direct mapping. Compared to students who did not receive direct mapping instruction, those who did showed greater gains in word reading, spelling, and sentence comprehension (Yeung & Savage, 2019).

Morphological approaches to reading instruction, in which students are taught patterns related to the different roots, suffixes, prefixes, and combinations thereof, have also garnered some support (Goodwin & Ahn, 2010; 2013). A meta-analysis of studies examining the impact of morphological interventions on the literacy outcomes of students with reading difficulties yielded significant but small effect sizes (d = 0.20-0.49) on a range of literacy outcomes including comprehension, morphological awareness and phonological awareness (Goodwin & Ahn, 2010). Reading interventions targeting comprehension through metacognitive strategies such as predicting and summarizing or comprehension monitoring, for their part, have yielded modest effects (d = 0.19-0.20) on reading outcomes (Scammaca, Roberts, Vaughn, & Stuebing,

2015). However, caution in interpreting effect sizes is needed, as a majority of intervention studies included 30 hours or less of direct teaching. As noted earlier, reading comprehension is thought to involve a range of complex processes, including decoding, vocabulary, working memory, listening comprehension, and parsing. Thus, it is possible that intervention that teaches each of these components, or intervention that is longer, may yield larger effect sizes on comprehension. Nonetheless, as comprehension underlies many aspects of learning and may have a beneficial impact on a broad range of academic outcomes, even small gains in comprehension are noteworthy.

In the research presented here, the target population was third graders with difficulties in phonological awareness, reading accuracy, fluency, and/or comprehension. Evidence-based practices were used to design the cognitive components of the intervention. While morphological and metacognitive approaches to reading have yielded some support, the evidence base is relatively smaller than that for direct and systematic phonics instruction. As the intervention was designed to be delivered over a short period of time (8-10 weeks), it sought to most efficiently address students' reading difficulties, Thus, the cognitive components of the intervention were based on the simplicity principle, teaching students high-frequency words and the most common phonological patterns. To teach students common phonological patterns, a direct and systematic phonics teaching approach was adopted. This was combined with shared book reading and direct mapping, to reinforce learning of new GPCs and support students' reading of words in text. In addition, in line with holistic views of development and reading, the proposed intervention was designed to target contributions of personal, environmental, and transactional factors on learning to read. A central factor within this intervention design was the inclusion of supports for student motivation. In the final section of this chapter, a review of the role of motivation in reading, and

of the rationale for the importance of its inclusion in the design of reading instruction, is presented.

Reading Motivation and Reading Development

The bulk of reading research has focused on the cognitive factors involved in reading, laying important foundations about the cognitive processes and skills that should be targeted during instruction to support learning. However, holistic theories of development (e.g., Neo-Piagetian theories, the bioecological model of development, dynamic systems theory) and of reading (e.g., the Component Model of Reading) suggest that cognitive processes represent only one of several contributors to reading development. Proponents of these theories argue that to fully comprehend reading development, cognitive factors as well as psychological and contextual factors must be considered. In recent years, increasing attention has been given to one important psychological factor in reading success, reading motivation. Findings from the literature on reading motivation support the view that to fully understand reading development, both cognitive and motivational factors should be considered. Reading motivation has, for example, been linked to increased achievement (Andreassen & Bråten, 2010), use of reading strategies, comprehension, and engagement during reading (Guthrie & Wigfield, 2000). Further, reading motivation has been shown to partly mediate increases in reading ability following intervention (Bates, d'Agostino, Gambrell, & Xu, 2016). When controlling for prior reading ability, reading motivation has been shown to account for independent variance in reading performance (e.g., Taboada, Tonks, Wigfield, & Guthrie, 2009), suggesting it contributes to reading skill above and beyond its direct relationship to reading achievement. Of note are findings that the relationship between motivation and reading is the strongest for students who are struggling with reading (Logan, Medford, & Hughes, 2011). One explanation for this pattern is that for students who

struggle with reading, motivation may act as a form of insurance, partly compensating for lower reading skills by fostering opportunities for skill development (Vollmeyer & Rheinberg, 2006).

For all learners, the process of learning to read is likely to be comprised of challenges, such as decoding novel words or grasping complex tests. Repeated failed attempts to surmount these challenges may, in some cases, have negative repercussions on future reading motivation (Byrne, Snowling, & Hulme, 2007). Lower motivation, in turn, has been linked to increased feelings of helplessness, avoidance, and disinterest during instruction, translating into lower engagement with instruction (Polychroni, Koukoura, & Anagnostu, 2006). This reduced engagement means students may not benefit from instruction as much as students who are motivated, limiting their opportunities to improve their vocabulary, strategy use, decoding, fluency, and comprehension (Morgan & Fuchs, 2007). Consistent with this, a bi-directional relationship between motivation to read and reading achievement has been proposed: Low reading achievement has a negative impact on motivation, while low motivation further hinders reading achievement, perpetuating a negative cycle of achievement and motivation (Morgan, Fuchs, Compton, Cordray, & Fuchs, 2008).

The importance of considering ways to foster reading motivation is underscored by a general downward trend in reading motivation as children grow older (Hong, Peng, & Rowell, 2009). Already in second grade, a dip in intrinsic motivation to read has been reported, and by the time students are in grades five and six, they are less likely to say they value reading or read for pleasure than when they first enter school (Fletcher, Grimley, Greenwood, & Parkhill, 2011). As students move from primary to secondary school, this trend is further exacerbated (Schunk, Pintrich, & Meece, 2008). Notably, the decline in motivation observed as children grow older has been found to be most pronounced in students who struggle (Nelson & Manset-Williamson,

2006). This echoes findings that motivation has a greater impact on the outcomes of students at risk for developing reading difficulties, suggesting that targeting the motivational components of learning may be especially important for students who are already experiencing difficulties (Vollmeyer & Rheinberg, 2006).

Contributors to Reading Motivation

Several individual and environmental factors have been shown to contribute to reading motivation. On one hand, individual differences in ability and interest have been shown to contribute to reading motivation (e.g., Logan et al., 2011). Developmental factors may also impact reading motivation. For example, as students grow older, their metacognitive awareness and their ability to distinguish between effort and ability tend to become more robust. While children in early elementary years tend to perceive ability and effort as co-varying (e.g., "children who are smart try hard"), older children tend to see them as opposed (e.g., "children who try hard do so because they are less able"). For students experiencing difficulties, this may lead them to increasingly negative self-appraisals of ability (Nicholls, 1978), which may subsequently lead to lower motivation and to helpless or avoidant behaviors during reading instruction (Dweck, 2002; Nicholls, 1978).

On the other hand, characteristics of the classroom environment have been found to influence motivation. First, as students move through school, reading tasks become progressively harder. For students who struggle, this may lead to more frequent experiences of reading failure, contributing to a decline in confidence about their ability to succeed, and to a corresponding decline in motivation (Boscolo & Gelati, 2007). Second, practices that encourage social comparison among students, e.g., giving privileges to those who perform best, tend to become more prevalent in upper elementary years (Kohn, 1993). Findings have shown that motivation

tends to be lower in classrooms where rewards are given for performance, compared to classrooms where rewards are given for progress (e.g., Guthrie, 2001). Conversely, several research endeavors have identified characteristics of classrooms that are linked to increased motivation, including classrooms that promote: (1) self-efficacy (i.e., beliefs in one's ability to successfully tackle learning tasks; Bandura, 1995; Guthrie, McRae, & Klauda, 2007), through opportunities to feel competent, (2) positive attribution beliefs, such as attributing success to effort or strategy use (Niemiec & Ryan, 2009), (3) task value, by providing personally relevant, interesting and authentic activities aligned with students' short- and long-term learning goals (Assor, Kaplan, & Roth, 2002), (4) autonomy, by providing opportunities for choice, shared decision making, or open tasks (Deci & Ryan, 1985; Kirschner, Sweller, & Clark, 2006; Reynolds & Symons, 2001), (5) mastery goals, i.e., learning goals driven by interest or a desire for self-improvement (Guthrie, 2001), (5) strategy use (Guthrie, 2001), (6) social and cooperative-learning opportunities, and (7) positive teacher-student relationships, by promoting fairness, mutual respect, and emotional support (Patrick, Ryan, & Kaplan, 2007).

It is important to note, however, that learning contexts are unlikely to be uniformly motivating or demotivating. Instead, in line with holistic views of development, their impact likely depends on the dynamic interaction between classroom and individual factors (Patrick et al., 2007). The close relationship between reading motivation and reading achievement strongly suggests that any efforts to improve reading must approach the issue holistically, rather than from a purely cognitive or a purely motivational standpoint. The impact of classroom structures on motivation to read suggests that motivation to read is responsive to changes in students' learning environments. Taken together, this suggests that classroom and curricular components that promote motivation to read may be helpful in promoting high reading achievement,

especially for students who appear to be in a cycle of low motivation to read and reading achievement. Well-executed experimental studies are needed to examine the potential of such an approach.

Gaps in the Reading Motivation Literature

The bulk of the teaching of reading literature has focused on measurable achievement in specific areas known to contribute to reading development, such as phonics and comprehension. This has, overall, resulted in less attention being given to the motivational factors involved in learning how to read (Edmunds & Bauserman, 2006). Findings that interventions which focus solely on the cognitive aspects of reading usually don't increase motivation to read (Morgan et al., 2008; Quirk & Schwanenflugel, 2004) and have, in some cases, been linked to more negative attitudes towards reading (Wanzek, Vaughn, Kim, & Cavanaugh, 2006), decreased self-efficacy beliefs, and increased anxiety (Weiner, 1985), highlight the need for novel approaches towards designing reading instruction.

It is argued here that intervention studies that compare the effects of cognitive reading interventions to those of combined cognitive and motivational interventions provide the strongest causal test of the potential of "motivationally-enhanced" designs, i.e., cognitive reading interventions that are supplemented with supports for reading motivation. While the majority of research into the contribution of reading motivation to reading development has been correlational (Naceur & Schiefele, 2005), a growing body of intervention research has begun to examine the potential of motivation-based reading instruction (meta-analyses of motivational designs conducted by Dignath & Büttner, 2008, Guthrie et al., 2007, Unrau et al., 2017 and van Steensel, van der Sands, & Arends, 2017 are described in Chapter 3). However, there remain

notable gaps in the literature which limit the potential of such interventions to be integrated within applied teaching contexts.

Lack of theoretically-informed intervention research. To best approach the question of how to support reading development, interventions that are driven by an understanding of development are needed. This involves addressing the influences of individual, environmental, and transactional factors both on reading skills and on reading motivation. However, most interventions that target reading motivation are not driven by a holistic understanding of development or by motivational theory (Wentzel & Wigfield, 2007). Of the 49 intervention studies included in the meta-analysis presented later in Chapter 3, only 19 made any reference to a motivational theory, and even fewer comprehensively described the links between theory and the intervention assessed. This finding echoes concerns that approaches to best-practice reading instruction have focused on rapidly designing interventions to the detriment of a theoretical understanding of reading development (Compton, Miller, Elleman, Steacy, 2014). In both cases, failure to ground intervention work in theory may compromise the power of interventions to comprehensively address reading motivation. More intervention studies that test the impact of motivational reading programs designed based on an understanding of motivational theory are needed. In Chapters 4 and 5, results from evaluations of such a theoretically-informed cognitive and motivational reading intervention are presented. To design the intervention, a review of motivational theory was first conducted to identify a comprehensive theoretical framework of reading motivation as well as theoretical recommendations for practice. Results of this review are presented in Chapter 2.

Lack of well-designed intervention research. One of the main limits of existing research into motivational approaches to reading instruction is a lack of well-designed

intervention research. A quality analysis of the 49 papers included in the meta-analysis presented in Chapter 3 identified only two high-quality intervention studies (i.e., that were internally consistent and appropriately designed to assess the impact of motivational reading instruction), while the overall methodological quality of papers was rated as "medium" on well-established quality rating rubrics (Weight of Evidence rubric; Gough, 2007). Further, analysis of effect sizes indicated that effects on reading achievement and motivation varied significantly according to study quality. This poses a significant limit to generalizability of results obtained, and supports the need for more well-designed, tightly controlled intervention research into motivational approaches to reading. The results of such a well-designed, tightly controlled intervention study are presented in Chapter 5.

Lack of research considering the impact of motivational intervention on a broad range of reading skills. Intervention studies assessing the impact of motivational reading interventions have identified promising effects of such programs on both reading comprehension and reading motivation outcomes. Van Steensel et al. (2017), for example, report mean effect sizes of $d = 0.28$, and $d = 0.40$ on reading motivation and comprehension respectively. However, as noted above, the quality of studies available for this review may have been variable. Additionally, relatively less attention has been given to the impact of cognitive and motivational reading interventions on other important early reading skills, such as phonological awareness, accuracy, or fluency. Motivation may operate to improve reading achievement through multiple pathways, including increasing time-on-task, frequency of reading, systematic use of reading strategies, and engagement (Vollmeyer & Rheinberg, 2006). Reading comprehension is thought to depend on activating 'central' processes, including fluent reading, activation of background knowledge, application of reading strategies, and self-regulation (Ahmadi & Pourhosein, 2012).

Potentially, motivation may improve reading comprehension by increasing strategy use and cognitive engagement during reading. Development of fluency, on the other hand, is thought to depend in large part upon practice (Guthrie & Cox, 2001). Motivation may possibly improve fluency in part by increasing the frequency and duration of children's reading. Intervention research that examines the impact of "motivationally-enhanced" designs on a broad range of reading skills is needed to fully understand the potential of such designs to support reading development, as well as to gain a deeper understanding of the mechanisms through which motivation may contribute to reading development. Studies that conduct mediation analyses with motivation as a candidate mediator are also needed to assess this. In the studies described in Chapters 4 and 5, the effects of a cognitive and motivational reading intervention are examined on a broad range of reading outcomes, including phonological awareness, accuracy, fluency, and reading comprehension.

Conclusion

The review of modern theories of development (social-constructivist, neo-Piagetian, bioecological, dynamic systems theory) and of reading (SVR, CMR, holistic views of reading development) presented in this chapter supports the need for reading instruction that adopts a holistic approach, i.e., that addresses the various individual, environmental, and transactional components of reading acquisition. While the review of evidence-based cognitive (i.e., skills-based) approaches to reading instruction presented in this chapter identified several instructional practices that have garnered empirical support, focusing only on skills-based approaches to reading instruction may have limited potential to support the needs of all learners. Students who persistently struggle with reading tend to demonstrate low motivation and low engagement behaviors during learning (e.g., task avoidant behaviors; Eklund, Torrpa, & Lyytinen, 2013). As

a result, providing remedial reading skills instruction while failing to address motivational components of learning may in many cases be insufficient to fully support their reading development. For students who persistently fail to respond to reading interventions, one possible avenue for remediation may be skills-based reading interventions that are complemented with supports for motivation (Fuchs, Fuchs, & Compton, 2004; Morgan et al., 2008). This is in line with a more holistic view of both development and reading acquisition, in which various individual, environmental, and transactional contributions are interdependent, and should be jointly addressed to foster optimal outcomes.

While a growing body of intervention research has begun to address the potential of motivational supports for reading instruction, several gaps in the literature remain. Namely, most intervention designs lack a comprehensive theoretical foundation and/or a rigorous methodological design. This may have limited the development of comprehensive motivational reading interventions, on one hand, and generalizability of findings, on the other. Further, intervention studies of motivational approaches to reading instruction have mainly focused on reading comprehension and motivation, but fewer have examined their impact on a broad range of reading skills including reading fluency, accuracy and phonological awareness. Evaluations of motivational reading instruction on a range of reading skills is needed both to fully assess the efficacy of such approaches and to gain more insight into the mechanisms through which motivation may contribute to reading development.

The research presented in this thesis seeks to address these gaps by proposing and evaluating a reading intervention designed to support the reading skills and motivation of students at risk for reading difficulties. The intervention described here was created following a novel methodological approach consistent with a holistic view of development. It was driven by

a solid understanding of developmental theory and reading theory, described above, and of motivational theory as it pertains to reading, described in Chapter 2. It further built upon evidence-based practice in both cognitive reading instruction, through the review described above, and in motivational reading instruction, through results of the meta-analysis described in Chapter 3. To evaluate the potential of such an approach, the impact of the intervention proposed here on the reading achievement (phonological awareness, accuracy, fluency, reading comprehension) and motivation of students at risk for reading difficulties was examined. Results from two evaluations of the intervention are described in Chapters 4 and 5, respectively. Implications for theory, practice, and future research are discussed.

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Chapter 2: Manuscript #1

Towards a Cohesive Theory of Reading Motivation: A Narrative Review

Miriam McBreen & Robert Savage

Department of Educational and Counselling Psychology

McGill University

Abstract

Reviews of the empirical literature on reading motivation have highlighted that there exists a large amount of variation in terms of theoretical frameworks and definitions cited in the literature. This has made it difficult to establish a unifying theory of reading motivation, which may in turn limit the development of practical instructional tools to foster reading motivation. A narrative review and thematic analysis was conducted to identify the most commonly cited theoretical frameworks of motivation in K-12 empirical reading research, propose a path towards a unifying theory of reading motivation, and provide a set of preliminary guidelines for instruction that fosters reading motivation. Four prominently cited theories of motivation were identified: Self Determination Theory, Expectancy Value Theory, Achievement Goal Theory, and Attribution Theory. A critical review highlighted gaps in individual theories as well as substantial overlap across theories. It is argued here that to drive the field of reading motivation research framework, a unifying and comprehensive framework of motivation is needed, and that such a framework is provided by Ford's Motivational Systems Theory (MST). A set of preliminary guidelines for instruction to foster reading motivation based on MST is outlined.

Keywords: Reading motivation, Theories of motivation, Motivational Systems Theory

Towards a Cohesive Theory of Reading Motivation: A Narrative Review

It has been argued that reading motivation is an important contributor to reading development (e.g., Bates, d'Agostino, Gambrell, & Xu, 2016). For example, reading motivation has been positively linked to reading achievement (e.g., Park, 2011) and shown to contribute unique variance in reading comprehension (Taboada, Tonks, Wigfield, & Guthrie, 2009). However, research has found that for many students, motivation to read tends to decline as they progress through school (Hong, Peng, & Rowell, 2009). This trend has been noted as early as the second grade (Fletcher, Grimley, Greenwood, & Parkhill, 2011), and is thought to become more pronounced as children move through elementary (Fletcher et al., 2011) and secondary school (Schunk, Pintrich, & Meece, 2008). Notably, this decline in motivation has been found to be most severe for students who are struggling with reading (Logan, Medford, & Hughes, 2011). Potentially, this feeds into a negative cycle, whereby experiencing difficulties causes students to become less motivated, and lower motivation exacerbates pre-existing difficulties (Morgan, Fuchs, Compton, Cordray, & Fuchs, 2008). Such findings emphasize the need for novel approaches towards fostering reading motivation during reading instruction, especially during early elementary years.

A growing body of empirical research has identified promising paths towards fostering reading motivation. Correlational investigations have identified characteristics of classrooms that support reading motivation, including providing authentic reading activities (Assor, Kaplan, & Roth, 2002) and opportunities for choice (Kirschner, Sweller, & Clark, 2006). Some intervention research further indicates that compared to reading instruction that targets only cognitive aspects of reading (e.g., knowledge, strategies), reading instruction that targets both cognitive and motivational aspects of reading may lead to greater gains in reading achievement (e.g., in reading

comprehension; Guthrie, McRae, & Klauda, 2007). However, empirical investigations into reading motivation have largely evolved separately from motivational theory. In a review of 92 empirical studies of reading motivation, Conradi, Jang, and McKenna, (2014) found that only 17% of the reviewed studies explicitly defined key motivational constructs, and 22% made no mention of motivational theory at all. Among those that did mention theory, a range of motivational frameworks were cited, including Self-Determination Theory (SDT; Deci & Ryan, 1985; 24%), the reading engagement model (Guthrie & Wigfield, 2000; 11%), Expectancy-Value-Theory (EVT; Eccles et al., 1983; 10%) and McKenna's model of reading attitude acquisition (McKenna, Kear, & Ellsworth, 1995; 9%). Further, Conradi et al. (2014) report that 20% of studies included vague associations among terms (i.e., did not clearly state whether sub-constructs involved causal, correlational, or reciprocal relationships, or alluded to a term but did not define it), 32% of studies included synonymous definitions of distinct constructs (i.e., interchangeable use of two conceptually different terms without providing a clear definition, such as using "attitudes" and "motivation" interchangeably), and 20% of studies included inaccurate statements about constructs (i.e., erroneous definitions that did not accurately represent a term taken from a cited source).

The lack of theoretical integration in empirical research into reading motivation, combined with disparity in theories and definitions, has made it difficult to advance concrete, comprehensive recommendations for instructional practices that foster reading motivation. This echoes concerns that approaches to reading instruction have focused on rapidly designing interventions to the detriment of a theoretical understanding of reading development (Compton, Miller, Elleman, Steacy, 2014). In both cases, failure to ground intervention work in theory may compromise the development of effective practice recommendations (e.g., Snowling & Hulme,

2011). To drive the field forward, intervention work that builds upon a solid theoretical understanding of the role of motivation in reading is needed. For this to be possible, a unifying framework of motivation is first needed.

This review sought to address two aims. First, it sought to provide a path towards a unifying theoretical framework of reading motivation. Second, it sought to propose a preliminary set of theoretically-derived practical guidelines that could guide future motivational reading instruction. It was guided by the following questions:

1. Which theoretical framework best addresses the role of motivation in reading development?
2. What recommendations does this framework provide for instructional practice?

To propose a unifying framework, a narrative review and thematic analysis was first conducted to identify the most commonly cited theoretical frameworks of motivation in empirical reading research. The review presented here extends upon Conradi et al. (2014)'s work in two ways. First, a critical analysis of frequently cited theories of motivation was conducted with the aim of identifying an overarching theoretical framework of motivation that can guide the field of reading motivation research forward. Second, this overarching theoretical framework was used to derive a set of instructional guidelines that can be used to foster reading motivation. The search and analysis process used to identify articles is first described. Then, an overview of main findings, commonalities amongst the most cited theoretical frameworks, and gaps in the literature as it currently stands are presented. Based on this analysis, a path towards establishing an overarching theoretical framework of reading motivation is proposed. Finally, a set of preliminary practical guidelines to guide future motivational reading instruction based on this framework is outlined.

Narrative Review: Theoretical Frameworks of Motivation in Reading Research

Method

To establish a unifying theoretical framework of reading motivation, a review was first conducted to identify the theories of motivation most frequently cited in empirical reading research among elementary aged students. To identify relevant articles, literature searches using the search terms *"Motivation" AND "Reading" AND "Theory"* were conducted on three main educational databases: PsycInfo, Education Full Text, and ERIC. Results were restricted to papers published in English since 2007 to obtain an overview of the most current theoretical perspectives. As this review aimed to examine how theory influences teaching practice, the review was limited to empirical studies conducted with school-age students (K-12). While some evidence suggests that reading motivation has the largest impact on the outcomes of students at risk for reading difficulties (e.g., Logan et al., 2011), the review was not restricted only to this population, to gain broader insight into the field of empirical research into reading motivational. Through this process, 341 articles were returned. After removing duplicates and triplicates, 299 articles remained. Titles and abstracts were read to identify potentially relevant articles, through which a total of 79 articles were included and 220 were excluded. All selected articles underwent a full-text review, using the following inclusion and exclusion criteria:

Inclusion Criteria.

- Empirical research paper (both correlation and intervention studies)
- Peer reviewed
- Considered students in grades K-12
- Directly referenced one or more theory of motivation
- Pertained to reading and/or reading instruction

- The sample included students with typically-developing reading skills and/or students at risk for reading difficulties

Exclusion Criteria.

- Not an empirical research paper (theoretical papers, opinion pieces, conference proceeding, etc.)
- Did not consider students in grades K-12
- Did not directly reference one or more theory of motivation
- Did not pertain to reading and/or reading instruction
- Included second language reading instruction

Search results and characteristics of the sample. On the basis of the criteria outlined above, a sample of 39 articles was included in the final analysis. A PRISMA diagram detailing the search process is presented in Figure 1. Of the 39 identified papers, nine included only students at risk for reading difficulties in their sample, and one included only students typically-developing as readers in their sample. The samples of the remaining 29 studies consisted of a general student population, including both students typically-developing as readers and students at risk for reading difficulties. Within the sample of 39 articles, 19 articles made only a brief mention of the theoretical framework used (e.g., cited it only once, included it in the introduction but not in interpretation of results), while the remaining 20 articles described the theoretical framework in more detail. Level of detail ranged from designing the study in line with the theoretical framework chosen to considering the implications of results for the specified theoretical framework.

Coding for theoretical frameworks. Main theoretical perspectives on motivation were identified through concept-driven thematic analysis (Gibbs, 2007) using the codes “theory”,

"model", and "perspective". Labels were extracted from the main theories, models, and perspectives named. Theories which did not pertain to both motivation and learning/reading specifically were excluded from the coding and labeling process (e.g., engagement theory, self-regulation theory). Similar labels were grouped together under a common theme, while any label that occurred in three or fewer articles was discarded (e.g., social cognitive theory, social motivation theory). Through this process, the following four themes were identified, in order of frequency: (1) Self-Determination Theory (SDT), (2) Expectancy-Value Theory (EVT), (3) Achievement Goal Theory (AGT), and (4) Attribution Theory (AT). Detail on how frequently each theory was cited in articles is provided in Table 1. In the following section, a brief overview of each theory is provided, and commonalities and gaps within the theoretical landscape are discussed.

Prominent Theoretical Frameworks of Motivation

Results of the review identified Self-Determination Theory (SDT) as the most frequently cited motivational theory within the K-12 reading literature. Proponents of SDT suggest that adaptive, goal-directed behavior occurs when students feel that their actions are self-directed (Covington & Mueller, 2001). They posit that for students to feel self-directed, three basic psychological needs must be met: autonomy (i.e., the sense that they have control over their reading outcomes), competence (i.e., the sense that they are able and efficient readers), and relatedness (i.e., the sense that they connected to and accepted by the peers and adults in their environment) (Ryan & Deci, 2000).

The second most prominently cited motivational framework, expectancy-value theory (EVT), posits that motivation is determined by two things: The expectation of success or failure on a given task, and the value the individual places on the task. Expectancy of success is thought

to derive from students' sense of competence towards a task (Eccles et al., 1983). Here, when students feel competent, they are more likely to be motivated, echoing SDT's proposal that students must be given opportunities to feel competent to develop a robust self-concept of themselves as a reader. Overall value is thought to derive from attainment value (i.e., how important a task is to a student's perceived identity, e.g., if they think of themselves as good readers, reading tasks will have high attainment value), interest value (i.e., how interesting students think a task is), the utility value of the task towards fulfilling later goals (i.e., whether the task will enable them to achieve later goals e.g., learn how to read a favorite book series), and cost value of pursuing the task (i.e., what demands the task involves e.g., lost time, excessive effort, anxiety) (Archambault, Eccles, & Vida, 2010).

Attribution theory (AT) argues that how motivated individuals are to perform a task depends on how they understand their performance and what they attribute success or failure to. This theory argues that it is not only important to bolster children's learning for them to feel competent, but also to guide them towards developing accurate attributions for their performance (e.g., "I succeeded because of effort" instead of "I succeeded because of luck") and, as a corollary to this, realistic expectations about their future success (Frederickson, 1998).

Finally, Achievement Goal Theory (AGT) echoes many of the claims advanced by attribution theorists, but extends upon these by proposing that students' attributions contribute to the goals that underlie their achievement behaviors, or their learning orientations, i.e., what students seek to gain from learning, e.g., building knowledge or outperforming classmates (Pintrich & Schunk, 1996). Most recent iterations of AGT have argued that students can endorse multiple goals simultaneously depending on the task and context, and that they are most motivated when they endorse both *mastery-approach* goals (e.g., "I want to master reading a

difficult book") and *performance-approach* goals (e.g., "I want to demonstrate I am the fastest reader in the class") (Pintrich, 2000). Conversely, both *mastery-avoidance* and *performance-avoidance* goals lead students to avoid attempting challenging tasks, with negative effects on their performance (Wolters, 2004).

Commonalities and Gaps in the Theoretical Landscape

A review of 39 articles of the empirical K-12 reading research revealed four prominently used theories of motivation: SDT, EVT, AT, and AGT. While none of these is reading-specific, each theory provides distinct contributions towards understanding and describing reading motivation. SDT highlights the importance of autonomy in motivation. Its proponents argue that for students to feel competent, they must feel that their learning is self-directed. This involves giving students the opportunity to have control over their learning (e.g., through choice over books or reading games) as well as giving them opportunities to experience success on reading tasks independently (e.g., by tailoring texts and tasks to be optimally challenging for each student). EVT echoes this, arguing that for students to be motivated to undertake a given task, they must expect that they will be able to succeed. For example, students will be more motivated to read a book if they deem they will be able to do so independently. EVT further expands this by incorporating the importance of task value. Within this conception, students should not only expect to succeed, they must also feel that the task at hand is valuable to them (e.g., because of interest in the subject at hand, or because it is relevant to their personal goals). AT further emphasizes the importance of students' attributional patterns in determining motivation. According to AT, we must not only give students opportunities to feel autonomous and to value reading, we must also help them see ability as malleable (e.g., "I struggle with certain aspects of reading now, but I am able to improve through effort and the right strategies"). This involves

enabling students to see which aspects of their learning are under their control (e.g., effort, time on-task, persistence). Finally, AGT extends upon AT, by arguing that different attributional patterns (i.e., whether students attribute success to internal or external factors) foster different learning orientations. Students who see ability as malleable tend to be more mastery-oriented, which in turn modulates how they approach subsequent learning tasks.

Additionally, each theory has borrowed and incorporated concepts from other theories (Cook & Artino, 2016). For instance, AT complements EVT by considering the antecedents of expectations and value, emphasizing the contributions of previous successes, failures, and learning emotions. AGT merges earlier goal theories with the concept of a fixed or flexible achievement mindset, drawing upon AT. SDT, for its part, combines aspects of both AT (the concept of *autonomy* in SDT draws upon the concept of *locus of control* in AT) and EVT (the concept of *competence* in SDT builds upon EVT's *expectancy of success*). In this sense, it may be more useful to view these theories as complementary rather than as contrasting.

Supporting the argument that multiple theories of motivation should be seen as complementary rather than mutually exclusive is that when considered alone, each theory arguably provides an incomplete understanding of motivation. SDT proposes a primarily first-person view of motivation. Here, the individual has a basic potential for growth, and if the environment allows for fulfillment of all the individual's needs, he or she will be able to self-regulate, become intrinsically engaged, and develop their full potential (Koole, Schlinkert, Maldei, & Baumann, 2019). However, SDT tends to over-emphasize proximal influences on motivation (e.g., how the individual experiences their immediate environment modulates their levels of intrinsic and extrinsic motivation) and fails to account more comprehensively for developmental influences (e.g., long-term goals, how prior experiences of success or failure

shape attributional patterns, how age modulates levels of extrinsic vs. intrinsic motivation). EVT similarly emphasizes individual factors, presenting the motivation to undertake a task as resulting from a rational cost-benefit analysis. EVT stresses the importance of expectancies and values in motivational decisions, but fails to consider the impact of broader learning orientations (e.g., mastery-orientation, performance-orientation) and of how these interact with various levels of the individual's eco-system (e.g., task-specific factors, classroom environment, school culture). AT similarly fails to consider how students' long-term goals influence how likely they are to pursue a task, and while AGT incorporates the importance of learning orientations, it fails to specify in detail how emotions, perceptions, and environmental factors modulate how these orientations are enacted in real-time.

The gaps within individual theories of motivation, combined with the disparity in theoretical frameworks used in the literature on reading, suggests that no single theory among the ones outlined above comprehensively describes the role of motivation in reading. In recent years, motivational theorists have argued that instead of using a single theory to describe the impact of motivation on learning, multiple theories of motivation should be used (e.g., Anderman & Wolters, 2006). And indeed, the critical review of the most frequently cited theoretical framework presented here suggests recommendations from multiple theories of motivation should be merged. It is argued here that one theoretical model, Motivational Systems Theory (MST; Ford, 1992), while not found in the above review of empirical reading motivation investigations, both addresses the need for cohesion within the field and best accounts for the multiple facets of motivation. While previous theories account for different components of motivation, MST proposes a path towards integrating the multiple facets of motivation within a single, coherent framework which on one hand considers the various subcomponents of

motivation, and on the other situates motivation within its relationship to individual (e.g., cognitive, biological) and environmental (e.g., classroom, culture) factors. MST was developed by merging key concepts from 32 theories of motivation, including self-determination theory, expectancy-value theories, attribution theories, and goal orientation theories. In doing so, it provides an overarching theoretical framework for motivation, while integrating recommendations from the theories of motivation most frequently used in recent research into K-12 reading motivation. In this sense, it may provide a path towards unifying the theoretical field of reading motivation research while acknowledging past contributions. In the following sections, the main arguments for MST are outlined, as well as support for its validity as a model of motivation. Finally, it is argued here that MST can be used to develop a preliminary set of guidelines for fostering reading motivation during reading instruction.

Comprehensive Theoretical Framework of Motivation: Motivational Systems Theory

Motivational Systems Theory (MST; Ford, 1992) arose in response to calls that cohesion was needed within the field of motivational theory. Proponents of MST argue that the full understanding of motivation is limited by the presence of multiple motivational theories, each with their own distinct predictions. It proposes that instead of seeking to identify a single, 'correct' theory, multiple theories should be integrated within a coherent, comprehensive framework (Ford, 1992):

"*The primary theoretical rationale for Motivational Systems Theory (MST) is the urgent need for a conceptual framework that addresses the lack of consensus, cohesion, and integration in the field of motivation. MST attempts to bring coherence to the field by providing a clear, precise, and comprehensive conceptualization of the basic substance and organization of*

motivational patterns and by showing how other theories can be understood within this integrative framework." (Ford, 1992, Chapter 8).

To build their theoretical model, proponents of MST integrate recommendations from 32 theories of motivation. MST uses the individual as the unit of analysis, but argues that to fully understand motivation and its relationship to achievement, we must consider how the individual is embedded within their wider biological, social, and environmental contexts (Putman & Walker, 2010). For achievement to occur, proponents of MST argue that an individual must be motivated to initiate and maintain action towards a goal, have the necessary skills to be successful, have the necessary biological background to support their motivation and skills, and, finally, act within an environment that is responsive (Ford, 1992, p.70):

$$Achievement = \frac{(Motivation \times Skill)}{Biological\ Structure} \times Responsive\ Environment$$

Here, a responsive environment is defined as one that facilitates students' progress towards their goals, and enables them to feel competent. MST further proposes that a responsive environment should contain individuals (e.g., teachers, parents) that act as facilitators. Facilitators are thought to support motivation when they help students find goals that are personally important, optimally challenging, and aligned with their long-term objectives, as well as when they provide constructive, goal-oriented feedback which bolsters students' personal agency beliefs/self-efficacy beliefs and directs them towards action.

Beyond describing how motivation relates to achievement, proponents of MST further specify that motivation should be understood as comprised of multiple, inter-related subcomponents. These subcomponents interact to determine how likely a student is to pursue goal-directed action. To identify these subcomponents, MST synthesizes findings from the 32

theories of motivation included in its conception, identifying through this process three main categories of motivational phenomena that reoccur throughout the field of human motivation: 1) the direction of motivation, or *goals* (i.e., what individuals are trying to do, and where they are heading), 2) the selective energization of motivation, or *emotions* (i.e., how individuals get turned "on" or "off), and 3) the regulation of behavior patterns (i.e., how individuals decide to try something, persist, or give up), which derives from their *personal agency or self-efficacy beliefs* (i.e., how likely they think they are to succeed independently) (Ford, 1992). Motivation is defined as the result of interactions between these three subcomponents which together direct, energize, and regulate goal-oriented behavior:

Motivation = goals x emotions x self-efficacy beliefs

The integrative nature of MST addresses calls from motivational theorists that multiple theories of motivation should be used to describe achievement events. It is argued here that in doing so, it proposes a more comprehensive understanding of motivation than is provided by the theories of motivation most commonly used in reading research currently. Analysis of recurring themes within different motivational theories supports this. For example, in their review, Conradi et al. (2014) proposed a path toward synthesizing recommendations from multiple theories of motivation within a common framework. They identified common themes across theories of motivation, and proposed a resulting hierarchy of motivation-related constructs, composed of three overarching constructs: 1) goals (e.g., performance, mastery), 2) beliefs (e.g., about self, about reading), 3) disposition (e.g., attitude, interest). This echoes the framework of motivation proposed by MST, which incorporates many of the same elements: (1) goals address both the short-term and long-term objectives that give direction to behavior, (2) emotions address both beliefs about reading and dispositions, while (3) personal agency beliefs address how beliefs

about the self, competence, and autonomy contribute to motivation. Through this hierarchy, MST proposes a path towards understanding the multiple components of motivation and how they interact with one another. It further situates motivation within a broader understand of various developmental influences on the individual, i.e., biological, prior learning/skills, environmental.

Further, while MST has not been extensively used within the field of reading research, findings from other fields provide some support for its validity as a model. For example, Campbell (2007) examined the validity of MST as a predictor of performance in college students pursuing business degrees. The authors found that all three subcomponents of motivation proposed by MST (i.e., goals, emotions, and self-efficacy beliefs) were significantly and positively related to academic performance, with the strongest links evident for task value and self-efficacy. Campbell, (2007) further found that academic performance was significantly and positively related to prior ability and the presence of a responsive environment. A thorough search of the literature did not identify any research examining the validity of MST within the context of reading instruction. Nonetheless, the comprehensive nature of MST makes it a useful starting point towards designing instruction that comprehensively addresses the multiple subcomponents of reading motivation.

Implications for Practice: Proposing a Preliminary Set of Guidelines for Motivational Reading Instruction

In this paper, it is argued that the lack of theoretical cohesion within the field of empirical reading research in grades K-12 has limited the development and implementation of instructional tools that comprehensively foster reading motivation. This argument is in line with proposals that to drive the field of educational research further, recommendations from theory and practice should be integrated within a “virtuous circle” (Snowling & Hulme, 2011). Snowling and Hulme

(2011), for example, have argued that educational research should strive to create a "virtuous circle" between theory and practice, whereby theory is used to provide recommendations for teaching practice, and empirical evaluations of theoretically-derived practices further refine theory. Based on a review of the theoretical frameworks of motivation most commonly cited in recent empirical reading research, and of gaps within the theoretical landscape, it is argued here that Motivational Systems Theory (MST; Ford, 1992) provides the most comprehensive approach towards understanding and addressing reading motivation. In this final section, a set of preliminary instructional guidelines based on MST is proposed. The aim of these guidelines is two-fold: (1) to provide a set of theoretical recommendations that can guide the development of future instruction to foster reading motivation, and (2) to provide a template for testing the validity of a theoretical model of motivation based on MST within a teaching-of-reading context.

In proposing an overarching framework of motivation, as well as recommendations for how to foster a responsive classroom environment, MST provides important implications for teaching practice. Based on MST, to comprehensively foster motivation, the following preliminary conditions should be met:

1. *The environment should support progress towards students' goals:* MST argues that for motivation to lead to learning, it must be anchored in clear, specific goals. Thus, for instruction to be motivating, it should be centered around students' goals (i.e., students are motivated to read when they perceive it to be relevant to their personal goals). MST further specifies that for students' goals to be effective, they should be clear, attainable, and compelling enough to impel concrete and immediate action. This implies students should both be able to endorse the classroom learning goals as personally relevant, and adopt personal goals that will foster their reading development. Finally, MST proposes

that learning should be centered around multiple, aligned goals, as this provides a form of "motivational insurance". Aligning proximal goals with distal ones helps students see the relevance of pursuing initially uninteresting tasks, acting as a safeguard against decreases in motivation.

2. *The environment should support positive learning emotions (e.g., pride, interest) and minimize negative learning emotions (e.g., shame, boredom)*: MST predicts that the learning emotions students' feel in relation to reading impact their motivation. Namely, when reading elicits positive learning emotions, students are more likely to be motivated to read than when reading elicits negative learning emotions. MST proposes that positive learning emotions are elicited when students have clear objectives, are working on tasks that draw upon their interests, understand the relevance of the tasks they are working on, are focused on mastery, and feel self-directed. Conversely, negative learning emotions may arise when students are working on tasks they perceive to be uninteresting or irrelevant to their goals, or when the learning environment is heavily focused on performance (e.g., strong emphasis on grades) or competition (e.g., rankings).
3. *The environment should provide opportunities for students to foster their self-efficacy beliefs*: Finally, MST predicts that for students to be motivated to read, they must believe they are capable readers. This implies that students must be given opportunities to feel competence, especially on tasks that target the most vulnerable aspects of their self-efficacy (e.g., if a student has negative appraisals on their ability to read aloud, success in this area of reading will have a larger impact on their self-efficacy beliefs than success in another area of reading). MST argues that students' self-efficacy beliefs are fostered

when they view ability as malleable and within their control. This implies that students should be given tasks they can accomplish independently.

The guidelines presented here, while in no way exhaustive, provide a preliminary framework towards designing reading instruction that comprehensively fosters motivation. Within the context of reading instruction, these guidelines can be used as a starting point towards creating a classroom environment which supports the development of reading motivation, and helps to counter a potential decline in motivation to read. Instruction that targets only motivation without attention to the cognitive aspects of reading is unlikely to be effective (e.g., Morgan et al., 2008). Thus, these guidelines should be seen as a supplement, rather than a substitute, to evidence-based reading instruction. Further, the above guidelines should be considered in light of existing research into motivational reading instruction. Incorporating motivational reading practices with supported effectiveness to the proposed guidelines can help to refine the above recommendations, as well as contribute to creating a virtuous circle between theoretical and empirical knowledge within the field of reading motivation research.

Conclusions

This review aimed to identify a unifying, comprehensive framework of motivation that could be used to guide recommendations for designing motivational reading instruction. It sought to identify the theoretical frameworks most commonly cited in empirical research on reading motivation, and highlight commonalities and gaps in the literature. The search focused on studies which considered reading motivation in school-aged students (K-12), as this period represents a critical time for supporting reading motivation. While the review identified a range of theoretical frameworks used in empirical investigations, including Self-Determination Theory, Expectancy Value Theory, and Achievement Goal Theory, no single unifying framework

emerged from the literature. Additionally, approximately half of the studies identified made only a brief mention of theory (e.g., did not contextualize results within a theoretical understanding of reading motivation). This echoes previous findings that the field of reading motivation research lacks cohesion and specificity in terms of theoretical backgrounds used (e.g., Conradi et al., 2014). It is argued here that this theoretical heterogeneity has limited the potential of research to fully understand the role reading motivation plays in reading development, and limited the development of practical instructional tools to foster reading motivation.

Further, it is argued that the theoretical frameworks most commonly cited in empirical research lack comprehensiveness. Each provides useful detail on aspects of motivation, but the present review reveals a need for integrative approaches that seek to comprehensively understand the different components involved motivation and how these interact with one another. It is argued here that one such integrative theory already exits, though it has not been widely used within the field of reading research: Motivational Systems Theory (MST). MST represents an attempt to merge recommendations from other theories within a single, unifying framework. It successfully integrates components from other theories, incorporating them within a cohesive framework. In doing so, it more comprehensively addresses motivation than other theories of motivation considered alone. A second aim of this paper was to provide a path towards creating guidelines for reading instruction which foster motivation. Using a theoretical framework based on MST, recommendations about instructional practice were identified, which are outlined above. A model based on MST would predict that targeting these components of learning during reading instruction, in tandem with effective skills-based instruction, would effectively support reading motivation and achievement.

Certain limitations of this review should be addressed in interpreting its results. First, the review was conducted as a narrative review rather than a systematic review and search terms included “Theory” but not other terms related to theory (e.g., “Model”, “Perspective”) meaning that it may have not been exhaustive, i.e., it may have failed to identify certain studies or theoretical approaches. Second, inclusion and exclusion of papers were conducted only by the primary researcher, which may have limited reliability. However, to counteract this, the search incorporated several elements of a systematic review, including in the breadth and range of sources included, and in the establishment of strict criteria for inclusion and exclusion. Third, the guidelines presented here represent only preliminary components of an instructional program that fosters motivation. To build more specific recommendations, it is necessary to identify practices that have received empirical support for fostering reading motivation. While theory and practice may have largely evolved separately, building upon a set of practices with empirical support and situating these within a comprehensive theoretical understanding of motivation is needed to create a virtuous circle between theory and practice (Snowling & Hulme, 2011). Finally, few articles assessing the validity of MST were found, especially within the field of reading research, which may limit its validity as a model. Nonetheless, it is argued that MST shows potential as a model of reading motivation due to its comprehensiveness, which is in line with holistic approaches to understanding development. Further, the lack of validation of MST justifies the need for empirical investigations that evaluate its validity.

The guidelines outlined here build upon MST to propose a multi-component approach to fostering reading comprehension in the classroom. Despite this, a search of the literature indicated that MST has not been widely used in empirical investigations of reading motivation in school-aged students, making it difficult to assess its validity. Intervention research can provide

the best test of the validity of a model of reading motivation based on MST, by allowing instruction based on principles of MST to be compared with traditional instruction. To assess the validity of the model proposed here, intervention research assessing the impact of instruction based on the guidelines outlined above is needed. Finally, it is worth noting that only nine of the 39 identified studies considered students at risk for reading difficulties specifically, despite some evidence suggests that motivation to read has the largest impact on the outcomes of students at risk for reading difficulties (Logan et al., 2011), Given the potentially greater importance of reading motivation on the reading development of these students, more studies that focus on the needs of students at risk for reading specifically, while being situated within an understanding of motivational theory, are needed.

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Figure 1

PRISMA Flow Diagram: Theories of Motivation in Empirical K-12 Reading Research

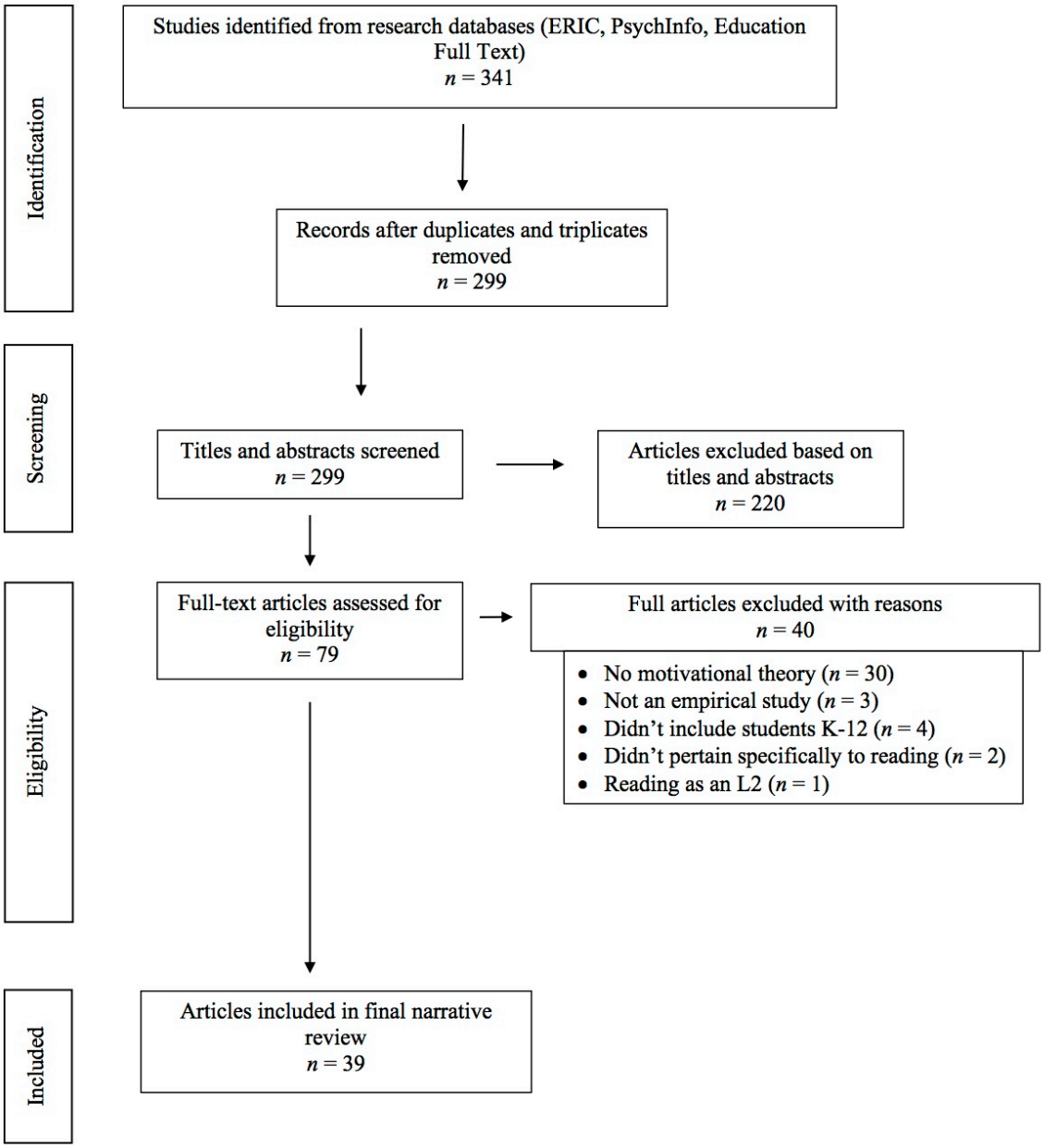

Table 1

Motivational Theories Cited: Frequencies

Label	Number of Articles containing this label	Numbers of Exemplars in data
Self-Determination Theory	32	139
Expectancy-Value Theory	15	62
Achievement Goal Theory	7	20
Attribution Theory	7	10

Note. Some articles included multiple labels

Bridging Manuscript #1: Complementing Theoretical Recommendations with Evidence-Based Practices

In Chapter 1, the need for reading instruction that is situated within a broad understanding of individual, environmental, and transactional contributions to learning was outlined. In particular, it has been argued that reading motivation has an impact on the reading development of students who struggle with reading (e.g., Bates, d'Agostino, & Gambrell, 2016). For these students, failing to address motivation during remedial intervention may limit their potential for growth, while efforts to foster reading motivation have been linked with gains in reading engagement and achievement (e.g., Guthrie, McRae, & Klauda, 2007). This emphasizes the need for novel approaches to reading instruction which target both cognitive and motivational components of reading.

In Chapter 2, the results of a review seeking to identify the most common theories of motivation used in empirical reading research in grades K-12 were presented. The review identified a range of theories of motivation, as well as gaps in the frameworks used. Results highlighted a lack of theoretical cohesion in the field of reading motivation, and emphasized the need for a theoretical framework that comprehensively addresses the various subcomponents of motivation. It was argued that such a comprehensive understanding of motivation is provided by Motivational Systems Theory (MST; Ford, 1992), which merges recommendations from multiple theories of motivation within a single coherent framework. Based on MST, a set of preliminary guidelines designed to foster reading motivation was proposed. Namely, these guidelines propose that the learning environment should 1) Support students' progress towards their goals, 2) Support positive learning emotions and minimize negative learning emotions, and 3) Provide opportunities to foster students' self-efficacy beliefs.

The overarching aim of this thesis was to explore avenues for intervention that most effectively address the needs of students at risk for reading difficulties. It was argued that to do so, intervention design should be driven by a solid theoretical understanding of the role of motivation in reading development and knowledge of currently existing evidence-based practices in motivational reading instruction. This follows recommendations that theory and practice should be merged to drive the field of education forward, both in order to refine the theoretical understanding of learning and to propose effective instructional guidelines (Snowling & Hulme, 2011). Theoretical recommendations were proposed based on the reviews presented in Chapters 1 and 2. Empirical recommendations for the cognitive components of the intervention proposed in this thesis were based on the review presented in Chapter 1. To identify empirical recommendations for the motivational components of the intervention, a systematic review and meta-analysis of motivational reading intervention research was conducted. Practices were identified through a systematic review of motivational reading interventions of reading interventions in K-12, while a meta-analysis was conducted to synthesize the effects of motivational reading interventions on reading achievement and reading motivation. Main findings and implications are presented in Chapter 3. In the bridge following Chapter 3, recommendations from theory and practice identified in Chapters 2 and 3 were merged to create the motivational components of the intervention assessed in this thesis.

Chapter 3: Manuscript #2

The Impact of Motivational Reading Instruction on the Reading Achievement and Motivation of Students: A Systematic Review and Meta-Analysis

Miriam McBreen & Robert Savage

Department of Educational and Counselling Psychology

McGill University

Abstract

This systematic review and meta-analysis explores the impact of motivational reading interventions on the reading achievement and reading motivation of school-age students. Results of preliminary searches for- and inspection of- the existing meta-analytic literature suggest that while there exist published meta-analyses on motivational reading interventions, these would benefit from inclusion of more recent research and narrower selection criteria (e.g., inclusion of a non-motivational control group, school-based). A systematic search of previous meta-analyses of motivational reading interventions identified 28 articles meeting inclusion criteria, while a systematic search of individual motivational reading intervention studies (2007-2020) identified a further 21 articles. A meta-analysis of the resulting 49 studies corrected by Hedge's g showed that motivational reading interventions were associated with an effect size of $g = 0.20$, $p < .001$ on reading achievement outcomes and an effect size of $g = 0.30$, $p < .001$ on reading motivation outcomes. However, analysis of funnel plots strongly suggested publication bias was present in reporting of reading achievement outcomes. Analysis of moderators indicated that effect sizes varied significantly depending on content approaches to intervention, intensity of training provided to intervention providers, study quality, and type of measures used. However, effect sizes did not vary significantly depending on group size or student population (e.g., age, at risk status). Implications for research and practice are discussed.

Keywords: Reading motivation, Motivational instruction, Reading achievement

The Impact of Motivational Reading Interventions on the Reading Achievement and Motivation of Students: A Systematic Review and Meta-Analysis

It has been proposed that reading motivation is associated with reading development. Positive correlations have been found between reading motivation and achievement (e.g. Park, 2011), and reading motivation has been found to contribute unique variance to growth in reading comprehension when initial comprehension is controlled for (Taboada, Tonks, Wigfield, & Guthrie, 2009). Intervention research, for its part, suggests that targeting motivation during teaching may increase both reading performance and motivation (e.g., Guthrie, McRae, & Klauda, 2007; van Steensel, van der Sands, & Arends, 2017). For students who struggle with reading, low reading motivation may exacerbate difficulties, feeding into a cycle of low achievement and motivation (Morgan, Fuchs, Compton, Cordray, & Fuchs, 2008). In line with this, it has been suggested that to foster reading development, effective instruction should address both the cognitive and motivational aspects of reading acquisition (Nelson & Manset-Williamson, 2006).

Various theories of motivation have sought to explain how motivation impacts achievement. Proponents of Self-Determination Theory argue that for individuals to be motivated, they must be given opportunities to feel autonomous, competent, and related to their environment (e.g., through strong teacher-student relationships) (e.g., Deci & Ryan, 1985). Expectancy-Value Theory argues that individuals are motivated when they both expect to succeed and see value in the tasks they are pursuing (e.g., Eccles et al., 1983). Goal orientation and attribution theories, for their part, extend the understanding of motivation by arguing that students' achievement goals (e.g., whether they are driven by a desire to master material or by competition) and attribution beliefs (e.g. whether they attribute success to innate ability or to

effort) contribute to motivation (e.g., Pintrich & Schunk, 1996). Interventions that aim to foster motivation have done so by targeting one or more of the key motivational components identified by various theories, including students' goals, attributions, competency or self-efficacy beliefs, and the value they attribute to reading.

The Need for Updated Meta-Analyses of Motivational Reading Interventions

The field of reading motivation research suggests that early declines in motivation may feed into a cycle of low motivation and achievement (Morgan et al., 2008), emphasizing the need for instruction which fosters reading motivation during school years. Intervention research provides the strongest test of the effectiveness of instructional methods. A growing body of intervention research has examined the impact of motivational reading instruction on reading outcomes, with promising results (e.g., Guthrie et al., 2007). Among these investigations, a range of different approaches to fostering reading motivation have been proposed (e.g., self-regulatory instruction, attribution training), justifying the need for research which synthesizes findings.

A review of the literature identified four previous meta-analyses which have sought to synthesize findings from intervention research on motivational practices in reading instruction (Dignath & Büttner, 2008; Guthrie et al., 2007; Unrau et al., 2017; van Steensel et al., 2017). However, both Dignath and Büttner (2008) and Guthrie et al. (2007) were published more than ten years ago, during which time novel approaches to motivational reading instruction are likely to have been proposed and evaluated. While van Steensel et al. (2017) and Unrau et al. (2017) include more recent studies, van Steensel's (2017) meta-analysis remains as of yet unpublished in a peer-reviewed format, and Unrau et al. (2017) examined the impact of reading interventions on self-efficacy beliefs, but not on other motivational outcomes. Further, several methodological issues justify the need for a new meta-analysis: all four reviews included studies which either did

not include a non-motivational control group or did not specifically target a motivational construct during intervention (i.e., targeted only skills), while Dignath and Büttner (2008), Guthrie et al. (2007), and Unrau et al. (2017) all included studies that were not Randomised Control Trials (RCTs) or quasi-experiments. While this has allowed previous meta-analyses to report associations between motivational instruction and reading outcomes, it limits their ability to causally examine the impact of motivational reading instruction. To establish an overall effect size of the impact of motivational reading intervention, further meta-analyses limited to studies reporting results from RCTs or quasi-experiments that include a non-motivational control group are needed. Thus, this paper seeks to contribute to the literature of reading motivation by presenting results from an updated systematic review and meta-analysis of motivational reading interventions for school-age students (K-12). This systematic review and meta-analysis sought to assess the impact of motivational reading interventions on reading achievement and motivation and to identify characteristics of effective interventions. To do so, the following questions were addressed:

1. What are the characteristics of studies assessing motivation reading interventions (e.g., sample type, content approach, theoretical frameworks, etc.)?
2. What is the impact of motivational reading interventions on reading achievement?
3. What is the impact of motivational reading interventions on reading motivation?
4. Which characteristics of motivational reading interventions moderate their impact on reading achievement and reading motivation?

Meta-Analysis: Motivational Reading Interventions

Method

Tertiary systematic review. First, a search of existing meta-analyses on motivational approaches to reading instruction was conducted. Meta-analyses have been argued to provide rigorous data because of the consistency in selection processes, evaluation of selected research, and synthesis of multiple information sources (Mulrow, 1994). An initial search was conducted on databases of systematic reviews and meta-analyses, including "The What Works Clearing House", "The EPPI Center", and "The Campbell Collaboration Library", as well as on "PyscInfo" and "ERIC", using the following search terms: set 1 - "meta-analysis", paired with set 2 - "intervention" OR "school-based intervention", set 3 - "motivation", "interest", "self-efficacy", "intrinsic motivation", "achievement motivation", "academic achievement motivation", and set 4 "reading", "dyslexia", "literacy", "reading comprehension", "reading achievement". Search terms were combined using the Boolean search terms "OR" within each set and "AND" between each set. Eligibility of meta-analyses was assessed using the following inclusion and exclusion criteria for the studies included in their samples. These were guided by the EPPI Center's guidelines for piloting systematic reviews.

Inclusion criteria.

- Studies that assessed motivational interventions for reading instruction
- Studies that measured the impact of interventions on reading skill (phonological awareness, fluency, vocabulary, reading comprehension) and/or reading motivation (self-efficacy, value for reading, intrinsic motivation, overall motivation)
- Studies whose research design included RCTs or quasi-experimental designs
- Studies whose samples included students in grades K-12 (aged 5 to 18)

- Studies that provided data allowing effect sizes to be calculated for pre- to post-test gains across conditions (e.g., means and standard deviations for both intervention and control conditions, t-test statistics, F-test statistics).

Exclusion Criteria.

- Studies that were not school-based
- Non-intervention studies, qualitative studies, single participant studies, ABA designs, other matched studies
- Studies that did not address subcomponents of motivation directly
- Studies focused on other academic subjects (e.g., science, math)
- Studies that did not include a control group
- Studies that did not include students of school age (grades K-12)
- Studies that did not provide data allowing calculation of effect sizes of pre- to post-gains across conditions

Search procedures. The initial search identified three meta-analyses from ERIC: Guthrie et al. (2007), Dignath and Büttner (2008), and Unrau et al. (2017). As the search only returned three articles, it was broadened to include meta-analyses presented at conferences. Through this procedure, a fourth meta-analysis was identified from the proceedings of the 24th annual meeting of the Society for the Scientific Study of Reading and a follow-up search of the author's biographical page: van Steensel et al. (2017).

Meta-analyses. Guthrie et al. (2007) conducted a meta-analysis of 10 studies investigating the impact of Concept-Oriented Reading Instruction (CORI) on motivational processes, cognitive abilities, and reading comprehension of students in upper elementary grades. CORI is a reading program based on self-determination theory, social cognitive theory, and goal theory,

which draws upon five instructional practices to promote motivation: (1) relevance (2) choice (3) success (4) collaboration, and (5) thematic units. The authors reported a mean effect size of d = 0.30 on combined measures of reading motivation, including curiosity, self-efficacy, and time spent reading for pleasure. The mean effect size reported for reading comprehension was d = 0.91 based on five studies that included standardized tests of reading comprehension. Three studies could not be retrieved (i.e., 2 conference proceedings and 1 submitted but unpublished paper).

Dignath and Büttner (2008) reviewed 74 intervention studies which aimed to foster self-regulated learning at the primary and secondary level, including 26 studies that included reading and/or writing outcomes. The aim of self-regulatory instruction being to foster students' autonomy and self-efficacy beliefs, it was deemed to be within the scope of motivational instruction. The mean effect size of self-regulation interventions on academic reading and writing performance was d = 0.44 for primary school students and d = 0.92 for high school students. The mean effect size on general academic motivation was d = 0.75. Two studies were redundant with Guthrie et al. (2007), five studies were in German, and one study could not be retrieved.

Van Steensel et al. (2017) conducted a meta-analysis of 88 intervention studies examining the impact of motivational interventions on the reading outcomes in students of primary and secondary school age. The authors identified positive effects on both reading motivation (d = 0.28) and reading comprehension (d = 0.40). Moderator analyses indicated that interventions which supported interest, autonomy, social motivation, and goal setting had the greatest effects on reading comprehension. Nine of these studies were redundant with those identified by Dignath & Büttner (2008) and Guthrie et al. (2007).

Finally, Unrau et al. (2017) conducted a meta-analysis of 30 studies examining the impact of reading interventions on reading self-efficacy. The authors reported an overall effect size of $g = 0.33$ on reading self-efficacy. The analysis included studies among students in elementary school through college, including 19 studies with a treatment and control group design whose sample included students in grades K-12. Four studies were redundant with Guthrie et al. (2007), Dignath and Büttner (2008), and/or van Steensel et al. (2017).

The initial search identified 119 studies. To ensure the search comprehensively identified motivational approaches to reading instruction, it was further extended to individual studies.

Research article search. To further identify relevant articles, a literature search of well-executed individual studies was conducted. The same inclusion criteria as those to identify meta-analyses were used, with the additional inclusion of a limited time frame (2007-2020). A PRISMA flow diagram summarizing inclusion, search, and coding procedures is provided in Figure 2. Articles were restricted to those published in English after 2007 to update findings from previous meta-analyses of motivational interventions by Guthrie et al. (2007) and Dignath & Büttner (2008). Included articles were restricted to RCTs and QED designs, which have been argued to be the most rigorous for assessing the efficacy of interventions (Torgerson, 2003). The search was conducted within three main educational databases; ERIC (242), PsycInfo (33), and Education Full Text (48), in May 2020. The following search terms were used: set 1 - “motivation”, “interest”, “intrinsic motivation”, “achievement motivation”, “academic achievement motivation”, “self-efficacy”, paired with set 2 - “intervention”, “school-based intervention” and set 3 - “reading”, “dyslexia”, “literacy”, “reading comprehension”, “reading achievement”. Search terms were combined using the Boolean search terms “OR” within each set and “AND” between each set. After screening for duplicates and triplicates, this search

process identified 301 articles. Hand searches of journals relevant to research in reading instruction were then conducted. After screening titles and removing duplicates, this identified a further 8 articles. The search was widened to include unpublished theses and dissertations, using the same databases, which identified a further 144 articles once duplicates and triplicates were removed. Finally, reference lists of selected articles were examined to identify further relevant articles. A further 27 articles were identified based on titles. Articles identified through individual article searches, hand-searching of relevant journals, unpublished dissertations and snowballing of reference lists were combined with the 119 studies identified from previous meta-analyses, leading to a combined sample of 455 articles.

Coding procedures. Titles and abstracts were screened by the primary researcher. Based on this screening, 111 articles were selected to be included in the full text-review. The primary author coded all 111 articles for inclusion/exclusion criteria. The second author independently coded 25% of all inspected articles to establish reliability. The inter-rater kappa for inclusion and exclusion criteria was = 1, showing perfect agreement. A sample of 49 articles met inclusion criteria, including 15 RCTs and 34 quasi-experiments.

Coding included articles for quality. The 49 included articles were first coded for quality, based on guidelines from CONSORT (Consolidated Standards for Reporting Trials; CONSORT, 2010). Following these guidelines, it was assessed whether the study reported (1) method of allocation (e.g., randomization, cluster randomization), (2) sample size justification or power estimate, (3) Intention to Treat Analysis (ITT; i.e., if the groups were statistically analyzed according to the original *n*, disregarding subsequent attrition), (4) blinded assessment of outcome, (5) a description of training or professional development, (6) evidence of reliability and validity, and (7) assessment of treatment integrity. The first author coded all 49 articles, and the

second author independently coded 40% of these to establish inter-rater reliability. The coding reliability kappa was 0.81. 70% of disagreements were related to differences in operationalization of key terms such as evidence of treatment integrity, reliability, or training. Differences in operationalization were resolved through discussion, and papers where subsequently reanalyzed by both coders. The remaining 30% of disagreements were resolved by identifying the evidence for a specific decision until consensus was reached. Only two studies included justification of sample size, five described ITT, six described blinding of outcomes, and 19 provided strong evidence of reliability or validity. Most described sampling procedures, all provided statistical evidence of impact on outcomes, and more than half provided evidence of training and/or treatment fidelity. Quality is summarized in Appendix A.

The second analysis conducted to ascertain the quality of the studies was the Weight of Evidence (WOE) analysis. WOE is a global quality assessment whose aim is to identify whether studies fit the inclusion criteria for a meta-analysis and answer the question addressed by the meta-analysis (Gough, 2007). The WOE analysis evaluates study quality based on three questions: (WOE A) *Did the reported findings answer the research question in the study and was it internally consistent?;* (WOE B) *Did the author design their research appropriately for the review questions?;* and (WOE C) *Is the focus of the study relevant to the review question?* Answers to WOE A, B, and C are used to determine the study's overall rating, called WOE D, which can be "high", "medium", or "low". WOE D is obtained by calculating the average score for WOE A, B, and C. However, if a study receives a "low" rating on WOE A, it is rated as "low" on WOE D. Formal inter-rater analysis was again conducted on 40% of all articles. Comparison of individual scores produced a reliability kappa of 0.87. Disagreements mainly concerned discrepancies in the concepts behind WOE questions (i.e., overall fit vs.

methodological quality). These were resolved by discussion, referring to the source of decision in the initial paper, and re-analysis by both coders until consensus was reached. Following analysis, 13 studies were rated Low WOE, 34 Medium WOE, and two High WOE. All studies provided appropriate statistical analyses of their impact on reading outcomes, however most studies lacked one or more elements of design that would qualify them for a high empirical rating. WOE ratings are presented in Appendix B.

Outcome measures. The present analysis sought to assess the impact of motivational interventions on reading achievement and motivation. Studies reported a range of reading motivation and reading achievement outcomes, which were grouped into two overarching outcome categories: (1) reading achievement and (2) reading motivation. 109 effect sizes were reported for reading achievement (including 68 effect sizes for reading comprehension, 20 effect sizes for fluency, 11 for reading accuracy, 7 for phonological awareness, and 3 for a more general reading measure, that provides a score based on performance on multiple reading tasks), and 57 effect sizes were reported for reading motivation (including 10 for intrinsic motivation, 20 for self-efficacy, 14 for value, and 13 for overall motivation). Effect sizes, confidence intervals, *Z* values and *p* values for each study are reported in Table 2.

Candidate moderators. Candidate moderators were identified through looking at moderators frequently used within the selected sample of studies: Content approaches to motivational intervention, Group size, Type of instructor, Level of training, Experimental design, Type of measure, Study quality, Type of sample, and Student age. Interventions were delivered within the context of whole-class teaching in 30 studies and in small groups for 18 studies. One study did not specify group size. In 27 studies, the motivational intervention was delivered by the classroom teacher, in 17 studies it was delivered by a researcher (either the primary author,

research assistants, and/or outside trainers), while in three studies it was delivered by a mix of teachers and researchers. Two studies did not provide data on who delivered the intervention. Of the 34 studies that described the training process for intervention providers, 17 described intensive training (e.g., over more than 2 weeks) and 17 described short training (e.g., over the course of a single session/day). Of the 45 papers that assessed achievement, 28 papers used standardized measures and 17 used researcher-developed measures. Of the 30 papers that assessed motivation, 16 used standardized measures and 14 used researcher-developed measures. The samples of 30 papers included both students who were typically-developing as readers and students at risk for reading difficulties, 18 studies included only students at risk for reading difficulties, and one study did not specify the profile of students included in the sample. Most studies defined being at risk for reading difficulties as showing delays in reading development (e.g., scoring at least two grade levels below their current grade). Three studies only included high school students, six included both elementary school students, and the remaining 38 included only elementary students. To compare the effects between educational levels, only high school and elementary samples were contrasted in moderator analyses. Only three of the studies included were dissertations, and only two of these measured both motivation and achievement outcomes. Thus, publication status was not included as a moderator. Characteristics of studies are described in Appendix C.

Content approaches to motivational intervention. Diverse approaches to motivational intervention were found within the sample of reviewed studies. The most frequently used approach was self-regulatory instruction (including training in goal setting, self-monitoring, self-evaluation and motivational regulation), which was used in 14 studies. Six studies evaluated the impact of motivational practices aiming to enhance student interest (e.g., use of interesting texts,

enhancing relevance), and five studies examined the impact of achievement goal/attribution training approaches (e.g., training students to see success or failure as due to factors within their control). The remaining 24 studies assessed the impact of motivational interventions that combined multiple approaches, including seven studies that evaluated CORI specifically and 17 studies that incorporated at least two of the above and/or autonomy-supportive practices (e.g., giving choice to students).

Theoretical background. Of the final sample of 49 articles, 19 studies mentioned using one or more theory of motivation or engagement as a framework, including seven that mentioned Self-Determination Theory (SDT), five that mentioned Goal Theory, four that cited the Reading Engagement Model, two that mentioned Expectancy-Value Theory (EVT), two that mentioned Motivation Theory broadly speaking, two that mentioned Attribution Theory, and one that mentioned the Goal Congruence Model. The remaining 30 articles made no mention of motivational theory. Of studies that did include a motivational theory, the majority did not comprehensively describe how theory guided instructional design or interpretation of results, making it difficult to compare the benefits of various theoretical approaches to one another. One notable exception are studies that assessed CORI, which has a thorough theoretical concept (detailed above).

Training length. The shortest interventions were delivered by Zentall and Lee, (2012) and Schaffner and Schiefele (2007), who both trained students during a single session. The longest interventions involved training students over a full academic year. The remainder of interventions lasted between 2 weeks and 6 months.

Sample size. Sample sizes ranged from small (n = 22) to large (n = 2019), with an average of n = 275. The largest sample size was reported by Little et al. (2014) with 2019 students (treatment n = 1188, control n = 831).

Meta-analysis

First, effect sizes were calculated for all included studies using the standardized mean differences method, to estimate the difference in pre- to post-test changes between treatment and control conditions. To obtain an impartial assessment of effect size, these were converted to the Hedge's *g* statistic (Borenstein, Hedges, Higgins, & Rothstein, 2011). Included effect sizes were those which assessed reading achievement (reading comprehension, fluency, accuracy, phonological awareness, and overall reading) and those which assessed reading motivation (intrinsic motivation, reading self-efficacy, value for reading, overall reading motivation). When multiple contrasts were included in a study, only contrasts between motivational conditions and non-motivational conditions were included. Analyses were conducted using the ProMeta3 software for meta-analysis (available in the public domain by IDoStatistics; https://idostatistics.com/prometa3/) using a random-effect model. Random-effect models assume that effect sizes are comparable among studies, in contrast to fixed-effect models which assume effect sizes are uniform across studies (Morris, 2008).

Many of the studies measured the effectiveness of motivational interventions through several instruments measuring multiple constructs. Statistically dependent effect sizes may be present in studies which measure multiple effect sizes using the same sample (e.g., including multiple measures of reading comprehension, or several subscales of motivation rather than an overall scale) or when multiple effect sizes for different treatment conditions compared to the same control group are calculated. To avoid studies with multiple effect sizes having a larger

impact on the analysis, effect sizes were aggregated per study and per construct (Slavin, 1996) using ProMeta3's "combine for analysis" function.

Publication bias. Journals are typically more likely to accept studies with significant results and reject those with non-significant results, which may lead to an overestimation of the true effect size, or publication bias (Torgerson, 2003). To assess publication bias, a funnel plot of effect sizes was created for both outcomes, with effect size placed on the *x* axis and standard error placed on the *y* axis (see Figures 3 and 4). On both figures, standard error is represented using an inverse scale (i.e., studies with larger standard errors at the bottom and those with smaller standard errors at the top). For reading motivation, the funnel plot indicates that studies with smaller standard errors yielded a range of effect sizes on either side of g = zero, whereas those with largest standard errors tended to show effect sizes clustered near g = zero. Thus, it was concluded that the studies in the present meta-analyses showed no evidence of publication bias. However, for reading achievement, the funnel plot indicates that while larger studies (i.e., those with a low standard error) tend to cluster near to g = zero, small and medium-sized studies (i.e., those with a higher standard error) tend to have positive effect sizes far from g = zero, including some with large and unrepresentative effect sizes. This indicates that publication bias was present for reading achievement outcomes in the studies included in the meta-analysis.

Results

Reading achievement. A first meta-analysis was run including effect sizes for all reading achievement measures. Results of the analysis showed that the studies were heterogeneous, $Q = 175.09$, $df = 43$, $p < .001$. All effect sizes were positive. The smallest effect size was $g = 0.02$, and the largest was $g = 1.59$. The overall observed effect size reported was $g = 0.37$ ($CI = .29$-$.45$), $SE = .04$, $p < .001$. To reduce the impact of publication bias, Duval and

Tweedie's (2000) trim and fill method was applied to estimate the true effect size, using ProMeta's "trim and fill" function. The trim and fill method aims to reduce funnel plot asymmetry caused by underreporting of non-significant or negative effect sizes by removing effect sizes from one side of the funnel plot until symmetry is achieved, and then filling the funnel plot back in using imputed observations (Duval & Tweedie, 2000). This process occurs iteratively, until the analysis estimates no more missing effect sizes are present. It has been deemed appropriate in small meta-analytic data sets, under the strict assumption that the missing studies are those with the smallest or most negative effect sizes (Vevea & Woods, 2005). The funnel plot for reading achievement outcomes showed asymmetry with a rightward bias, suggesting underreporting of small or negative effect sizes. The trim and fill analysis trimmed 15 studies, and yielded an estimated unbiased effect size of $g = 0.20$ ($CI = .11$-$.29$), $SE = .05$, $p < .001$.

Comparison of moderators indicated that the impact of intervention on reading achievement varied significantly depending on intensity of training provided to interventionists, $Q = 5.89$, $df = 1$, $p = .015$. Larger effect sizes were found for studies that included intensive training ($g = 0.40$, $CI = .25$ - $.56$, $SE = .08$, $p < .001$) than for those that did a short training ($g = 0.18$, $CI = .08$ - $.27$, $SE = .05$, $p = .001$). Results varied significantly depending on type of measure used, $Q = 20.21$, $df = 1$, $p < .001$, with larger effect sizes found for researcher-developed tools ($g = 0.70$, $CI = .50$-$.89$, $SE = .10$, $p < .001$) than for standardized tools ($g = 0.21$, $CI = .15$-$.28$, $SE = .03$, $p < .001$). There was also a significant difference in effect sizes for reading achievement depending on WOE quality, $Q = 27.66$, $df = 2$, $p < .001$, with larger effect sizes found for studies with Low WOE quality ($g = 0.51$, $CI = .33$-$.70$, $SE = .10$, $p < .001$) and Medium WOE quality ($g = 0.34$, $CI = .24$-$.45$, $SE = .05$, $p < .001$), than for those with High

WOE quality (g = 0.09, CI = .03-.16, SE = .03, p = .005). While all content approaches to motivational intervention yielded significant effects on reading achievement, there was a significant difference in effect sizes depending on content approach to motivational intervention (Q = 11.26, df = 3, p = .010). Largest effect sizes were found for studies using attribution training (g = 0.78, CI = .46-1.10, SE = .16, p < .000) and interest-based practices (g = 0.65, CI = .27-1.03, SE = .19, p = .001), while smaller effect sizes were present for studies using self-regulatory instruction (g = 0.35, CI = .21-.48, SE = .07, p < .000) or the more general multi-component type of intervention (g = 0.28, CI = .17-.38, SE = .07, p < .000). No significant differences were observed depending on group size (Q = 1.20, df = 1, p = .27), whether students were in high school or elementary school (Q = 1.33, df = 1, p = .249), whether or not the study cited a theory of motivation (Q = .02, df = 1, p = .882), type of instructor (Q = 5.02, df = 2, p = .081), publication type (Q = 1.90, df = 1, p = .168), experimental design (Q = 3.37, df = 1, p = .066), or type of students included in the sample (Q = .07, df = 1, p = .796).

An overall effect size was calculated by combining all achievement measures. Analyses conducted for individual achievement components indicated that motivational interventions had a significant overall effect on reading comprehension (g = 0.40, CI =.31 - .50, SE = .05, p < .001), fluency (g = 0.21, CI =.08 - .34, SE = .07, p < .001), word reading/accuracy (g = 0.24, CI =.07 - .40, SE = .08, p = .005), and overall reading (g = 0.13, CI = .03-.23, SE = .05, p = .012), and a small but non-significant effect on phonological awareness (g = 0.20, CI = -.03 - .44, SE = .12, p = .092).

Reading motivation. A second meta-analysis was run including all reading motivation measures. Final results of the analysis showed that the studies were heterogenous, $Q = 103.78$, $df = 27$, $p < .001$. All effect sizes were positive. The smallest effect size was $g = 0.00$, and the largest was $g = 1.96$. The overall effect size reported was $g = 0.30$ ($CI = .20$-$.41$), $SE = .05$, $p < .001$.

Moderator analyses indicated there was a significant difference in effect sizes for reading motivation depending on WOE quality, $Q = 16.41$, $df = 2$, $p < .001$. Larger effect sizes were found for studies with a Medium WOE quality ($g = 0.41$, $CI = .26$-$.56$, $SE = .08$, $p < .001$) than for those with High WOE ($g = 0.24$, $CI = .11$-$.36$, $SE = .07$, $p < .001$) or Low WOE quality ($g = 0.07$, $CI = -.02$-$.15$, $SE = .04$, $p = .112$). Study design was found to significantly moderate effect sizes, $Q = 6.49$, $df = 1$, $p = .011$, with larger effect sizes for quasi-experimental studies ($g = 0.42$, $CI = .24$-$.59$, $SE = .09$, $p < .001$) than for randomized control trials ($g = 0.17$, $CI = .11$-$.24$, $SE = .03$, $p < .001$). The content approach to intervention had a significant impact on effect sizes for reading motivation ($Q = 10.61$, $df = 3$, $p = .014$). All content approaches to intervention had an impact on reading motivation, with effect sizes of $g = 1.35$, $CI = .13$-2.57, $SE = .62$, $p = .030$ for attribution training, $g = 0.37$, $CI = .22$-$.51$, $SE = .07$, $p = .001$ for the general type of multi-component intervention, $g = 0.15$, $CI = -.01$-$.30$, $SE = .07$, $p = .042$ for interest-based interventions, and $g = 0.13$, $CI = -.04$-$.23$, $SE = .05$, $p = .007$ for self-regulatory interventions. No significant differences were observed depending on whether or not a theoretical framework was cited ($Q = .00$, $df = 1$, $p = .944$), group size ($Q = 1.69$, $df = 1$, $p = .194$), intensity of training ($Q = 1.65$, $df = 1$, $p = .199$), whether students were in elementary or high school ($Q = .04$, $df = 1$, $p = .849$), instructor ($Q = 2.50$, $df = 1$, $p = .11$), type of measure used ($Q = .18$, $df = .1$, $p = .672$), or type of students included in the sample ($Q = .84$, $df = 1$, $p = .359$).

An overall effect size was calculated by combining all motivation outcomes. Analyses conducted on each measure of motivation indicated that motivational interventions had a significant overall effect on self-efficacy (g = 0.29, CI =.13 - .45, SE = .08, p < .001), value (g = 0.27, CI =.10 - .43, SE = .09, p = .002), and overall motivation (g = 0.43, CI =.24 - .62, SE = .10, p < .001), and a non-significant effect on intrinsic motivation (g = 0.17, CI = -.03 - .38, SE = .11, p = .100).

Reading motivation and achievement. Of the 24 studies that included both motivation and achievement outcomes, only four conducted a mediation analysis (Aro et al., 2018; Schunk and Rice, 1989; Orkin, 2013; Spörer and Schünemann, 2014). To further evaluate the relationship between motivation and achievement outcomes, a regression analysis was conducted with effect sizes for motivation included as a moderator in the 24 studies that reported both types of outcomes. Results of the regression analysis indicated no significant association between effects on motivation and effects on achievement, F (1, 20) = 3.22, p = .088, r^2 = .139.

Discussion

The systematic review and meta-analysis presented here sought to describe the characteristics of motivational reading interventions, evaluate the impact of such interventions on the reading achievement and motivation of school-aged students, and examine which characteristics of interventions moderate their impact. A review of previous meta-analyses of motivational reading interventions identified several gaps, including methodological concerns and the need for inclusion of more recent research. The present research aimed to provide an updated synthesis of findings from the intervention literature on motivational reading practices in school-aged students. Well-designed intervention studies were identified through a thorough search of the motivational intervention field. Analysis of all effect sizes showed an overall

estimated effect size of $g = 0.20$ on reading achievement, which was significantly different from zero at $p < .0001$, and an overall effect size of $g = 0.30$ on reading motivation, which was significantly different from zero at $p < .001$.

It is worth noting that for reading achievement outcomes, the most frequent outcome assessed was reading comprehension. This may have somewhat biased results by overestimating effect sizes on other reading achievement outcomes. However, analysis of effect sizes run by type of achievement outcome indicate modest but significant effect sizes on multiple aspects of reading achievement, including fluency, comprehension, and word reading. Additionally, analysis of effect sizes run by type of motivation outcome indicated a significant effect on self-efficacy, value and a more general motivation construct. While additional meta-analyses examining each subcomponent is needed, this tentatively suggests that motivational interventions may positively impact multiple aspects of both reading achievement and reading motivation.

Further, analysis of candidate moderators provides some insight into the characteristics of motivational interventions that may modulate their effectiveness. Larger effect sizes were found for achievement for researcher-developed measures than for standardized measures and effect sizes for both motivation and achievement were found to vary significantly depending on study quality. It should be noted that only two of studies included in this sample had a High overall WOE rating. To obtain a High rating, studies had to be internally consistent, appropriately designed for the review questions, and relevant to the questions assessed in this meta-analysis. The lack of High rated studies may limit the generalizability of results and highlights the need for more studies with a rigorous experimental design and validated measures which explicitly examine the impact of motivational practices on reading outcomes. Among studies that described the training process, those with intensive training for intervention providers prior to intervention

delivery showed a larger effect on achievement outcomes than those that didn't, emphasizing the need for thorough training to promote optimal outcomes. No significant differences in effects on either achievement or motivation were found depending on group size (i.e., small-group vs. whole classroom interventions), instructor (teachers vs. researchers), type of students in the sample (i.e., general student population vs. only students at risk for reading difficulties), or age of students (i.e., whether they were in elementary or high school). This tentatively suggests that motivational interventions that are effective in a small-group setting may also be effective when delivered during regular classroom instruction, and that motivational reading instruction may have a beneficial effect on the reading outcomes of students of different ages and reading levels. It should however be noted that only three studies only included high school students.

In interpreting the results presented here, it should be noted that analysis of the funnel plot for reading achievement outcomes strongly indicated the presence of publication bias (i.e., studies with larger standard errors reported larger effect sizes). Publication bias may reflect under-publication of papers that report non-significant or negative effect sizes, either because these are rejected by editors and reviewers or because these are never submitted in the first place (e.g., Ferguson & Heene, 2012). Lack of inclusion of such results may result in a biased meta-analytic sample that overestimates the true effect size of motivational reading interventions on reading achievement outcomes. The trim and fill correction for publication bias (Duval & Tweedie, 2000) was applied here to provide a better estimate of the true effect size. However, caution should be used in interpreting this effect. Indeed, simulations of different approaches to reducing publication bias in meta-analyses (e.g., trim-and-fill, *p*-curve, *PET-PEESE*) have observed that different approaches yield inconsistent results depending on characteristics of the meta-analytic sample (e.g., sample size, research practices), and that attempts to triangulate

different approaches fail to converge on a "true" value (Carter, Shönbrodt, Gervais, & Hilgard, 2019). This lack of consensus in approaches to correct for publication bias makes it difficult to confidently interpret results from meta-analyses that indicate the presence of publication bias. This suggests the effect size reported above for reading achievement outcomes should not be interpreted as being conclusive. Instead, the present results emphasize the need for future research that counters publication bias, e.g., through larger, more robust intervention research and publication of studies with non-significant or negative effect sizes.

Additionally, these findings suggest some lack of integration between theory and practice. Of the 49 papers included in this meta-analysis, only 19 made explicit mention of a motivational theory, and many of those that did mention a theoretical framework did not explicitly state how it was related to instructional design or interpretation. Additionally, multiple theories were cited throughout the literature, including Self-Determination Theory, Expectancy Value Theory, Goal Orientation Theory, and the Reading Engagement Model, with few examples of studies in each category, making it difficult to compare the benefits of one theoretical approach over another. This is in line with a previous review of the empirical literature on reading motivation, which included both correlational and intervention studies, that noted that many empirical investigations into reading motivation fail to specify a guiding theoretical framework, and that among those that do, a wide range of theories and definitions are cited (Conradi, Jang, & McKenna, 2014). While effect sizes were not found to be moderated by whether or not a theoretical framework was cited in the intervention design/interpretation of results, situating results within a theoretical understanding is nonetheless important to gain insight into the mechanisms through which motivational instruction may impact reading achievement and guide effective practice. Snowling and Hulme (2011), for example, have argued

that educational research must strive to create a "virtuous circle" between theory and practice, whereby theory provides recommendations for teaching practices, and empirical evaluations of theoretically-derived practices refine theory (Snowling & Hulme, 2011).

Finally, the findings presented here contribute to further refine the understanding of the relationship between reading motivation and achievement. Correlational research into reading motivation has suggested that reading motivation and achievement are strongly linked. For example, Morgan and Fuchs (2007) reviewed 15 studies addressing the relationship between reading and students' competency beliefs and goal orientations and found that reading motivation and reading achievement were moderately correlated, while other authors have found that motivation significantly predicts reading growth (e.g., Park, 2011). In contrast to this, the results presented here indicate that interventions that target motivational components of reading have a small effect on reading achievement and motivation outcomes, especially when correcting for the presence of publication bias. This may to a certain extent reflect a difficulty in modulating reading motivation, i.e., that while reading motivation and achievement are moderately linked, interventions' ability to modulate motivation is more modest. Additionally, caution is needed in interpreting gains in reading achievement as being due to gains in reading motivation. To assess this possibility, studies that include mediation analyses are needed. Of the 49 studies that met inclusion criteria, 24 reported both at least one motivation and one achievement outcomes, and only four conducted a mediation analysis. Regression analyses examining the relationship between effect sizes on motivation and effect sizes on achievement in these studies did not indicate a significant relationship between the two, suggesting that motivational interventions' impact on reading achievement may not be directly mediated by its effect on motivation. It is however possible that motivational interventions operated on

achievement through their impact on a specific subcomponent of motivation or their impact on other learning behaviors, such as engagement. Engagement was only measured in five of the studies in this sample, meaning a mediation analysis was not possible. This further emphasizes the need for future research includes mediation analyses of various factors that may explain how motivational instruction leads to gains in achievement.

Limitations

Several limitations should be addressed in interpreting results. First, the quality of studies included in the meta-analysis was variable, with most studies rated either Low or Medium on the WOE analysis, and the meta-analysis indicated that size of effects varied according to study quality. The variability in study quality may have led to either under- or overestimation of the true effect sizes, and underlines the need for more well-designed, tightly-controlled intervention research assessing the potential of motivational reading instruction. Second, discrepancies in the operationalization of reading motivation may have limited generalizability. In the studies reviewed, a range of motivational constructs were measured, including overall reading motivation, intrinsic motivation, self-efficacy for reading, and value for reading. It is likely that motivational instruction affects these different components in different ways. While differentiated measures of motivation are needed to examine how motivational intervention affects various subcomponents of motivation, additional studies examining the impact of motivational interventions on each of these subcomponents, as well as factorial analyses of how it impacts different subcomponents is needed to gain a better understanding of the ways in which motivational interventions may impact reading development. Additionally, many of the interventions assessed in these studies include other instructional components that may contribute to both motivation and achievement (e.g., skills-based instruction, peer relationships,

strategy instruction, etc.), making it hard to isolate the impact of motivational instruction per se. To help limit the impact of this, only studies that included a non-motivational control group were included in the sample (i.e., studies where the main contrast was the presence or absence of motivational practices). Nonetheless, it is possible that some non-motivational aspects of interventions also contributed to the effects reported here. Studies that tightly control for this are needed to draw stronger conclusions. Finally, this meta-analysis only included studies who had a quasi-experimental or RCT design, excluding case studies and other single subject designs. It is possible this may have led to greater exclusion of studies with students with special learning needs. However, this criterion was selected to more easily identify best practices and support generalizability of results.

Recommendations for teaching practice

The results presented here hold several implications for teaching practice. While variability in study quality and the presence of publication bias for achievement results suggests caution should be used in interpreting results, the review of content approaches to motivational interventions identified several practices that may foster both reading achievement and motivation, including self-regulatory instruction, instruction aiming to promote reading interest or value, and instruction aimed at retraining students' attributions to help them adopt a flexible mindset. Additionally, approximately half of the studies in the sample combined multiple approaches to promoting motivation in their interventions, including the above as well as autonomy-supportive practices. All approaches to motivational intervention yielded significant effects on both achievement and motivation outcomes. While the heterogeneity in the types of approaches used and the small number of studies in each category make it difficult to draw strong conclusions concerning the efficacy of one approach over another (e.g., effect sizes for

attribution training are based on only two studies), findings nonetheless suggest that multiple approaches to motivational instruction can effectively support reading development, and support the general argument that addressing both motivational and skills-based components of reading during instruction is more effective than only targeting reading skills (Nelson & Manset-Williamson, 2006). Potentially, intervention programs that integrate many of these components within a single, cohesive program may have a beneficial outcome on the reading achievement and motivation of students. However, further investigations that compare different single-component approaches to other single- and multi-component approaches are needed to assess this.

Conclusions and future directions

Given the links between reading motivation and achievement, instructional practices that support reading motivation have important practical implications. Despite the above limitations, the findings presented here offer support for the potential of motivational reading instruction to improve both reading achievement and reading motivation. They further suggest several avenues that future research into motivational reading instruction should address. First, analysis of different approaches to motivational intervention suggests that several approaches, including self-regulatory instruction, interest-based practices, attribution training, autonomy-supportive practices, and various combinations of these, may have beneficial effects on both reading achievement and motivation. Further research that compares the potential of different approaches and combinations of these is needed. Second, analysis of funnel plots suggested that publication bias was present in the reporting of the impact of motivational reading interventions on reading achievement. This highlights the need for larger, more robust intervention studies that better estimate population variance, as well as the need for more robust procedures to ensure

publication of studies with non-significant results (e.g., through trial pre-registration). Third, most studies examined the impact of motivational reading intervention on reading comprehension, while relatively fewer examined its effect on other aspect of reading, such as fluency, accuracy, and phonological awareness. Future research that examines the impact of motivational intervention on multiple aspects of reading is needed to better understand the mechanisms through which motivational instruction may contribute to reading development. Finally, analysis of the relationship between gains in motivation and gains in achievement did not yield conclusive results, and a review of interventions indicated that few studies conducted mediation analyses between motivation and achievement. This highlights the need for future research that assesses the impact of motivational interventions on a range of motivational and behavioral components of learning (e.g., engagement, strategy use) and conducts mediation analyses to explore the pathways through which motivational intervention may contribute to reading development.

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Note: Studies marked with an asterisk were included in the meta-analysis

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Figure 2

PRISMA Flow Diagram: Meta-Analysis

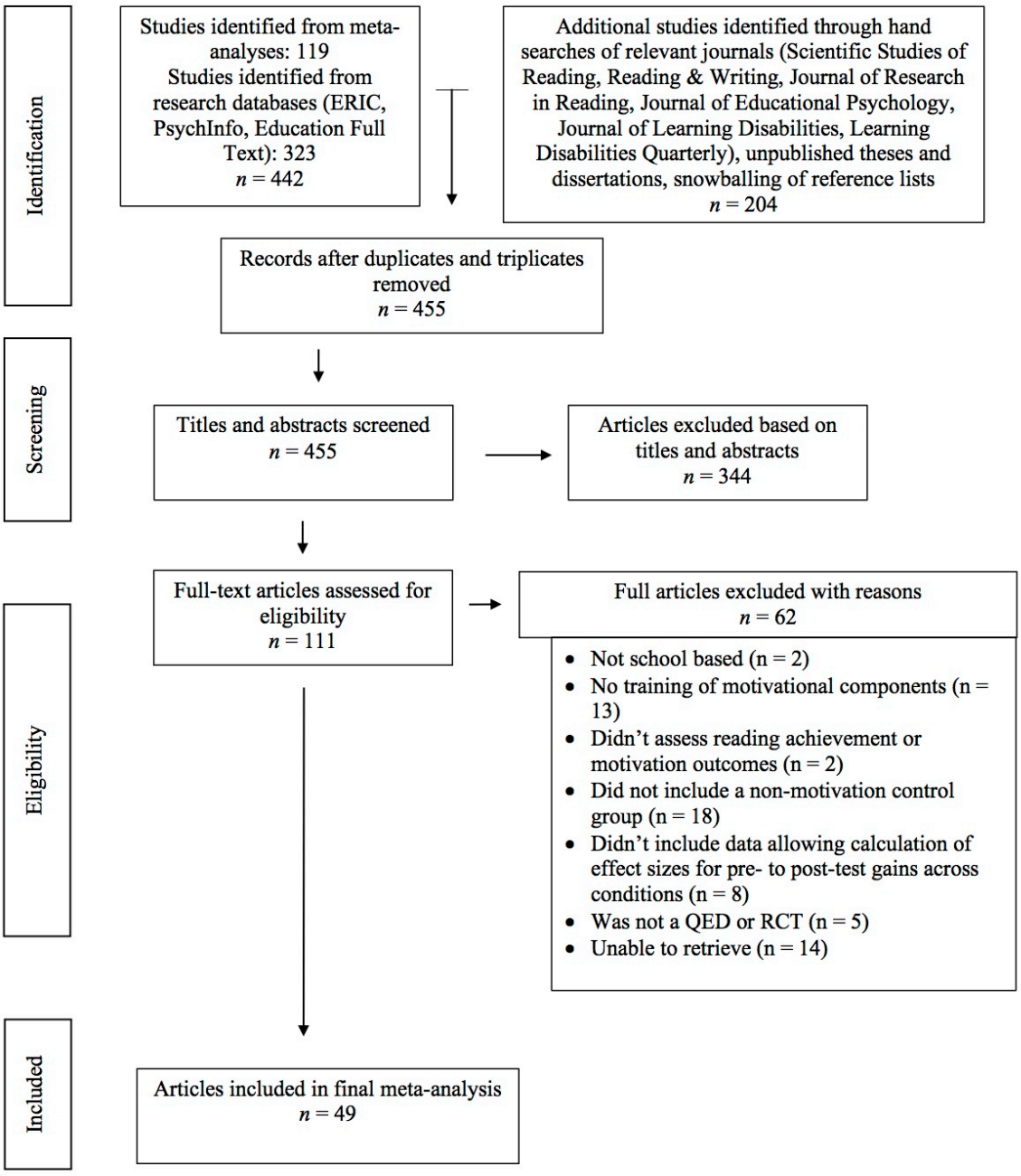

Figure 3

Publication Bias Funnel Plot: Reading Achievement

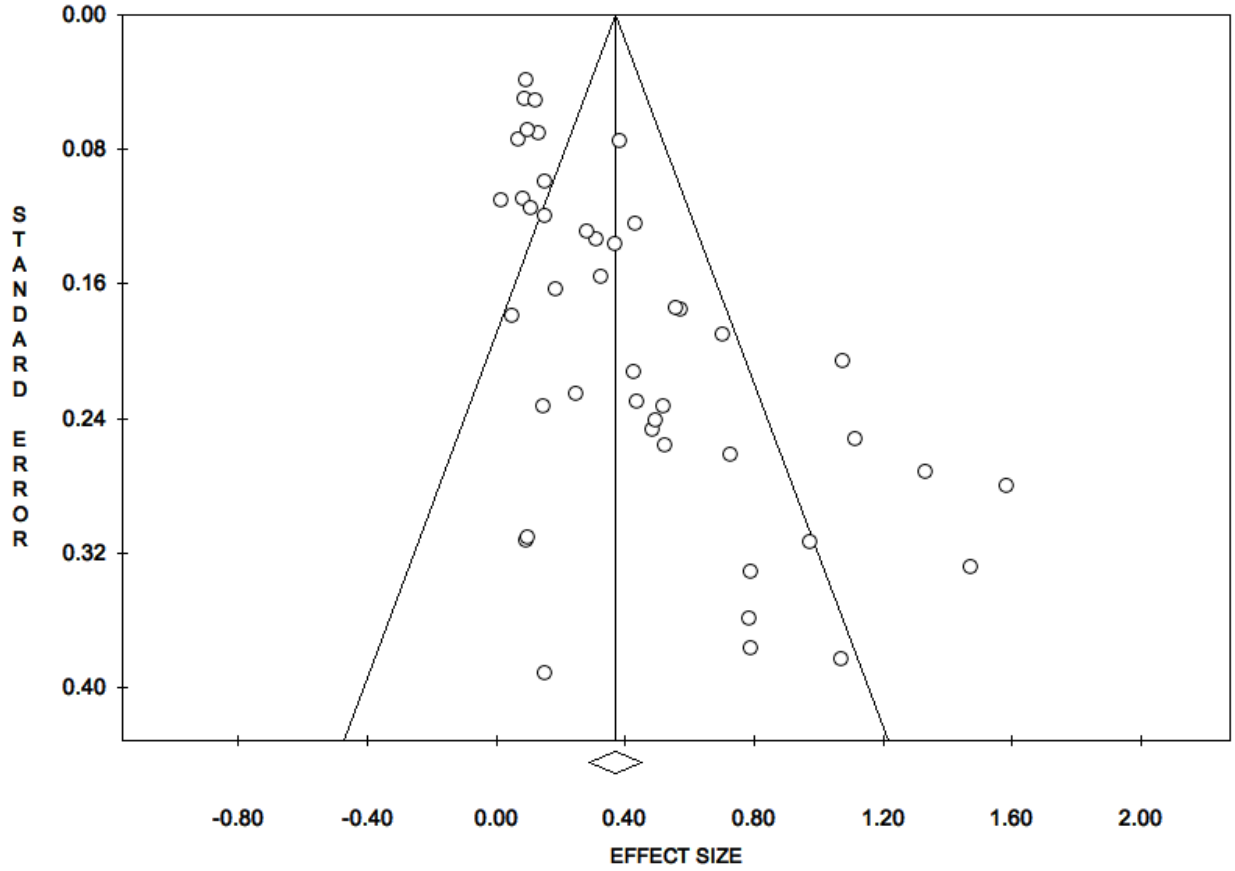

Figure 4

Publication Bias Funnel Plot: Reading Motivation

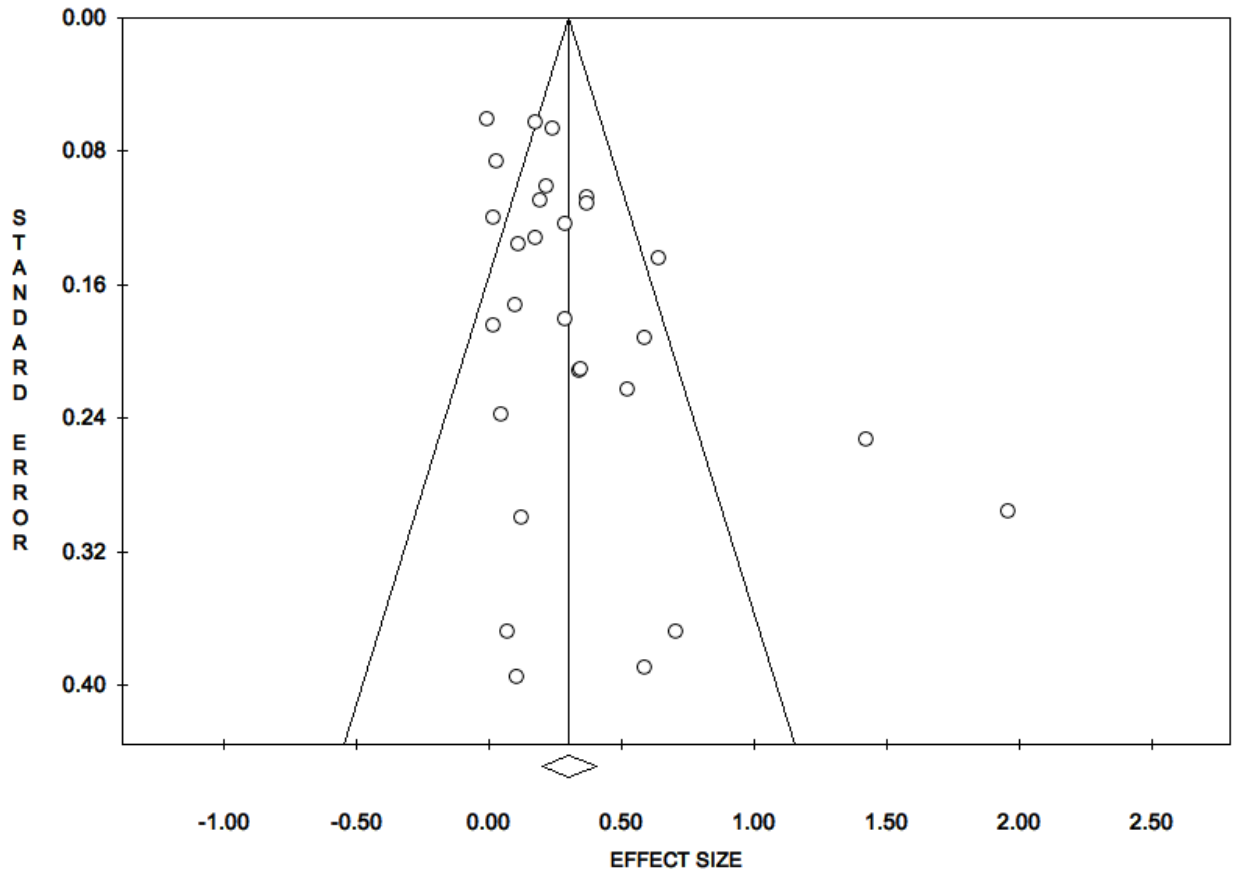

Table 2

Effect Sizes, Confidence Intervals, Z Values and p Values for the 49 Studies Included in the Meta-Analysis

Study name	Main outcomes	Hedge's g	Standard error	Variance	Lower limit	Upper Limit	P-Value
Aarnoutse & Schellings (2003)	Reading achievement	.02	.11	.01	-.20	.24	.862
	Reading motivation	.37	.11	.01	.15	.59	.001
Alhabahba, Pandian, & Mahfoodh (2016)	Reading achievement	1.59	.28	.08	1.04	2.13	.000
	Reading motivation	.64	.14	.02	.36	.92	.000
Andreassen & Bråten (2011)	Reading achievement	.37	.14	.02	.10	.64	.007
	Reading motivation	.11	.14	.02	-.15	.38	.40
Antoniou & Souvignier (2007)	Reading achievement	.50	.24	.06	.02	.97	.04
	Reading motivation	.05	.24	.06	-.42	.51	.85
Aro et al. (2018)	Reading motivation	.52	.22	.05	.09	.96	.018
Belet Boyaci & Güner (2018)	Reading achievement	1.47	.33	.11	.83	2.12	.000
Benito et al. (1993)	Reading achievement	.79	.38	.14	.05	1.53	.035
Berkeley, Mastropieri, & Scruggs (2011)	Reading achievement	.53	.26	.07	.02	1.03	.040
Borkowski, Weyhing, & Carr (1988)	Reading achievement	.52	.23	.05	.06	.98	.026
Bråten, Johansen, & Strømsø (2015)	Reading achievement	.70	.19	.04	.33	1.08	.000
	Reading motivation	.02	.18	.03	-.34	.38	.918
Cantrell et al. (2014)	Reading achievement	.10	.07	.00	-.04	.23	.158
	Reading motivation	.24	.07	.00	.11	.37	.000
Cantrell, Almasa, Rintamaa, & Carter (2016)	Reading achievement	.12	.05	.00	.02	.23	.015
	Reading motivation	.18	.06	.00	.05	.30	.005
Cirino et al. (2007)	Reading achievement	.49	.25	.06	.00	.97	.049
Cosentino (2017)	Reading achievement	.15	.39	.15	-.61	.92	.694
Denton,	Reading achievement	.15	.23	.05	-.31	.61	.521

Montroy, Zucker, & Cannon (2020)							
Förster & Souvignier (2014)	Reading achievement	.13	.07	.01	-.01	.27	.061
	Reading motivation	.00	.06	.00	-.12	.12	.944
Guthrie et al. (1999)	Reading achievement	.28	.13	.02	.03	.54	.030
Guthrie et al. (2004)	Reading achievement	.38	.08	.01	.24	.53	.000
	Reading motivation	.37	.11	.01	.16	.58	.001
Guthrie et al. (2009)	Reading achievement	.31	.13	.02	.05	.57	.021
Kettman Klingner, Vaughn, & Schumm (1998)	Reading achievement	.56	.17	.03	.22	.90	.001
Kolić-Vehovec (2002)	Reading achievement	.73	.26	.07	.21	1.24	.005
Little, McCoach, & Reis (2014)	Reading achievement	.09	.04	.00	.02	.17	.017
Loranger (1997)	Reading achievement	.79	.36	.13	.08	1.49	.029
Lutz, Guthrie, & Davis (2006)	Reading achievement	1.12	.25	.06	.62	1.61	.000
Marinak (2013)	Reading motivation	.59	.19	.04	.21	.96	.002
Marshall (2017)	Reading achievement	.10	.31	.10	-.51	.71	.755
	Reading motivation	.59	.39	.15	-.18	1.35	.131
Mason (2004)	Reading achievement	1.33	.27	.07	.80	1.86	.000
	Reading motivation	.12	.30	.09	-.46	.71	.683
Millin & Rinehart (1999)	Reading achievement	.79	.33	.11	.14	1.44	.017
	Reading motivation	.07	.37	.14	-.65	.79	.842
Nevo & Vaknin-Nussbaum (2020)	Reading motivation	1.42	.25	.06	.93	1.92	.000
Ng, Bartlett, Chester, & Kersland (2013)	Reading achievement	.57	.18	.03	.23	.92	.001
	Reading motivation	.35	.21	.04	-.07	.76	.100
Orkin (2013)	Reading achievement	.09	.31	.10	-.52	.71	.765
	Reading motivation	.10	.40	.16	-.67	.88	.792
Orkin, Pott, Wolf, May, & Brand (2018)	Reading achievement	.44	.23	.05	-.01	.89	.057
Reis et al. (2007)	Reading achievement	.11	.11	.01	-.11	.34	.335
	Reading motivation	.18	.13	.02	-.08	.44	.176

Reis et al. (2018)	Reading achievement	.07	.07	.01	-.08	.21	.366
	Reading motivation	.03	.09	.01	-.14	.20	.751
Reis et al. (2011)	Reading achievement	.09	.05	.00	-.01	.19	.075
Rhew, Piro, Goolkasian, & Cosentino (2008)	Reading motivation	1.96	.30	.09	1.38	2.54	.000
Schaffner & Schiefele (2007)	Reading motivation	.19	.11	.01	-.02	.41	.076
Schünemann, Spörer, & Brunstein (2013)	Reading achievement	.43	.12	.02	.19	.68	.001
	Reading motivation	.29	.12	.02	.04	.53	.021
Schunk & Rice (1989)	Reading achievement	1.07	.38	.15	.32	1.82	.005
	Reading motivation	.71	.37	.14	-.01	1.43	.054
Shaunessy-Dedrick et al. (2015)	Reading achievement	.09	.11	.01	-.13	.30	.44
	Reading motivation	.22	.10	.01	.02	.42	.03
Souvignier & Mokhlesgerami (2006)	Reading achievement	.15	.12	.01	-.08	.39	.204
	Reading motivation	.02	.12	.01	-.22	.25	.897
Spörer & Schünemann (2014)	Reading achievement	.15	.10	.01	-.04	.35	.125
Taboada Barber et al. (2015)	Reading motivation	.29	.18	.03	-.06	.64	.108
Tijms (2018)	Reading achievement	.43	.21	.05	.01	.84	.045
	Reading motivation	.34	.21	.04	-.24	.44	.571
Toste et al. (2017)	Reading achievement	.25	.23	.05	-.19	.69	.270
Toste et al. (2019)	Reading achievement	.19	.16	.03	-.13	.51	.251
	Reading motivation	.10	.17	.03	-.24	.44	.571
Vauras et al. (1999)	Reading achievement	.98	.31	.10	.36	1.59	.002
Wigfield et al. (2008)	Reading achievement	.33	.16	.02	.02	.63	.002
Zentall & Lee (2012)	Reading achievement	1.08	.21	.04	.67	1.48	.000

Bridging Manuscript #2: Developing Guidelines for Motivational Reading Instruction

In Chapter 3, the results of a systematic review and meta-analysis of motivational reading interventions in grades K-12 were described. Meta-analysis of effect sizes found some evidence that motivational reading interventions may have a significant effect on both reading achievement and motivation. Analysis of content approaches to motivational instruction identified five main categories of motivational reading instruction which have received empirical support: 1) Interest enhancing programs, 2) Self-regulatory instruction, 3) Autonomy-support, 4) Attribution/Goal orientation training, and 5) Multi-component approaches to fostering motivation, e.g., Concept-Oriented Reading Instruction (CORI; Guthrie, McRae, & Klauda, 2007). However, caution should be used in interpreting these results, as analysis of funnel plots strongly suggested that publication bias was present in reporting of reading achievement outcomes. Quality coding of the identified studies further indicated a lack of high quality intervention research assessing motivational reading interventions. This, combined with the presence of publication bias, justify the need for additional, well-designed studies assessing motivational reading interventions. Additionally, a review of study characteristics identified relatively few studies that included multiple reading achievement outcomes (e.g., phonological awareness and fluency in addition to comprehension), that focused on students at risk for reading difficulties specifically, or that explicitly and thoroughly situated their work within an understanding of motivational theory. Future intervention research that addresses these gaps is needed. The interventions described in Chapters 4 and 5 aimed to address these gaps.

In this thesis, it is argued that the disconnect between theory and practice in the field of reading motivation has limited the design of instructional tools which comprehensively support reading motivation, and limited our understanding of the relationship between reading

motivation and reading development. To drive both theory and practice forward, findings from theory and practice should be integrated, wherein theory guides practice, and empirical evaluations of theoretically-derived practices refine our understanding of theory (Snowling & Hulme, 2011). Taken together, the reviews conducted in Chapters 2 and 3 sought to address two aims: 1) to integrate the theoretical and empirical fields of reading motivation, and 2) to provide concrete guidelines for instructional practice. In Chapters 4 and 5, the effectiveness of a reading intervention that targets both cognitive (e.g., reading skills and strategies) and motivational (e.g., self-efficacy beliefs, learning emotions) components of reading was evaluated. The preliminary guidelines outlined in Chapter 2 were used as the basis for the proposed intervention. To extend upon this preliminary framework, evidence-based motivational practices identified through the meta-analysis described in Chapter 3 were integrated within the intervention. The resulting intervention thus merges recommendations from both theory and practice. This follows recommendations that a solid understanding of theory should form the basis for practice recommendations (Compton et al., 2014), and that theory and practice should be integrated to drive research forward (Snowling & Hulme, 2011). The resulting framework is comprised of three components, each one of which targets one of the subcomponents of motivation proposed by Motivational Systems Theory (MST): (1) Goals, (2) Emotions, and (3) Self-efficacy beliefs. Below is a description of the targets for each component, and practices that can support attainment of these targets. In understanding these guidelines, it is important to note that motivational instruction is unlikely to be effective unless combined with high quality reading instruction (Morgan, Fuchs, Compton, Cordray, & Fuchs, 2008). Thus, these guidelines are designed to complement cognitive (i.e., skills- and knowledge-based) reading instruction.

Block 1: Goals

A. Supporting students' long-term goals, and aligning these with classroom goals:

a. Autonomy-supportive practices: Provide students with the chance to contribute input to the reading classroom's agenda setting, by addressing the following questions: (1) "What are we going to work on?", (2) "How will lessons proceed?", (3) "How will progress be assessed?". The classroom agenda should be communicated to students through a clear and specific plan, which includes expectations for learning and behavior and criteria for assessment.

b. Attribution/goal orientation training: Guide students to focus on learning goals that are attainable for all, e.g., improvement, time-on-task, use of reading strategies. Both performance (e.g., learn and apply new reading strategies) and motivational (e.g., learn how to ask for help when you feel like avoiding a task) targets should be included within classroom goals.

B. Supporting students' personal learning goals:

a. Self-regulatory goal setting instruction: Work with students to help them establish their personal goals for the overall instructional period, and to subdivide these into short-term progress goals. Teach students how to set clear, realistic, challenging, and personally relevant goals which are aligned with the classroom agenda.

b. Self-regulatory metacognitive instruction: Teach students how to plan, monitor, and evaluate progress towards personal goals.

Block 2: Emotions

C. Promote positive emotions in the classroom:

a. Interest-based practices: Provide materials which are interesting to students and relevant to their daily lives. Link interesting topics to reading materials through, e.g., concept-oriented reading instruction.

b. Autonomy-supportive practices: Embed opportunities for choice of e.g., books, activities, assessment methods. Provide interesting and optimally challenging tasks that are based on students' interests, strengths, and weaknesses and which they can complete independently, leading to feelings of success.

c. Create an environment in which students' need for relatedness is fulfilled by promoting warm, respectful relationships: Listen to and acknowledge student concerns.

D. Support students' ability to deal with negative learning emotions

a. Emotional and motivational self-regulatory instruction: Teach students to identify situations that elicit anxiety and avoidance, elaborate coping strategies, and visualize success.

Block 3: Self-efficacy beliefs

E. Support students' feelings of competence & malleable views of ability

a. Self-regulatory instruction in progress monitoring: To allow students to visualize their progress, instruct students to self-track their progress towards their goals in terms of strategies used, successes, setbacks, affective reactions to tasks and how they were dealt with. This can be done through producing a portfolio of their work, a progress-tracking graph, or another collaboratively determined method.

b. Attribution/goal orientation training: Provide goal-directed, specific feedback about students' behavior, effort, cognitive strategy use, and avenues for improvement. Build upon this using discussions that aim to promote incremental views of ability and adaptive attributional patterns.
c. Autonomy-supportive practices: Autonomy-supportive practices, such as providing choice of books, tasks, and goals, should be integrated throughout lessons to promote students' independence, competence, and feelings of self-efficacy.

The guidelines proposed here provide a path towards integrating theoretical and practical recommendations in the field of reading motivation. A theoretical model of reading motivation based on MST would predict that implementing the above guidelines within the classroom would lead to gains in students' reading motivation and reading achievement compared to traditional, cognitive-only reading instruction. To fully assess the validity of a model based on MST, intervention studies that assess the impact of these guidelines on students' reading outcomes are needed. As this is the first study to assess the potential of these guidelines, it was deemed it appropriate to first conduct a pilot study using a multiple baseline design. Results from this study are presented in Chapter 4.

Chapter 4: Manuscript #3

The Effectiveness of a Cognitive plus Motivational Reading Intervention: A Multiple-Baseline Study of Four Students At Risk for Reading Difficulties

Miriam McBreen & Robert Savage

Department of Educational and Counselling Psychology

McGill University

Abstract

This paper examined the impact of an intervention combining remedial cognitive reading intervention with supports for motivation on the reading achievement and motivation of four third grade boys at risk for reading difficulties. Using a multiple-baseline across-participants design, effects of a combined Cognitive plus Motivational intervention were compared to those of a Cognitive-only intervention using probes for reading fluency, interest, and self-efficacy. Scores on each probe were plotted and analyzed combining visual analysis and the Process Control Chart method of statistical analysis. Results suggested that incorporating supports for motivation improved the fluency of three participants, and the interest and self-efficacy of two out of four participants. The findings presented here provide preliminary evidence that supplementing remedial cognitive reading intervention with supports for motivation can improve the reading achievement and motivation of students at risk for reading difficulties.

Keywords: Reading motivation, Self-efficacy, Interest, Intensive intervention, Motivational intervention

The Effectiveness of a Cognitive plus Motivational Reading Intervention: A Multiple-Baseline Study of Four Students At Risk for Reading Difficulties

Research into reading motivation suggests that it contributes to reading development (e.g., Park, 2011). For example, reading motivation has been linked to enjoyment, strategy use, and achievement during reading (Guthrie & Wigfield, 2000; Park, 2011). Further, for students receiving intensive instruction, findings suggest that increases in motivation may partly mediate increases in achievement (Bates, d'Agostino, Gambrell, & Xu, 2016). It is notable then that for students with reading difficulties, motivation to read tends to decline as they grow older (Nelson & Manset-Williamson, 2006). Students who struggle with reading are more likely to feel disinterested or helpless during reading instruction, which in turn may exacerbate pre-existing difficulties (Morgan, Fuchs, Compton, Cordray, & Fuchs, 2008). Conversely, when they are motivated, they are more likely to generate opportunities that foster skill development (Vollmeyer & Rheinberg, 2006).

Findings that reading motivation impacts reading development suggest that when designing reading programs, their impact on motivation should be considered. In response to this, a growing stream of intervention research examining the potential of reading programs that address both cognitive and motivational aspects of reading has emerged. A recent review of the existing literature of motivational reading interventions, which focused on intervention research in school-aged students, identified 49 interventions studies evaluating the impact of a motivational reading intervention. A meta-analysis of effect sizes indicated that motivational reading instruction may have beneficial effects on both reading achievement ($g = 0.20$) and reading motivation ($g = 0.30$) (Authors, submitted). While there was variation in the effect sizes reported both for reading achievement and reading motivation, all reported effect sizes were

positive. However, a review of the existing studies revealed two important gaps. First, most existing intervention studies fail to explicitly and thoroughly situate their intervention within a theoretical understanding of motivation and/or to define key motivational constructs (Conradi, Jang, & McKenna, 2014). It has been noted that failure to situate intervention research within a solid understanding of reading theory may limit the development of effective and comprehensive reading interventions (Compton, Miller, Elleman, & Steacy, 2014). Similarly, failure to situate intervention research within a theoretical understanding of motivation and its relationship to reading may limit the potential of interventions to comprehensively address reading motivation. Second, most existing intervention studies examine the impact of motivational programs on reading motivation and comprehension, but not on other aspects of reading, such as fluency. This limits researchers' ability to provide concrete instructional recommendations that target the needs of students experiencing a variety of reading difficulties. Additionally, the acquisition of different reading skills is thought to involve different processes. Motivation may thus impact these skills in different ways. For example, motivation may contribute to gains in reading comprehension through increasing engagement and strategy use during reading, while motivation may contribute to gains in fluency by increasing the amount of time spent engaging with text (Guthrie & Cox, 2001). To determine the precise mechanisms through which motivational instruction may contribute to gains in reading achievement, investigations which expand the range of reading outcomes included in assessments of motivational instruction are needed.

The present paper sought to address these gaps and contribute to the literature on motivational reading instruction by assessing the impact of a Cognitive plus Motivational reading intervention on the reading fluency and motivation of third grade students at risk for

reading difficulties. First, overviews of the intervention's theoretical and empirical backgrounds are presented, followed by a description of how the intervention was created. Then, results from a multiple baseline study assessing the intervention's efficacy are presented. The systematic search of the literature described above identified previous meta-analyses of motivational reading interventions and individual intervention studies by searching databases of systematic reviews and of educational research, with the search limited to intervention studies that examined the impact of motivational reading instruction on the reading outcomes of school-age students (Authors, submitted). Analysis of the 49 studies identified, which included quasi-experiments and randomized controlled trials, indicated that this is the first intervention to combine all the proposed components within a single reading intervention. Thus, it was deemed appropriate to conduct a pilot evaluation of the intervention using a multiple-baseline across-participants design.

Theoretical Background: Motivational Systems Theory

Motivational Systems Theory (MST) integrates elements of 32 theories of motivation in an effort to provide an overarching framework of motivation. MST was created in response to concerns that the field of motivation theory lacked consensus, cohesion, and integration (Ford, 1992). This concern has been echoed more recently by e.g., Anderman and Wolters (2006) who suggest that to fully describe learning motivation, multiple theories of motivation must be integrated, as they build upon one another to explain a given achievement situation. Because of MST's capacity to account for the multi-faceted nature of motivation, it was chosen as the theoretical rationale for this intervention.

MST subdivides motivation into three interrelated components: goals, emotions, and self-efficacy beliefs (Ford, 1992). Here, goals act as the impetus for adaptive learning behavior by

anchoring motivation in concrete objectives. The emotions felt during reading, such as interest or anxiety, modulate how likely students are to tackle novel tasks and persist. Self-efficacy beliefs represent students' beliefs about their ability and which tasks they can succeed on, and thus modulate how they decide to invest their time and effort. MST argues that together, these components underlie motivated behavior, which encourages students to generate situations that favor skill development (Deci & Ryan, 1985). Support for this claim comes from findings linking goals, emotions, and self-efficacy beliefs to classroom achievement (Campbell, 2007). MST suggests that to promote learning motivation, classrooms should enable students to (1) progress towards clear, personally relevant, and realistic goals; (2) experience positive learning emotions, such as interest or pride; and (3) develop a sense of self-efficacy (Ford, 1992). A review of the motivational intervention literature further suggests that explicitly targeting motivation during instruction can promote motivation and achievement, and provides practical guidelines that complement MST's recommendations.

Empirical Background: Motivational Reading Instruction

A recent systematic review and meta-analysis of the literature on motivational reading interventions in students in grades K-12 indicated that motivational reading interventions may have a beneficial effect on both reading achievement ($g = 0.20$) and reading motivation ($g = 0.30$) (Authors, submitted). The review identified five main categories of motivational instruction that have received support: (1) interest enhancing practices, (2) self-regulatory practices, (3) autonomy-supportive practices, (4) attribution/goal orientation training, and (5) multi-component motivational interventions, such as Concept-Oriented Reading Instruction (CORI; Guthrie et al., 2007) (Authors, submitted). Self-regulatory interventions teach students skills designed to make them more self-directed during learning. For example, strategy-focused

self-regulatory interventions teach students how and when to use reading strategies (Cantrell et al., 2014), metacognition-focused ones help develop students' ability to plan, monitor and evaluate their learning (Dignath & Büttner, 2008), while motivation-focused ones help students become reflective about their self-efficacy beliefs and goal orientations (Martin, 2008). Autonomy-supportive practices aim to help students become more independent in their learning. For example, inviting students to collaborate on creating the reading curriculum has been shown to increase value for reading (Marinak, 2013). Cooperative learning programs, in which students develop their autonomy by sharing responsibility among group members, have been found to lead to greater motivation and achievement when compared to traditional instruction (Lin, Chen, Yang, Xie, & Lin, 2014).

Interest-based practices capitalize on students' interests to generate sustained reading motivation. For example, CORI (Guthrie et al., 2004) first presents students with stimulating tasks to generate intrinsic interest, and then encourages them to independently read further on the subject. It has been shown to improve both reading comprehension and motivation compared to traditional instruction (Guthrie et al., 2007). Attribution/goal orientation training aims to help students attribute their success to controllable factors, and adopt a learning mindset focused on progress. Toste, Capin, Vaughn, Roberts, and Kearns (2017) found that supplementing strategy instruction with attribution training (i.e., self-reflection, positive self-talk, recognition of negative beliefs) yielded greater growth in reading comprehension than strategy instruction delivered alone. Finally, multi-component approaches, such as CORI, combine two or more of the above practices to foster motivation. To design the intervention assessed here, the above practices were integrated within MST's theoretical framework.

Designing a Comprehensive Motivational Intervention

Self-regulatory instruction, autonomy-supportive practices, interest-based practices, and attribution/goal orientation training have all gained support for their potential to improve reading motivation and achievement. Further, these practices complement practical recommendations from MST that instruction should support students' goals, emotions, and self-efficacy beliefs. It has been noted that teaching design should build upon a solid understanding of theory and knowledge of effective practices (Snowling & Hulme, 2011). This approach was used to create the intervention assessed here, by combining theoretical and empirical recommendations within a comprehensive, three-component intervention. Each component of the intervention targets one of the motivational subcomponents identified by MST. The intervention's content was informally validated with experienced teachers. Its outline is presented here, and further detail and template lesson plans are provided in Appendix D.

The first component involved teaching students to set individual, progress-oriented learning goals, and to contribute to the creation of the learning agenda covered during subsequent lessons. This included determining skills to be learned, classroom goals, and methods for assessing progress. It drew upon autonomy-supportive practices, self-regulatory goal setting instruction, and attribution training.

The second component aimed to foster positive learning emotions. Students received motivational self-regulatory instruction focused on identifying strengths, self-modeling success, and brainstorming ways to cope with negative emotions. Interest-based practices were used to elicit interest-based motivation.

The third component taught students to self-track the progress they have made towards goals. Based on students' self-tracking, teachers and students engaged in discussions centered on progress made and subsequent steps to be undertaken. This built upon self-regulatory instruction

in goal setting, progress monitoring, and attribution training. Additionally, autonomy-supportive practices were integrated throughout lessons to foster students' independence and feelings of competence.

Research Questions and Hypotheses

The research presented here sought to contribute to the literature on motivational instruction by examining the impact of supplementing cognitive reading intervention with supports for motivation, designed through the process described above, on the reading motivation and achievement of students at risk for reading difficulties. It addressed the following question and sub-questions: What are the effects of a Cognitive plus Motivational reading intervention on the reading outcomes of students at risk for reading difficulties?

a. Compared to a Cognitive-Only reading intervention, how does supplementing cognitive reading instruction with supports for motivation impact reading motivation (i.e., interest for reading, self-efficacy beliefs)?
b. Compared to a Cognitive-Only reading intervention, how does supplementing cognitive reading instruction with supports for motivation impact reading fluency?

To address these questions, a Cognitive plus Motivational reading intervention developed based on the principles above was implemented with four students at risk for reading difficulties. Its effect on their reading motivation and fluency was compared to that of a remedial Cognitive-Only reading intervention. It was hypothesized that, compared to cognitive reading intervention delivered alone, students who received remedial cognitive reading intervention combined with the above motivational components would show greater gains in reading fluency, interest, and self-efficacy.

Method

Design

A concurrent AB multiple-baseline across-participants design was used to assess the effects of the Cognitive plus Motivational reading intervention on four grade three students at risk for reading difficulties. Multiple-baseline designs have been deemed appropriate for research in educational settings in which effects are not expected to return to baseline after intervention delivery (Neuman & McCormick, 1995). As reading ability tends to improve with age provided students continue to receive adequate reading instruction, reading fluency was not expected to decrease at any point over the course of the study. Thus, a return to baseline was not included. Multi-participant concurrent designs, in which data collection begins simultaneously for all students, have been argued to promote internal validity (Christ, 2007).

Following a multiple-baseline across-participants design, the length of the baseline phase and the start of the experimental phase were staggered across participants. Staggering the phases helped to ensure that changes were due to changes between conditions rather than changes extraneous to the intervention. It also helped to control for the possibility that changes between conditions occurred because by the time they were in experimental condition, students had simply had more opportunities to practice reading skills than when they were in the baseline condition. To further control for this, the amount of direct reading instruction was kept constant across the baseline and experimental phases. Lessons were delivered one-on-one by the primary researcher, lasted 40-45 minutes, and were delivered two to three times a week either during or after school hours. In total, students received between 10 and 14 hours of reading intervention (combined baseline and experimental phases). This follows the length of previous research showing measurable effects of intensive intervention on standardized reading measures in similar

samples (National Reading Panel, 2000; Savage, Georgiou, Parrila, & Maiorino, 2018). Further, all students received between seven and nine hours of the motivational intervention. To assess outcomes, on-going data was collected for each lesson, using probe measures (i.e., short, quick-to-administer methods which provide a snapshot of a given skill) for reading motivation and fluency. Further detail on baseline and experimental conditions is presented in the Procedure section.

Participants

Participant selection. The study was reviewed and approved by a university research ethics board. Grade three students were selected for the intervention for two reasons: (1) by grade three, a decline in motivation has begun to occur for students who are experiencing reading difficulties (Nelson & Manset-Williamson, 2006); (2) third graders are more likely than their older counterparts to experience difficulties in fluency, in addition to comprehension. Thus, this age group was chosen in order to be able to examine the effects of the intervention on reading motivation and fluency. Participant selection began only once written parental consent was obtained for all students. All students underwent universal screening on measures of reading achievement and motivation (detail on screening measures is provided in the Measures section). Guidelines for identifying students at risk for reading difficulties recommend using a cut-off point for multiple measures of early literature including fluency, accuracy, and comprehension (Connor, Alberto, Compton, & O'Connor, 2014). A cut-off point at the 30th percentile has been used as an operational definition of at risk status (e.g., Savage et al., 2018). Thus, the selection criterion was scoring below the 30th percentile on one or more assessment of reading ability.

Sample description. Students were selected from an all-boys private elementary school in large urban city in Canada. Written consent was obtained for 16 students, four of whom met

eligibility criteria and were selected to participate (M_{age} = 8.54 years, SD = 0.18). All students in the school participate in an early French-immersion program, meaning that all kindergarten and grade one instruction is provided in French. English is introduced in grade two, accounting for 15% of instructional time, and is gradually increased until reaching 70% in grade six. Research on English-speaking students in similar programs in this city has reported that they attain similar levels of English language competence as students in all-English programs (Genesee, 2004). The socio-economic status of families who attend this school tends to be higher than the provincial average.

Student A. Student A was 8.66 years old at the time the study began. The main languages spoken at home were Chinese and English. During universal screening, he scored 45% on the value for reading subtest and 50% on the self-concept for reading subtest, indicating that both low value for reading and weak self-efficacy beliefs contributed to low motivation for reading and should be targeted during intervention. His performance was above the 19th percentile for reading accuracy, the 16th percentile for reading fluency, and the 22nd percentile for reading comprehension.

Student B. Student B was 8.42 years old at the time the study began. The main languages spoken at home were Chinese and English. During universal screening, student B scored 82.5% on the value for reading subtest and 67.5% on the self-concept for reading subtest, indicating that self-efficacy for reading should be the main focus for promoting motivation. His reading performance was above the 4th percentile for reading accuracy, the 7th percentile for reading fluency, and the 3rd percentile for reading comprehension.

Student C. Student C was 8.75 years old at the time the study began. The main language spoken at home was English. During universal screening, student C scored 67.5% on the value

for reading subtest and 70% on the self-concept for reading subtest, indicating slightly low value for reading but average reading self-efficacy. This suggests that value specifically should be targeted during instruction to promote motivation. His reading performance was above the 13th percentile for reading accuracy, the 7th percentile for reading fluency, and the 23rd percentile for reading comprehension.

Student D. Student D was 8.33 years old at the time the study began. The main language spoken at home was English. During universal screening, student C scored 90% on the value for reading subtest and 60% on the self-concept for reading subtest, indicating that self-efficacy for reading should be focused on to promote motivation. His reading performance was above the 9th percentile for reading accuracy, the 1st percentile for reading fluency, and the 3rd percentile for reading comprehension.

Measures

Universal screening.

Reading accuracy. English word reading accuracy was assessed using the word reading subtest of the Wide Range Achievement Test-4 (Wilkinson & Robertson, 2006), which includes letter recognition (15 items) and word reading (55 progressively more difficult words presented in list format). The test is discontinued after 10 consecutive errors. The manual reports test-retest reliability of .86 and internal validity ranging from .60 to .63 for the word reading subtest (Wilkinson & Robertson, 2006).

Reading fluency. The Dynamic Indicators of Early Literacy Skills Oral Reading Fluency test (DIBELS ORF, 6th edition; Good & Kaminski, 2007) was used to assess oral reading fluency. During the task, children are asked to read three grade-level passages aloud for one minute, and the number of words read correctly is calculated. Omissions, substitutions, and

hesitations lasting more than 3 seconds are scored as errors. Performance on the three texts is compiled to provide an average score for oral reading fluency. Good, Kaminski, Simmons, and Kame'enui (2001) report alternate-form reliability of .94 and criterion validity of .79.

Reading comprehension. The Group Reading Assessment and Diagnostic Evaluation (GRADE; Williams, 2001) grade three reading comprehension subtest was used to assess reading comprehension. During the test, students must read short stories and answer a series of questions assessing their comprehension of the stories. Alternate-form reliability for the GRADE ranges between .81-.96 (American Institutes for Research, 2017). Criterion validity for the GRADE ranges between .69-.90 (American Institutes for Research, 2017)

Reading value and reading self-efficacy. The *Motivation to Read Profile-Revised* (MRP-R; Marinak, Malloy, Gambrell, & Mazzoni, 2016) was used to assess reading motivation. The test was designed for use in students in second to sixth grade. It calculates motivation to read as a composite of value for reading and self-efficacy for reading. Cronbach's alpha reliability ranges from $\alpha = .81$ to .87 (Marinak et al., 2016). Given that the scale for the survey items is ordinal, nonparametric analysis using a root mean square error of approximation (RMSEA) has been used to assess validity (Malloy, Marinak, Gambrell, & Mazzoni, 2013). Analysis yielded a RMSEA estimate of .089 with a confidence interval of .081-.098, and a probability of RMSEA being less than or equal to .05 of $p < .001$ (Malloy et al., 2013).

Probe measures.

Reading fluency. A modified version of the DIBELS ORF test (Good & Kaminski, 2007) was used to probe oral reading fluency (see above). For this probe measure, only one text was presented, rather than 3. Good, Kaminski, Simmons, and Kame'enui (2001) report alternate-form reliability of .94 and criterion validity of .79.

Reading interest. Reading interest was assessed using a 5-point observer based Likert scale adapted from Koegel, Singh, and Koegel (2010), which ranged from *0 = the child looks bored and attempts to leave the activity* to *5 = the child attends readily to the task and is alert, eager and involved in the activity*. A shared book-reading episode was broken down into one-minute intervals to code the level of interest shown by the student during each interval. Ratings were then added and divided by the number of intervals to obtain an average score for the session examined. Koegel et al. (2010) report inter-rater reliability of .85-.99. Validity scores for this measure do not exist.

Reading self-efficacy. Reading self-efficacy was assessed using a protocol adapted from Wang and Pape's (2007) study on the self-efficacy of third and fourth graders for English language learning activities. To elicit self-efficacy beliefs, a chart with five stars was presented before shared book reading and administration of the fluency probe. Children were asked to choose a star to indicate how well they believed they could accomplish the task. The largest star indicates "can do it very well", while the smallest star indicates "unable to do it". In the first lesson, students were trained on how to respond to the self-efficacy star chart. This follows a visual analog scale (VAS) self-rating method. VAS assessments have been shown to have parallel-form reliability of .76 to .82 in children aged 6 to 18 (Laerhoven, van der Zaag-Loonen, & Derkx, 2004). An investigation into multiple VAS measures for clinical phenomena (e.g., mood, pain) have reported criterion validity ranging from .42 to .91 (Wewers & Lowe, 1990).

Procedure

Independent variable. The present study examined the differences in reading motivation and fluency across baseline and experimental conditions across participants. Before the study began, student reading profiles were created using the measures of reading accuracy, fluency,

and comprehension collected during participant selection. In both baseline and experimental lessons this information was used to ensure that optimally challenging tasks were provided. In both conditions, 75% of instructional time was dedicated to direct reading instruction which included systematic instruction in synthetic phonics, game-based practice of phonics concepts, and shared book reading with direct mapping (i.e., new phonological concepts learned in a session were applied to decode novel words during shared book reading in that same session). These approaches have been shown to have positive effects on the reading performance of students at risk for reading difficulties (e.g., Savage et al., 2018; Yeung & Savage, 2019).

In the experimental condition, the tasks were combined with the motivational components outlined above. Students were given choice over reading materials and games to support autonomy, and tasks were tailored to their interests. Additionally, instruction in self-regulation and attribution training took up 25% of each experimental session. During this time, students received no direct reading instruction. To balance the amount of direct reading instruction in both conditions while keeping the length of intervention constant across conditions, 25% of each baseline session's time was used to complete non-verbal math fluency exercises. All mathematics materials were drawn from the University of Chicago's *Everyday mathematics* resource and information center (UChicago STEM education, 2017). Baseline and experimental template lessons plans are provided in Appendix D.

Analysis plan. Data collected on the outcome probes was graphed for each student after each session (see Figures 5, 6, and 7). It has been suggested that the most efficient way to interpret multiple-baseline results is by combining visual analysis with statistical interpretation (Satake, Jagaroo, & Maxwell, 2008). For visual analysis, six types of changes were observed: changes in value, variability, data trends, immediacy of effect, and consistency (Kratochwill et

al., 2013). Then, the "Process Control Chart" method of statistical analysis was used (Juhel, 2008). The method consists of delimiting a confidence area whose lower and upper limits are set to 2 standard deviations below or above the mean for baseline observations (Juhel, 2008). When two or more data points of the experimental phase fall outside the bounds of the confidence area, the average of the experimental phase is deemed to be significantly different from that of the baseline phase (Juhel, 2008). For clarity of interpretation, the upper limit of the confidence area is represented using dotted lines in students' progress graphs.

Results

Ceiling Effects and Language Effects

Both the interest and self-efficacy probes were measured on a scale from 0-5. Student D, who scored 70% on the self-efficacy subscale of the reading motivation measure during screening, reached ceiling effects for the probe during the baseline phase, precluding the potential for observable change. For this student, the impact of the experimental condition on self-efficacy beliefs was assessed using only visual analysis. Additionally, for students B and D, the upper boundary of the baseline phase for self-interest reached ceiling effects, precluding observable changes. For these students, the impact of the experimental condition on interest was assessed using only visual analysis. It is also worth noting that while the primary language spoken at home was not the same for all students (50% English, 50% Chinese), no distinct pattern of responsiveness related to the primary home language emerged during analysis. Thus, this is unlikely to have significantly influenced results.

Student A

Visual analysis of Figure 5 indicates that student A's reading fluency remained similar across baseline and experimental conditions. While student A reached higher reading fluency

during the experimental phase relative to the baseline phase, the data in both conditions followed a slightly increasing trend, was variable and inconsistent, and overlap between phases was present. Further, there was no immediate effect on fluency following introduction of the experimental phase. Statistical analysis suggests there was some improvement in fluency, as two data points in the experimental phase exceeded the baseline phase's upper boundary of 84.39 words per minute.

Visual analysis of Figure 6 indicates that student A's reading interest increased during the experimental phase relative to the baseline phase. Overall, the level is higher during the experimental phase. During both phases, the trend is stable, with slight fluctuations. Further, the effect on interest appears immediately when the experimental phase is introduced, no overlap is present between phases, and interest remains consistently high during the experimental phase. Results from the statistical analysis support findings from the visual analysis, as all observations during the experimental phase exceed the baseline phase's upper boundary of 3.375 out of 5, suggesting a significant effect on interest.

Visual analysis of Figure 7 indicates that student A's self-concept increased during the experimental relative to the baseline phase. Overall, the level is higher during the experimental phase and, while the trend is decreasing during the baseline phase, it increases during the experimental phase. Further, following introduction of the experimental phase, there appears to be an immediate effect on self-concept, the trend becomes more stable, self-concept remains consistently high, and while early stages of the experimental phase overlap with the baseline phase, later stages do not. The statistical analysis supports the visual analysis, as five data points exceed the baseline phase's upper boundary of 3.63 out of 5, indicating a significant effect on self-concept.

Student B

Visual analysis of Figure 5 indicates that student B's reading fluency increased during the experimental phase relative to the baseline phase. Overall, the level is slightly higher during the experimental phase than during the baseline phase, and while the trend during the baseline phase shows a steep initial decrease followed by a slight increase, the overall trend during the experimental phase is increasing. Further, despite the lack of an immediate effect on fluency, the trend becomes more stable and consistent during the experimental phase, and there is only one point of overlap between both phases. Results from the statistical analysis support the visual analysis, as two data points exceed the baseline phase's upper boundary of 37.34 words per minute, indicating a significant effect on reading fluency.

Visual analysis of Figure 6 indicates that student B's interest did not increase during the experimental phase, but that it tended to become more stable. Overall, the level is similar between both phases, the trend fluctuates slightly in both phases, there is no immediate effect of introducing the experimental phase, and there is overlap between the two phases, but the data in the experimental phase are more stable and more consistent. As the upper boundary of the confidence area exceeded ceiling during the baseline phase, statistical analysis was not possible.

Visual analysis of Figure 7 indicates that the experimental condition did not impact student B's self-concept. While the overall level is higher during the experimental phase relative to the baseline phase, the trend in both phases is positive overall, there is overlap between data in both phases, there is a lot of variability in each phase, and there is no immediate effect on self-concept following the introduction of the experimental phase. Statistical analysis supports findings from the visual analysis, as there was no significant effect on self-concept, i.e., no data points exceeded the baseline phase's upper boundary of 3.24 out of 5.

Student C

Visual analysis of Figure 5 indicates that student C's reading fluency did not increase during the experimental phase relative to the baseline phase. In both phases, the level was similar, and the trend was slightly increasing in both conditions. There is overlap between both phases, no immediate effect of introducing the experimental phase is present, and the data in both phases is variable, though it is slightly more consistent in the experimental phase. Results of the statistical analysis further indicate no significant effect on reading fluency, as no data points in the experimental phase exceed the baseline phase's upper boundary of 51.88 words per minute.

Visual analysis of Figure 6 indicates that student C's interest increased during the experimental phase relative to the baseline phase. The overall level is higher during the experimental phase, the trend becomes stable and consistently high whereas it fluctuates during baseline, there is no overlap in data between phases, and the effect appears to be immediate following introduction of the experimental phase. Results from the statistical analysis support the visual analysis, as 11 data points in the experimental phases exceed the baseline phase's upper boundary of 4.66 out of 5, indicating a significant effect on interest.

Visual analysis of Figure 7 indicates a small effect of the experimental phase on student C's self-concept. Overall, the level is higher during the experimental phase, and while there is some overlap between phases, data in the experimental phase is more consistently high and stable, especially in later lessons. While the effect does not appear immediately following introduction of the experimental phase, the data overall is less variable in the experimental phase than during the baseline phase. As the upper boundary of the confidence area exceeded ceiling during the baseline phase, statistical analysis was not possible.

Student D

Visual analysis of Figure 5 indicates that student D's reading fluency increased during the experimental phase relative to the baseline phase. Overall, the level of fluency is higher during the experimental phase, and while the trend is positive in both phase, the slope is steeper during the experimental phase. In both phases, there are slight variations in the data, and while there appears to be no immediate effect of introducing the experimental phase, data in the experimental phase follows a consistent increase, and only overlaps with the baseline phase at early stages. Statistical analysis further indicates a significant difference between phases, as nine data points from the experimental phase exceeded the baseline's upper boundary of 22.7 words per minute.

Visual analysis of Figure 6 indicates that student D's interest underwent a slight increase during the experimental phase relative to the baseline phase. Overall, the level is higher, and while the trend in the baseline phase fluctuates, it is stable during the experimental phase. Following introduction of the experimental phase, there appears to be an immediate impact on interest, interest remains consistently high throughout the phase, and there is minimal overlap between phases. As the upper boundary of the confidence area exceeded ceiling during the baseline phase, statistical analysis was not possible.

Visual analysis of Figure 7 indicates that student D's self-concept increased during the experimental phase relative to the baseline phase. Overall, the level is higher during the experimental phase, and there is no overlap between the data in both conditions. While the trend in the baseline phase is slightly increasing, it is variable. In the experimental phase, the trend continues to increase slowly, but remains stable and consistently high, which appears to occur immediately following introduction of the experimental phase. The statistical analysis further

indicates the experimental phase significantly increased self-concept compared to the baseline phase, as four data points in the experimental phase exceed the baseline phase's upper boundary of 4.34 out of 5.

Discussion

The present research sought to assess whether supplementing remedial cognitive reading intervention with a motivational intervention based on MST had an impact on the reading fluency and motivation of four third grade students at risk for reading difficulties. It was hypothesized that compared to a Cognitive-Only reading intervention, cognitive intervention combined with the motivational components proposed here would lead to greater improvements in reading fluency, interest, and self-efficacy. Results provide preliminary support this hypothesis, as positive effects of the intervention on reading fluency, self-efficacy and interest were found. However, caution is needed in interpreting these results.

Reading Fluency

The combined visual and statistical analyses revealed that three of the participants, students A, B and D, made greater gains in fluency during the experimental relative to the baseline condition. Notably, those who demonstrated the most improvement, students A and D, were those with the most severe initial reading difficulties, scoring between the 1st and 9th percentiles on the screening measures for reading ability. The finding that the Cognitive plus Motivational intervention was most effective for the students with the weakest initial reading performance needs to be interpreted with extreme caution given the small sample size. It is however in line with previous results showing that motivation contributes the greatest variation in outcomes for students with the most pronounced reading difficulties (e.g., Logan, Medford, & Hughes, 2011), and that motivation-focused interventions are most effective for these students

(van Steensel, van der Sands, & Arends, 2017). Further, this is in line with MST's proposal that motivation is especially important for students experiencing severe difficulties, as it encourages them to foster opportunities for skill development (Ford, 1992). This persistence, in turn, is assumed to translate into improved performance (Vollmeyer & Rheinberg, 2006). While the difference across conditions may in part be explained by prolonged exposure to best-practice reading instruction, it should be noted that student D was in the baseline condition for almost twice as long as student B. This suggests that at least some of the observed discrepancy may be due to differences in motivational instruction between conditions.

While statistical analysis indicated that the intervention had no observable effect on the reading fluency of student C, visual analysis indicated that average fluency increased slightly in the experimental relative to the baseline phase. Here, it is possible that the gains in motivation observed for student C would eventually lead to increases in reading ability, but that the short length of intervention did not allow for these changes to have an observable statistical effect.

Reading Motivation

Overall, results from the analysis can be cautiously interpreted to suggest that the intervention had a positive impact on both reading interest and self-efficacy. Students B and D had relatively high value for reading prior to beginning the study, and the upper boundary for interest reached ceiling during baseline. This precluded the possibility of obtaining a statistically significant effect on interest. However, visual analysis suggests interest may have become more stable during the experimental phase compared to the baseline phase. For students A and C, who had low value for reading at pre-test, visual and statistical analysis of the interest probe indicated that interest significantly increased once the experimental phase began. One potential explanation for this increase may be that students were asked to help select the books and

learning games that would be used. Possibly, giving students choice made it more likely that they were choosing materials they found interesting, and contributed to more stable interest than when book and activity choices were instructor-driven. This is in line with self-determination theory's claim that when students are given opportunities to be autonomous, they are more likely to be engaged during instruction (Deci & Ryan, 1991). It further echoes previous intervention studies, which have linked autonomy-supportive practices to increased value for reading (e.g., Marinak, 2013).

Second, statistical analyses suggest that the Cognitive plus Motivational intervention was effective for improving the self-efficacy of half the participants, while visual analysis of student graphs indicated that for all students, self-efficacy became more stable during the later stages of the intervention. As noted previously, student B's self-efficacy appraisals reached ceiling levels during baseline, precluding the potential for observable statistical changes. As all students saw gains in their reading throughout the length of the study, one contributing factor to improved self-efficacy may be that as students' reading skills improved, their self-efficacy showed corresponding gains. Additionally, during the experimental phase, students were instructed to self-track their progress and encouraged to see learning as progressive and self-referenced. Resulting improvements in self-efficacy appraisals are consistent with findings that progress-oriented teaching makes students more likely to adopt mastery orientations (e.g., Anderman, Anderman, Yough, & Gilbert, 2010), and achievement goal theory's claim that mastery-oriented students have more resilient self-efficacy beliefs (Schunk, Pintrich, & Meece, 2008). Thus, it is possible that the observed improvements in reading ability combined with an increased focused on progress-oriented self-efficacy appraisals contributed to improved self-efficacy beliefs.

Limitations

Several limitations should be addressed when interpreting results. First, the probe measures may have been demotivating. All students expressed dislike of the probe measures and resistance to completing them. Additionally, they took approximately three to five minutes to administer, which had a cumulative effect of decreasing instructional time. However, as probe measures were administered identically in both baseline and experimental lessons, this cannot explain differences between both conditions. Second, it is possible that differences between phases were due to the cumulative effect of receiving reading instruction. Namely, that reading instruction received during baseline as part of the intervention and as part of regular classroom instruction had effects on fluency or motivation that only became manifest during the experimental phase. However, as baseline and intervention lengths were staggered across participants, this partially controlled for delayed intervention effects manifesting at different moments.

Third, enthusiasm of delivery may have varied across conditions. As the teacher was the primary researcher, it is possible that enthusiasm may have been unintentionally higher during the experimental relative to the baseline phase. To control for this, efforts were made to foster a positive and warm relationship and to listen attentively to students in both conditions. In future assessments of the intervention, externally assessed treatment integrity measures should be implemented to control for this. Fourth, it is possible that some of the motivational components delivered during the experimental phase would have been more effective if the intervention had lasted longer. Fifth, scores on the self-efficacy probe reached ceiling for student D during baseline, while the upper boundary of interest scores reached ceiling for two students during the baseline phase. In these cases, the potential for observable statistical change was limited, and

these specific results were difficult to interpret. However, evidence from students who did not reach ceiling effects provides evidence that is more readily interpretable, and which suggests that the intervention had a beneficial effect on motivation. To address both issues, longer-term intervention studies using outcome measures with reliable psychometric properties and without ceiling effects are needed. Sixth, the findings reported here show an impact on reading fluency, but to fully understand the intervention's impact on reading, further measures of reading ability are needed. Future assessments of the intervention should also include measures of phonological awareness, reading accuracy, and comprehension. Seventh, the most up to date version of the measure of reading comprehension used here was 18 years old. However, it has strong psychometric properties and is still widely used in reading research. Nonetheless, alternative, and more recently-standardized measures of reading comprehension may have yielded more precise estimates of reading ability.

Finally, the intervention sought to increase motivation for reading during the experimental lessons, but did not target students' motivation in their classroom or home environments. Thus, while it is possible that transfer occurred to other reading contexts, interpretation of the observed effects should be limited to the present context, i.e., intensive one-on-one reading intervention. Additionally, this study has all of the limitations generally associated with controlled case studies, including generalization and replicability. The sample used was not representative of the general population in terms of income, gender distribution, primary language, and school type. Caution should thus be used when generalizing the results obtained here to other school populations. Further, the design used did not allow for causality to be established, as all students received the Cognitive plus Motivational intervention. Nonetheless, the results presented here justify the need for future research assessing the present

intervention's efficacy using a more rigorous design, e.g., pre-test/post-test control group intervention designs.

Conclusion

Despite the above limitations, the results reported in this paper provide preliminary evidence that a combined Cognitive plus Motivational reading intervention may be effective for improving both the reading motivation and reading fluency of at least some third grade students experiencing reading difficulties. Results also provide partial support for a theoretical framework of motivation in line with Motivational Systems Theory, which proposes that to foster motivation and subsequent achievement, goals, emotions, and self-efficacy beliefs should be addressed within a comprehensive framework. The intervention's impact on motivation provides initial support for using MST as a guiding framework to foster motivation through providing learning environments that anchor learning in concrete and specific goals, that foster positive learning emotions, and that promote the adoption of progress-oriented learning goals.

If validated through future research, the results obtained here have potentially important implications for teaching practice, as they suggest that incorporating instruction that targets multiple aspects of motivation alongside remedial reading instruction can foster reading motivation and skill development in students at risk for reading difficulties. To better assess the potential of such an approach, larger scale interventions using more rigorous experimental designs, such as pre-test post-test quasi-experimental trials, are needed. Additionally, measures that are more sensitive to small changes in motivational subcomponents would allow for a more detailed understanding of the intervention's impact on motivation. A pre-test post-test quasi-experimental trial study is therefore the next step in this programmatic research.

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Figure 5

Reading Fluency

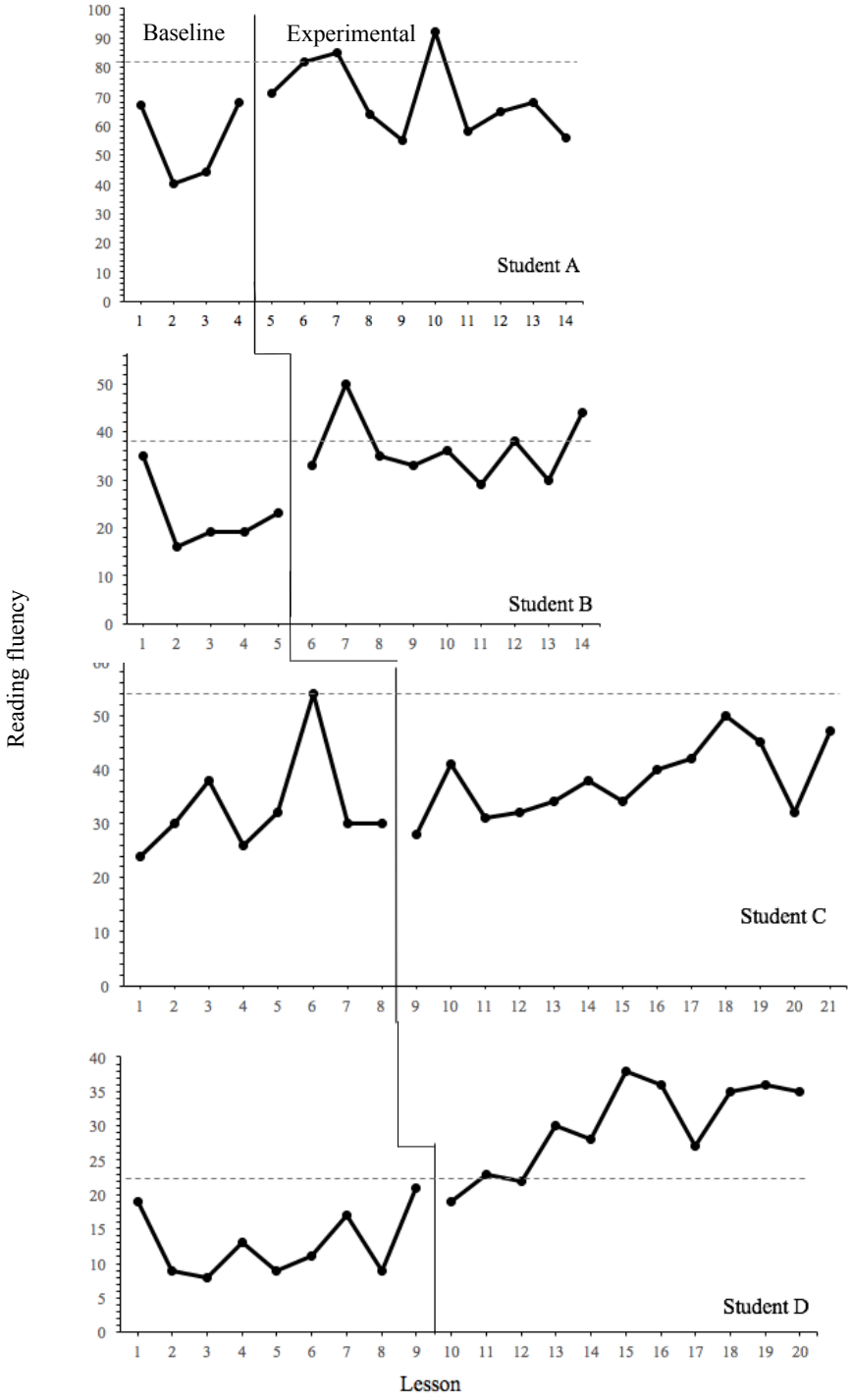


Figure 6

Reading Interest

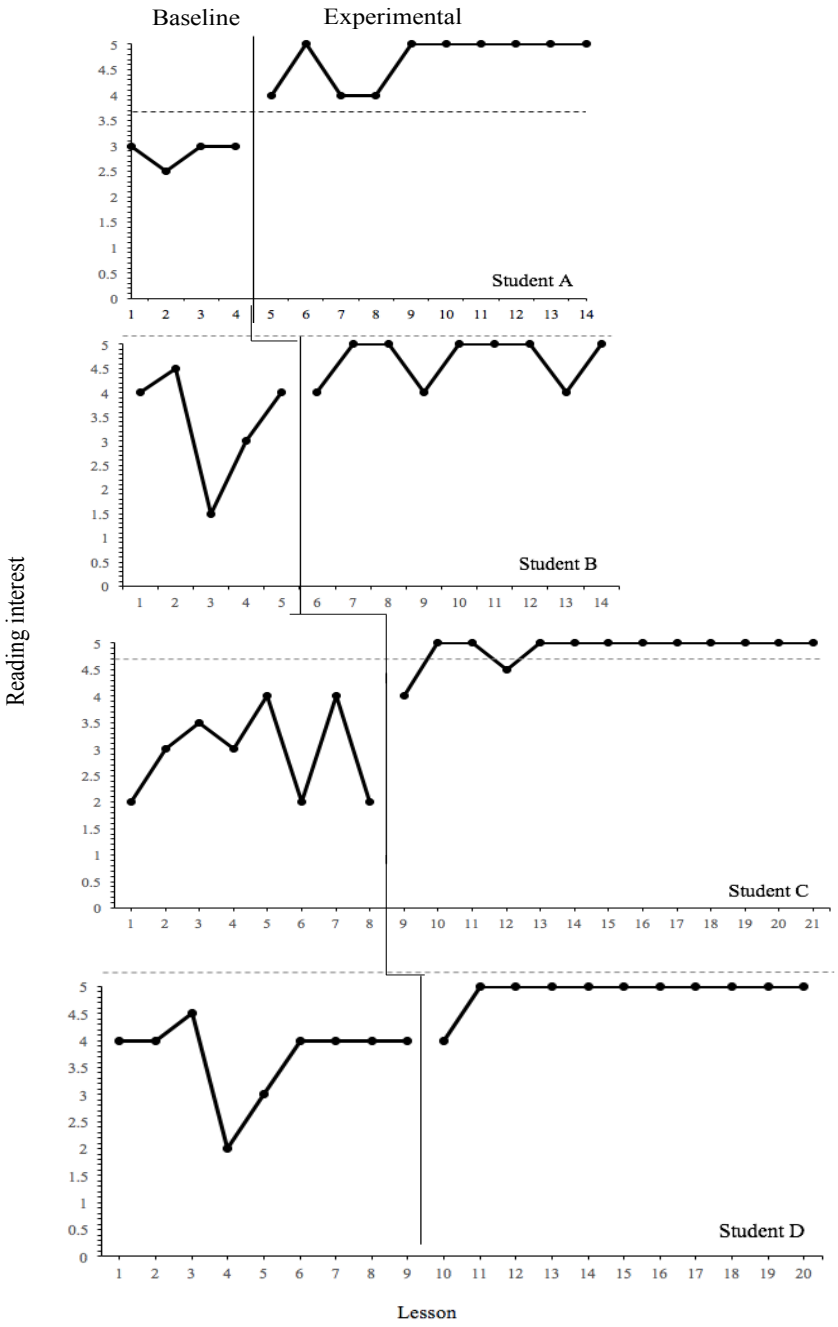
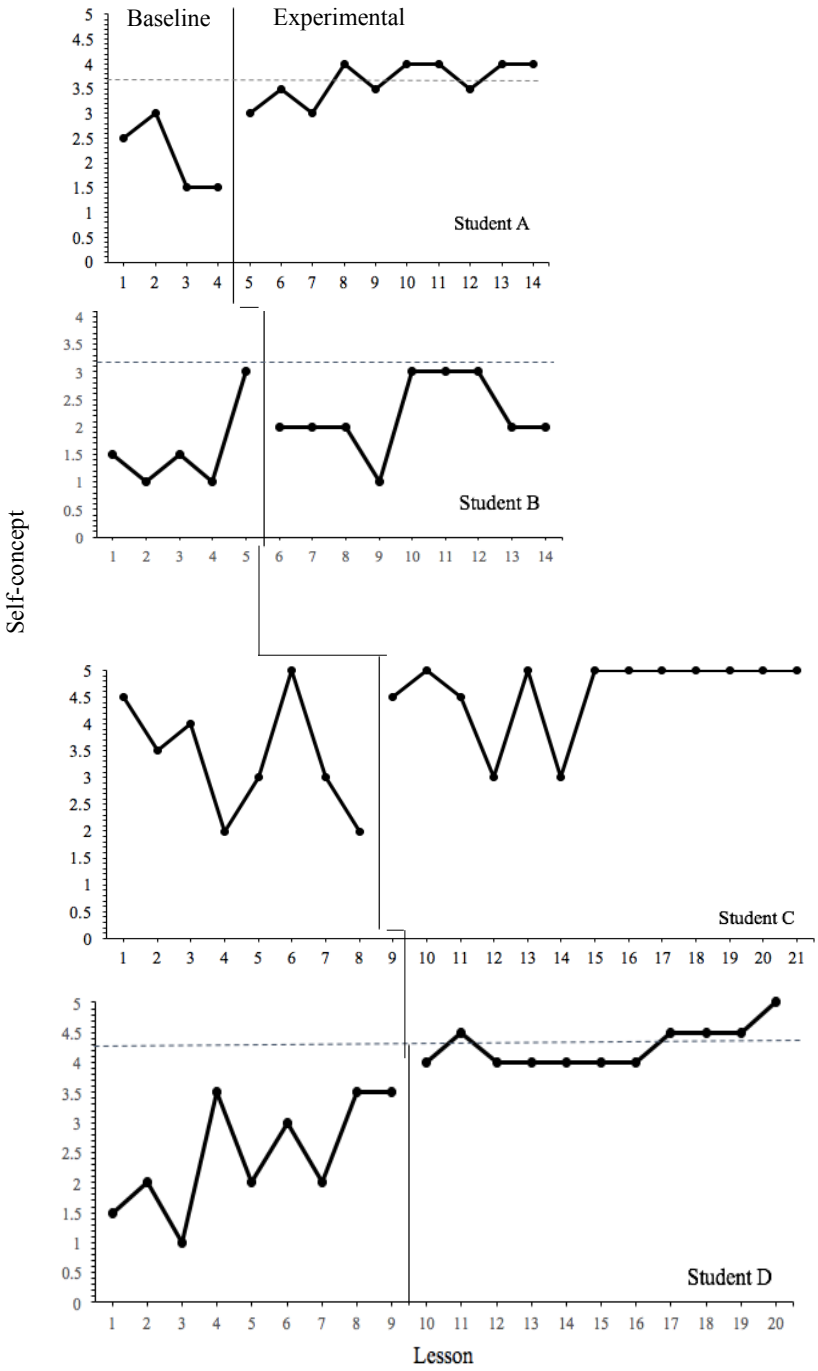


Figure 7

Reading Self-Efficacy



Bridging Manuscript #3: Scaling Up the Pilot Evaluation of a Combined Cognitive and Motivational Reading Intervention

In Chapter 4, results of a pilot study that examined the impact of a cognitive and motivational reading intervention were presented. Cognitive components of the intervention were drawn from reading theory and evidence-based reading instruction. Motivational components of the intervention were designed by merging recommendations from motivational theory and practice, identified in Chapters 2 and 3 respectively. Using a multiple baseline design, the impact of the program on the reading fluency and motivation of four third grade boys at risk for reading difficulties was assessed. In the baseline phase, all students received a Cognitive-Only reading intervention. In the treatment phase, all students received a combined Cognitive plus Motivational reading intervention. Cognitive components of the intervention were the same in both phases, while in the treatment phase students received additional support for reading motivation. Findings provided tentative support for the value of supplementing cognitive reading intervention with supports for reading motivation. Three out of four students showed greater gains in reading fluency during the treatment phase compared to the baseline phase, two students showed a greater increase in level and stability of interest, and two students showed improved self-efficacy. Due to the small sample size and issues of generalizability associated with controlled case studies, it was not possible to draw strong conclusions about the efficacy of the proposed intervention based on the results presented in Chapter 4. In Chapter 1, the lack of high-quality, rigorous intervention studies of motivational reading instruction was noted. Thus, one aim addressed by this thesis was to contribute to the field through such a study. The preliminary results obtained in Chapter 4 justified scaling up evaluation of the proposed Cognitive plus Motivational intervention.

To extend upon the findings described in Chapter 4, results from a quasi-experimental pre-test post-test efficacy trial design of the intervention are presented in Chapter 5. Students at risk for reading difficulties were identified through universal screening. Selected students were grouped according to school, and schools were randomly assigned to one of two treatment conditions. In the first treatment condition, students received between 9-11 hours of a cognitive reading intervention based on evidence-based reading instruction. In the second treatment condition, students received 9-11 hours of a combined cognitive and motivational reading intervention. Cognitive components of the intervention were the same in both conditions, while students in the second treatment condition additionally received instruction aiming to foster reading motivation. Findings from this trial are presented in Chapter 5. In the final chapter of this thesis, implications of the findings presented in this thesis on reading theory and practice are discussed.

Chapter 5: Manuscript #4

The Impact of a Cognitive and Motivational Reading Intervention on the Reading Achievement and Motivation of Students At Risk for Reading Difficulties

Miriam McBreen & Robert Savage

Department of Educational and Counselling Psychology

McGill University

Abstract

This research assessed the impact of combining small-group cognitive reading intervention with a motivational program targeting students' goals, emotions, and self-efficacy beliefs on the reading performance and motivation of third grade students at risk for reading difficulties (n = *25,* M_{age} = *8.99, SD = .38*). Using a quasi-experimental pre-test/post-test efficacy trial design, effects of the intervention on phonological awareness, listening comprehension, accuracy, fluency, reading comprehension, and motivation were assessed. Results indicate that compared to students who received Cognitive-Only reading intervention, students who received the combined Cognitive plus Motivational reading intervention showed greater gains in reading comprehension and phonological awareness. Findings provide preliminary evidence that supplementing cognitive reading intervention with the proposed motivational program can improve the reading performance of students at risk for reading difficulties.

Keywords: Reading motivation, Reading performance, Motivational instruction

The Impact of a Cognitive and Motivational Reading Intervention on the Reading Achievement and Motivation of Students At Risk for Reading Difficulties

Research has suggested that reading motivation contributes to reading acquisition (e.g., Bates, d'Agostino, Gambrell, & Xu, 2016). Positive correlations have been found between reading motivation and both strategy-use and achievement in reading (Guthrie & Wigfield, 2000), while it has been suggested that reading motivation partly mediates responsiveness to intensive reading instruction (Bates et al., 2016). Motivation may operate to improve different components of reading achievement through multiple pathways, including increasing time-on-task, frequency of reading, systematic use of reading strategies, and engagement (Vollmeyer & Rheinberg, 2006). For example, reading comprehension is thought to depend in part on activating central processes, including fluent reading, activation of background knowledge, application of reading strategies, and self-regulation (Ahmadi & Pourhosein, 2012). Potentially, motivation may improve reading comprehension by increasing strategy use and cognitive engagement during reading. Development of fluency, on the other hand, may depend in large part upon practice (National Reading Panel, 2000). Motivation may possibly improve fluency in part by increasing the frequency and duration of children's reading. Notably, the impact of reading motivation on reading achievement has been shown to be strongest for students at risk for reading difficulties (Logan, Meford, & Hughes, 2011).

Findings linking motivation to reading achievement suggest it may be important to address motivation when designing reading instruction, especially for students at risk for developing reading difficulties. Intervention research on motivational reading instruction further suggests that targeting motivation alongside reading skills during instruction may lead to improvements in both reading achievement and motivation. For example, a meta-analysis of

interventions assessing the impact of Concept-Oriented Reading Instruction (CORI), a multi-component program that supports motivation by providing relevant tasks, choice, social motivation, and promoting self-efficacy, yielded positive effects on both reading comprehension (d = 0.91) and motivation (d = 0.30) (Guthrie, McRae, & Klauda, 2007). However, it should be noted that other meta-analyses suggest effect sizes are much smaller, namely g = 0.20 for reading achievement outcomes and g = 0.30 for reading motivation outcomes (Authors, submitted).

While findings from intervention research offer support for motivational approaches to reading instruction, notable gaps in the literature remain to be addressed. First, most interventions are not solidly grounded in motivational theory. In a recent systematic review and meta-analysis of 49 intervention studies on motivational reading instruction in students in grade K-12 selected on methodological quality, only 19 studies made any direct mention of motivational theory (Authors, submitted). It has been noted that to comprehensively address the needs of learners, the design of effective instruction should draw upon solid theoretical grounding, on one hand, and empirically-supported teaching practices, on the other (Snowling & Hulme, 2011). Second, existing intervention research has mainly assessed the impact of motivational instruction on reading motivation and comprehension, but not on other aspects of reading such as phonological awareness, accuracy, and fluency. Examining how motivational instruction impacts a range of reading abilities may provide further insight into the precise mechanisms through which motivation improves reading, e.g., through increasing strategy use and engagement during reading or by increasing frequency or duration of reading. Third, there exist few high-quality intervention studies of motivational reading instruction in school-age students, which limits researchers' ability to draw strong conclusions concerning the effectiveness of such an approach. In the above-mentioned systematic review and meta-analysis

of motivational reading instruction, only two studies were rated as high quality (Authors, submitted). The lack of high-quality intervention research into motivational reading instruction in grades K-12 highlights the need for additional well-designed studies.

The present research sought to address these gaps through a well-designed quasi-experimental pre-test/post-test efficacy intervention trial, which evaluated the impact of a theoretically- and empirically driven cognitive plus motivational reading intervention on the reading outcomes of students at risk for reading difficulties. The intervention was developed in a principled manner, by combining recommendations from motivational theory with practice recommendations extracted from an extensive search for-, and an analysis of-, existing intervention research. A brief overview of the program's theoretical and empirical background is provided, followed by an outline of the program's main components. Results from an intervention study evaluating the program's impact on reading achievement and motivation are then presented.

Theoretical Framework: Motivational Systems Theory

Motivational Systems Theory (MST) was used as the theoretical framework guiding this intervention. This framework was chosen because it is argued that MST most thoroughly accounts for the multi-faceted nature of reading motivation. MST arose in response to calls from motivational theorists that the field lacked consensus, cohesion, and integration (Ford, 1992). To address this, MST incorporates recommendations from 32 theories of motivation within a coherent and organized framework of motivation. This is in line with recommendations that multiple theories of motivation be integrated to fully describe the motivational components involved in learning, and the view that different theories build systematically on each other to explain achievement situations (Anderman & Wolters, 2006).

MST identifies three main subcomponents of motivation: goals (i.e., the direction of effort), emotions (i.e., affective reactions to learning tasks), and self-efficacy beliefs (i.e., beliefs about one's abilities), and argues that each of these must be addressed to support optimal learning (Ford, 1992). To foster motivation, MST proposes that classrooms should 1) support students' progress towards concrete goals by e.g., providing relevant tasks, encouraging students to set clear, attainable, and realistic goals; 2) promote "positive learning emotions" such as value for reading and pride by e.g., drawing upon students' interests and providing opportunities for success, and minimize "negative learning emotions" that can arise from e.g., competition; and 3) build students' self-efficacy beliefs by e.g., providing opportunities for students to feel both independent and competent (Ford, 1992). This theoretical framework was complemented with empirically supported instructional practices drawn from a recent meta-analysis and systematic review of intervention research on motivational reading interventions in students in grades K-12.

Empirical Framework: Motivational Reading Instruction

Current best-practices in motivational instruction were identified based on a systematic review and meta-analysis of motivational reading interventions in students in grades K-12 (Authors, submitted). The review sought to identify the most recent studies (up to 2020) and was restricted to intervention studies comparing the impact of motivational reading interventions to a non-motivational control on reading achievement and/or reading motivation on students in grades K-12. It was further restricted to studies with a randomized control trial or quasi-experimental design, which provided data allowing for calculation of effect sizes for pre- to post-test gains across conditions. Synthesis of effect sizes identified a significant overall effect of motivational reading interventions on both reading achievement ($g = 0.20$) and reading motivation ($g = 0.30$) (Authors, submitted). Additionally, a review of content approaches to

motivational instruction identified five main categories of motivational reading instruction that have gained support: (1) self-regulatory instruction, (2) interest-enhancing practices, (3) attribution/goal orientation training, (4) autonomy-supportive practices, and (5) multi-component motivational interventions, such as Concept-Oriented Reading Instruction (CORI; Guthrie, McRae, & Klauda, 2007). Self-regulatory instruction aims to help students become self-directed in their learning. This includes teaching them to set learning goals for themselves, monitoring and evaluating their learning, and regulating their emotions and self-efficacy beliefs (Dignath & Büttner, 2008). Autonomy-supportive instruction aims to develop students' independence. For example, instructional practices that invite students to give input on classroom targets and tasks have been found to promote value for reading compared to traditional instruction (Marinak, 2013). Interest-based instruction builds upon students' interests to generate intrinsic motivation and foster value for reading. For instance, the CORI (Guthrie et al., 2004) framework first exposes students to tasks they find intrinsically interesting, and then coherently links these tasks to reading. Attribution and goal orientation training both help students make attributions for their performance focused on factors within their control and adopt learning goals that are realistic and progress-oriented. It has been found that students who received strategy instruction with attribution training (i.e., self-reflection, positive self-talk, recognition of negative beliefs) showed greater gains in comprehension than students who received only strategy instruction or traditional instruction (Toste, Capin, Vaughn, Roberts, & Kearns, 2017). To develop the intervention, empirically-supported practices were incorporated within MST's theoretical framework.

Building a Motivational Reading Intervention

MST proposes that to foster motivation, it is necessary to target students' goals, emotions, and self-efficacy beliefs, while a review of intervention research identified five broad categories of empirically supported motivational reading practices. Recommendations from theory and practice were integrated to create a comprehensive motivational intervention designed to address the needs of students at risk for reading difficulties. The resulting program is subdivided into three components, each of which addresses one of the subcomponents of motivation identified by MST. In the first component, focused on goal setting, students and teachers collaborated to set learning goals for the classroom to support autonomy, and students were instructed to set personal goals focused on progress. Self-regulatory instruction was used to guide students in setting and planning goals, while attribution/goal training instruction was used to help students adopt goals centered on progress, effort, and personal mastery. In the second component, focused on learning emotions, students received motivational self-regulatory instruction to develop affective self-regulation, and interest-based practices were used to support interest and enjoyment. In the third component, focused on promoting self-efficacy beliefs, students were instructed to track their progress and retrain their performance attributions, using self-regulatory instruction and attribution/goal orientation training. Autonomy-supportive practices were used to promote students' independence, further contributing to their self-efficacy beliefs.

It has been noted that both cognitive and motivational components of reading should be addressed during instruction to promote optimal outcomes (Morgan et al., 2008). Indeed, targeting motivation alone is unlikely to yield gains in reading development. Thus, the program evaluated here was designed to be used in conjunction with evidence-based cognitive reading intervention. In this intervention, the motivational program was implemented in conjunction with

the following cognitive instructional components: differentiated reading instruction including direct, systematic instruction in synthetic and analogic phonics following the simplicity principle, game-based practice of phonics concepts, and shared book reading with direct mapping (i.e., new phonological concepts learned in a session were applied to decode novel words during shared book reading in that same session). These practices were chosen as they have been found to yield positive effects on the outcomes of students at risk for reading difficulties in previous intervention research (e.g., Savage, Georgiou, Parrila, & Maiorino, 2018). Further detail on delivery of instructional components, as well as a template lesson plan, is provided in Appendix E. The program was informally validated with experienced teachers.

Research Aims and Questions

The present research sought to contribute to the field of reading motivation research by assessing a cognitive and motivational reading program based on the principles outlined above. The aim of this research was to determine the impact of supplementing cognitive reading intervention with the proposed motivational program on the reading outcomes of students at risk for reading difficulties. A secondary aim of this research was to examine the mechanisms through which motivational instruction leads to gains in reading achievement. It was guided by the following research question and sub-questions:

1. What are the effects of a Cognitive plus Motivational reading intervention on the reading outcomes of students at risk for reading difficulties?
    a. Compared to a Cognitive-Only reading intervention, how does supplementing cognitive reading instruction with supports for reading motivation impact different components of reading achievement (phonological awareness, accuracy, fluency, comprehension)?

b. Compared to a Cognitive-Only reading intervention, how does supplementing cognitive reading instruction with supports for reading motivation impact different components of reading motivation (i.e., reading self-efficacy, value for reading)?

2. If gains in reading motivation were present, were gains in reading achievement mediated by gains in reading motivation?

The theoretical framework adopted here suggests that to comprehensively support learning, both cognitive and motivational components of learning should be addressed during instruction. Thus, it was hypothesized that supplementing small-group cognitive reading intervention with the present motivational program would lead to greater growth in reading achievement and motivation than Cognitive-Only reading intervention. It was further hypothesized that gains in achievement would be mediated by gains in motivation.

Method

Sample

Participant selection. Prior to data collection, the study was reviewed and accepted by a research ethics board and written parental consent was obtained for all participants. Participants were selected from grade three classrooms of participating schools. This age group was selected because by this age, many students at risk for reading difficulties experience (1) a decline in reading motivation (Nelson & Manset-Williamson, 2006) and (2) difficulties with multiple aspects of reading (e.g., accuracy, fluency, comprehension). Choosing this age group thus allowed for the intervention's impact to be assessed on both on reading motivation and a range of reading skills. Students at risk for reading difficulties were identified through universal screening on four measures of reading ability: (1) phonological awareness, (2) reading accuracy, (3)

reading fluency, and (4) reading comprehension. Selection criterion was scoring below the 30th percentile on at least one of these four measures. A 30th percentile cut-off point has been used as an operational definition of at risk status in previous literacy research (e.g., Savage et al., 2018).

Sample description. Students were selected from nine English-speaking third-grade classrooms in six elementary schools in a large urban Canadian city. Written consent was obtained from the parents or guardians of 50 students, 26 of whom met study eligibility criteria. One student withdrew from the study during pre-test assessment. The final sample of eligible participants included 25 students (M_{age} = 8.99, *SD*=.38, 36% female). Of these 25 students, all were typically developing, and slightly more than half of the sample was Caucasian (56%). Based on parents who responded to a demographic parent survey, the primary language spoken at home by the final sample of 25 students was either English or English and French, and the median household income was 100,000-124,999$.

Procedure

The study took place over the course of eight weeks during the winter semester of the 2018 school year. Children in both conditions were divided into groups of two to five students, and received two to three lessons per week, each lasting 45 minutes, for a total of 1.5-2.25 hours per week. If a student was absent for a session, make-up sessions were offered. All students received between nine and 11 hours of total instructional time, which is consistent with previous research finding a measurable effect on standardized reading measures for students at risk for reading difficulties (e.g., on word reading and comprehension; Savage et al., 2018). A quasi-experimental pre-test/post-test efficacy intervention trial design, in which participants or groups are allocated to one out of two or more experimental conditions, was used to assess the impact of the intervention on students' reading achievement and reading motivation. Due to the small

number of students in each school, students were grouped according to school. Schools were randomly allocated to one of two treatment conditions by creating a number code (1 or 2) for each condition and using an online random number generator (random.org; Haahr & Haahr, 2005) to allocate schools to conditions. Using this approach, two schools (11 students, 3 groups) were allocated to the Cognitive-Only condition, and four schools (14 students, 4 groups) were allocated to the Cognitive plus Motivational condition. Following randomization, the quality of matching between conditions was assessed on control measures of receptive vocabulary, non-verbal IQ, and classroom quality, and pre-test primary outcome measures of reading comprehension and motivation. No significant differences were found across conditions, indicating high quality of match. Descriptive data for control, pre-, and post-test measures are presented in Tables 3 and 4.

Assessment. Pre-test assessment consisted of two 30-minute sessions, during which students' performance on outcome measures and control measures were assessed. Post-test assessment consisted of one 30-minute session, during which performance on outcome measures was assessed. Instructions were delivered orally by the primary researcher, or by a research assistant (RA). The four RAs that participated in the study were trained on how to administer the tests, observed the primary researcher administer the tests, and finally were observed administering the tests by the primary researcher. Once they were deemed able to administer the tests correctly, RAs tested independently.

Conditions. In both conditions, the primary researcher taught some groups, and RAs taught some groups. RAs were undergraduate students in Psychology or Education. RAs were trained on how to deliver the intervention by the primary researcher during a training session preceding the intervention and received an intervention booklet providing a detailed overview of

lesson plans. In both conditions, students received the same cognitive instructional components: differentiated reading instruction including direct, systematic instruction in synthetic and analogic phonics following the simplicity principle, game-based practice of phonics concepts, and shared book reading. These practices have been found to yield positive effects on the outcomes of students at risk for reading difficulties in previous intervention research (e.g., Savage et al., 2018). In the Cognitive plus Motivational condition, autonomy-supportive and interest-based practices were integrated throughout lessons. Students were asked to select the books and reading games used, to foster feelings of autonomy and allow them to select books/activities based on their interests. Additionally, in the Cognitive plus Motivational condition, 25% of each lesson was allocated to self-regulatory instruction and/or attribution training, which did not include any direct reading instruction. During the first two lessons, which centered on goal setting, the instructor introduced group goals for the intervention, and asked students to provide input. Students were then asked to set personal goals. The instructor guided students to set goals that were realistic, clear, challenging, and attainable. The subsequent eight lessons included socio-emotional coaching, that aimed to make students more aware of their strengths and interests and to identify ways to cope with challenging learning situations (e.g., identifying a support team, visualizing progress made and next steps). Finally, all lessons included training in self-regulatory instruction and positive attribution beliefs. Students were given progress charts to self-track their progress towards goals, and specific, goal-directed feedback was provided by the instructor to help students identify successful strategies and plan next steps. To ensure the amount of direct reading instruction received across conditions was balanced while maintaining the length of intervention constant across conditions, 25% of lesson

time in the Cognitive-Only condition was allocated to non-verbal mathematic exercises. Further detail and template lesson plans for both conditions are provided in Appendix E.

Implementation fidelity. Implementation fidelity was assessed for a randomly selected subset of 20% of all lessons. Raters, who were either the primary investigator or RAs, were provided with a fidelity of implementation rubric for each condition that assessed delivery of instructional components, quality of teaching, and quality of the teaching environment (see Appendix F), and trained on how to complete them. A series of 2 x 2 chi-square analyses were then conducted to compare implementation fidelity between conditions. No significant differences were found between groups on delivery of instructional components (χ^2 (1) = *1.92, p = .15*), quality of teaching (χ^2 (1) = *2.92, p* = .088) or quality of the teaching environment (χ^2 = (1) *.83, p = .36*). Instructional components were rated as delivered fully in 87.9% of cases and partly in 12.1% of cases, teacher quality was rated as excellent in 77.6% of cases and generally good in 22.4% of cases, and environment quality was rated as excellent in 60% of cases and adequate in 40% cases.

Student response. Raters were also asked to rate students' engagement for 20% of lessons in both conditions. Engagement was defined as time students spent on-task, application of strategies during reading, and enthusiasm (interest and excitement) during the instructional period. Significant differences emerged across groups, χ^2 (1) = *4.21, p = .04*. Frequencies indicates that students were more engaged in the Cognitive plus Motivational condition than in the Cognitive-Only condition; the response of students in the Cognitive plus Motivational condition was rated as excellent in 100% of cases, the response of students in the Cognitive-Only condition was rated as excellent in 70.37% of cases and generally good in 29.62% of cases.

Classroom observations. To ensure results were not due to differences in the quality of the classroom literacy environment, raters observed one hour of a regular English Language Arts class for each classroom. Observations were made using the Early Literacy and Language Classroom Observation (ELLCO K-3; Smith, Brady, & Clark-Chiarelli, 2008), which assesses *Classroom Structure and Climate*, *Language Environment*, *Books and Reading*, and *Print and Writing*. For each observation, two raters first filled out the rubric independently and then consulted until agreement was reached on all measures. A *t*-test conducted on global ELLCO scores indicated no significant differences in regular classroom climate and quality of the literacy environment across conditions, $t\ (23) = -1.562,\ p = .132$.

Measures

Guthrie et al.'s (2007) meta-analysis reported a small effect size of motivational interventions on reading motivation outcomes, and a large effect size on reading comprehension outcomes. Both reading comprehension and reading motivation were therefore included as primary outcome measures. To assess the impact of the intervention on a broader range of reading abilities, phonological awareness, accuracy, fluency, and listening comprehension were included as secondary outcome measures. For all outcome measures, internal reliability of outcome measures was assessed in this sample. Internal reliability, an index of how consistently different elements on a test measure a construct, was calculated by correlating students' score on even numbered test items to their score on odd numbered test items, using the Spearman-Brown correction for internal reliability.

Primary outcome measures.

Reading comprehension. Reading comprehension was assessed using the sentence comprehension subtest of the Group Reading Assessment and Diagnostic Evaluation (GRADE;

Williams, 2001). During the test, students are asked to read sentences in which one word is missing, and to choose the missing word from four choices (e.g. "Cars and buses run on the ____": told, road, goat, roar). Criterion validity ranges between .69-.90 (American Institutes for Research, 2017). Internal reliability for this sample was $r = .68$.

Reading motivation. Reading motivation was assessed using the Motivation to Read Profile-Revised (MRP-R; Marinak, Malloy, Gambrell, & Mazzoni, 2016). The test was designed for use with students in second to sixth grade. It includes a value for reading subscale and a self-efficacy for reading subscale composed of 10 Likert-scale questions each. The value for reading subscale was used as an index of emotions towards reading, while the self-efficacy for reading subscale was used as an index of self-efficacy beliefs. As items are rated on an ordinal scale, nonparametric analysis using root mean square error of approximation (RMSEA) has been used to assess validity (Malloy, Marinak, Gambrell, & Mazzoni, 2013). Malloy et al. (2013) report an RMSEA estimate of .089, $p < .001$. Internal reliability in this sample was $r = .66$ for the self-efficacy subtest and $r = .65$ for the value subtest.

Secondary outcome measures.

Phonological awareness. The Comprehensive Test of Phonological Processing-2 (CTOPP-2; Wagner, Torgesen, & Rashotte, 1999) "blending words" and "segmenting non-words" subtests were used to assess phonological awareness. The "blending words" subtest consists of 33 items that assess students' ability to combine orally presented speech sounds into words (e.g., /dʒ/-/ʌ/-/m/-/p/ = 'jump'). The "segmenting non-words" subtest consists of 31 items that assess students' ability to segment orally presented non-words into speech sounds (e.g., "seb" = /s/-/e/-/b/). The CTOPP manual reports validity correlations ranging between .49 to .84

for all subtests (Wagner et al., 1999). Internal reliability for this sample was r = .80 for the blending subtest and r =.98 for the segmenting subtest.

Reading accuracy. Reading accuracy was assessed using the Wide Range Achievement Test-4 (WRAT-4; Wilkinson & Robertson, 2006) word reading subtest. In the test, students are asked to name 15 letters and read from a list of 55 typed, lowercase, progressively more difficult words (e.g., "see", "wrap", "rancid"). The test is discontinued following 10 consecutive errors. Students' scores are obtained by calculating the number of words read correctly. Internal validity ranges from .60 to .63 (Wilkinson & Robertson, 2006). Internal reliability for this sample was r = .57.

Reading fluency. Reading fluency was assessed using the Dynamic Indicators of Early Literacy Skills Oral Reading Fluency sub-test (DIBELS ORF, 6th edition; Good & Kaminski, 2007). In the test, students are asked to read three grade-level passages ("Finding a nest", "A famous food: The history of pizza", and "Living in Singapore") out loud for one minute, and the number of correctly read words is calculated. Students read the same passages at pre-test and post-test. Omissions, substitutions, and hesitations longer than three seconds are scored as errors. An average score is calculated based on performance on the three passages. The DIBELS ORF alternate-form criterion validity is .79 (Good, Kaminski, Simmons, & Kame'enui, 2001). As the DIBELS uses text rather than test items, published reliability measures were used for this measure. Good, Kaminski, Simmons, and Kame'enui (2001) report alternate-form reliability of .94

Listening comprehension. The Group Reading Assessment and Diagnostic Evaluation (GRADE; Williams, 2001) grade three listening comprehension subtest was used to assess listening comprehension. During the test, students are asked to choose a picture out of four

choices that visually depicts a sentence orally presented by the experimenter (e.g. "The horse is jumping over the fence"). Criterion validity ranges between .69-.90 (American Institutes for Research, 2017). Internal reliability for this sample was $r = .53$.

Control measures.

Non-verbal intelligence. The Raven's Colored Progressive Matrices was used to assess non-verbal intelligence (Raven, 1998). The test is made up of 36 untimed perceptual problems in three sets of 12 items. The manual reports reliability of .88 (Raven, 1998). Criterion-referenced validity for children aged three to nine ranges from .643 to .703 (Bildiren, 2017).

Receptive vocabulary. English receptive vocabulary was assessed using the Peabody Picture Vocabulary Test – IIIA (PPVT-IIIA; Dunn & Dunn, 1997). In the test, participants are asked to choose a picture out of four choices that visually depicts a word orally presented by the experimenter (e.g. "plumber", "vase"). The manual reports reliability of .94 and criterion-validity ranging from .69 to .91 (Dunn & Dunn, 1997).

Results

Preliminary Data Analysis

To reduce the potential influence of extreme scores, outliers were identified by searching for data points that fell outside of the interquartile range for all outcome measures at pre- and post-test. Through this process, 22 potential outliers were identified (11% of the entire data set) and adjusted either to the lower or upper boundary of the interquartile range or to 1.5 SD from the mean. Analyses with outliers adjusted by either method yielded the same results. The final analyses were conducted with 22 outliers adjusted to either the lower or upper boundary respectively. There was no missing data. Finally, to assess generalizability of results to the wider population, the sample was compared to average norms for non-verbal intelligence and family

characteristics. The sample's average raw score on Raven's Coloured Progressive Matrices was in the 50th percentile for its age group ($M = 26$, $SD = 4.71$), indicating average levels of non-verbal intelligence. Parents were given a short survey assessing household income and mother's education. Parents answers to the survey were compared to national norms from the 2016 Canadian Census (Statistics Canada, 2016) using chi-square analyses. No significant differences between the sample and population were observed for household income, $\chi^2 (18) = 12.03, p = 0.85$; or mother's education level, $\chi^2 (9) = 8.01, p = 0.53$. Means and standard deviations for control measures are reported in Table 3. Means, standard deviations, and effect sizes across conditions are reported in Table 4.

Inferential Analyses

To ensure that the control and treatment groups did not differ significantly prior to receiving intervention, independent samples *t*-tests were conducted on pre-test scores with condition as the independent variable for all outcome and control measures. At pre-test, no significant differences across conditions were found for control measures (see Table 3). The groups differed significantly on two secondary outcome measures, fluency, $t(23) = 3.287$, $p < .01$, $d = 1.37$ and phonological blending, $t(23) = -2.591$, $p = .016$, $d = 1.18$ (see Table 4). No other significant differences were present for either achievement or motivation measures at pre-test.

To facilitate interpretation and comparison across outcomes, data for outcome measures at pre- and post-test were first converted to z-scores and then grand-mean centered. Due to the nested nature of the data, outcomes were analyzed using Hierarchical Linear Modeling (HLM; Hayes, 2006). The final HLM models were built sequentially from preliminary analyses. Students were grouped according to school and schools were randomized into either condition. In some schools, students within a single group came from multiple classrooms. To control for

possible variations in baseline activity due to regular teacher effects within individual classes, classroom-level variance was assessed. In Model 1, an unconditional one-way ANOVA indicated that there was significant classroom-level variance at pre-test and post-test on primary and secondary outcome measures beyond the variance attributable to students (i.e., intra-class correlations ranged from .06 to .57). Thus, it was deemed that HLM with clustering at the classroom level was appropriate. The intra-class correlation at the classroom level was below .05 for four outcome measures: accuracy at both pre-test and post-test, segmenting at pre-test, and listening comprehension at pre-test. It is worth noting that the small sample size may have affected the power of the analyses presented here. Each classroom in the sample contained between two and five students who participated in the study, meaning that clusters at level-1 of the model ranges from $n = 2$ to $n = 5$. However, it has been argued that HLM is appropriate for studies with small and/or variable sample sizes at level-1, for example in twin studies where the level-1 is $n = 2$ or family studies where the number of children at level-1 is variable (e.g., Lynch et al., 2010; Turkheimer, D'Onofrio, Maes, & Eaves, 2005). Thus, HLM was deemed appropriate despite the small sample size at level-1 clusters.

The final two-level hierarchical model examined whether variance on post-test reading achievement and motivation for students (level 1) at the class level (level 2) was explained by condition (Cognitive plus Motivational versus Cognitive-Only, at level 2), after controlling for children's pre-test achievement on the outcome measure (level 2).

An ANCOVA model was deemed appropriated because controlling for pre-test levels of attainment improves the power of analyses even when the covariate is not statistically significant (e.g., Raudenbush et al., 2011). Equations 1 and 2 describe this final model at the student and classroom levels, for student i in classroom j, respectively.

(1) Equation for Student Level 1 Model:

$$Y_{ij} = \pi_{00j} + \pi_{1j}\,(\text{PRETEST}) + e_{ij}$$

(2) Equations for Classroom Level 2 Model:

$$\pi_{00j} = \beta_{00} + \beta_{01j}*(\text{PRETEST ATTAINMENT}) + \beta_{02j}*(\text{INTERVENTION}) + r_{0j}$$

Where Y_{ij} = reading achievement or motivation outcome, π_{00j} = the classroom-level intercept, π_{1j} = the regression coefficient associated with the classroom-level pre-test attainment, e_{ij} = random error associated, β_{00} = overall mean intercept adjusted for Condition, β_{01j} = regression coefficient associated with nested at classroom-level Pre-test attainment relative to individual-level intercept, β_{02j} = regression coefficient associated with nested at classroom-level Condition relative to individual-level intercept, and r_{0j} = random effects of the *j*th classroom-level unit adjusted for Condition on the intercept.

As intervention groups were variable in composition (i.e., students within groups had variability in pre-test levels of achievement and motivation, and variable demographic characteristics), individual scores rather than group means were the unit of analysis used in the analyses, both for predictor and outcome variables. For all primary and secondary outcome measures, parallel 2-level models were run, with pre-test attainment on the outcome measure included as a covariate. Results of the HLM analysis are presented in Table 5, including coefficients representing fixed effects of intercept, condition, and pre-test, and random effects of child- and classroom-level variance on post-test.

Primary outcomes were analyzed at conventional significance ($\alpha = .05$). Secondary outcomes were analyzed in the same manner but with Bonferonni adjustments for multiple contrasts ($\alpha = .05/4 = .0125$). Effect sizes (Cohen's *d*) were calculated for all dependent measures by

comparing gains in pre- to post-test scores across conditions and dividing them by the pooled standard deviation (Busk & Serlin, 1992). Cohen's (1988) standards were used to describe strength of effects, where .2 indicates a small effect, .5 a medium effect, and .8 a large effect. Effect sizes of pre- to post-test gains across conditions are summarized in Table 4.

The results revealed a significant effect of condition on Sentence Comprehension ($p = .024$, $d = 0.55$), Blending ($p < .01$, $d = 0.62$), and Segmenting ($p < .01$, $d = 1.76$) at post-test. In all cases, this favored the Cognitive plus Motivational condition over the Cognitive-Only condition. Other effects did not reach significance. However, analysis of non-significant effect sizes suggested small effects of the Cognitive plus Motivational intervention compared to the Cognitive-Only intervention on value for reading, self-efficacy for reading, and fluency for reading, as well as a medium effect on listening comprehension. As no significant differences in pre- to post-test gains in motivation were observed across conditions, a mediation analysis examining whether gains in reading achievement were mediated by gains in motivation was not possible.

Discussion

The present research sought to assess the impact of a motivational program on the reading achievement and motivation of third grade students at risk for reading difficulties. To limit the impact of extraneous variables, conditions were matched on pre-test performance on main outcome variables, receptive vocabulary, non-verbal IQ, and quality of the classroom literacy environment. It was first hypothesized that, compared to Cognitive-Only reading intervention, supplementing cognitive reading intervention with the motivational program proposed here would lead to greater improvements in reading achievement and motivation. Results partly support this. Comparison of pre- to post-test gains across conditions indicated that the Cognitive plus Motivational intervention had a medium effect on sentence comprehension

and a medium to large effect on phonological awareness for students at risk for reading difficulties. These findings are consistent with some previous findings that motivational instruction contributes to gains in reading comprehension (e.g., Guthrie et al., 2007), and extend upon these by showing gains on a wider range of reading skills, including phonological awareness. No significant differences between groups were observed for gains in reading accuracy, fluency, or listening comprehension. Several factors may have contributed to this. First, given the study's modest sample size, it is possible that it was not sufficiently powered to detect significant effects on secondary outcomes. Analysis of non-significant effect sizes suggested a small effect of the Cognitive plus Motivational intervention compared to the Cognitive-Only intervention on fluency, as well as a medium effect on listening comprehension. Second, the cognitive components of the intervention focused on direct phonics instruction, combined with shared book reading. As the intervention lasted only eight weeks, it is possible that gains in phonological awareness were more readily observable, as this was directly trained. Conversely, gains in reading skills such as accuracy and fluency are thought to cascade from phonological awareness and may also depend upon repeated exposure and practice, (e.g., National Reading Panel, 2000), and thus may not have been observable within the timeframe of this study. Larger and longer-term studies that include a delayed post-test are needed to properly assess this.

Second, it was hypothesized that gains in reading ability would be mediated by gains in motivation. No significant differences in gains across conditions were observed for either value for reading or self-efficacy for reading. Thus, it was not possible to examine whether gains in motivation mediated gains in achievement. However, analysis of non-significant effect sizes for motivation measures indicated a small effect of condition on both subcomponents. Additionally,

it is worth noting that student response ratings indicate that students in the Cognitive plus Motivational condition were significantly more engaged during lessons than those in the Cognitive-Only condition. Engagement was operationalized as time spent on-task, interest, and application of reading strategies during instruction. It is possible that gains in performance were mediated by levels of engagement, which would be in line with findings linking engagement to learning (Reeve, 2013).

These findings have several implications. First, these results support the general view of motivational theorists that when students learn in environments that support motivation, their learning improves (Ford, 1992). It further provides tentative support for a model of motivation advanced by MST theorists, which proposes that targeting goals, emotions, and self-efficacy beliefs within a responsive environment contributes to gains in achievement (Ford, 1992). Second, the finding that the program improved both sentence comprehension and phonological awareness, which are thought to involve different cognitive processes, may provide some insight into the mechanisms through which motivational instruction may impact achievement. Reading comprehension is thought to depend not only on successful word reading, but also upon central processes, such as activating background knowledge, applying reading strategies, and self-regulation (Ahmadi & Pourhosein, 2012). Similarly, phonological awareness may involve not only on successfully linking letters to sounds, but also other cognitive processes such as working memory (i.e., to hold and manipulate sounds) and application of reading strategies (e.g., blending, segmenting). It is possible that the motivational components of the intervention assessed here contributed to greater gains in both reading comprehension and phonological awareness through increasing the activation or efficient use of cognitive processes involved in

both skills, including application of reading strategies and self-regulation. One pathway through which this may have occurred is by higher engagement levels during learning tasks.

Greater engagement during lessons was observed for students in the Cognitive plus Motivational condition compared to the Cognitive-Only condition, tentatively supporting this hypothesis. Higher levels of engagement have been argued to lead to gains in achievement in part by operating directly on learning behaviors, e.g., by increasing goal-directed behaviors and strategy use during reading tasks (Guthrie et al., 2004). Additionally, analysis of non-significant effect sizes indicated that while value for reading underwent a small increase for students in the Cognitive plus Motivational condition, it showed a small decrease for students in the Cognitive-Only condition. This is consistent with previous research showing that intensive reading interventions that focus only on cognitive components of reading may in some cases lead to more negative attitudes towards reading (Wanzek, Vaughn, Kim, & Cavanaugh, 2006). Conversely, self-efficacy for reading showed a slight decrease for students in the Cognitive plus Motivational condition, compared to a slight increase for students in the Cognitive-Only condition. This is in line with previous findings that self-regulatory instruction can lead to more negative self-efficacy beliefs for students with learning difficulties (Nelson & Manset-Williamson, 2006). One explanation proposed for this is that self-regulatory instruction leads students to recalibrate their self-efficacy beliefs, as they gain a better understanding of their actual skill level (Kruger & Dunning, 1999). While slightly elevated self-efficacy beliefs are generally thought to be adaptive, as they may increase persistence (Bandura, 1997), self-efficacy beliefs that are mismatched with actual ability have in some cases been linked to incorrect strategy use (Schraw, Potenza, & Nebelsick-Gullet, 1993) and lower engagement (Linnenbrink & Pintrich, 2003). It is possible that the greater value for reading observed for students in the

Cognitive plus Motivational condition, combined with more accurate self-efficacy beliefs, contributed to greater engagement for students in this condition, which in turn contributed to greater effort and more effective strategy use during reading tasks. However, as differences in subcomponents of motivation did not reach significance, and engagement was only assessed for 20% of the lessons, was assessed on a group level, and was not assessed using a formal measure, extreme caution is needed in interpreting these results.

Implications for practice

The results presented here have several implications for teaching practice. First, as the only difference between both treatment conditions was the presence or absence of motivational instructional components, these results tentatively support the hypothesis that supplementing high-quality reading instruction with supports for motivation can improve reading achievement. Additionally, the intervention proposed and assessed here provides a set of instructional practices with which to target motivation during reading instruction, including goal-directed, progress-oriented, and autonomy-supportive practices. Findings that incorporating these during reading intervention supported greater gains in some reading skills (i.e., phonological awareness and reading comprehension) provides support for the benefits of a motivational program that incorporates these practices for students at risk for reading difficulties. It should be noted that the research design used here examined the impact of supplementing cognitive reading instruction with the proposed motivational program during small-group, intensive reading intervention. Findings may underestimate the effects of the intervention compared to regular classroom instruction. Conversely, findings may not be generalizable to the context of whole-class reading instruction, or to the outcomes of typically developing readers. Nonetheless, the results presented here provide tentative support for the benefits of a reading intervention driven

by MST that addresses both cognitive and motivational components of reading and provide specific practical guidelines to target the motivation of students at risk for reading difficulties.

Limitations

Several limitations should be addressed when interpreting results. First, the small sample size may have limited generalizability. However, conditions were carefully matched prior to beginning the intervention, and the intervention was tightly controlled to increase validity. Second, only 32% of parents responded to the parent survey. While the socio-demographic characteristics of families for whom parents responded were representative of the general population, due to the low response rate it is possible this is not the case for the overall sample. Third, the relatively short duration of intervention, while sufficient to substantially improve reading comprehension and phonological awareness, may have limited the potential for measurable effects on other aspects of students' reading motivation and achievement. Longer-term studies are needed to properly assess this. Nevertheless, the study was sufficient to measurably improve standardized outcome measures including reading comprehension. Fourth, some of the measures (GRADE, CTOPP) used to assess outcomes were standardized some time ago. However, all measures included were standardized, have been widely used in previous reading research, and generic effects of tests would not account for the specific effects of intervention reported here. Additionally, measures of reading comprehension, reading motivation, reading accuracy, and listening comprehension had somewhat lower internal reliability ($r < .80$) as assessed in this sample, which may have compromised reliability of the data. This could in part be due to the modest sample size used here, as the published reliabilities of most tests used is high. Fifth, raters for treatment fidelity and post-test assessment were not blind to condition, which may have introduced bias into the coding and testing procedure. It may

however be hard to disguise the visible differences in these interventions to a treatment integrity team. Additionally, both treatment fidelity for each lesson and pre- and post-test measures were rated by a single coder, which may have compromised reliability. Finally, because the intervention contained multiple components, it was not possible to identify which of these was effective, or whether the efficacy of the intervention would be improved by removing or adding components. Follow-up investigations using other designs such as factorial experimental interventions are needed to assess this.

Conclusions, contributions, and further directions

The results presented here tentatively suggest that remedial reading instruction has a greater impact on various aspects of reading performance and motivation when it is combined with evidence- and theory-driven instruction that aims to improve motivation. A review of the intervention research of motivational reading interventions in students in grades K-12 highlighted a lack of well-designed studies, as well as the need for research that examines the impact of motivational reading instruction on a range of reading outcomes. The present study contributes to the literature on motivational reading instruction by proposing a high-quality quasi-experimental trial of one approach to motivational reading instruction, and examining its impact on an array of reading skills. Further, the effect of the program on reading performance provides support for a theoretical framework of motivation based on MST to address goals, emotions, and self-efficacy beliefs within a single comprehensive program. To draw stronger conclusions about the efficacy of this approach, replication of these findings is needed. A larger sample and the inclusion of a delayed post-test to evaluate the sustained effects of the interventions would extend the present findings. Additionally, to more fully assess the program's impact on affective components of learning, longitudinal studies that assess the potentially

complex and inter-related impact of intervention on attainment, motivation, and engagement are needed, with candidate mediation effects of motivation modeled. If supported by future research, the results observed here have important implications for teaching practice and intervention with students at risk for reading difficulties. Results suggest that designing reading programs that complement skills-based instruction with motivation support by offering goal-directed, progress-oriented, and autonomy supportive teaching can lead to better outcomes than those which focus only on the cognitive aspects of reading acquisition. Additionally, if validated by future research, the results presented here provide tentative support for a model of reading development in which reading motivation operates to improve reading skills through its effects on task-related behaviors, including increased engagement and effective strategy use during reading.

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Table 2

Means for Control Measures Variables Across Conditions at Pre-Test

Control variable	Cognitive-Only	Cognitive plus Motivational
PPVT[a]	91.55 (6.98)	91.36 (11.57)
Ravens non-verbal IQ[a]	101.73 (7.42)	101.71 (11.08)
ELLCO[b]	3.37 (0.39)	3.98 (0.35)

[a]Standard scores

[b]Raw scores

Table 3

Pre- and Post-Test Means for Main Outcomes and Effect Sizes Across Conditions

	Cognitive-Only		Cognitive plus Motivational		*d*
Main outcome variable	Pre-test (SD)	Post-test (SD)	Pre-test (SD)	Post-test (SD)	
Reading accuracy[a]	89.36 (5.87)	94.27 (9.18)	84.92 (7.81)	90.57 (10.50)	.07
Reading fluency[a]	84.91 (5.52)	88.18 (5.79)	74.35 (9.43)	80.92 (9.83)	.40
Phonological awareness: Blending[b]	7.73 (2.10)	8.18 (3.22)	10.43 (2.47)	12.43 (1.79)	.62
Phonological awareness: Segmenting[b]	6.27 (.47)	6.64 (.67)	6.86 (.86)	9.29 (1.44)	1.76
Sentence comprehension[c]	2.55 (.93)	2.36 (1.03)	1.86 (.95)	2.29 (1.20)	.55
Listening comprehension[c]	3.64 (2.50)	3.73 (2.10)	3.14 (2.21)	4.43 (2.14)	.57
Value for reading[d]	26.63 (5.90)	25.36 (4.18)	30.11 (4.76)	30.61 (4.69)	.40
Self-efficacy for reading[d]	27.32 (5.81)	29.27 (3.64)	25.39 (3.64)	26.35 (3.49)	.28

[a]Standard scores

[b]Scaled scores

[c]Stanine scores

[d]Raw scores

Table 4

HLM Results for the Effect of the Intervention Condition on Post-Test Attainment

Parameter	Estimate	*SE*	Sig.
Accuracy			
Fixed effects			
Intercept	-.19	.55	.73
Condition	.11	.34	.75
Accuracy pre-test	.76	.14	.00**
Random effects			
Child-level variance	.42	.15	.006**
Classroom-level variance	.08	.15	.002**
Fluency			
Fixed effects			
Intercept	-.45	.34	.196
Condition	.29	.21	.181
Fluency pre-test	.99	.11	.00**
Random effects			
Child-level variance	.18	.06	.001**
Classroom-level variance	.00	.00	
Value for reading			
Fixed effects			
Intercept	-.91	.63	.20
Condition	.62	.40	.18

Value pre-test	.53	.16	.004**
Random effects			
Child-level variance	.46	.17	.007**
Classroom-level variance	.14	.21	.50
Self-efficacy			
Fixed effects			
Intercept	1.08	.68	.15
Condition	-.69	.43	.15
Self-efficacy pre-test	.42	.18	.034*
Random effects			
Child-level variance	.61	.21	.003**
Classroom-level variance	.16	.19	.418
Reading comprehension			
Fixed effects			
Intercept	-.93	.34	.025*
Condition	.61	.21	.024*
Reading comprehension pre-test	.98	.09	.00**
Random effects			
Child-level variance	.16	.06	.004**
Classroom-level variance	.03	.05	.579
Blending			
Fixed effects			
Intercept	-1.58	.57	.01*

Condition	1.01	.35	.008**
Blending pre-test	.28	.18	.126
Random effects			
Child-level variance	.55	.17	.001**
Classroom-level variance	.00	.00	
Segmenting			
Fixed effects			
Intercept	-2.06	.46	.004**
Condition	1.33	.29	.005**
Segmenting pre-test	.24	.14	.102
Random effects			
Child-level variance	.40	.15	.007**
Classroom-level variance	.01	.11	.098
Listening comprehension			
Fixed effects			
Intercept	-.96	.78	.25
Condition	.66	.49	.22
Listening comprehension pre-test	.53	.15	.003**
Random effects			
Child-level variance	.44	.16	.006**
Classroom-level variance	.35	.30	.237

**Significant at <.05*

***Significant at <.01*

Chapter 6: Final Discussion and Conclusion

The four studies presented in this thesis contribute to the field of reading research by proposing and evaluating a cognitive plus motivational reading intervention. The intervention was created by combining cognitive (skills- and knowledge-based) components, derived from reading theory and evidence-based practices in cognitive reading instruction, and motivational components, derived from motivational theory and evidence-based practices in motivational reading instruction. The resulting intervention targeted both cognitive and motivational components of reading. The intervention's efficacy was then examined by evaluating its impact on the reading achievement and reading motivation of students at risk for reading difficulties. To do so, the Cognitive plus Motivational intervention was compared to a standard, Cognitive-Only reading intervention. The research presented here aimed to address several gaps in the literature on reading instruction, including the need for integration between theoretical and empirical perspectives on reading motivation, the need for well-designed intervention research that assesses the potential of combined cognitive and motivational reading interventions, and the need for research that considers the impact of motivational reading interventions on a broad range of reading outcomes.

Throughout the work presented in this thesis, a theoretical framework consistent with a holistic view of development was adopted. Holistic views of development propose that learning results from interactions between individual, environmental, and transactional factors of a person's life. Within the context of reading instruction, adopting a holistic view of development implies that it is necessary to consider not only the cognitive factors involved in reading development, but also the environmental, transactional, and motivational factors that impact reading. It is argued here that one holistic approach to reading instruction that shows promise is

one that considers both how the learning environment supports the acquisition of key knowledge and skills and how it impacts students' motivation to read.

In Chapter 2, results of a narrative review and thematic analysis that sought to identify the most commonly cited motivational theories in empirical K-12 research on reading motivation were presented. A critical review of the four most frequently cited theories of motivation (i.e., Self-Determination Theory, Expectancy-Value Theory, Achievement Goal Theory, and Attribution Theory) highlighted gaps in individual theories as well as considerable overlap across theories. It was argued that while each theory provides valuable insight into different subcomponents of motivation, when considered alone, they fail to comprehensively describe motivation and its relationship to individual and environmental components of learning. Consequently, it was argued that a unifying theory of motivation is needed to drive the field forward and that such a theory is provided by Ford's (1992) Motivational Systems Theory. MST integrates 32 theories of motivation within a single theory of motivation that comprehensively describes both the various subcomponents of motivation and their relationship to individual (e.g., cognitive, biological) and environmental (e.g., classroom, culture) components of learning. Finally, a preliminary set of practical guidelines for supporting reading motivation derived from MST was outlined. To complement the proposed theoretical guidelines, a review was conducted to identify empirically-supported motivational reading practices. In Chapter 3, results of a systematic review and meta-analysis of intervention research into motivational reading instruction in school-aged (K-12) students were presented. Results indicated a positive effect of motivational reading interventions on both reading achievement and motivation, and identified five main categories of evidence-based motivational practices: self-regulatory instruction, interest-based practices, autonomy-supportive practices, attribution/goal orientation training, and

multi-component interventions. Analysis of candidate moderators, discussed in further detail below, shed further light onto potential mediators of intervention effectiveness. In the bridge following Chapter 3, recommendations from theory and evidence-based practice were merged to create a set of practical guidelines for fostering reading motivation. Cognitive components of the intervention were based on evidence-based practices in cognitive (i.e., skills-based) reading instruction, discussed in Chapter 1, and included direct and systematic phonics instruction, practice with high frequency sight words, and shared oral reading with direct mapping. Motivational components of the intervention were based on the practical guidelines created through the work presented in Chapters 2 and 3, and included helping students set learning goals for themselves, fostering positive learning emotions (e.g., interest, pride), and fostering students' self-efficacy beliefs (e.g., through autonomy-supportive practices). In Chapters 4 and 5, the impact of a reading intervention that addressed cognitive and motivational components of reading, using the set of guidelines outlined in the bridge following Chapter 3, was examined. A pilot evaluation of the intervention's effectiveness was first conducted, through a concurrent multiple-baseline AB design study that examined the intervention's impact on the reading fluency and motivation of four third grade students at risk for reading difficulties. To assess students' performance, probe measures of self-efficacy, interest, and reading fluency were collected during both the baseline condition, during which students received a Cognitive-Only reading intervention, and the experimental condition, during which students received a Cognitive plus Motivational reading intervention. Differences between conditions were analyzed through visual analysis of changes across conditions in value, variability, data trends, immediacy of effect, and consistency (Kratochwill et al., 2013), as well as through the Process Control Chart method of statistical analysis of multiple-baseline data (Juhel, 2008). Results indicated higher

and more stable self-efficacy and interest for two out of four students during the experimental phase, as well as greater growth in reading fluency during the experimental phase for three out of four students. These results tentatively suggest that supplementing cognitive reading instruction with motivational instruction can have beneficial effects on the reading fluency and motivation of students at risk for reading difficulties. Based on these tentative results, a more rigorous assessment of the intervention's efficacy was undertaken, through a quasi-experimental pre-test/post-test efficacy trial study. Specifically, the impact of a Cognitive plus Motivational intervention based on the principles above was compared to the impact of a Cognitive-Only reading intervention, to examine the added benefits of supplementing cognitive reading instruction with instructional practices aiming to foster reading motivation. Data was analyzed using Hierarchical Linear Modeling, with data nested at the classroom level. Findings from HLM analyses suggested that the combined Cognitive plus Motivational intervention led to greater gains in phonological awareness and reading comprehension than a Cognitive-Only approach. If validated by future research, these findings offer several implications for reading and motivation theory. In this chapter, possible implications for theory, future research, and practice are discussed, taking into account the limitations of the current research. Finally, original contributions of this dissertation are presented.

Implications for Theory

First, in a broad sense, the finding that providing supports for reading motivation in combination with cognitive reading instruction led to greater gains in reading achievement than cognitive reading instruction delivered alone is consistent with holistic views of development and of reading. Holistic views of development (e.g., bioecological models, dynamic systems theory) suggest that learning depends on the interplay of various individual (e.g., genes, ability),

environmental (e.g., task characteristics, cultural environment), and transactional (e.g., affect, perceptions) factors. Such views predict that to fully understand development, we must consider the influence of each of these factors, as well as how they interact with one another. Holistic views of reading adopt a similar approach. For example, the Component Model of Reading (CMR; Joshi & Aaron, 2012) proposes that reading depends on distinct cognitive (e.g., ability, knowledge of reading strategies), psychological (e.g., motivation, attitude, perceptions), and environmental (e.g., SES, culture) factors. The findings presented here suggest that targeting both cognitive and motivational components of reading can lead to greater gains in reading achievement than targeting cognitive components alone. This is consistent with holistic views of both development and reading, in that it suggests multiple factors contribute to learning and to reading acquisition. More specifically, these findings provide support for a theoretical view of reading that views motivation as contributing to reading development. This support should however be seen as tentative, as motivation was not formally assessed in the multiple-baseline study, and no significant differences in gains in motivation were observed in the quasi-experimental trial. Because of this, it was not possible to conduct mediation analyses examining whether gains in motivation mediated gains in achievement. Replications of these findings that include a mediation analysis are needed to draw stronger conclusions about the role of reading motivation in reading development.

Nonetheless, findings from the multiple-baseline study indicated that both interest and self-efficacy beliefs tended to be higher and more stable when students received the combined Cognitive plus Motivational intervention than when they received the Cognitive-Only reading intervention. These results tentatively suggest that students were, on average, more interested and more confident in their reading abilities when instruction included supports for motivation

than when it didn't. For some students, this may have contributed to gains in learning, though the study's design did not allow for a formal mediation analysis to be conducted. Additionally, while results from the quasi-experimental trial did not identify any significant differences in either value for reading or reading self-efficacy across experimental conditions, observations of both conditions suggested that students in the combined Cognitive plus Motivational condition were more engaged during instruction than those in the Cognitive-Only condition. Thus, it is possible that the observed gains in phonological awareness and reading comprehension were due in part to increased engagement during instruction. However, as engagement at the individual level was not assessed using a standardized measure, a mediation analysis was not possible. These results should therefore be interpreted cautiously, and further validation through research that includes direct assessment of student engagement is needed to examine whether engagement does in fact mediate gains in achievement. Nonetheless, as the cognitive instructional components were identical in both conditions in both studies, this pattern of results provides support for the potential of an approach that supplements cognitive reading intervention with supports for reading motivation on the reading achievement of students at risk for reading difficulties. It further supports the view, consistent with holistic theories of development and of reading, that reading development results from a complex interplay of factors, including but not necessarily limited to cognitive skills and motivation.

Second, the findings presented here support a theoretical view of reading motivation as multi-faceted, and the need for reading instruction that reflects this view. The design of the intervention assessed in Chapters 4 and 5 was guided by Motivational Systems Theory (MST; Ford, 1992), a comprehensive theory of motivation that integrates key concepts from previous theories of motivation. MST synthesizes the work of 32 theories of motivation to propose a

theory of motivation where motivation is operationalized as being composed of three main, interrelated sub-components: goals, emotions, and personal agency beliefs/self-efficacy beliefs. MST predicts that a teaching model that supports these three factors would lead to improvements in both motivation and achievement. It proposes that motivation is one of several key components that impact learning, and that achievement depends on the interaction between a student's motivation (i.e., willingness to initiate and maintain action towards a goal), skills (e.g., phonological awareness, knowledge of reading strategies), biological background (e.g., genetic predisposition for reading difficulties), and environment (e.g., characteristics of the classroom and of reading tasks). In considering the impact of a range of individual, environmental, and transactional factors on learning, MST is consistent with holistic theories of development. The intervention assessed here was developed based on MST to include three main instructional components, each of which targeted a sub-component of motivation identified by MST: (1) goals, (2) emotions, and (3) self-efficacy beliefs. It further incorporated aspects of MST by providing supports for motivation in tandem with skills-based reading instruction and a responsive reading environment (i.e., one that facilitates students' progress towards their goals and enables them to feel competent).

Compared to a reading intervention in which students received only cognitive reading intervention, students who received the intervention based on MST saw greater gains in some aspects of reading achievement (i.e., phonological awareness and reading comprehension). This provides preliminary support for a theory of reading motivation consistent with MST, in which motivation is understood as being multi-faceted and where achievement is understood as resulting from the interactions between motivation, skill, biological factors, and the environment. It should be noted that the present research aimed to assess the benefits of supplementing

cognitive reading instruction with multi-component motivational instruction (i.e., instruction that comprehensively addressed the different sub-components of motivation within a single program). As such, all students who received motivational instruction received all three components of the motivational intervention. Thus, the design of the intervention did not allow for the efficacy of individual instructional components (e.g., goal setting instruction, progress tracking) to be assessed. It is possible that certain components of the intervention were more effective than others, but further research that compares different components delivered alone or in combination is needed to assess this.

Finally, the findings reported here provide some insight into the mechanisms through which motivational instruction may contribute to growth in reading ability. While the pilot evaluation of the program indicated some benefits of combined cognitive and motivational intervention on reading fluency, these findings were not replicated in the quasi-experimental trial presented in Chapter 5. However, in Chapter 5, students who received the Cognitive plus Motivational intervention were observed to make greater gains in both phonological awareness and reading comprehension than students who received the Cognitive-Only intervention. These results replicate previous findings that motivational reading instruction leads to gains in reading comprehension (e.g., Guthrie et al., 2007), and extend upon these by suggesting they may also have an impact on a broader range of reading skills, including phonological awareness. The finding that the intervention led to gains in multiple reading skills supports the general argument advanced by motivational theories that supporting students' motivation leads to gains in learning (Ford, 1992). While both skills are important to reading, they are likely to involve different processes, e.g., repeated exposure and generalizing learned Grapheme-Phoneme Correspondences (GPCs) to novel words for phonological awareness vs. activation of

background knowledge, reading strategies, and self-regulation for reading comprehension (Guthrie & Cox, 2001). However, both skills are also thought to involve higher order cognitive processes, including self-regulation, working memory, and application of reading strategies (e.g., Ahmadi & Pourhosein, 2012). It is possible that motivational components of the intervention operated to improve both reading comprehension and phonological awareness by increasing the activation of cognitive processes involved in both comprehension and phonological awareness, such as self-regulation and strategy use.

One mechanism through which motivational instruction may potentially impact a diverse range of reading skills is by the effect it has on students' engagement during instruction. Engagement refers to how actively students participate in instruction, including both behavioral (e.g., time-on-task, persistence, enthusiasm) and cognitive (e.g., application of reading strategies and background knowledge, interest) factors (e.g., Guthrie, Wigfield, & You, 2012). Increased engagement during instruction, in turn, has been linked to increased reading achievement (e.g., Wigfield et al., 2008). While no significant differences in gains in motivation across conditions were observed in the quasi-experimental trial, it is possible that the supports for motivation present in the combined condition had an impact on how engaged students were during reading instruction. Probe measures taken during the multiple-baseline study suggested students had higher and more stable interest during the experimental phase, and observations taken in the quasi-experimental study suggested students appeared significantly more engaged in the Cognitive plus Motivational condition. Potentially, increased engagement may improve both phonological awareness and reading comprehension by increasing students' time-on-task during instruction, as well as their application of reading strategies, e.g., applying learned GPCs to decoding novel words in the case of phonological awareness, activating background knowledge

in the case of reading comprehension. Reading accuracy and fluency, on the other hand, may to a larger extend depend on repeated exposure and time spent engaging with text (Guthrie & Cox, 2001). Changes in accuracy or fluency due to the motivational components of the intervention may thus not have been observable during the length the study, which took place over the course of 8 weeks. However, as reading engagement was not formally assessed in either study, this hypothesis needs further validation.

Implications for Research and Teaching Practice

The findings presented in this thesis hold several important implications both for future research and for teaching practice. First, results presented in Chapters 2 and 3 highlight a disconnect between reading motivation theory and practice in the research literature on reading motivation of students in grades K-12. Of the 39 studies included in the narrative review presented in Chapter 2, which included empirical studies of reading that cited a theory of motivation, approximately half of the studies mentioned a motivational theory only briefly (i.e., did not consider implications of findings for theory). Additionally, of the 49 motivational reading intervention studies identified in Chapter 3, only 19, or 39%, made any mention of motivational theory whatsoever. Among studies that mentioned one or more motivational theory, many different theories of motivation were cited, including Self-Determination Theory, Goal Theory, Expectancy-Value Theory, Motivation Theory and Attribution Theory. This echoes findings from Conradi, Jang, & McKenna (2014), who noted that the empirical literature of reading motivation lacks both cohesiveness and definitional clarity in terms of theoretical frameworks adopted. Failure to solidly ground intervention work in a theoretical understanding of motivation, combined with disparity within the field of theoretical frameworks and definitions, may compromise the development of effective practice recommendations to foster reading motivation

(e.g., Snowling & Hulme, 2011). This parallels the concern that cognitive reading research has focused on rapidly designing interventions to the detriment of a theoretical understanding of reading development (Compton, Miller, Elleman, & Steacy, 2014). It is argued here that to drive the field forward, intervention research that is driven by a comprehensive understanding of reading and reading motivation theories is needed. The research presented in this thesis suggests one path towards doing so, by proposing an intervention based on a comprehensive framework of reading motivation, MST.

Second, results from the meta-analysis presented in Chapter 3 suggest that there exists a range of motivational reading practices that can effectively support both reading motivation and achievement, including interest-enhancing practices, self-regulatory instruction, autonomy-support, attribution/goal orientation training, and various combinations of the above. A meta-analysis of the 49 identified intervention studies assessing the impact of motivational instruction on the reading outcomes of students in grades K-12 found an overall significant, small estimated effect size on outcomes of reading achievement ($g = 0.20$, $CI = .11$-$.29$, $SE = .05$, $p < .001$), and an overall significant, small effect size on outcomes of reading motivation ($g = 0.30$, $CI = .20$-$.41$, $SE = .05$, $p < .001$). Significant effects were found for all types of motivational instruction on both types of outcomes, with effect sizes ranging from small to medium. This suggests that there may be multiple motivational reading practices that can support students' reading achievement and motivation in the classroom. No significant differences were found depending on group size (i.e., whole classroom vs. small-group instruction), type of instructor (i.e., teacher vs. researcher), type of students included in the sample (i.e., general student population vs. students at risk for reading difficulties), or students' age (i.e., whether they were in elementary or high school). On one hand, this suggests that motivational interventions may be effective both in

the context of small-group and whole classroom instruction, and provides tentative support for researchers' ability to scale up small-group interventions, such as the one assessed in this thesis, to whole classroom instruction. On the other, it suggests that motivational approaches to reading instruction may have a beneficial effect on the reading outcomes of students who are typically developing as readers as well as those who are at risk for reading difficulties, and that it may be beneficial throughout school years.

While the above results are promising, it should be noted that the overall quality of the studies included in the meta-analysis was medium, and analysis of moderators indicated that effect sizes varied based on study quality. Notably, studies that were rated as being of higher-quality had smaller effects on reading achievement, which highlights the need for caution when interpreting the overall effect size of motivational reading instruction on reading achievement and in interpreting the effect of moderators on outcomes. Moreover, analysis of funnel plots of effect sizes and standard errors provided strong evidence that for reading achievement outcomes, studies with larger standard errors had larger effect sizes, while studies with smaller standard errors had effect sizes closer to $g = 0$, which strongly suggests that publication bias may be present in reporting of reading achievement outcomes in studies of motivational reading interventions. While the same pattern was not found for reading motivation outcomes, the presence of publication bias in reporting of reading achievement outcomes further limits interpretation of results. Publication bias may occur when non-significant or negative effect sizes, or findings that aren't in line with accepted theory, are either not submitted for publication or are rejected by reviewers and editors (e.g., Ferguson & Heene, 2012). Given that meta-analyses estimate effect sizes based on studies that are retrievable, a bias towards publishing

significant and positive effect sizes may result in a sample of studies that overestimate the true effect size of a given effect.

In this analysis, Duval and Tweedie's (2000) trim and fill correction for publication bias was used to estimate the true unbiased effect size of motivational reading interventions on reading achievement outcomes, as it has been deemed appropriate for small meta-analytic samples under the assumption that the missing studies are those with the most negative or with the smallest effect sizes (Vevea & Woods, 2005). However, it should be noted that simulations of various approaches to correcting for publication bias (e.g., trim and fill, *p*-curve, *PET-PEESE*) have failed to yield consistent results regarding the value of one approach over another (Carter, Shönbrodt, Gervais, & Hilgard, 2019). Notably, a study by Carter et al. (2019), which simulated the effect of different approaches on publication bias, found that different approaches did not converge on a "true" value, and that their effectiveness varied depending on characteristics of the studies included in the meta-analytical sample (e.g., sample size, questionable research practices). The impact of publication bias on estimating effect sizes, combined with the lack of consensus in different approaches to correcting for publication bias, limits the interpretation of meta-analyses results (e.g., Fabrigar & Wegener, 2016). Because of this, it has been suggested that meta-analyses should not be interpreted as conclusively representing a true effect size, but rather should be used as a tool with which to draw attention to the specific strengths and weaknesses of a given research literature (Carter et al., 2019). Results of the meta-analysis presented in Chapter 3 strongly suggest that publication bias exists in reporting of the effects of motivational reading interventions on reading achievement outcomes. This highlights the need for additional research and measures to counter the presence of publication bias in reporting of motivational reading interventions, such as larger, more robust intervention studies that provide

better estimates of population variance, as well as more frequent publication of studies with non-significant results (e.g., through trial registration, open access to all funded trial results, and requiring researchers to consider non-significant trial results in their funding proposals).

Additionally, both the narrative review presented in Manuscript 1 and the systematic review presented in Manuscript 2 identified only a small subset of studies that focused specifically on students at risk for reading difficulties (i.e., nine out of 39 studies and 18 out of 49 studies, respectively). Analysis of candidate moderators did not indicate that effect sizes varied significantly depending on the type of students included in the sample (i.e., whether the study's sample included both students at risk for reading difficulties and students typically-developing as readers or included only students at risk for reading difficulties). However, the small amount of studies focusing exclusively on students at risk for reading difficulties limit interpretation and make it difficult to draw strong conclusions about how motivational reading instruction affects different student populations. Evidence suggests that the impact of reading motivation may be strongest for students at risk for reading difficulties (Logan, Medford, & Hughes, 2011). To properly assess the potential of motivational reading instruction to support the needs of these students, additional research that focuses on how it impacts the reading development of students at risk for reading difficulties specifically is needed. Additionally, the majority of studies included a measure of reading comprehension, while relatively fewer included measures of reading fluency, accuracy, and phonological awareness. The overall effect size on reading achievement may thus have disproportionately reflect the impact of motivational reading intervention on reading comprehension compared to other reading skills. The interventions presented in Chapters 4 and 5 extend upon previous findings by examining the impact of combined motivational and cognitive instruction on a wider range of reading

outcomes. Finally, only half of the 49 studies included in the meta-analysis included both an achievement outcome and a motivation outcome, and only four of these conducted a mediation analysis examining whether gains in achievement were mediated by gains in achievement. This makes it difficult to assess whether gains in achievement were in fact due to gains in motivation, and highlights the need for further studies that include both outcomes and conduct mediation analyses.

Third, by using a research design that compared cognitive remedial reading intervention delivered with or without motivational reading instruction, the results presented here provide strong support for the added benefits of reading intervention that targets both motivational and cognitive components of reading, compared to reading intervention that targets only cognitive aspects of reading. This contributes to a growing body of intervention work supporting the benefits of motivational instruction on the reading outcomes of students in grades K-12. No significant differences were found in gains in motivation across conditions in the quasi-experimental trial, precluding the possibility of conducting a mediation analyses. While this limits the ability to draw strong conclusions concerning the ways in which motivation intervention led to gains in reading achievement, the results presented here nonetheless provide support for the idea that motivational reading intervention may have a beneficial impact of a range of reading skills, including phonological awareness and reading comprehension.

Fourth, through the intervention proposed and assessed here, a set of concrete guidelines that can be used to comprehensively target motivation during reading instruction was proposed. A finding reported here that incorporating these practices during cognitive reading instruction led to gains in some aspects of reading achievement (i.e., phonological awareness and reading comprehension) suggests that directly targeting motivational components of reading during

instruction may support the reading development of students at risk for reading difficulties. It should be noted that the research presented here investigated the impact of added motivational supports on the outcomes of students at risk for reading difficulties delivered through remedial, small-group intervention. It is possible that the results found here underestimate the effect of the intervention if it was compared to business-as-usual reading instruction. Additionally, the research presented in this thesis does not speak to whether the intervention proposed here would be effective if delivered within the context of whole-classroom reading instruction, or would have the same effect on the outcomes of students whose reading skills are developing typically. Nonetheless, the findings presented here provide preliminary support for the benefits of a combined cognitive and motivational reading intervention driven by MST on the reading achievement of students, as well as concrete guidelines to support reading motivation during instruction. To further evaluate the potential of this approach, studies that assess the impact of this intervention within regular classroom instruction on the outcomes of students both at risk and not at risk for reading difficulties are also needed. If validated by future research, the findings presented here may provide a concrete path towards incorporating supports for reading motivation during reading instruction.

Original Contributions and Conclusion

The research presented in this thesis offers three important original contributions to the field of human development. First, the work conducted in studies 1 and 2 contributed to providing a comprehensive theoretical framework of reading motivation, synthesizing findings from intervention research on motivational reading instruction, and proposing a path towards bridging the theoretical and empirical literatures of reading motivation in students in grades K-12. Bridging theoretical and empirical perspectives on reading motivation contributes to the

creation of a "virtuous circle" in the field, whereby theory is used to guide the development of practice guidelines, and empirical evaluations of practices derived from theory are used to refine theory (Snowling & Hulme, 2011). Here, a reading intervention developed according to this bridging process, i.e., that is driven by MST and incorporates evidence-based practices in motivational reading instruction, was evaluated. Findings that the intervention had a beneficial effect on the reading achievement of students at risk for reading difficulties provides support for a theoretical framework of reading motivation based on MST, on one hand, as well as for a multi-component approach to supporting motivation during reading instruction, on the other.

Second, the research presented in this dissertation proposes a path forward towards instruction that is situated within a holistic understanding of development. A novel approach towards designing instruction, which was driven by a solid understanding of theory and of evidence-based practice, was presented and evaluated. The finding that combined motivational and cognitive reading instruction led to greater gains in reading achievement than cognitive-only reading instruction suggests that adopting a more holistic approach towards designing instruction may yield greater benefits for students. While the present research focused on how to support motivation during reading instruction, it is likely that there are more factors to consider to comprehensively support reading, some of which are less amenable to instruction (e.g., socio-economic status, genetics, Bronfenbrenner, 2005) and some of which are more amenable to instruction (e.g., designing optimally challenging tasks). Additionally, while the present research focused on reading instruction, it is possible that the guidelines presented here may be applicable to other learning contexts. Future research that examines the effects of instruction that incorporates other components of holistic theories of development and reading (e.g., family systems, attitudes towards reading; Joshi & Aaron, 2012) are needed. Third, the findings

presented here contribute to refining the understanding of reading development. They suggest that it is possible to target reading motivation during instruction, and that doing so may contribute to greater gains in reading achievement. They further suggest that motivation supports multiple aspects of reading, potentially through various pathways (e.g., increasing time-on-task and cognitive engagement during instruction). Finally, they provide support for a theoretical model of reading motivation that merges findings from multiple theories within a multi-faceted, cohesive understanding of motivation.

This dissertation was driven by a desire to further the understanding of how best to support the needs of students who are struggling within the school context. It is my hope that the findings presented here can contribute to creating learning environments that support both the cognitive and emotional needs of all students, and help to foster a generation of interested, engaged, and happy learners.

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Appendix A

Quality Code of Articles

Quality Code of Assessment for the 49 Articles Included in the Meta-Analysis

Study	Reported method of allocation	Sample size justification	Intention to treat analysis	Blinding	Provided evidence of impact on students	Described the process of training or professional development	Evidence made to establish reliability and validity	Evidence of treatment integrity
Aarnoutse & Schellings (2003)	Y	NS	NS	NS	Y	Y (SHORT)	NS	NS
Alhabahba, Pandian, & Mahfoodh (2016)	Y	NS	NS	NS	Y	Y	Y	NS
Andreassen & Bråten (2011)	Y	NS	NS	NS	Y	Y	NS	Y
Antoniou & Souvignier (2009)	Y	NS	NS	NS	Y	NS	Y	NS
Aro et al. (2018)	NS	NS	NS	NS	Y	Y (SHORT)	Y	Y
Belet Boyaci & Güner (2018)	NS	NS	NS	NS	Y	NS	Y	NS
Benito et al. (1993)	Y	NS	NS	NS	Y	NS	NS	NS
Berkeley et al. (2011)	Y	NS	Y	NS	Y	Y (SHORT)	Y	Y
Borkowski et al. (1988)	Y	NS	NS	NS	Y	NS	NS	NS
Bråten et al. (2015)	Y	NS	NS	NS	Y	NS	NS	NS
Cantrell et al. (2014)	Y	Y	Y	NS	Y	Y	NS	Y
Cantrell et al. (2016)	Y	Y	Y	NS	Y	Y	Y	Y
Cirino et al. (2007)	Y	NS	Y	NS	Y	Y (SHORT)	Y	Y
Cosentino (2017)	Y	NS	NS	Y	Y	Y (SHORT)	Y	Y
Denton et al. (2020)	Y	NS	NS	NS	Y	Y (SHORT)	Y	Y
Förster & Souvignier (2014)	Y	NS	NS	NS	Y	NS	NS	NS

Guthrie et al. (1999)	Y	NS	NS	NS	Y	Y	NS	NS
Guthrie et al. (2004)	Y	NS	NS	NS	Y	Y	NS	Y
Guthrie et al. (2009)	Y	NS	NS	NS	Y	Y	NS	Y
Kettman Klingner, Vaughn, & Schumm (1998)	Y	NS	NS	NS	Y	NS	NS	Y
Kolić-Vehovec (2002)	NS	NS	NS	NS	Y	NS	NS	NS
Little et al. (2014)	Y	NS	NS	NS	Y	Y	NS	Y
Loranger (1997)	Y	NS	NS	NS	Y	NS	NS	NS
Lutz, Guthrie, & Davis (2006)	NS	NS	NS	NS	Y	Y	NS	Y
Marinak (2013)	Y	NS	NS	NS	Y	Y (SHORT)	NS	NS
Marshall (2017)	Y	NS	NS	Y	Y	NS	Y	Y
Mason (2004)	Y	NS	NS	Y	Y	NS	Y	Y
Millin & Rinehart (1999)	Y	NS	NS	NS	Y	Y (SHORT)	NS	NS
Nevo & Vaknin-Nussbaum (2020)	Y	NS	NS	NS	Y	Y	Y	NS
Ng et al. (2013)	Y	NS	NS	NS	Y	Y (SHORT)	NS	NS
Orkin (2013)	Y	NS	NS	NS	Y	Y	Y	Y
Orkin et al. (2018)	Y	NS	NS	Y	Y	Y	NS	Y
Reis et al. (2007)	Y	NS	NS	NS	Y	Y (SHORT)	NS	Y
Reis et al. (2008)	Y	NS	NS	Y	Y	Y (SHORT)	Y	Y
Reis et al. (2011)	Y	NS	NS	NS	Y	Y (SHORT)	NS	Y
Rhew et al. (2008)	Y	NS	NS	NS	Y	Y (SHORT)	Y	Y
Schaffner & Schiefele (2007)	NS	NS	NS	NS	Y	NS	Y	NS
Schuneman n et al. (2013)	Y	NS	NS	NS	Y	Y	Y	Y
Schunk &	Y	NS	NS	NS	Y	NS	Y	NS

Rice (1989)								
Shaunessy-Dedrick et al. (2015)	Y	NS	NS	NS	Y	Y	NS	Y
Souvignier & Mokhlesgerami (2006)	NS	NS	NS	NS	Y	Y (SHORT)	NS	Y
Spörer & Schünemann (2014)	Y	NS	NS	NS	Y	Y	NS	Y
Taboada Barber et al. (2015)	NS	NS	NS	NS	Y	Y	Y	Y
Tijms et al.(2018)	Y	NS	NS	NS	Y	Y (SHORT)	NS	Y (SHORT SUMMARY)
Toste et al. (2017)	Y	NS	Y	Y	Y	Y (SHORT)	NS	Y
Toste et al. (2018)	Y	NS	NS	NS	Y	Y (SHORT)	NS	Y
Vauras, Kinnunen, & Rahaunummi (1999)	Y	NS	NS	NS	Y	NS	NS	NS
Wigfield et al. (2008)	Y	NS	NS	NS	Y	Y	NS	Y
Zentall & Lee (2012)	Y	NS	NS	NS	Y	NS	NS	NS

Note. Y = Yes, NS = Not Stated

Appendix B

WOE Analysis

Weight of Evidence (WOE) for the 49 Articles Included in the Meta-Analysis

Author/ Date	WOE A	WOE B	WOE C	WOE D
Aarnoutse & Schellings (2003)	Medium	Medium	Medium	Medium
Alhabahba, Pandian, & Mahfoodh (2016)	Medium	Low	Medium	Medium
Andreassen & Bråten (2011)	Low	Low	Medium	Low
Antoniou & Souvignier (2007)	Medium	Low	Medium	Medium
Aro et al. (2018)	Medium	Medium	Medium	Medium
Belet Boyaci & Güner (2018)	Medium	Low	Medium	Medium
Benito et al. (1993)	Medium	Low	Medium	Medium
Berkeley et al. (2011)	Medium	Medium	High	Medium
Borkowski et al. (1988)	Medium	Low	Medium	Medium
Bråten et al. (2015)	Low	Low	Medium	Low
Cantrell et al. (2014)	High	High	High	High
Cantrell et al. (2016)	Medium	Medium	Medium	Medium
Cirino et al. (2007)	Medium	Low	Medium	Medium
Cosentino (2017)	Medium	Medium	High	Medium
Denton et al. (2020)	Medium	Medium	Medium	Medium
Förster & Souvignier (2014)	Low	Low	Medium	Low
Guthrie et al. (1999)	Low	Low	Medium	Low
Guthrie et al. (2004)	Medium	Medium	Medium	Medium
Guthrie et al. (2009)	High	Medium	Medium	Medium
Kettman Klingner, Vaughn, & Schumm (1998)	Medium	Low	Medium	Low
Kolić-Vehovec (2002)	Low	Low	Medium	Low
Little et al. (2014)	Medium	Low	Medium	Medium
Loranger (1997)	Low	Low	Low	Low
Lutz, Guthrie, & Davis (2006)	Medium	Low	Medium	Medium
Marinak (2013)	Medium	Low	Medium	Medium
Marshall (2017)	Medium	Medium	Medium	Medium
Mason (2004)	Low	Low	Medium	Low
Millin & Rinehart (1999)	Low	Medium	Medium	Low
Nevo & Vaknin-Nussbaum (2020)	Medium	Medium	Medium	Medium
Ng et al. (2013)	Low	Low	Medium	Low
Orkin (2013)	High	High	Medium	High
Orkin et al. (2018)	Medium	Low	Medium	Medium
Reis et al. (2007)	Medium	Medium	Medium	Medium
Reis et al. (2008)	Medium	Medium	Medium	Medium
Reis et al. (2011)	Medium	Medium	Medium	Medium
Rhew et al. (2018)	Medium	Medium	Medium	Medium
Schaffner & Schiefele (2007)	Medium	Low	Medium	Medium

Schunemann et al. (2013)	Medium	Medium	High	Medium
Schunk & Rice (1989)	Medium	Low	High	Medium
Shaunessy-Dedrick et al. (2015)	Low	Low	Medium	Low
Souvignier & Mokhlesgerami (2006)	Low	Low	Medium	Low
Spörer & Schünemann (2014)	High	Medium	Medium	Medium
Taboada Barber et al. (2015)	Medium	Low	Medium	Medium
Tijms et al. (2018)	Medium	Low	Medium	Medium
Toste et al. (2017)	High	Medium	Medium	Medium
Toste et al. (2018)	High	Medium	Medium	Medium
Vauras, Kinnunen, & Rahaunummi (1999)	Medium	Low	Medium	Medium
Wigfield et al. (2008)	Medium	Medium	Medium	Medium
Zentall & Lee (2012)	Low	Low	Medium	Low

Appendix C

Characteristics of Studies

Features of Motivational Intervention in the 49 studies of the Meta-Analysis

Study	Study design	Theoretical framework	Type of motivational instruction	Content	Provider of intervention	Contact hours and duration	Content group	Group size and composition
Aarnoutse & Schellings (2003)	Quasi-experiment	NS	Interest-based, Self-regulation	Problem-based learning (PBL), Strategic Self-Regulation (SRL)	Teacher	1 academic year	Grade 3 155 Treatment (PBL + SRL) 172 Control	Whole classroom, Both typically-developing and at-risk readers
Alhababha, Pandian, & Mahfoodh (2016)	Quasi-experiment	SDT, Goal theory	Interest-based, Self-regulation, Autonomy support	Concept Oriented Reading Instruction (CORI)	Teacher	50 minutes per day, over 16 weeks	Grade 5 32 Treatment 34 Control	Whole classroom, Both typically-developing and at-risk readers, only girls
Andreassen & Bråten (2011)	Quasi-experiment	Engagement model	Interest-based	Relevance-enhancing (activate relevant background knowledge)	Teacher	Five 45 minute lesson, over 18 weeks	Grade 5 103 Treatment 113 Control	Whole classroom, Both typically-developing and at risk readers
Antoniou & Souvignier (2007)	Quasi-experiment	NS	Self-regulation	Cognitive and metacognitive strategy instruction, planning, monitoring	Teacher	29 hours, 1 academic year	Grade 5-8 45 Treatment 28 Control	Whole classroom, Students at risk for reading difficulties
Aro et al. (2018)	Quasi-experiment	NS	Self-regulation, Attribution training	Mastery experiences, progress tracking, emotions checklist	Special education teachers	1 weekly group session, 3 individual computer sessions, 12 weeks	Grades 3-5 40 Treatment 42 Control	Small groups, Students at risk for reading difficulties
Belet Boyaci & Güner (2018)	Quasi-experiment	NS	Interest-based	Authentic materials	Teacher	60 class periods, over 10 weeks	Grade 4 22 Treatment 24 Control	Whole classroom, Both typically-developing and at-risk readers
Benito et al. (1993)	Quasi-experi	NS	Self-regulation	Strategy instruction,	Teacher	4 weeks	Grades 3-5	Whole classroom, Both typically-

	ment			Metacognitive awareness			15 Treatment 14 Control	developing and at-risk readers
Berkeley et al. (2011)	Quasi-experiment	NS	Attribution training	Strategy instruction (SI), Attribution retraining (AR)	Special education reading teacher, reading specialist, trained researcher	360 minutes, 4 weeks	Grades 7-9 20 SI with AR 19 SI without AR 20 Control	Small group, Students at risk for reading difficulties
Borkowski et al. (1988)	Quasi-experiment	Attribution theory	Attribution training	Strategy instruction (SI), Attribution training (AT)	NS	NS	Grades 5-8 35 Treatment 40 Control	Small group, Students at risk for reading difficulties
Bråten et al. (2015)	RCT	Engagement model	Interest-based	Relevance-enhancing hands-on activities (RE), Prior knowledge activation (PKA)	Researcher, Research assistants	2 sessions over 2 weeks	Grade 6 42 Control 44 RE 44 PKA	Whole classroom, Both typically-developing and at-risk readers
Cantrell et al. (2014)	RCT	SDT	Self-regulation	Learning strategies	Teachers	>250 minutes per week, for 1 year	Grade 6 462 treatment 389 controls	Small group, At-risk readers
Cantrell et al. (2016)	Quasi-experiment	SDT	Self-regulation	Metacognitive strategies to monitor progress towards goals	Learning strategies curriculum teacher	250-400 minutes per week, 1 year	Grades 6-9 1198 Treatment 1065 Control	Small group, Students at risk for reading difficulties
Cirino et al. (2007)	Quasi-experiment	NS	Self-regulation	Goal setting, planning, monitoring, evaluating, discussions around motivation	Outside trainers	175 minutes per week, 2 weeks	Grade 4 24 Text based reading (TB) 24 TB + Self-regulation 27 Control	Small group, Students at risk for reading difficulties
Cosentino (2017)	Quasi-experiment	AGT	Self-regulation	Goal setting, progress monitoring,	Teachers	40 minutes per week,	Grade 6 16 Treatmen	Small group, Students at risk for reading

				self-evaluation		8 weeks	t 10 Control	difficulties
Denton et al. (2020)	Quasi-experiment	NS	Self-regulation, Achievement goals	Growth mindset, goal setting, emotional responses, self-regulated use of reading strategies	Special educators, dyslexia specialist, reading interventionists	26 weeks	Grades 2-4 23 Treatment 20 Control	Small group, Students at risk for reading difficulties
Förster & Souvignier (2014)	Quasi-experiment	EVT, SDT	Self-regulation	Learning progress assessments (LPA), Goal setting (GS)	Teachers	8 sessions over 6 months	Grade 4 335 LPA 280 LPA + GS 285 Control	Whole classroom, Both typically-developing and at-risk readers
Guthrie et al. (1999)	Quasi-experiment	NS	Interest-based, Self-regulation, Autonomy support	Concept Oriented Reading Instruction (CORI)	Teachers	1 academic year	Grade 5-6 120 Treatment 119 Control	Whole classroom, Both typically-developing and at-risk readers
Guthrie et al. (2004)	Quasi-experiment	Motivation theory	Interest-based, Self-regulation, Autonomy support	Concept Oriented Reading Instruction (CORI)	Teachers	12 weeks	Grade 3 Study 1 148 Treatment 213 Control Study 2 184 CORI 248 SI 59 TI	Whole classroom, Both typically-developing and at-risk readers
Guthrie et al. (2009)	Quasi-experiment	NS	Interest-based, Self-regulation, Autonomy support	Concept Oriented Reading Instruction (CORI)	Teachers	90 minutes per day, over 12 weeks	Grade 5 94 Treatment 62 Control	Whole classroom, Both typically-developing and at-risk readers
Kettman Klingner, Vaughn, & Schumm (1998)	RCT	NS	Self-regulation	Learning strategies	Researchers	11 45-minute sessions	Grade 4 85 Treatment 56 Control	Whole classroom, Both typically-developing and at-risk readers
Kolić-Vehovec (2002)	Quasi-experiment	NS	Self-regulation, Attribution training	Self-monitoring (SM) & token economy rewards,	Graduate students	15 minutes per day, over 8 weeks	Grade 2 60 students 15 SM 15 AT 15 SM +	Small group, Students at risk for reading difficulties

				Attribution training (AT)			AT 15 Control	
Little et al. (2014)	RCT	NS	Interest-based, Self-regulation, Autonomy-support	Schoolwide Enrichment Model (SEM): interest, strategy instruction, autonomy	Teachers	3 hours per week, 6 months	Grades 6-8 1179 Treatment 832 Control	Whole classroom, Both typically-developing and at-risk readers
Loranger (1997)	Quasi-experiment	NS	Self-regulation	Learning strategies	Researchers	180 minutes per week, for 8 weeks	Grade 4 16 Treatment 16 Control	Small group, Both typically-developing and at-risk readers
Lutz, Guthrie, & Davis (2006)	Quasi-experiment	NS	Interest-based, Self-regulation, Autonomy support	Concept Oriented Reading Instruction (CORI)	Teachers	90-120 minutes per day, for 12 weeks	Grade 4 42 Treatment 15 Control	Whole classroom, Both typically-developing and at-risk readers
Marinak (2013)	Quasi-experiment	EVT	Autonomy-support, Interest-based	Choice, control over intervention, collaborative learning	Teacher	1 academic year	Grade 5 32 Treatment 44 Control	Whole classroom, Both typically-developing and at-risk readers
Marshall (2017)	Pre-test post-test control group	NS	Interest-based	Reader's theater	Researcher	3 hours/day, for 2 weeks	Grade 2 13 treatment 13 controls	Whole classroom, Both typically-developing and at-risk readers
Mason (2004)	RCT	NS	Self-regulation	Multi-component self-regulatory instruction (strategic, goal setting, self-monitoring, self-reinforcement)	Researcher, University assistants	5 lessons, NS	Grade 5 16 Treatment 16 Control	Small group, Students at risk for reading difficulties
Millin & Rinehart (1999)	Quasi-experiment	NS	Interest-based	Readers' theater	Teachers, Reading specialists	40 minutes per day, for 7 weeks	Grade 2 14 Treatment 14 Control	Small group, Students at risk for reading difficulties
Nevo & Vaknin-Nusbaum	Quasi-experiment	NS	CORI	Some components of CORI:	Teacher	90 minues per day, 6 months	Grade 1 29 Treament	Whole classroom, Both typically-developing and

(2020)				relevance, choice, collaboration			29 Control	at-risk readers
Ng et al. (2013)	RCT	NS	Self-regulation, Mastery goal orientation	Learning strategies, Motivational dialogue emphasizing mastery and effort	Teachers, researchers	60 minutes per day, for 6 weeks	Grade 5 76 students Strategy instruction Strategy instruction + motivational support Control	Whole classroom, Both typically-developing and at-risk readers
Orkin (2013)	Quasi-experiment	SDT, Goal orientation	Autonomy-support, Mastery goals	Strategic instruction, supports for autonomy and mastery	Teachers	1 hour per day, over 5 weeks	Grade 1-4 24 students	Whole classroom, Students at risk for reading difficulties
Orkin et al. (2018)	Quasi-experiment	SDT	Autonomy-support, Mastery goals	Strategic instruction, supports for autonomy and mastery	Teachers	2 hours per day, over 5 weeks	Grade 1-4 24 Treatment 23 Control	Whole classroom, Students at risk for reading difficulties
Reis et al. (2007)	RCT	NS	Interest-based, Self-regulation, Autonomy support	Schoolwide Enrichment Model (SEM): interest, strategy instruction, autonomy	Teachers	12 weeks	Grade 3-5 220 Treatment 232 Control	Whole classroom, Both typically-developing and at-risk readers
Reis et al. (2008)	RCT	NS	Interest-based, Self-regulation, Autonomy support	Schoolwide Enrichment Model (SEM): interest, strategy instruction, autonomy	Teachers	14 weeks	Grade 3-5 313 Treatment 245 Control	Whole classroom, Both typically-developing and at-risk readers
Reis et al. (2011)	RCT	NS	Interest-based, Self-regulation, Autonomy support	Schoolwide Enrichment Model (SEM): interest, strategy instruction, autonomy	Teachers	1 hour per day, 5 months	Grade 3-5 649 Treatment 543 Control	Whole classroom, Both typically-developing and at-risk readers

Rhew et al. (2018)	Quasi-experiment	Theory of mindsets	Attribution training	Training to promote mastery goals and a growth mindset	Teachers	15 minutes per day, 8 weeks	Grades 6-8 40 Treatment 28 Control	Whole classroom, Students at risk for reading difficulties
Schaffner & Schiefele (2007)	Quasi-experiment	Goal congruence model	Interest-based	Emphasize intrinsic incentives (IM), extrinsic incentives (EM)	Researcher	45 minutes, one time	Grade 9 125 IM 125 EM 125 Control	Whole classroom, Both typically-developing and at-risk readers
Schunemann et al. (2013)	Quasi-experiment	NS	Self-regulation	Goal setting, monitoring, self-evaluation	Outside trainer	90 minutes per week, 7 weeks	Grade 5 127 Reciprocal teaching (RT) 117 RT + Self-regulation 62 Control	Small group, Both typically-developing and at-risk readers
Schunk & Rice (1989)	Quasi-experiment	NS	Goal orientation	Goal setting for process/product	Outside trainer	35 minutes per day, 15 days	Grades 4-5 11 Prcoess goal 11Product goal 11 Control	Small group, Students at risk for reading difficulties
Shaunessy-Dedrick et al. (2015)	RCT	NS	Interest-based, Self-regulation, Autonomy support	Schoolwide Enrichment Model (SEM): interest, strategy instruction, autonomy	Teachers	1 academic year	Grade 3-4 786 participants	Whole classroom, Both typically-developing and at-risk readers
Souvignier & Mokhlesgerami (2006)	Quasi-experiment	NS	Self-regulation	Learning strategies (LS), Cognitive self-regulation (CSR), Motivational self-regulation (MSR)	Teachers	NS, 1 academic year	Grade 5 64 LS + CSR 115 LS + CSR + MSR 84 Control	Whole classroom, Both typically-developing and at-risk readers

Spörer & Schünemann (2014)	Pre-test post-test maintenance with 4 conditions	NS	Self-regulation	Reciprocal teaching (RT) with Strategy implementation (SIP), outcome regulation (ORP)	Trained assistants	>75 minutes per week, for 14 weeks	Grade 5 129 RT + SIP 126 RT + ORP 146 RT + SIP + ORP 133 Controls	Whole classroom, Both typically-developing and at-risk readers
Taboada Barber et al. (2015)	Quasi-experiment	Reading engagement model	Interest-based, Autonomy-support	Supports for reading self-efficacy, engagement/ relevance, use of authentic texts	Teachers	7 weeks	Grades 6-7 59 USHER 50 Control	Whole classroom, Both typically-developing and at-risk readers
Tijms et al. (2018)	RCT	NS	Interest-based, Autonomy-support	Choice of books, relevance to personal lives	Outside trainer	45 minutes per week, 12 weeks	Grades 7-9 40 Treatment 50 Control	Small group, Both typically-developing and at-risk readers
Toste et al. (2017)	RCT	Attribution theory	Attribution training, Self-regulation	Multi-syllabic word reading (MWR), Motivational beliefs training (MB; self-reflection, positive self-talk), Attribution training	Tutors	2 hours per week, over 8 weeks	Grade 3-4 18 MWR 19 MWR + MB 22 Control	Small group, Students at risk for reading difficulties
Toste et al. (2018)	RCT	Motivation theory (broadly)	Attribution training, Self-regulation	Multi-syllabic word reading (MWR), Motivational beliefs training (MB; self-reflection, positive self-talk), Attribution training	Tutors	40 minutes, over 40 lessons	Grade 4-5 34 MWR 38 MWR + MB 37 Control	Small group, Students at risk for reading difficulties

Vauras, Kinnunen, & Rahaunummi (1999)	Quasi-experiment	NS	Self-regulation	Learning strategies, Metacognitive training	NS	2 hours per week, 17 weeks (34 hours)	Grade 3 22 Treatment 22 Controls	Small group, Students at risk for reading difficulties
Wigfield et al. (2008)	Quasi-experiment	NS (engagement theory)	Interest-based, Self-regulation, Autonomy support	Concept Oriented Reading Instruction (CORI)	Teachers	90 minutes per day, 12 weeks	Grade 4 315 Participants	Whole classroom, Both typically-developing and at-risk readers
Zentall & Lee (2012)	RCT	SDT, Goal theory	Mastery & performance goals	Positive feedback related to mastery standards, positive labeling, external standards related to performance goals	Researcher	1, 10-15 minute session	Grade 2-5 40 Treatment 40 Control	Not stated, Both typically-developing and at-risk readers

Appendix D

Intervention Overview: Multiple-Baseline Study

Summary of the two conditions

Baseline	Experimental
Aspects that differ across conditions	
Non-verbal math fluency exercises	Motivation-fostering practices
Instructor-selected books and reading games	Student-selected books and reading games
General, positive feedback	Specific, goal-directed feedback
Aspects that are matched across conditions	

Student Characteristics: As all students received both the baseline and the experimental condition, conditions are matched on all student characteristics.

Methodology: Participant sampling, length, frequency, and duration of intervention lessons

Pedagogy: One-on-one instruction, PI delivery, differentiation by student level, game-based learning, best-practice reading instruction elements

Shared pedagogy: Evidence-based reading instruction

All lessons included a review and introduction to the day's lesson (2-5 minutes), direct instruction using evidence-based reading instruction (5-10 minutes), an application game using the concepts learnt during the day's lesson (10-15 minutes), and shared book reading (10-15 minutes). The evidence-based cognitive components used included synthetic phonics, analogic phonics, shared book reading, and shared book reading with direct mapping. The learning goals targeted during lessons were to teach students grapheme-phoneme correspondences, digraphs, blending sounds into words, using blending to write words, learning common sight words, and building fluency. These practices have been shown to have positive effects on the reading

achievement of students at risk for reading difficulties in previous intervention studies (e.g., Savage et al., 2018). Teaching of grapheme-phoneme correspondences and digraphs followed the simplicity principle, in which letter-sound correspondences are taught in order of most common occurrence in children's books (Chen & Savage, 2014). Each lesson built upon previous lessons, with a review of previously seen concepts. Time dedicated to each sound or sight word was adjusted based on students' ability. Lessons were designed to allow for differentiation, i.e., students with the most severe reading difficulties were given easier versions of the same task, and those who were more advanced were given more difficult versions. Games were used to create an active-learning atmosphere. For example, one board game asked students to give an example of a word containing the sound of the day when they landed on a yellow square, read a word when they landed on a green square, write a word when they landed on a red square, and write a sentence when they landed on a blue square. In every lesson, students read books taken from their school library, and the instructor scaffolded reading as needed. In this and all activities, children were encouraged to read words at their level, and instructors helped when necessary.

Differing pedagogy

Baseline lessons: Non-verbal math exercises

In all baseline lessons, students completed non-verbal math fluency exercises for 25% of instructional time. Students were provided with worksheets drawn from the Grade 3 *Everyday mathematics* guide of the University of Chicago (UChicago STEM education, 2017), and were given short instructions on how to complete the tasks. Topics covered included ordering numbers, double-digit addition, fact extensions, partial sums, subtraction, estimation, multiplication, division, comparing numbers, fractions, and decimals. Tasks were differentiated

so that students with weaker mathematics skill completed easier worksheets such as addition and subtraction, and stronger students completed more difficult worksheets such as multiplication and division. All math worksheets involved minimal reading, and instructions were delivered orally by the instructor.

Experimental lessons: Motivational components

In all experimental lessons, students received motivational instruction for approximately 25% of instructional time. Below is an outline of the different motivational components taught.

Two lessons: Goal setting. The instructor introduced learning goals for the length of the intervention, and invited students to provide their input. The instructor asked students to set personal learning goals. Guidance was provided to help students set goals that were realistic, clear, challenging, and focused on attainable targets. Students were asked to write down their goals in their personal notebook and encouraged to add/amend goals in subsequent lessons.

Eight lessons: Socio-emotional coaching. Exercises drawn from Solution-Focused Brief Therapy for use in children (National Society for the Prevention of Cruelty to Children, 2015) were used. These included asking students to say what they would like to change about their school life, to imagine their ideal future at school, to write/draw their strengths and interests, to identify things they are already doing to reach their goals, and identify their solution team. Props such as blocks, steps, and drawing were used to visualize progress.

All lessons: Positive attribution beliefs. Students were given progress charts and taught how to self-track their progress towards their goals. In all subsequent lessons, students were asked to track their progress, and to identify ways in which to continue. Students and instructors discussed the progress students made, the setbacks students had, and how to move forward by focusing on effort and growth. To support students' autonomy and develop feelings of competence, students

were given choice over the books, games, and other activities, as well as provided with books leveled so they could read them independently.

Lesson plan outline

Baseline condition lesson plan template

All lessons.

10-15 minutes: Non-verbal math fluency exercises.

2-3 minutes: The instructor introduced the book and the day's lesson.

5-10 minutes: Direct instruction in areas of student weakness using best practices.

10-15 minutes: Teacher-chosen application reading game of concepts learnt.

10-15 minutes: Shared book reading of instructor-selected book. Probes for reading interest.

0-5 minutes: Probes for reading fluency and reading self-efficacy.

Experimental condition lesson plan template

Lessons 1 & 2: Goal setting.

2-3 minutes: The instructor introduced the plan for the day's lesson and subsequent lessons, and invited students to provide their input on what they like/don't like, want to do/don't want to do.

5-6 minutes: The instructor asked students to set personal learning goals. Guidance was provided to help students set goals that were realistic, clear, challenging, and focused on attainable targets.

- Potential script: *Now we're going to set out together what your goals are for our lessons, and you and I will write down what we decide. First, what would you like to be able to do by the end of our time together? Be specific: for example, "I want to be able to read more words"; "I'm going to try reading a whole page on my own, and use strategies I learn to read words I don't know"; "I'm going to participate in all the learning activities". Second, how are you going to decide whether you've achieved your goals?*

2-3 minutes: Students were asked to write down their goals in their personal class notebook.

- Potential script: *Now, write down your goals and how you will evaluate them. If you don't know how to spell any words, let me know and I will help.*

5-10 minutes: Direct instruction in areas of student weakness using best practices.

10-15 minutes: Student-chosen application reading game of concepts learnt.

10-15 minutes: Shared book reading of student-selected book. Probes for reading interest.

0-5 minutes: Probes for reading fluency and reading self-efficacy.

Lessons 3, 4, 5, 6, 8, 9, 10, 11: Socio-emotional coaching.

2-3 minutes: Review and introduction of the day's lesson.

8-10 minutes: Solution-Focused Brief Therapy for use in children exercises (National Society for the Prevention of Cruelty to Children, 2015).

2-3 minutes: Students were encouraged to look over their goals and amend / add goals.

5-10 minutes: Direct instruction in areas of student weakness using best practices.

10-15 minutes: Student-chosen application reading game of concepts learnt.

10-15 minutes: Shared book reading of student-selected book. Probes for reading interest.

0-5 minutes: Probes for reading fluency and reading self-efficacy.

Lessons 6, 10, 12: Positive attribution beliefs.

2-3 minutes: Review and introduction of the day's lesson.

5-10 minutes: Direct instruction in areas of student weakness using best practices.

10-15 minutes: Student-chosen application reading game of concepts learnt.

10-15 minutes: Shared book reading of student-selected book. Probes for reading interest.

5 minutes: Students were given progress graphs and taught how to self-track their progress towards their goals. In all subsequent lessons (i.e., lessons 7-12), students were asked to self-track their progress.

- Potential script: *Now I'd like you to write down, make a graph, or draw, the progress you've made towards your goals. We're going to be writing down how much progress you've made after each lesson we have together.*

8-10 minutes: The instructor and student discussed the graphs: where progress was made, where setbacks occurred, and why in both cases. Students were guided to observe that progress is made due to effort, and that learning is a gradual process.

- Potential script: *Let's take a look together on all the progress you've made this week. At the beginning of the week, you said you wanted to do X, Y, and Z. How do you feel you've progressed towards those goals? Why do you think you improved? / Didn't improve?, What do you think you could do better next week? You've made good progress this week on X, Y, Z. Next week we're going to take a look at W, which will help you understand the texts better. Good job this week, I appreciate your hard work!*

0-5 minutes: Probes for reading fluency and reading self-efficacy.

Appendix E

Intervention Overview: Quasi-Experimental Trial

Summary of the two conditions

Cognitive-Only	Cognitive plus Motivational
Aspects that differ across conditions	
Non-verbal math fluency exercises	Motivation-fostering practices
Instructor-selected books and reading games	Student-selected books and reading games
General, positive feedback	Specific, goal-directed feedback
Aspects that are matched across conditions	

Student Characteristics: Pre-test sentence comprehension, value for reading, self-efficacy for reading, receptive vocabulary, non-verbal IQ, quality of the regular classroom and literacy environment, parent characteristics

Methodology: Participant sampling, training and support of RAs, length, frequency, and duration of intervention lessons, implementation fidelity, group-level randomization

Pedagogy: Small-group instruction, RA or PI delivery, differentiation by student level, game-based learning, best-practice reading instruction elements

Shared pedagogy: Evidence-based reading instruction

All lessons included a review and introduction to the day's lesson (2-5 minutes), direct instruction using evidence-based reading instruction (5-10 minutes), an application game using the concepts learnt during the day's lesson (10-15 minutes), and shared book reading (10-15 minutes). The evidence-based cognitive components used included synthetic phonics, analogic phonics, shared book reading, and shared book reading with direct mapping. The learning goals targeted during lessons were to teach students grapheme-phoneme correspondences, digraphs,

blending sounds into words, using blending to write words, learning common sight words, and building fluency. These practices have been shown to have positive effects on the reading achievement of students at risk for reading difficulties in previous intervention studies (e.g., Savage et al., 2018). Teaching of grapheme-phoneme correspondences and digraphs followed the simplicity principle, in which letter-sound correspondences are taught in order of most common occurrence in children's books (Chen & Savage, 2014). Each lesson built upon previous lessons, with a review of previously seen concepts. Time dedicated to each sound or sight word was adjusted based on students' ability. Lessons were designed to allow for differentiation, i.e., students with the most severe reading difficulties were given easier versions of the same task, and those who were more advanced were given more difficult versions. Games were used to create an active-learning atmosphere. For example, one board game asked students to give an example of a word containing the sound of the day when they landed on a yellow square, read a word when they landed on a green square, write a word when they landed on a red square, and write a sentence when they landed on a blue square. In every lesson, students read books taken from their school library, and the instructor scaffolded reading as needed. In this and all activities, children were encouraged to read words at their level, and instructors helped when necessary.

Differing Pedagogy

Cognitive-Only lessons: Non-verbal math exercises

In all Cognitive-Only lessons, students completed non-verbal math fluency exercises for 25% of instructional time. Students were provided with worksheets drawn from the Grade 3 *Everyday mathematics* guide of the University of Chicago (UChicago STEM education, 2017), and were given short instructions on how to complete the tasks. Topics covered included

ordering numbers, double-digit addition, fact extensions, partial sums, subtraction, estimation, multiplication, division, comparing numbers, fractions, and decimals. Tasks were differentiated so that students with weaker mathematics skill completed easier worksheets such as addition and subtraction, and stronger students completed more difficult worksheets such as multiplication and division. All math worksheets involved minimal reading, and instructions were delivered orally by the instructor.

Cognitive plus Motivational lessons: Motivational components

In all Cognitive plus Motivational lessons, students received motivational instruction for approximately 25% of instructional time. Below is an outline of the different motivational components taught.

Two lessons: Goal setting. The instructor introduced learning goals for the length of the intervention, and invited students to provide their input. The instructor asked students to set personal learning goals. Guidance was provided to help students set goals that were realistic, clear, challenging, and focused on attainable targets. Students were asked to write down their goals in their personal notebook and encouraged to add/amend goals in subsequent lessons.

Eight lessons: Socio-emotional coaching. Exercises drawn from Solution-Focused Brief Therapy for use in children (National Society for the Prevention of Cruelty to Children, 2015) were used. These included asking students to say what they would like to change about their school life, to imagine their ideal future at school, to write/draw their strengths and interests, to identify things they are already doing to reach their goals, and identify their solution team. Props such as blocks, steps, and drawing were used to visualize progress.

All lessons: Positive attribution beliefs. Students were given progress charts and taught how to self-track their progress towards their goals. In all subsequent lessons, students were asked to

track their progress, and to identify ways in which to continue. Students and instructors discussed the progress students made, the setbacks students had, and how to move forward by focusing on effort and growth. To support students' autonomy and develop feelings of competence, students were given choice over the books, games, and other activities, as well as provided with books leveled so they could read them independently.

Lesson plan outline

Cognitive-Only lesson plan template

All lessons

10-15 minutes: Non-verbal math fluency exercises.

2-3 minutes: The instructor introduced the book and the day's lesson.

5-10 minutes: Direct instruction in areas of student weakness using best practices.

10-15 minutes: Teacher-chosen application reading game of concepts learnt.

10-15 minutes: Shared book reading of instructor-selected book. Probes for reading interest.

Cognitive plus Motivational lesson plan template

Lessons 1 & 2: Goal setting

2-3 minutes: The instructor introduced the plan for the day's lesson and subsequent lessons, and invited students to provide their input on what they like/don't like, want to do/don't want to do.

5-6 minutes: The instructor asked students to set personal learning goals. Guidance was provided to help students set goals that were realistic, clear, challenging, and focused on attainable targets.

- Potential script: *Now we're going to set out together what your goals are for our lessons, and you and I will write down what we decide. First, what would you like to be able to do by the end of our time together? Be specific: for example, "I want to be able to read more words"; "I'm going to try reading a whole page on my own, and use strategies I learn to*

read words I don't know"; "I'm going to participate in all the learning activities". Second, how are you going to decide whether you've achieved your goals?

2-3 minutes: Students were asked to write down their goals in their personal class notebook.

- Potential script: *Now, write down your goals and how you will evaluate them. If you don't know how to spell any words, let me know and I will help.*

5-10 minutes: Direct instruction in areas of student weakness using best practices.

10-15 minutes: Student-chosen application reading game of concepts learnt.

10-15 minutes: Shared book reading of student-selected book. Probes for reading interest.

Lessons 3, 4, 5, 6, 8, 9, 10, 11: Socio-emotional coaching

2-3 minutes: Review and introduction of the day's lesson.

8-10 minutes: Solution-Focused Brief Therapy for use in children exercises (National Society for the Prevention of Cruelty to Children, 2015).

2-3 minutes: Students were encouraged to look over their goals and amend / add goals.

5-10 minutes: Direct instruction in areas of student weakness using best practices.

10-15 minutes: Student-chosen application reading game of concepts learnt.

10-15 minutes: Shared book reading of student-selected book. Probes for reading interest.

Lessons 6, 10, 12: Positive attribution beliefs

2-3 minutes: Review and introduction of the day's lesson.

5-10 minutes: Direct instruction in areas of student weakness using best practices.

10-15 minutes: Student-chosen application reading game of concepts learnt.

10-15 minutes: Shared book reading of student-selected book. Probes for reading interest.

5 minutes: Students were given progress graphs and taught how to self-track their progress towards their goals. In all subsequent lessons (i.e., lessons 7-12), students were asked to self-track their progress.

- Potential script: *Now I'd like you to write down, make a graph, or draw, the progress you've made towards your goals. We're going to be writing down how much progress you've made after each lesson we have together.*

8-10 minutes: The instructor and student discussed the graphs: where progress was made, where setbacks occurred, and why in both cases. Students were guided to observe that progress is made due to effort, and that learning is a gradual process.

- Potential script: *Let's take a look together on all the progress you've made this week. At the beginning of the week, you said you wanted to do X, Y, and Z. How do you feel you've progressed towards those goals? Why do you think you improved? / Didn't improve?, What do you think you could do better next week? You've made good progress this week on X, Y, Z. Next week we're going to take a look at W, which will help you understand the texts better. Good job this week, I appreciate your hard work!*

Appendix F

Treatment Integrity and Student Response Checklists

Reading motivation project

Observation for treatment integrity – Cognitive plus Motivational condition

GENERAL INFORMATION

School: _____ Observer: _____

RA/Teacher: _____

CONTENT

	NOT DONE	PARTIALLY DONE	FULLY DONE
Review and introduction (2-3 min)	___	___	___
Students are instructed to set goals (5-10 min)	___	___	___
Students are given SFBT (5-10 min)	___	___	___
Introduce new phonics sound (1-2 min)	___	___	___
Students read target words with sound (3-5 min)	___	___	___
Students write target words with sound (3-5 min)	___	___	___
Students practice sight words	___	___	___
Application game (10-20 min)	___	___	___
Shared book reading (10-30 min)	___	___	___
Students track their progress (2-3 min)	___	___	___

TEACHING QUALITY

	POOR	GENERALLY GOOD	EXCELLENT
Clarity	___	___	___
Tone (warmth, enthusiasm, etc.)	___	___	___
Ability to highlight/work with the sound	___	___	___
Students are primarily responsible for reading words/text	___	___	___
Ability to engage students	___	___	___
Group management	___	___	___
Attention to individual needs	___	___	___
Students' response (enthusiasm, etc.)	___	___	___
Reviewed difficult concepts if necessary	___	___	___
Provided specific, goal-directed feedback	___	___	___
Students are given opportunities for choice	___	___	___

ENVIRONMENT

	LESS THAN ADEQUATE	ADEQUATE	EXCELLENT
Noise levels	____	____	___
Interruptions	____	____	___

Notes:

_____

_____

_____

_____

_____

Reading motivation project

Observation for treatment integrity – Cognitive-Only condition

GENERAL INFORMATION

School: _____ Observer: _____

RA/Teacher: _____

CONTENT

	NOT DONE	PARTIALLY DONE	FULLY DONE
Review and introduction (2-3 min)	___	___	___
Math worksheets (5-10 min)	___	___	___
Introduce new phonics sound (1-2 min)	___	___	___
Students read target words with sound (3-5 min)	___	___	___
Students write target words with sound (3-5 min)	___	___	___
Students practice sight words	___	___	___
Application game (10-20 min)	___	___	___
Shared book reading (10-30 min)	___	___	___

TEACHING QUALITY

	POOR	GENERALLY GOOD	EXCELLENT
Clarity	___	___	___
Tone (warmth, enthusiasm, etc.)	___	___	___
Ability to highlight/work with the sound	___	___	___
Students are primarily responsible for reading words/text	___	___	___
Ability to engage students	___	___	___
Group management	___	___	___
Attention to individual needs	___	___	___
Students' response (enthusiasm, etc.)	___	___	___
Reviewed difficult concepts if necessary	___	___	___
Provided general, positive feedback	___	___	___

ENVIRONMENT

	LESS THAN ADEQUATE	ADEQUATE	EXCELLENT
Noise levels	____	____	___
Interruptions	____	____	___

Notes:

_____

_____

_____

_____

_____

Appendix G

Information Letter for School Board Directors/Principals

Dear Sir or Madam,

I am contacting you concerning a research study I, Miriam McBreen, will be carrying out during the 2017-2018 school year as part of my PhD in Educational and Counselling Psychology at McGill University, under the supervision of Prof. Robert Savage. I am currently recruiting 3rd grade students as participants.

This is a 1 year project that seeks to examine the impact of a reading program on the reading performance and reading motivation of 3rd grade students who struggle with reading. We are seeking to develop a sustained collaborative relationship with you for this time. We strongly appreciate the involvement of school boards and principals in our studies as our research can potentially benefit their students, provide professional development for staff, and, with a strong university-school collaboration, impact future generations of readers/learners.

The broad aim of this project is to improve the reading development and reading motivation of 3rd grade students who experience difficulties in reading. Specifically, I wish to evaluate the potential of a reading program that has been developed based on best practices in reading instruction and pedagogical methods that have been shown to foster motivation. This follows the recommendations of many researchers that best practices in reading instruction may be enhanced by combining them with practices that foster motivation to read. Indeed, many struggling readers are also unmotivated, which may limit their ability to fully benefit from instruction.

To test whether such a program can be helpful for students who struggle with reading, I plan to intervene with students using this program and to examine its impact on reading motivation and reading performance (i.e., on tests of accuracy, fluency, and comprehension). In the intervention program, students will be taught using best practices in teaching of reading, and will receive additional tools to promote their motivation. Specifically, they will be encouraged to set learning goals for themselves, to discuss situations that make them feel unmotivated and brainstorm solutions, and given tools to build their confidence in their reading abilities.

The study will be carried out in two parts. In Fall 2017, the program will be tested using a multiple-baseline design. This means that all students who participate in the Fall will receive the intervention program but that the start of the intervention will vary for each student. In this portion of the study, students will receive the intervention one-on-one. In Winter 2018, the program will be tested using a randomized control trial where children are randomly allocated to one of two interventions, so that stronger conclusions about its efficacy can be made. Thus, students who participate in the Winter will be randomly assigned to either an intervention or a control group. Students in the intervention group will receive the intervention program. Students in the control group will receive reading instruction using best practices in teaching of reading and math instruction using best practices in teaching of math, both of which have been shown to be effective with struggling students. In this portion of the study, students will be seen in groups

of 3 to 4. In all conditions, students will be seen in 45-1 hour sessions, 2-3 times a week, during approximately 8-11 weeks per student. Students will be seen during times that have been agreed-upon with their teacher as being appropriate, and can also be seen outside of class time (e.g., evenings and weekends, under parent or school staff supervision) if preferable. In all sessions, students will be taught using best practices in reading, to compensate for any negative effects of missing class time. Both interventions should help students progress as learners albeit in different areas.

Additionally, we would like to observe classrooms to get a sense of how reading strategies are taught in classes. This will involve myself or a research assistant attending one reading lesson of the teachers of participating students for approximately one hour, at a time of their choosing during the school year. During this time, I will be observing the quality of the literacy environment (e.g., types of books, types of activities), and the quality of the classroom climate (e.g., types of discussions, disciplinary methods). Consent will be obtained from teachers before the observations. This data like all data is confidential and will not be shared within schools or anywhere else except in an anonymous group-data form.

The study has received McGill University Research Ethics approval.

Confidentiality: All information collected for this study will be kept completely confidential and anonymous. Data will be used for publication purposes in academic journals and will be presented in an anonymous form at all times. Your school board's name, school names, teacher and student names will not be mentioned in publications. Data will not be circulated within school boards.

Voluntary Participation: Participation in this study is voluntary and no risks are involved in participating in the study.

Withdrawal from the Study: Students at your school can withdraw from the study at any time, or decline to participate for any reason. The decision to terminate participation on any grounds will not affect any relationships with the researcher or McGill University. You may also decide to withdraw your school board from all or parts of the study.

Questions about the Research: Should you have any questions or desire further information, please email me: Miriam McBreen, Miriam.mcbreen@mail.mcgill.ca, (514) 553-2493

Should you have any ethical concerns regarding this research project, you may contact Lynda McNeil, the Research Ethics Officer of REB- III studies for McGill University, by email at lynda.mcneil@mcgill.ca or by phone at 514-398-6831.

We hope that this research can contribute towards developing reading programs that help students become better and more motivated readers. If your school board is interested in participating in this research, please let us know what next steps should be taken.

Thank you for your time and consideration,

We look forward to hearing from you soon.

Sincerely,

Miriam McBreen & Dr. Robert Savage

McGill University

Appendix H

Consent Form for Parents/Legal Guardians

Dear parent or legal tutor,

I would like to invite you to participate in a research study that I, Miriam McBreen, will be conducting during the 2017-2018 school year as part of my PhD in Educational and Counselling Psychology at McGill University, under the supervision of Prof. Robert Savage. We are writing to ask for your consent that your child can take part in this study.

This project will take place over the course of the 2017-2018 school year, and will help us understand the potential of a reading program that helps students develop reading skills and improve their motivation to read. Specifically, I wish to evaluate the potential of a reading program that has been developed based on best practices in reading instruction and pedagogical methods that have been shown to foster motivation. All children who participate in the study will receive reading instruction that follows best practice recommendations (e.g., teaching phonics, reading strategies, choral reading). Additionally, some students will receive tools to improve their reading motivation, including setting learning goals for themselves, discussing tasks that make them feel motivated or unmotivated and brainstorming solutions, and tools to build their confidence in their reading abilities. All the pedagogical methods used in the study have been shown in previous research to promote reading performance.

At school, with your consent, your child will complete short tests of reading ability and reading motivation. These tests will be done during school time, and will take approximately 30 minutes per student. These tests will be carried out three times during the year: in the Fall to identify participants for phase 1, in December/January to identify participants for phase 2, and in the Spring to assess the impact of the intervention. This will allow us to assess your child's abilities at the beginning and end of the project. If the tests indicate your child may benefit from this intervention, he or she will be selected to participate. If more students than are needed for the study qualify, participants will be randomly selected. If your child is not selected, his or her tests will be destroyed and will not be used in any analyses.

If your child is selected to participate, he or she will take part in either phase 1 of the study, in the Fall, or phase 2 of the study, in the Winter. In phase 1, students will be seen one-on-one. In this phase, all students will receive the intervention program, which includes best practice reading instruction and instruction to foster reading motivation. In phase 2, students will be seen in groups of 3 or 4. In this phase, some students will receive the intervention program, and others will receive a control program. If your child is in the control program, he or she will receive best practice reading instruction, as well as short math fluency exercises that follow best practice recommendations. Based on previous research, we expect that all conditions will benefit your child's reading abilities and development as a learner.

In both phases, we will work with students during 45-1 hour sessions, 2-3 times a week, for approximately 8-11 weeks. We will collaborate with teachers to find times that are least likely to

disrupt your child's learning. It may also be possible to work with your child outside of regular class time, e.g., during evenings or weekends, in his or her school or at a location of your choosing (under your supervision). This additional consent is entirely optional, even if you consent for your child to take part in the study.

Additionally, if you agree to participate in this study, you will be asked to complete a short demographic survey. Like all information collected in this study, data from this survey will be coded and encrypted to ensure it remains confidential. Results from this survey will not be shared in analyses or at publication.

During this project, we would like to occasionally audio-record sessions, to ensure the quality of the intervention is maintained. This additional consent is entirely optional, even if you consent for your child to take part in the study.

If you consent for your child to participate in this study, be assured that only myself, my supervisor, the research assistants who will teach the program, and members of the McGill research ethics board may have access to information about you and your child. Research assistants will be given a sign to form stating that they will keep all information confidential. All the data collected during this project is confidential, which means neither your name or your child's name will be linked to any data. At the end of the study, the results will be shared in academic journals and presentations as anonymous group results. Additionally, your child's results on different tests will not be shared with his or her teacher, unless you consent for us to do so. This additional consent is entirely optional, even if you consent for your child to take part in the study.

Participation in this study is voluntary and we foresee no potential risks. You may choose to withdraw your consent or that of your child at any moment. Additionally, your decision not to participate will carry no consequences on the relationship you have with your child's teacher, his or her school, the researchers involved in this study, or McGill University.

The study has received McGill University Research Ethics approval. Agreeing to participate in this study does not waive any of your rights or release the researchers from their responsibilities. A copy of this consent form will be given to you and the researcher will keep a copy. To ensure the study is being conducted properly, authorized individuals such as a member of the Research Ethics Board, may have access to your study information. By signing this consent form, you are allowing such access.

If you would like more information or have any questions or concerns about the research, please email me: Miriam McBreen, Miriam.mcbreen@mail.mcgill.ca, (514) 553-2493.

Should you have any ethical concerns regarding this research project, you may contact Lynda McNeil, the Research Ethics Officer of REB- III studies for McGill University, by email at lynda.mcneil@mcgill.ca or by phone at 514-398-6831.

We hope that this research can help develop programs that improve students' reading performance and reading motivation. If your child is selected to participate, we hope that he or

she will benefit from participating in this research project by improving their reading ability and their motivation to read.

We look forward to hearing from you soon.

Sincerely,

Miriam McBreen & Dr. Robert Savage

McGill University

Please indicate whether you wish to allow your child to participate in this project by checking the statements below, and signing your name.

Keep a copy of this form for your records, and return this second page with signatures to me by email.

I agree for my child's results to be shared with the teacher: Yes____ No___

I agree for my child to be audiotaped: Yes___ No___

I agree for my child to be seen outside school hours, on school grounds or a location of my choosing (under my supervision): Yes___ No___

Name of student: _____

Name of parent/tutor: _____

Signature: _____ Date: _____

Appendix I

Consent Form for Teachers

Dear Sir or Madam,

I am contacting you to invite you to participate in a research study I, Miriam McBreen, will be carrying out during the 2017-2018 school year as part of my PhD in Educational and Counselling Psychology at McGill University, under the supervision of Prof. Robert Savage. I am currently recruiting 3rd grade students as participants.

This is a 1 year project that seeks to examine the impact of a reading program on the reading performance and reading motivation of 3rd grade students who struggle with reading. We are seeking to develop a sustained collaborative relationship with you for this time. We strongly appreciate the involvement of teachers in our studies as our research can potentially benefit their students, provide professional development for staff, and, with a strong university-school collaboration, impact future generations of readers/learners.

The broad aim of this project is to improve the reading development and reading motivation of 3rd grade students who experience difficulties in reading. Specifically, I wish to evaluate the potential of a reading program that has been developed based on best practices in reading instruction and pedagogical methods that have been shown to foster motivation. This follows the recommendations of many researchers that best practices in reading instruction may be enhanced by combining them with practices that foster motivation to read. Indeed, many struggling readers are also unmotivated, which may limit their ability to fully benefit from instruction.

To test whether such a program can be helpful for students who struggle with reading, I plan to intervene with students using this program and to examine its impact on reading motivation and reading performance (i.e., on tests of accuracy, fluency, and comprehension). In the intervention program, students will be taught using best practices in teaching of reading, and will receive additional tools to promote their motivation. Specifically, they will be encouraged to set learning goals for themselves, to discuss situations that make them feel unmotivated and brainstorm solutions, and given tools to build their confidence in their reading abilities.

To identify participants, students will be screened using 3 short tests of reading ability and 1 short test of reading motivation. These tests will be done during school time, and will take approximately 30 minutes per student. Tests will be carried out three times during the year: in the Fall to identify participants for phase 1, in December/January to identify participants for phase 2, and in the Spring to assess the impact of the intervention. This will allow us to assess students' abilities at the beginning and end of the project. If the tests indicate a student may benefit from this intervention, he or she will be selected to participate in the project. A total of 40-42 students will be participating in this study throughout the school year. If more than this amount qualify, participants will be randomly selected. If a student is not selected, his or her tests will be destroyed and will not be used in any analyses.

The study will be carried out in two parts. In Fall 2017, the program will be tested using a multiple-baseline design. This means that all students who participate in the Fall will receive the intervention program but that the start of the intervention will vary for each student. In this portion of the study, students will receive the intervention one-on-one. In Winter 2018, the program will be tested using a randomized control trial where children are randomly allocated to one of two interventions, so that stronger conclusions about its efficacy can be made. Thus, students who participate in the Winter will be randomly assigned to either an intervention or a control group. Students in the intervention group will receive the intervention program. Students in the control group will receive reading instruction using best practices in teaching of reading and math instruction using best practices in teaching of math, both of which have been shown to be effective with struggling students. In this portion of the study, students will be seen in groups of 3 to 4.

Students will be seen in 45-1 hour sessions, 2-3 times a week, during approximately 8-11 weeks per student. Students will be seen during times that have been agreed-upon with you as being appropriate, and can also be seen outside of class time (e.g., evenings and weekends, under parent or school staff supervision) if preferable. In all sessions, students will be taught using best practices in reading, to compensate for any negative effects of missing class time. Both interventions should help students progress as learners albeit in different areas.

Your willing participation as a teacher is central to the success of this project. We ask you to work with myself or a graduate assistant from the university to find times that are most appropriate for working with students. We will work with students during 45-1 hour sessions, 2-3 times a week, during approximately 8-11 weeks.

Additionally, we would like to observe classrooms to get a sense of how reading strategies are taught in classes. This will involve myself or a research assistant attending one of your reading lessons for approximately one hour, at a time of your choosing during the school year. During this time, I will be observing the quality of the literacy environment (e.g., types of books, types of activities), and the quality of the classroom climate (e.g., types of discussions, disciplinary methods). This data like all data is confidential and will not be shared within schools or anywhere else except in an anonymous group-data form.

The study has received McGill University Research Ethics approval. Agreeing to participate in this study does not waive any of your rights or release the researchers from their responsibilities. A copy of this consent form will be given to you and the researcher will keep a copy. To ensure the study is being conducted properly, authorized individuals such as a member of the Research Ethics Board, may have access to your study information. By signing this consent form, you are allowing such access.

Confidentiality: All information collected for this study will be kept completely confidential and anonymous. Data will be used for publication purposes in academic journals and will be presented in an anonymous form at all times. Your school's name will not be mentioned in publications. Data will not be circulated within school boards.

Voluntary Participation: Participation in this study is voluntary and no risks are involved in participating in the study.

Withdrawal from the Study: Students at your school can withdraw from the study at any time, or decline to participate for any reason. The decision to terminate participation on any grounds will not affect any relationships with the researcher or McGill University. You may also decide to withdraw your school or class from all or parts of the study.

Please indicate whether you wish to participate in this project by checking the statements below, and signing your name.

Keep a copy of this form for your records, and return this second page with signatures to me by email.

Name of school: _____

Name of teacher: _____

Signature: _____ Date: _____

Appendix J

Confidentiality Agreement

Project title - **The effects of a "motivationally-enhanced" reading program on struggling readers' reading performance and reading motivation**

In my capacity as research assistant on this project, I, _____ agree to -

1. keep all the research information shared with me confidential by not discussing or sharing the research information in any form or format (e.g., recordings, tests, student names & behaviors, notes) with anyone other than the *Researcher(s)*.

2. keep all research information in any form or format (e.g., recordings, tests, student names & behaviors, notes) secure while it is in my possession.

3. return all research information in any form or format (e.g., recordings, tests, student names & behaviors, notes) to the *Researcher(s)* when I have completed the research tasks.

4. after consulting with the *Researcher(s),* erase or destroy all research information in any form or format regarding this research project that is not returnable to the *Researcher(s)* (e.g., information stored on computer hard drive).

Research assistant

_____	_____	_____
(Print Name)	(Signature)	(Date)

Researcher

_____	_____	_____
(Print Name)	(Signature)	(Date)

The plan for this study has been reviewed for its adherence to ethical guidelines and approved by Research Ethics Board of *McGill University*. For questions regarding participant rights and ethical conduct of research, contact the Research Ethics Office at 514-398-6831

Appendix K

Parent Demographic Survey

Dear parent/guardian,

Thank you very much for your participation in my research project on reading motivation this winter.

I have now completed the intervention in all the schools involved in the project, and will be proceeding to analyze results in the coming weeks. If you have any questions or would like more details about the study, please don't hesitate to contact me at the e-mail address provided at the end of this letter.

To make sure my results are generalizable, I wish to include some basic demographic information as control variables. To this effect, I've created a short (5-10 minute) online survey for parents. As with all the data collected in this project, the results of the survey are completely anonymous. If you have time to complete this, it would be greatly appreciated.

The link to the survey is available at: https://www.surveymonkey.com/r/2V83MXZ. I've also included a paper copy of the survey with this letter. If you prefer, you may also fill out the paper copy and send me a scanned or photographed copy of the survey to the following e-mail address: mririam.mcbreen@mail.mcgill.ca.

Thank you once again,

Best regards,

Miriam

--
Miriam McBreen, B.A.Sc., M.A.
PhD Candidate, Human Development
Department of Educational and Counselling Psychology
McGill University

Contact: miriam.mcbreen@mail.mcgill.ca

1. What school does your child attend? _____
2. What is your relationship to your child?

   Mother ____ Grandfather ____ Father ____

   Grandmother ____ Step-mother ___ Aunt ___

   Step-father ____ Uncle ___ Guardian ____

   Other ____
3. What year were you born? _____
4. Which race/ethnicity best describes you? (Please choose only one.)

   Native American ___ Black or African American ___

   Asian / Pacific Islander ____ Hispanic ___ White / Caucasian ____

   Multiple ethnicity / Other (please specify) _____
5. Which race/ethnicity best describes your child? (Please choose only one.)

   Native American ___ Black or African American ___

   Asian / Pacific Islander ____ Hispanic ___ White / Caucasian ____

   Multiple ethnicity / Other (please specify) _____
6. What is the primary language spoken in your home? _____
7. What other languages are spoken in your home? _____
8. What is the highest level of education you have completed?

   Some elementary school ___ Graduated elementary school ___

   Some high school ___ Graduated high school ___

   Some postsecondary/CEGEP ___ Graduated postsecondary/CEGEP ____

   Postsecondary certificate or diploma ___ Some university ____

   Undergraduate degree ___ Postgraduate degree ___
9. What is your approximate average household income?

   0$ – 24,999$ ____ 25,000$ - 49,999$ ____

   50,000$ - 74,999$ ____ 75,000$ - 99,000$ ____

   100,000$ - 124,999$ ____ 125,000$ - 149,999$ ____

   150,000$ - 174,999$ ____ 175,000$ - 199,999$ ____

   200,000$ and up ____
10. Has your child ever been in a special education placement? If so, please specify.

    _____