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THE POWER OF READING: A MULTILEVEL STUDY OF THE LONGITUDINAL EFFECT OF A PAIRED INTERGENERATIONAL READING ALOUD PROGRAM ON ACADEMICALLY AT-RISK ELEMENTARY STUDENTS' READING ATTITUDES, READING MOTIVATION AND ACADEMIC ACHIEVEMENT

A DISSERTATION SUBMITTED TO
THE FACULTY OF THE GRADUATE SCHOOL
IN CANDIDACY FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

PROGRAM IN APPLIED SOCIAL PSYCHOLOGY

BY

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To Ignacio Martín-Baró and Francisco Armando Torres

The role model I never met, the mentor who nurtured me

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ABSTRACT

The effectiveness of early reading interventions and tutoring programs for academically at-risk students is still open to debate among practitioners and researchers despite their popularity. Many of the studies and evaluations that show mixed results or no positive outcomes at all suffer from one or more serious methodological shortcomings that contribute to misrepresent the impact of such interventions. Some of their most widespread shortcomings include extremely small samples, uninterpretable designs, ad hoc outcome measures, short term assessments, single implementations, and unsuitable data analysis approaches. This study focused on the longitudinal effects of a paired intergenerational reading aloud program on academically at-risk elementary students across three main reading-related outcomes (i.e., attitudes toward reading, reading motivation, and reading achievement) and addressed all the previously mentioned limitations. It specifically included a larger combined sample size across four minority student cohorts (N = 866) attending 12 Chicago public schools, an interpretable quasi-experimental design, a set of sound and widely used measures, a larger span of time to test the sustainability of results up to four years after the intervention, a number of consecutive implementations across multiple years, and a more complex statistical approach that addresses multilevel longitudinal data. In addition, it is based on multiple sources of outcome-related data (i.e., student, teacher, and school data). Results from the present study showed that the intervention had a positive effect on academically at-risk

elementary students' reading attitudes, reading motivation, and reading achievement. Some of the effects found were moderated by students' gender and grade level. The small-to-medium treatment effect sizes observed are in line with what has been reported in meta-analytic reviews of various types of youth interventions. Overall, the study suggest that community members involved in read-aloud programs run by small organizations can make a long lasting, if modest, impact on the literacy of children and, potentially, their lives.

CHAPTER ONE

INTRODUCTION

In today's society, every aspect of life involves some degree of reading. From learning current events' news to enjoying literary masterpieces, reading allows us to function in the world and figure out its meaning. Yet millions around the globe, particularly in poor regions, remain illiterate; while many others, in industrialized countries above all, choose not to read despite having the ability, becoming then progressively illiterate (UNESCO, 2005). In the U.S., millions are considered functionally illiterate individuals due to their limited reading skills and their inability to perform even basic tasks such as completing a deposit slip or following written instructions (Kirsch, Jungeblut, Jenkins, & Kolstad, 2002).

The negative consequences of not knowing how to read well or not at all are pervasive and extensively documented. Kutner et al. (2007) found that individuals with lower literacy levels are more likely to be unemployed, receive lower wages, and work mostly in service occupations. In addition, they are less likely to vote, stay informed about current events, participate in civic organizations, use email, access the Internet and read regularly to their children. The lack of adequate reading skills is also related to potential problems with the law. Greenberg, Dunleavy, and Kutner (2007) found that inmates have lower literacy proficiency levels than adults living in households with comparable academic attainment and whenever they are serving longer sentences.

Although reading deficiencies can be addressed even later in life, it is more sensible and effective to prevent them, beginning in the early years of schooling (Torgesen, 2004). This is especially true for minority and economically disadvantaged children who typically perform below expected learning and academic benchmarks (Arnold & Doctoroff, 2003; Vernon-Feagans, Scheffner Hammer, Miccio, & Manlove, 2001). In Illinois, for instance, African-American students living in poverty obtain much lower scores than most minority students at the national level. An analysis of the 2006 National Assessment of Educational Progress conducted by the Thomas B. Fordham Foundation (2006) indicated that only 9% of fourth grade low-income black students were able to read proficiently, ranking Illinois 38th out of 41 states assessed. These numbers should not be completely surprising; according to additional data from the same report, low-income and minority students in Illinois have made no significant progress over the last decade.

The academic situation of many Illinois students is clearly less than desirable, particularly during the formative years that will determine a great deal of their future educational and personal success. Research shows that children do not outgrow their learning difficulties and are less likely to benefit from instruction at school once they start falling behind their peers (Durlak, 1995). As a result, more intensive, costly and prolonged interventions are needed, but such a demand cannot be supplied and sustained by the same ill equipped and poorly funded schools that many minority students attend.

One strategy used to help economically disadvantaged children improve their literacy skills is implementing site-based reading programs in collaboration with tutors and mentors from the community (Fashola, 2002; Mandell Morrow & Gee Woo, 2001).

Early literacy programs intend to promote the development of reading skills among children, which can occur directly (e.g., reading aloud to children, classroom instruction) or indirectly (e.g., visiting the local library or bookstore) through instructional and motivational activities (Moss, Hiller, Moore, & Gamse, 1999). Reading aloud programs stand out as an engaging and dynamic way of promoting literature while demonstrating at the same time that reading can be pleasurable. A typical read-aloud session in many reading programs brings to mind a picture of one adult and one child sitting side by side, huddled over a book, completely immersed in the story. When adults and children share read-aloud sessions, students learn the correct way to hold, read, and discuss the content of a book. This same process can also enhance children's listening comprehension, vocabulary and decoding skills, while introducing content beyond their reading levels that can further stimulate their interest in reading and foster healthy reading attitudes and motivation to read (Butler, 1980; Dwyer & Isabel, 1990; Elkind, 1989; Kimmel & Segel, 1988).

Although the effectiveness of reading and mentoring/tutoring programs is still open to debate among practitioners and researchers, a growing body of evidence indicates that they are very valuable for children's academic and literacy development (DuBois, Holloway, Valentine, & Cooper, 2002; Gordon, Morgan, O'Malley, & Ponticell, 2007; Ritter, Denny, Albin, Barnett, & Blankenship, 2006; Zief, Lauver, & Maynard, 2006). In numerous cases, mixed results and inconclusive positive findings have nothing to do with the programs themselves, but rather with a series of methodological and statistical issues. One of the problems identified in the current literature about supplemental reading programs is the large body of studies with exceptionally small samples, ranging from 10

cases to fewer than 75 (e.g., Brungardt, 1994; Chandler & Aldridge, 1992; Dale & Radell, 1995; Porter, 1995; Robertson, 1993; Rimm-Kaufman, Kagan, & Byers, 1999; Thames & Reeves-Kazelskis, 1993), which consequently increases the likelihood of making Type II errors due to low statistical power. Researchers then can mistakenly conclude that no positive associations exist between program participation and reading outcomes when in fact this could emerge if a larger sample size was available.

In other cases, even when sample size is not an issue, studies do not offer the methodological conditions under which one can make a reasonable causal inference. In particular, some of these studies employ a one-group pretest/posttest design (e.g., Blaisdell, De Young, Hutchinson, & Pedersen, 1999; Fitzgibbons, 1997). As Cook and Campbell (1979) assert, this design is generally uninterpretable and vulnerable to a number of threats to validity, making it difficult to rule out multiple alternative interpretations other than those associated with the treatment itself.

Another pervasive problem is the lack of basic psychometric information about the instruments used to measure reading-related outcomes. In the area of reading attitudes, for instance, a number of *ad hoc* instruments with unknown psychometric properties are used in studies linking attitudes toward reading to other reading outcome variables (e.g., Herrold, Stanchfield, & Serabian, 1989; Quinn & Jadav, 1987; Schulte Johnson & Gaskin, 1992). Without such crucial information, it is difficult to assess the instrument's validity, reliability, and factorial structure as well as the merits of the conclusions drawn upon the results. With a multiplicity of instruments measuring the same construct, it is not surprising to obtain a large collection of incongruent findings across different studies.

When studies are better planned and executed and all previously described issues are arguably not present or lessened, results are more likely to be reliable, valid and causally interpretable. However, the question of whether positive effects endure the test of time or get diluted as time goes by is seldom explored in most interventions, including those in the area of reading. A large portion of these studies show relatively short term effects associated with interventions within periods that range between six months to a year. What happens once the intervention is over is frequently ignored and researchers rarely investigate for longer time frames.

Data collected in reading interventions in educational settings are regularly hierarchical due to the structure of the contexts in which they take place (e.g., students nested in classrooms) and the arrangement of observations taken over time (e.g., repeated measures nested within students) (Clements, Bolt, Hoyt, & Kratochwill, 2007). Unfortunately, a review of the literature on reading aloud interventions show that researchers often fail to incorporate such hierarchical structure when assessing the effects of interventions and tend to either disaggregate units of analyses to the individual level (i.e., student by student analysis) or aggregate them to reflect higher-order variables (i.e., classroom by classroom analysis or school by school analysis). Alternatively, Raudenbush and Bryk (2002) as well as others (Bickel, 2007; Gelman & Hill, 2007; Hox, 2002; Luke, 2004) recommend using multilevel modeling, a more complex and appropriate approach that combines information of both individual and higher levels simultaneously. Hierarchical linear and non-linear modeling (HLM) is one of the approaches available to analyze hierarchically structured data (Raudenbush, Bryk, Cheong, & Congdon, 2004).

Lastly, effective programs must also yield comparable results across multiple implementations before they can be widely adopted and disseminated, but this is a condition that very few studies and researchers accomplish as well. When small community-based organizations are those delivering the programs, it is not rare to find single evaluations in the span of several implementations or no evaluations at all (see Carman, 2007). The problem with single evaluations is that it is difficult to establish if the samples used in the assessment were partially responsible for the results obtained due to idiosyncrasies not shared by other groups. Unfortunately, the elements that allow organizations to conduct programmatic evaluation, a healthy culture of assessment as well as sufficient financial and staff resources, are the same elements that most small organizations lack (see Ellis, Small-McGinley, & de Fabrizio, 2001; Michael, 1990). As a result, numerous social and community programs are implemented and sustained without being thoroughly evaluated.

Given the numerous and significant weaknesses identified in the research and evaluation of early reading interventions, the present study seeks to investigate the short and long term effects of one particular program on a series of reading outcomes among young, academically at-risk minority students. In order to do so, it includes a larger sample size, an interpretable quasi-experimental design, a set of sound measures, a longer interval of time, a better suited statistical approach that addresses multilevel longitudinal data, and a number of implementations across multiple years. From a theoretical perspective, it also seeks to further the understanding of the interplay of the three main outcomes assessed (i.e., attitudes toward reading, reading motivation, and reading achievement) and, therefore, expand the research on those same areas among children.

The study is based on evaluation data accrued over a period of five years from the paired intergenerational reading aloud program Power Lunch, implemented by Working In The Schools (WITS), a Chicago non-for-profit community organization. The data include close to 900 students attending 12 public schools, distributed across four different cohorts with each cohort representing an independent one-year implementation (i.e., each participant received the treatment only once and no student is present in more than one cohort), starting in the Fall of 2002 and ending in the Spring of 2006. The study includes matched treatment and comparison groups of students from the schools where the intervention was offered as well as pretest and posttest measures of reading attitudes and reading motivation for each cohort. In addition, it incorporates multi-year follow ups on the students' reading achievement between the Spring of 2002 and the Spring of 2007, depending on their respective cohort, and employs well established high-stake reading achievement outcome measures.

The evaluations of Power Lunch included also a series of innovations that other assessments lack. The most important of them is the multi-informant approach in which data are collected from various sources about reading outcome variables and then combined to assess their convergence. By doing this, it is possible to acquire a better understanding of change as informed by all participating members and to balance out any particular report biases. In the case of Power Lunch, measures are usually collected from students, but also from participating and non-participating teachers. Additionally, non-obtrusive standardized measures of reading achievement are gathered.

The annual evaluations of Power Lunch (see Portillo & Weiner, 2002, 2003; Portillo, Weiner, & Davis, 2004; Portillo & Davis, 2005) that correspond to each cohort

include many additional measures and findings that are not reported in the present study. Information on different student outcomes, program processes, and satisfaction among reading tutors was not used in this study either. The present study, instead, combines and reanalyzes the data collected on three specific outcomes using a multilevel approach and, more importantly, incorporates a longitudinal follow up for each student cohort, an analysis not conducted in past evaluations of Power Lunch. All data were collected by WITS between the school years of 2002 and 2007 with the authorization of Chicago Public Schools (CPS). As a former in-house evaluator, WITS granted the author full permission to use all gathered information after de-identifying the schools included in the study and removing all individual-identifying information in order to safeguard the complete anonymity of the participants.

In sum, this study will contribute to better understand the short and long term impact of a reading-aloud intervention based on three main reading-related outcomes, attitudes toward reading, reading motivation, and reading achievement while shedding some light on how these outcomes interplay across time. The following section includes a literature review of each the constructs of attitudes and motivation, how they relate to each other and to reading achievement. The next section reviews a number of early literacy and reading-aloud programs in order to identify what aspects make them work effectively. Finally, a description of the implementing organization, WITS, and some of the theoretical underpinnings of the Power Lunch program are presented as well.

CHAPTER TWO

REVIEW OF THE LITERATURE

Attitudes toward reading and reading achievement

In the area of children's literacy development, contemporary researchers have shown a greater interest in studying and understanding the role played by cognitive factors (Kush & Watkins, 1996). However, reading is a task that children can deliberately choose to do or not despite having the necessary cognitive capabilities and, therefore, other critical aspects deserve close examination as well. Among such aspects, some researchers have studied the potential of reading attitudes.

Attitudes represent the most studied area in social psychology, but surprisingly little is known about children's attitudes in general and more specifically about their attitudes toward reading. If one examines the volumes written about attitudes, attitude acquisition, and attitude change in the last four decades (e.g., G.F. Summers, 1970; Eagly & Chaiken, 1993; Albarracín, Johnson, & Zanna, 2005), the majority of the research focuses solely on attitudes among adults and college students. In very rare instances, information on attitudes among children is available, but it is mostly related to political cognition (e.g., Barrett, 2007; Hess & Torney, 1967) and advertisement (e.g., Gunter & Furham, 1998; C. Luke, 1990).

The interest in children's reading attitudes, not surprisingly, has received special attention among researchers and practitioners in the areas of educational and

developmental psychology. A survey of the research available shows that this interest is in fact not entirely novel and it can be traced back to the early 1950s. It grew during the 1970s (see Alexander & Filler, 1976; G.F. Summers, 1977) and has continued until now with some paucity. This sustained research interest is partially due to the presumption that reading attitudes are likely to guide reading actions and influence reading achievement (Mathewson, 1985; McKenna, Kear, & Ellsworth, 1995a; Stevenson & Newman, 1986). In addition, researchers have continued to study reading attitudes hoping to predict future academic performance and establish factors that can positively influence reading instruction in schools and beyond (Heathington & Alexander, 1984). Thames, Kazelskis, and Reeves-Kazelskis (2001), for instance, maintain that when working with a struggling reader, any comprehensive assessment needs to explore self-perceptions of the reader about engaging in literacy activities through measures of reading attitudes.

From a tripartite attitudinal approach, an attitude is typically viewed by social psychologists as a construct integrated of behaviors, beliefs, and affect (see Eagly & Chaiken, 1993). Attitudes toward reading, however, are commonly characterized only as a general affective response without making any explicit reference to either cognitive or behavioral aspects. From early on, researchers (see Summers, 1977) asserted that the study of reading attitudes belonged largely to the area of affect and, as a result, began advancing conceptualizations based on a system of feelings. Alexander and Filler (1976), for instance, defined reading attitudes as "a system of feelings related to reading which causes the learner to approach or avoid a reading situation" (p. 1). In keeping with the affective tradition, Smith (1990) defined reading attitudes "as a state of mind, accompanied by feelings and emotions that makes reading more or less probable" (p.

215). Interestingly, the affective characterization of reading attitudes among children is congruent with the developmental path of attitude structure suggested by Petty and Cacioppo (1986a). These authors argue that children's attitudes are affected mainly by what feels good or bad and by simple cognitive rules as they mature because children lack the motivation and ability to scrutinize information.

More recently, McKenna and Kear (1990; see McKenna, 1994; McKenna et al., 1995a) adopted a similar affective conceptualization of reading attitudes and proposed a model in which beliefs constitute separate entities that are causally related to reading attitudes. McKenna's model is based on a modified version of Fishbein and Ajzen's model of attitude development (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) by Liska (1984) and includes many of the ideas of other reading attitude researchers such as Mathewson (1985) and Ruddell and Speaker (1985). In his proposed model, McKenna (1994) kept Mathewson's notion that the decision to read is a consequence of subjective norms, intent and attitude, which can also depend on specific contingencies (e.g., external impositions, time constraints, nature of text). Reading remains conceptualized as a continuing process as opposed to a discrete act because the decision to read becomes a decision to keep reading once the process is set in motion. This decision is then determined at each moment by constant feedback from the reader's metacognitive state coupled with the influence of subjective norms, intent and attitude.

McKenna (1994) also incorporated most of Liska's modified model, but introduced a few changes. Departing from Fishbein and Ajzen, Liska argued that intentions are not sufficient to cause certain behaviors in the absence of necessary skills or social conditions. Both attitude and normative beliefs were then given causal roles on

behavior as a consequence and contingencies were also introduced. In addition, Liska maintained that social structure affects behavioral intentions directly and that beliefs do not affect them, but rather only indirectly influence behavior through their effect on attitude. Finally, he introduced a direct effect of behavior on attitude which is found in Mathewson's model, but it is absent in Fishbein and Ajzen's model. McKenna adapted these changes to the reading experience and introduced reading-related contingencies.

Based on all these earlier models of attitude, McKenna and others (1995a; McKenna, 1994) identified three principal factors that can directly influence reading attitudes and their development: 1) normative beliefs about outcomes of reading; 2) beliefs about reading and its outcomes; and 3) outcomes of specific reading experiences. The normative aspect in the process of reading and development of reading attitudes is very critical. If the value of reading and its outcomes are perceived to be low, the development of reading skills can be constrained in the long run and, as a result, the beliefs associated with the reading outcome will then confirm the normative belief about the low value of reading (McKenna et al., 1995). Both group membership and strength of group identity can shape one's beliefs about reading and its outcomes. Minority group and gender status are, for example, two variables that can have an impact on reading and how literacy is viewed in terms of value and appropriateness.

McKenna and others (1995a) argue that beliefs associated with reading outcomes are formed in relation to beliefs of outcomes of alternative and competing activities. When children grow older, they usually have a wider variety of leisure activities and the prospect of reading is then assessed in light of these other activities and their associated attitudes (e.g., should I continue reading this book that I found boring or watch my

favorite show on TV?). McKenna's model proposes that outcome-related beliefs are expected to be associated to some degree with the children's level of reading. However, competing and more compelling activities are capable of driving able readers away from books and set off the progressive detriment of healthy reading attitudes.

The act of reading itself and its outcomes, the third factor identified in McKenna's model, can have a direct effect on reading attitudes as well. When a child is confronted with numerous frustrating, unsuccessful and unpleasant reading experiences, the chances of developing negative beliefs and attitudes related to reading increase. This situation may be further exacerbated if the child possesses poor reading skills and faces punitive consequences as a direct result (McKenna et al., 1995).

McKenna's model has several implications and predicts three main findings: (1) children's attitudes toward reading become more negative across time, especially among poorer readers; (2) poorer readers harbor more negative attitudes compared to better readers; and (3) gender and ethnic-related normative beliefs influence children's attitudes; that is, girls are expected to hold more positive attitudes toward reading, whereas children from minority groups (e.g., African-Americans, Hispanics) are expected to display more negative attitudes toward reading.

For the most part, the predictions made by McKenna's model have been confirmed by several studies, although some mixed results are present in the literature. In his own research, McKenna and his colleagues (1995a) found that most children have very positive reading attitudes when they enter the school system, but their reading attitudes experience a gradual detriment as they advance in grade levels. Similar results have been reported also by several other researchers regardless of the instruments used to

measure attitudes toward reading (Barnett & Irwin, 1994; Davis Lazarus & Callahan, 2000; Estes, 1971; Kush & Watkins, 1996; Shapiro & White, 1991; Tunnell, Calder, & Justen, 1988a; Tunnell, Calder, Justen, & Phaup, 1988b). In an exceptional longitudinal study about reading attitude development from childhood to adulthood that spanned over 40 years, Smith (1990) demonstrated that reading attitude remains fairly consistent across time, although the best predictor of adults' reading attitudes according to the results were the attitudes held during the early adulthood period, right after high school.

As for the second model prediction, research shows that poor readers are more likely to exhibit more negative attitudes in comparison to better readers. Numerous studies show consistently that reading attitudes are positively related to reading achievement, although the magnitude reported tends to vary greatly from less than .10 to slightly above .50 (e.g., Swanson, 1982; Walberg & Tsai, 1985). In an 11-year longitudinal study, Stevenson and Newman (1986) found that reading achievement measures as well as teachers' and mothers' ratings predicted attitudes toward reading, especially among girls. Other studies report, on the contrary, no existing relationship between attitudes toward reading and reading achievement (Quinn & Jadav, 1987) or correlations with only certain variable levels (Diamond & Onwuegbuzie, 2001). Some researchers (Cafferty, 1992) point out that the lack of congruency between attitudes and achievement outcomes, at least among young children, may be partially rooted in their inability to use past performance to inform their feelings and self-attributions. Consequently, younger children tend to hold a more positive view about their own academic abilities despite failure, but as they grow older they develop a more realistic and commonly pessimistic appraisal.

It should be noted that McKenna's model does not rule out the decline of reading attitudes among proficient readers due to the multiple influences that can affect the attitudes. Furthermore, some researchers (Davis Lazarus & Callahan, 2000) have demonstrated that even children with reading or learning disabilities may harbor positive attitudes toward reading. Compared to McKenna et al.'s (1995a) non-disabled national student sample, Davis Lazarus and Callahan's findings show that reading attitudes of students diagnosed with learning disabilities were similar to or superior and tended to remain more stable between grades 1 to 5. In a previous study, Wallbrown, Vance, and Prichard (1979), found nevertheless evidence of more negative attitudes among children with learning disabilities compared to children without learning disabilities as predicted by McKenna's model. Because the present study includes only students with no reported learning disabilities, the issue of learning/reading disability and its possible impact on the results of the intervention is not further reviewed.

McKenna's model predicts group differences based on normative beliefs and expectations about reading outcomes. Not surprisingly, the most replicated finding in terms of group differences is the superiority of girls' reading attitudes (Diamond & Onwuegbuzie, 2000; Fitzgibbons, 1997; Friend, 1995; McKenna et al., 1995; Wallbrown, Levine, & Engin, 1981). Study after study shows that girls exhibit more positive attitudes toward reading than boys even when accounting for progressive detriment in attitudes across time. There is some evidence, however, indicating that young girls and boys may not differ in their reading attitudes during elementary school (Cloer & Pearman, 1992). In their study, Cloer and Pearman (1992) found that children of both sexes in grades 1 to 3 did not differ in their reading attitudes, but in grades 4 to 6, boys demonstrated a more

negative attitude toward reading than their female counterparts as found in past studies and predicted by McKenna's model.

Although the effect of gender on reading attitudes is confounded to some extent with the effect of reading ability, which overwhelmingly favors girls over boys, McKenna and others (1995) found that reading ability does not explain sufficiently the gender differences commonly found in reading attitudes. One study that may help to explain the effect of normative beliefs and gender on reading attitudes is that of E. McKenna (1997). Specifically, she found that reading is seen as a gender-free activity by young children, but as they grow older and accumulate more schooling, both girls and boys agree that reading is viewed as an activity more suitable for girls.

Researchers have also investigated the role of ethnicity and other relevant variables such as socio-economic status in the development of children's reading attitudes, but have failed to disentangle and separate the overlapping effect of class on race and ethnicity and, thus, results are fairly inconclusive. In the national reading attitude study that McKenna and his colleagues (1995a) conducted with more than 18,000 U.S. children in grades 1 to 6 across 78 school districts in 38 U.S. States, results did not yield any significant variation among ethnic groups. Although there were some differences at some grade levels, all groups followed the same declining trend across time. Other studies (see Brungardt, 1994; Diamond & Onwuegbuzie, 2000; Diamond & Onwuegbuzie, 2001) have also failed to show any consistent differences among different ethnic groups despite some variation in their reading attitudes.

In terms of socio-economic status, findings are mixed and inconclusive as well. In a study with children participating in a whole-language program, Brungardt (1994) did

not find evidence of attitudinal differences using McKenna's reading attitude instrument, the *Elementary Reading Attitude Survey* (ERAS; for a detailed description of the instrument see Method section), based on school lunch status as an indicator of socio-economic status. Interestingly, results did suggest that children with reduced price and free lunches had lower attitudinal scores than children with full price lunches, but low statistical power limited the ability to establish group differences. In spite of using a larger sample size, Diamond and Onwuegbuzie (2001) did not find statistically significant differences among white and black students in grades 1 to 5. These authors did report, however, that high socio-economic status African-American students had more positive attitudes toward reading than low socio-economic status African-American students, but did not elaborate on this specific finding.

Another contribution made by McKenna (see McKenna & Kear, 1990; McKenna et al., 1995a) to the literature on reading attitudes is the study of their structure. By studying this aspect of attitudes, it is possible to better understand how they are internally organized and linked to other attitudes or psychosocial variables (Eagly & Chaiken, 1993). As eloquently expressed by Cothern and Collins (1992), attitudes coexist within systems and attitudes within those systems are interconnected. Although the structure of reading attitudes has been represented in multiple ways, this study adopted in particular both the attitudinal structure proposed by McKenna and Kear (1990) and the instrument that they designed to measure it, the ERAS.

Like most constructs in social psychology, reading attitudes are considered to be multidimensional. Specifically, McKenna and others (1995a) argue that reading attitudes are organized around two main dimensions: recreational and academic reading attitudes.

These dimensions are believed to be independent from each other, although moderately related. Based on an exploratory factor analysis (EFA), McKenna et al. (1995a) found evidence that supports the bidimensional structure captured by their own instrument. They also determined that the correlation between both dimensions was equal to .62.

Further studies have presumably confirmed the existence of both dimensions using the ERAS, but there seems to be some controversy about its underlying structure. Thames and others (2001) used confirmatory factor analysis (CFA) to test the two-factor model of the ERAS among 565 first to sixth grade students in 10 schools located in three different Mississippi school districts. Their initial results showed that the bidimensional structure fit the data fairly well, yet the high correlation between both factors (r = .85) suggested that a one-factor model could yield also an adequate solution. They subsequently tested the one-factor model and its results seemed to provide a fairly good fit too, but the two-factor model was statistically superior when they were compared using their associated Chi-squares. No further modifications or analyses were conducted and it was concluded that the two-factor model provided the best fit to the data.

Later, Kazelskis, Thames, and Reeves (2004) conducted another study based on the ERAS original two-factor solution to explore its factor invariance across gender and race among 728 Mississippi students in grades 4 to 6. In short, their findings indicate that the ERAS is factor invariant between males and females, but not between ethnic groups, specifically African-American and European-American students. The sources of invariance emerged in three specific items from the recreational reading attitude subscale (Items 5, 7, and 8), with African-Americans having greater variance than European-American students. These results indicated differences in the meaning of the recreational

reading attitude factor between both student groups; that is, "For the European-American group, items reflecting attitude about reading during leisure time were more important in defining the recreational reading attitude dimension than they were for the African-American group" (Kazelskis et al., 2004, p. 119). The association between the two factors was not reported in this study.

Worrell, Roth, and Gabelko (2007) analyzed also the structure of reading attitudes as measured by McKenna's ERAS among 575 academically talented students who participated in a three-week non-residential program in a large city in California. Students in grades Kindergarten through 6, ranged in age from five to 12 years. Worrell and others performed a series of EFAs with two-, three-, and four-factor solutions and arrived at the conclusion that the two-factor solution was statistically better and reflected virtually the same composition noted by McKenna and others (1995a). The authors did not attempt, however, to conduct any CFAs and reported exactly the same correlation between both factors (r = .62) that McKenna et al. found in their study.

One additional study examining the structure of reading attitudes was conducted by Portillo (2008), who performed a CFA on the ERAS among 333 evenly divided elementary female and male students between grades 1 and 4. The results from this study converged with those reported by Thames et al. (2001) and suggested that the two-factor solution fit the data better than the single-factor solution. However, a close examination of various fit indices indicated that both models had the exact same results, which suggested that a single-factor solution could also be plausible. The extremely high correlation obtained between both academic and recreational factors after controlling for error measurement (r = .93) also pointed out the presence of a single-factor model. In

fact, the magnitude of this association was significantly higher than the association reflected by simple Pearson product-moment correlation coefficients reported in past studies (ranging between .60 and .75) or even in Portillo's own study (r = .70). In sum, he concluded that the two-factor model could be satisfactorily explained by a more parsimonious one-factor model solution and, consequently, favored using preferably all items to calculate an ERAS global score. Taken together, these results suggest that the bidimensional factorial structure of the ERAS is still open to debate.

Two closing aspects of reading attitudes that deserve some examination are related to a number of strategies that are likely to modify attitudes and the psychosocial mechanisms involved in the process of attitudinal change. Social psychologists argue that attitudes are acquired and learned as a result of many experiences and beliefs (Eagly & Chaiken, 1993). As a general rule, attitudes are not altered as easily as belief systems, although their intensity, quality, and valence can experience gradual modifications that would lead to change (Cothern & Collins, 1992). In the area of reading attitudes, McKenna (1994) has offered some advice to help foster healthy reading attitudes among children. Teachers, parents and programs are encouraged to instill positive beliefs about reading by discussing and challenging negative beliefs associated with reading, providing books as gifts, and sharing reading experiences.

The environment in which the reading experience takes place needs to be conducive to learning and rich in books of different genres and difficulty levels so children can start figuring out their favorite themes and characters at a reading level that will ensure a positive reading experience. Young children need also to be exposed to adults and other student models that can show in an engaging way that reading is fun

while conveying positive messages about the benefits and the joy of reading. Reading-aloud programs are very useful in achieving this goal.

Among the numerous psychosocial mechanisms that may help explain positive change in children's reading attitudes, at least four are considered here: persuasion, cognitive dissonance, mere exposure, and social influence. Persuasion refers to "any change in attitudes that results from exposure to a communication" (Petty & Cacioppo, 1986b, p. 5) and it can follow two routes; a central route and a peripheral route. Petty and Cacioppo's Elaboration Likelihood Model (ELM; Petty & Cacioppo, 1986a, 1986b; Petty & Weneger, 1998) as well as Chaiken's Heuristic-Systematic Model (HSM; Eagly & Chaiken, 1993) posit that persuasion not only can be achieved through systematic cognitive-processing (central route), but also through indirect and less argumentative routes (peripheral). The central route involves message elaboration; that is "the extent to which a person carefully thinks about issue-relevant arguments contained in a persuasive communication" (Petty & Cacioppo, 1986b, p. 7). In the peripheral route, the message is processed without active thought about attributes of the issue or the object at stake. Recipients rely rather on a variety of cues (e.g., liking, consistency, authority) to make decisions or modify their attitudes or judgments. The direct route is similar to the systematic processing route and the peripheral route is similar to the heuristic processing route of Chaiken's HSM. However, unlike the peripheral route, heuristic processing entails some cognitive elaboration as the direct or systematic processing does, but it takes less effort and resources. When information is heuristically processed, people rely on "rules of thumb" that enable them to make judgments using a minimum amount of cognitive elaboration. More specifically, heuristic processing assumes that people form

and change their attitudes by using heuristic cues, which refer to any anchoring variable that impacts judgment by the mediating effect of simple decision rules. Heuristic cues or "persuasion cues" are based on direct or indirect past experiences and can be represented as cognitive schemas (i.e., knowledge structures). Although the two processing modes are characterized as qualitatively different and operant during specific conditions, both the peripheral/central and systematic/heuristic processing may take place concurrently.

Applying these models to the area of reading attitudes, children can be influenced, first, via the direct/systematic by strong messages about the benefits and the pleasure of reading, especially older children. Second, younger children can also be influenced in a more peripheral/heuristic manner by illustrated and full-color books, inviting environments (e.g., posters of characters, banners with positive messages), and animated story telling sessions that can serve as cues to entice children to engage in reading.

Cognitive dissonance (Festinger, 1957) is another psychological mechanism likely involved in the process of changing reading attitudes. Cognitive dissonance may be experienced by children who hold negative beliefs about reading, but who progressively start enjoying reading. Cognitive dissonance refers to the uncomfortable tension that may occur from having two conflicting thoughts at the same time (e.g., reading is boring, but I like reading adventure stories), or from engaging in behavior that conflicts with one's beliefs (e.g., if I'm reading adventure stories, how can reading be boring?). This conflictive state can be resolved by modifying existing beliefs or acquiring new beliefs so that the dissonance between cognitions and associated feelings is lessened and their consistency or balance is achieved (e.g., if I'm reading adventure stories, reading must not boring after all).

Mere exposure is another mechanism by which children's reading attitudes can be modified. Research shows that people's attitudes can be altered by being repeatedly exposed to attitude objects or information about them (Eagly & Chaiken, 1993). In the case of children with less favorable attitudes toward reading, repeated exposure to books and engaging reading experiences in a non-threatening environment may help foster healthier feelings and ideas associated with reading. This same process, if continued, could easily lead to habituation and more resilient positive attitudes.

Social influence in its informational and normative forms (see Maruyama & LeCount, 1992) is an additional mechanism that could impact students' reading behaviors and attitudes. Reading tutoring represents a collective social activity in which children may pick up cues from the context and the interactions regarding what is considered an appropriate behavior. Using Maruyama and LeCount's (1992) informational influence perspective, students seek relevant information from their surroundings and observe that in the tutoring situation the most appropriate behavior is reading. From a normative perspective, tutors represent attractive and influential figures that show and model how reading should be done. Thus, given that reading becomes habitual in tutoring programs and that tutors usually enjoy high social status, students may feel motivated to comply with the expectation that they should engage in reading.

Reading Motivation and reading achievement

Another non-cognitive aspect that has been thoroughly examined and extensively applied in early literacy programs is that of reading motivation (Schunk & Zimmerman, 2008). Researchers stress the importance of the early years of schooling in the

development of reading motivation (Anders Mazzoni, Gambrell, & Korkeamaki, 1999) and point out that a proficient reader must possess not only the skills to read, but also the will to do so (Gambrell, 1996; Winograd & Greelee, 1986). In fact, teachers agree that fostering the interest to read, developing an intrinsic desire to read and increasing children's reading represent some of the top educational priorities (O'Flahavan, Gambrell, Guthrie, Stahl, & Alvermann, 1992).

Similar to the area of attitudes, the study of motivation has a long tradition. The topic of motivation became particularly predominant during the 1980s when several models and theories were proposed. The longstanding interest in reading motivation and its implications in learning has remained strong, especially in the areas of reading acquisition and achievement (Gambrell, 1996; Wigfield, 1997). The conceptualizations and definitions of motivation are varied, although numerous salient commonalities can be found among them. According to Guthrie and Wigfield (1999), motivation researchers are concerned with what moves people to act. Motivation is related to the initiation, direction, intensity and persistence of behavior (Geen, 1995). From a broad perspective, it is defined as "an internal state that arouses, directs, and sustains human behavior" (Glynn, Aultman, & Owens, 2005, p. 150).

From a theoretical point of view, the construct of motivation is very similar to that of behavioral intention proposed by Ajzen and Fishbein (1980) in their theory of reasoned action and Ajzen's (1989) subsequent work on the theory of planned behavior. Although McKenna (see McKenna, 1994; McKenna et al., 1995a) departed from Ajzen and Fishbein's original model by making slight modifications, his reading attitude model in fact kept the influence of the intentions to read on the reading behavior along with

attitudes toward reading and subjective norms. Because both reading attitudes and intentions to read are directly related to reading they should be positively associated with each other as well. Curiously, despite the obvious linkage between the constructs of attitudes and motivation (Eagly & Chaiken, 1993; Wigfield, 1997), no single study could be located in which both of them were examined concurrently in the area of reading.

Among all the proposed theories and models on the construct of motivation, most researchers concur that there are at least two types of motivations: intrinsic and extrinsic motivation (Guthrie & Wigfield, 1999; Sansone & Harackiewicz, 2000). Wigfield (1997) argues that these two types of motivation are captured by the question "Do I want to be a good reader?" As stated by Sweet, Guthrie and Ng (1998), intrinsic motivation has to do with "a person's desire to engage in an activity, whether or not the activity has external value to someone else," whereas extrinsic motivation "refers to external factors that prompt a person to engage in an activity" (p. 211). In the area of reading, studies show that intrinsically motivated individuals actively seek opportunities to engage in reading and read more frequently than individuals with low intrinsic motivation (Baker & Wigfield, 1999; Sweet et al., 1998). Guthrie and Wigfield (1999) note that intrinsically motivated readers "participate in reading for its own sake, enjoying the knowledge constructed from the text, and being disposed toward engaging in reading activity when it is possible and appropriate" (p. 201). Extrinsically motivated readers, on the other hand, engage in reading primarily to fulfill an external obligation or because reading is seen as a means to an end (e.g., good grades, a reward) (Harter, 1981; Wigfield, 1997).

Besides acknowledging the different types of motivation, researchers advocate for the study of motivation from both a domain-specific and multidimensional approach as

well (McCombs, 1997; Wigfield, 1997). According to Wigfield (1997; see also Eccles, Wigfield, & Schiefele, 1998), one of the most important theoretical and methodological issues in the study of children's motivation is the domain-specificity versus generality level of analysis of the construct. This same author argues that the meaning of motivation attached to the specific domain of reading is expected to differ from the meaning of motivation to learn in school or from a different subject matter such as mathematics. In this last case, if a student possesses a different set of skills and beliefs associated with each subject, the resulting motivation to each of them is likely to vary. A number of studies measuring competence beliefs among children (see Eccles, Wigfield, Harold, & Blumenfeld, 1993; Marsh, Craven, & Debus, 1991) seem to confirm this notion, showing that children's competence beliefs form distinct factors across different specific domains.

Children's motivation to read is conceptualized as a multidimensional construct as is the case with attitudes toward reading (Wigfield & Guthrie, 1997). In the domain of reading, because there is no agreement on what the main structure of motivation is, there are several theories available that attempt to explain them. Based on the "expectancy-value" theoretical framework (Eccles, 1983; Wigfield & Eccles, 2002), which proposes self-perceived competence and task value as the two major determinants of motivation, Gambrell, Martin Palmer, Codling, and Mazzoni (1996) defined reading motivation as a function of an individual's self-concept as a reader and the value the individual places in reading. To capture these two dimensions of reading motivation, Gambrell et al. (1996) designed the *Motivation to Read Profile* (MRP), which includes a survey and an interview. With it, they found that reading proficiency levels (i.e., high, middle, low) were positively associated with both reading self-concept and value of reading.

Another instrument designed to measure reading motivation among children is Baker and Wigfield's (1999) *Motivation to Read Questionnaire* (MRQ), a 54-item instrument that assesses 11 different dimensions of reading motivation distributed in three different categories. The first category, competence and efficacy beliefs include three dimensions: self-efficacy, challenge, and work avoidance. The second category, goals for reading, includes six different dimensions: curiosity, involvement, importance, recognition, grades, and competition. The last category of the reading motivation model, social purposes of reading, includes two dimensions: social and compliance. The results obtained with this instrument show that all scales were correlated to reading activity and reading achievement.

Relevant to the present study is the structure proposed by Sweet et al. (1998), who examined different dimensions of motivation to read based on their intrinsic as well as extrinsic nature. Unlike most of the instruments designed to measure reading motivation based on children's self-reports, Sweet and her colleagues developed the *Teacher Questionnaire on Student Motivation to Read* (TQSMR) which records teacher perceptions of student reading motivation. Although reading motivation has been measured successfully even among the youngest students (e.g., kindergarten), Guthrie and Wigfield (1999) recommend also the application of instruments completed by parents or teachers to counterbalance the effect of social desirability among the responses provided by students. Sweet et al.'s (1998) questionnaire measures six different dimensions: individual, topic, autonomy support, social support, competence support, and activity-based. The first two dimensions capture aspects of students' intrinsic motivation and were included as outcomes in the present study (for a detailed description of the

instrument, see Method section). Sweet and her colleagues (1998) did not perform any exploratory or confirmatory factor analyses on each of the dimensions measured by their instrument, but they provide some evidence about their validity when examined in light of students' reading achievement. Specifically, Sweet et al. found that the highest scores for intrinsic dimensions (i.e., topic and individual) were among students in the top 20% of the scale total score and the lowest intrinsic scores were among students in the bottom 20% of the total scale score. This specific result is congruent with past studies carried out with student self-report measures of reading motivation and underscores the crucial role of intrinsic motivation in the process of reading.

Researchers have also investigated the role of gender, socioeconomic-status, ethnicity, and grade level in the development of reading motivation among children. Similar to the findings reported for reading attitudes, numerous studies show that girls are generally more motivated to read than boys. Using their 11-dimension model of reading motivation, Baker and Wigfield (1999) found that girls outperformed boys in almost all of them with the exception of work avoidance and competition. A similar pattern was reported in a previous study by Wigfield and Guthrie (1997) who also administered the same 11-dimension instrument of reading motivation. Interestingly, they found that motivational differences among girls and boys were more prevalent during the Fall than in the Spring of the same school year. In addition, the literature suggests that the effect of gender seems to exist not only in U.S. students, but also in students from other countries. In a cross-cultural study with 744 American and 412 Finnish elementary students, Anders Mazzoni et al. (1999) found that girls in first and second grade obtained higher reading motivation scores than boys both in the U.S. and Finland.

The role of ethnicity in reading motivation and the confounding effect of socio-economic status are not as clear and fully understood as the effect of gender and consequently there are several contradictory findings. In a study with 371 fifth and sixth graders, Baker and Wigfield (1999) found that African-American students scored higher in all 11 reading motivation dimensions measured by their instrument. Surprisingly, when the relationship between motivational scores and two measures of achievement were analyzed, only three correlations were statistically significant with the first achievement measure while no association was found with the second measure of reading performance. The three coefficients established for the statistically significant correlations showed a very moderate relationship between motivation to read and reading achievement (*r*s = .20, .22 and -.34). Most of the motivational scores of white students, however, were correlated with reading achievement and to a lesser degree with a measure of reading performance. The magnitude of each statistically significant association obtained by this group of students was no larger than .26. These results are somewhat paradoxical since black students tend to perform more poorly academically.

Other studies (Morgan & Fuchs, 2007) proposed tentatively that the relationship between reading motivation and reading achievement may be bidirectional. They reported across several studies a range of correlations that went from .11 to .65. In another study, Gottfried (1990) noticed that academic intrinsic motivation was not related to reading achievement among younger elementary students, but after the age of nine, both were associated.

Researchers have also attempted to understand how children's reading motivation develops across grade levels. Similar to what has been noted with reading attitudes,

studies suggest that reading motivation generally experiences a decline as students advance through school, although there are authors who report no detriment across time or even longitudinal gains. In terms of overall development, some researchers (Harter, 1983; Wigfield, 1997) argue that children's reading motivation is at first more global and as children advance in school, it tends to become more differentiated based on the learning experiences encountered along the way. In terms of mean-level changes, numerous studies suggest that different aspects of reading motivation become more negative over the school years. Various studies show that children tend to progressively lose general interest in school (Epstein & McPartland, 1976) and experience a decline in their intrinsic motivation (Harter, 1981; Lepper & Henderlong, 2000; Rogers, 1980) and reading motivation (Baker & Wigfield, 1999; Gambrell et al., 1996; Wigfield & Guthrie, 1997). Using their own measure of reading motivation with American and Finnish students, Anders Mazzoni et al. (1999) found the opposite trend to be the case. In their study, first graders' reading motivation became more favorable during the course of the school year, whereas reading motivation among second graders remained unchanged. The authors acknowledge, however, that is difficult to predict if the same pattern would emerge had they included older students and grade levels above second grade.

One additional study that differs from all previously described is that of Sweet et al. (1995). While most studies rely on students' self-reported measures, Sweet and her colleagues measured reading motivation using teachers as judges. Given the substantial amount of time and interaction that teachers have with their students, they have first-hand knowledge about their students and their reading-related skills and inclinations. More importantly, they can observe how these aspects evolve during the course of the school

year and report back this information. The findings of Sweet et al.'s (1998) suggest that when teacher ratings are used, no grade differences emerge in any of the dimensions of reading motivation. Unfortunately, because the instrument was administered only at the beginning of the school year in Sweet et al.'s study, it is not possible to determine if teachers changed how they viewed their students' reading motivation within the same school year.

An additional aspect that has not received the full attention from researchers is the convergence between teacher perceptions of students' reading motivation and students' self-reported perceptions of reading motivation or feelings about reading. In a pilot study with 22 Latino students and six teachers, Rueda, Au, and Choi (2004) found that the perceptions of reading motivation of teachers and students, as measured by Sweet et al.'s (1998) *Teacher Questionnaire on Student Motivation to Read* (TQSMR) and Gambrell et al.'s (1996) *Motivation to Read Profile* (MRP), were not significantly associated with each other (r = -.16, p = .48). Rueda and his associates then examined how teacher and student perceptions were related to students' reading achievement and found out that teachers were more influenced by achievement levels than students themselves. This same influence was reported by Carr and Kurtz (1991; see Carr & Kurtz-Costes, 1994) who found that teachers perceived high achievers to be more motivated and vice versa.

The importance of teacher's perception of the abilities of students is very well captured in what is known as the Pygmalion effect (Rosenthal & Jacobson, 1968) which shows that teachers' perceptions and expectations have the power to ultimately influence the performance of students too. In a longitudinal study with 500 students in grades 6 to 12, Smith, Jusimm, and Eccles (1999) found that although the power of self-fulfilling

prophecies emanated from teachers' perception of students' achievement was relatively small in terms of effect sizes (ranging from .15 to .25), it persisted over a span of seven years. Besides pointing out the importance of teacher perceptions, the findings of these investigations are relevant to the present study because they suggest that teacher perceptions of students' of reading motivation and the perception of students themselves are not necessarily related to each other or even lean in the same direction. Furthermore, these same findings imply that teacher perceptions of reading motivation should be better predictors of achievement than students' perceptions, in this case, of reading motivation. A similar prediction could be extrapolated and applied to the construct of reading attitudes.

One last aspect that requires attention is how students' reading motivation is likely to change as a result of an early reading intervention. Researchers argue that reading motivation is defined by two distinct, but related aspects: competency beliefs and goal or achievement orientations (Morgan & Fuchs, 2007). According to Wigfield (1997) competency beliefs are "estimates of how good one is at a given activity" (p. 451). This same notion is captured in the construct of perceived self-efficacy, which refers to "beliefs about one's capabilities to learn or perform behaviors at a designated level" (Schunk & Pajares, 2002, p. 15; see Pajares, 2008; Zimmerman, 1995). Reading tutors may be in a position of influencing and enhancing how students' perceptions of reading ability, even when negative affect may be associated with reading itself. Reading tutors can model and reward higher levels of work, persistence, and choice, which over time should lead to increased academic and learning self-regulation (Schunk & Zimmerman, 2008; see also Nelson-Le Gall, 1993).

Zimmerman (1995) argues that people's perceptions of self-efficacy are highly influenced by social comparisons, which happens frequently in academic settings. Tutoring programs as Power Lunch are collective and social activities in which the failures and successes of others can impact students' efficacy beliefs and motivate comparative evaluations through similarity appraisals.

Goal or achievement orientations are "the purposes children have for achievement in different areas" (Wigfield, 1997, p. 61). In other words, they respond to the "why" of doing something. At the core of intrinsic reading motivation, reading tutors can expand the meaning attached to academic behaviors. Among children with poor reading skills, reading is usually associated with negative aspects like boredom and academic failure. In one-to-one interactions, reading tutors may become powerful agents of change that can shape the value of achieving, especially in settings that are overwhelmingly underperforming (see Wigfield, Hoa, Lutz Klauda, 2008).

After surveying the literature on the three outcome variables (i.e., attitudes toward reading, reading motivation, and reading achievement) examined in this study, the following section includes a review of a number of reading and literacy programs that can impact them as well as the key components that make them more likely to be successful. Some of the programs described also cover other reading-related areas such as amount and breadth of reading, usage of printed material, vocabulary development, oral fluency, comprehension, silent reading, and writing (Mandel Morrow, 1992; Sénéchal, LeFevre, Hudson, & Lawson, 1996). However, greater attention has been given to reading-aloud and shared book programs with community participants, similar to the one examined in the present study.

Early reading and literacy interventions

The National Commission on Reading concluded in its groundbreaking report *Becoming a Nation of Readers* (Anderson, Hiebert, Scott, & Wilkinson, 1984) that "the single most important activity for building the knowledge required for eventual success in reading is reading aloud to children" (p. 23). Even though many school age children are expected to have already acquired vast previous read-aloud experiences and be familiarized with books and authors, children raised in poverty often enter school with limited exposure to books and, as a result, their literacy and language skills are underdeveloped (Adams, 1990; Vernon-Feagans et al., 2001). In fact, many low-income children experience their first shared reading outside their homes.

Reading-aloud programs have become one of the primary strategies to help children with low exposure to printed material and story books. The literature in this area shows that there are numerous programs available which seem to be effective across different reading outcomes. Wells (1986) suggests that when children and adults read aloud in a one-on-one setting, they are more likely to focus on the same objects and events, understanding the story similarly. Without noisy distractions, young students are able to focus with their adult partner solely on the reading material set in front of them while simultaneously increasing their attention span. Students also recognize the importance of reading when repeatedly exposed to a caring adult who enjoys reading; this sends the positive message that the child is worth the adult's time. In turn, students are more likely to respond with a greater capacity to listen attentively and relate the characters in a book to real world experiences, and develop a greater sense of self-awareness and confidence (Coiro, 2000).

Among the programs currently available, *Project Story Boost* (see Wood & Prata Salvetti, 2001) aims at tackling literacy and language development deficits among at-risk children who did not receive adult read-aloud attention prior to attending school. Program participants are primarily economically disadvantaged kindergarten students with low scores in a diagnostic reading assessment who are read to by adult volunteers from the community. Sessions last about 25 minutes, three times a week for 20 weeks, totaling 25 hours of program exposure during a whole school year. The program also includes a classroom coordinator who selects the books and monitors the work of reading volunteers. Children's gains in familiarity with story structure and language were evaluated via story retelling within the school year. Four additional areas, children's motivation/interest, appropriateness of book selections, engagement during reading, and reading competency, were rated by teachers two and three years after the intervention. Teachers had no prior knowledge about students' past participation in the program. Evaluation results from this program showed that participating children gained an average of 115 words, whereas control children had an average gain of just 57 words. Furthermore, teacher assessments revealed that participants were rated higher in all four evaluated areas. Although all findings suggest that *Project Story Boost* is effective, Wood and Prata Salvetti (2001) did not report if the group differences observed within and across the years were statistically significant and failed to include in their assessments any unobtrusive measures of reading achievement that could validate their findings.

Book Buddies is another read-aloud program (see Bromley, Winters, & Schlimmer, 1994) that is carried out by schools in collaboration with teachers, parents, and university students. The main objective of this program is to generate enthusiasm for

reading and writing among young elementary students at-risk of academic failure. As part of the program, 20 students from three different classrooms meet with a university student tutor, three times a week for a total of 10 weeks. All participating students usually perform below grade-level standards for reading and writing. In an evaluation of the program, Bromley and her colleagues (1994) showed evidence that the students' attitudes toward reading, as measured by the ERAS (McKenna & Kear, 1990), became more positive after completing the program. Specifically, students increased their total attitudinal average score to 58.77 from an initial average score of 45.55 (highest possible score in the ERAS is 80). Moreover, participating children were able to learn how to effectively figure out the main elements of a story (i.e., setting, characters, plot, theme, problem, and solution) and made more use of webbing, which is a "graphic representation of categories of information and the relationships among them" (Bromley et al., 1994, p. 393). Anecdotal information from teachers and university students participating in the program supports many of the changes assessed quantitatively. The evaluation of the program, however, did not include any further statistical analyses besides the construct of children's reading attitudes and, more notably, did not include a comparison group. This last aspect precludes any causal inferences derived directly and exclusively from the application of the program.

Reading Together (Neuman, 1995) is a community-supported parent tutoring program designed for kindergarten and first grade children from economically distressed communities. According to Neuman (1995, p. 121), the program seeks to "encourage the people in the community to help one another, empowering both parents and children to experience the confidence, joys, and power associated with literacy learning." Using what

is called a prop box, which is a thematically based box set of chants, story books, play objects and writing books, community volunteers and parents read to either a single student or a pair of students for about 30 to 45 minutes twice a week for several months. The adult reads to the child for 10-15 minutes each session and then the child takes the lead by singing, playing with the story-related objects, and writing toward the end of the session. Each prop box was repeatedly used for a one-month period and then a new thematic box was introduced. The evaluation of *Reading Together* is rather informal and most of the evidence of its success is anecdotal. The only assessment provided that supports the benefits of the program is the gain observed in the children's concepts of prints as measured by the Concepts of Print Test (Clay, 1979).

In addition to these programs, there are other studies that report one-on-one read-aloud interventions that show positive outcomes among at-risk students. Mandel Morrow, O'Connor and Smith (1990), for instance, assessed various reading strategies and found a difference between children who heard stories in one-on-one settings and those in whole-class settings. Specifically, results from this study indicated that children in one-on-one settings asked more questions and made more comments, suggesting the superiority of one-on-one reading.

In a year-long reading aloud program in rural western Kansas, Rains (1993) found evidence that the intervention had a positive impact on children's reading attitudes. Using the ERAS (McKenna & Kear, 1990), she found that students participating in the reading program displayed more positive attitudes toward reading after completing the program. Similar results were found by Porter (1995), who studied 58 third and sixth graders participating and not participating in a reading aloud program in another Kansas school.

Congruent with these findings, Duran (1995, cited in Smith, Elvove, & Nesbitt, 2000) found that a read-aloud program for elementary students led to increases in ERAS scores and in the number of books read. These findings are encouraging since past research shows that reading attitudes and reading habits become less favorable as children progress through school. Similar findings associated with read-aloud and literacy interventions are reported by others in the U.S. (Angeletti, Hall, & Warmac, 1996; Blaisdell et al., 1999; Bottomley, Truscott, Marinak, Henk, & Melnick, 1999; Porter, 1995) and South Africa (Overett & Donald, 1998).

In spite of the numerous accounts of success, the literature on read-aloud and paired reading programs with tutors reveals also that many interventions fail to produce the desired effect or fail to reach statistical significance when positive change is found (see Topping, 1998). As previously argued, many studies show no positive effects related to reading-aloud intervention because they are seriously limited by several flaws (e.g., small sample sizes, no pretest measures, no comparison group condition), but even stronger and better evaluated interventions do not yield positive evidence in favor of reading interventions.

In a study with 2,400 students, Fitzgibbons (1997) investigated whether an intervention named REAP (Reading Excitement and Paperbacks Project) had a positive effect on participants' reading attitudes over a period of two years. Her results show that contrary to the expected gains, students' reading attitudes followed the declining pattern across school years found by other researchers. She noted though that most students had a very positive reading attitude to begin with (most were above the midpoint) and thus the results reflected a possible ceiling effect or possibly a regression to the mean effect. In

another study, Diamond and Onwuegbuzie (2000) assessed the effectiveness of a 4-Block Balance Reading Program implemented in the State of Georgia with 2,127 students from grades 1 to 5 for a whole school year. Results from this intervention showed that in some grades, students experienced a steep decline in their reading achievement, with the exception of fourth grade students who exhibited some gains. Students' reading attitude, as measured by the ERAS, became more negative at the end of the school year and followed the well established progressive detriment over the school year. According to Diamond and Onwuegbuzie (2000), the results suggested that the intervention, despite being widely implemented for many years, was not as effective as believed. They recommended, however, using a longer period of inquiry to determine if long-term effects existed. No explanations or speculations were offered regarding the disparate result pattern obtained for some grade levels.

It seems evident that some interventions are more successful than others as many of the findings previously presented attest (for a review of programs, see Topping, 1998). But, what can make reading aloud interventions a successful venture? A series of criteria and principles have been suggested by researchers and are briefly reviewed here to better assess the quality of the reading program evaluated in this investigation.

According to Wood and Prata Salvetti (2001) successful programs need high-quality, age appropriate literature, frequent and consistent reading sessions, and a quiet and non-distracting environment. Specifically, children should be read to at least three times a week, every week by the same reader whenever possible. They also suggest that reading sessions need to be interactive and followed up with discussion as well as story retelling time.

After examining a series of reading aloud programs, Wasik (1998) provided several additional and crucial guidelines to be taken into account when implementing effective reading interventions. In her review, she stresses the need for qualified reading specialists who can monitor and provide support to reading tutors, ongoing tutor training and feedback, highly structured reading sessions, ongoing student and tutor assessments, and coordination with classroom instruction. In terms of intensity and consistency, Wasik argues that children should receive between one-and-a-half and two hours of weekly reading tutoring, either during a single session or during various shorter sessions. She also advocates working with the same tutor consistently so both parties can form a relationship, and develop interpersonal trust and an appreciation for each other. Tutors also need to have a basic understanding of how the process of reading works and some background information about their child.

Description of the study intervention

The intervention program presented in this study is called Power Lunch and it is implemented by Working in the Schools (WITS). WITS is a literacy organization that offers programs seeking to increase the reading proficiency and learning capacity of low-income and minority students in public schools. Founded in 1991, WITS recruits and supports dedicated business, government and community volunteers who deliver measurable and consistent tutoring and mentoring services. While WITS offers a series of other programs through which volunteers help children build the skills they need to succeed as adults, while providing teachers and principals with valuable support, the present study focuses specifically on Power Lunch.

Power Lunch is a paired intergenerational reading-aloud tutoring program available in various U.S. cities. Founded in 1991 by Everybody Wins! New York, the program was launched in 1995 and WITS began implementing it during the Fall of 2001. Its main goal is to instill the love and passion for reading within elementary students. Operationally, the program aims to improve, or to maintain when healthy, six different aspects of reading: 1) students' positive attitudes toward reading; 2) students' intrinsic motivation to read; 3) reading achievement; 4) students' reading confidence; 5) recreational reading in and out of school; and 6) reading-related skills and habits.

Power Lunch is implemented with low academic performing public schools located across Chicago. The vast majority of the students served live in poverty (i.e., 90% qualify for free lunch) and belong to a racial/ethnic minority group (i.e., 80% are African-American, 15% are Hispanic, and 5% belong to other groups). Participating students are grouped in whole classrooms. The process of classroom selection is based on practical grounds and is conducted by teachers, school officials, and WITS. Once each group of volunteers is assigned to work with a specific classroom, each volunteer is paired with a student and the same working dyad is maintained throughout the implementation. For schedule flexibility, reading tutors may choose to alternate weeks with a partner.

On the same day each week, reading tutors meet with their students during their lunch break. Upon arrival, reading tutors check in with an on-site school coordinator and proceed to a designated reading area. During the regular 45-minute session, reading tutors and students select their favorite readings from a wide variety of high quality, age-appropriate books provided to all participating classrooms by WITS, read aloud to each other, share favorite stories and talk about books.

Power Lunch offers even the busiest professionals the opportunity to work with academically at-risk children. Professionals are recruited from private and public organizations located nearby schools and participation is completely voluntary. All potential tutors must complete criminal background checks and provide personal and professional references. After being screened, they receive formal training, including a handbook advising how to read aloud to children. WITS provides tutors with round trip transportation from their workplace to the school and back. In most sites where Power Lunch is offered, the program is run throughout the school year. Students receive on average about 30 hours of program exposure when participating during the whole school year provided by either the same reading tutor or from the same pair of reading tutors.

Power Lunch engages community members as well through the role of the school coordinator. These are mostly hired parents who offer support, answer questions and ensure a rewarding reading experience for both tutors and students. Besides tracking attendance, accommodating tutors' schedules, and monitoring logistical details such as food distribution, greeting and dismissing, coordinators serve as the liaison between WITS and the tutoring group. When a tutor is unable to attend the program, coordinators are responsible for contacting his or her reading partner or finding substitutes to ensure that no student is left without a reading tutor.

Each program site is also monitored and supervised on a regular basis by a staff member from WITS. These visits usually take place every week or every other week. WITS receives advice from classroom teachers and reading specialists at each school. This is particularly useful when working with struggling readers so that tutors are better equipped to address their needs. During holidays, books are given as presents.

The staff also carries out yearly evaluations of the program to establish its impact among participating students. Pretest measures from teachers, students, and volunteers are used to gain knowledge about the needs of all parties and the fidelity with which the program is delivered on a regular basis. Reading tutors are given the opportunity to share experiences and suggestions in order to document reading-related and behavioral changes and make necessary changes in the program when needed.

Power Lunch incorporates many of the principles that experts recommend to insure some degree of success. At a more theoretical level, it applies important aspects of developmental learning models as well. For instance, the approach taken resembles Holdaway's (1979, cited in Mandel Morrow, 1992, p. 254) developmental learning theory which specifies four processes that enable children to acquire literacy abilities: (1) observation of literacy behaviors such as being read to and seeing adults read; (2) collaboration between the child and another individual who provides encouragement and help; (3) practice of what has been learned by reading alone or with others; and (4) performance and sharing of what has been learned to obtain approval from a supportive adult.

The program also resembles Cambourne's (1988, cited in Mandel Morrow, 1992, p. 254) model of learning which specifies learners' various needs. First, they need to be immersed in different types of texts. Second, they need multiple demonstrations of how printed material is used and constructed. Third, they need to interact with individuals with high expectations regarding the learners' success. Fourth, they need opportunities to take responsibility for their learning experience and exercise freedom and choice about when, how, and what to learn. Fifth, they need the chance to make mistakes when

engaged in literacy activities. Finally, they also need constructive, timely, and non-threatening feedback from someone knowledgeable.

Another principle shared by Power Lunch is that of mediation which emphasizes reading as an interactive and collaborative process between a child and a caring adult (see Overett & Donald, 1998). Vygotsky (1978) argued that any significant adult in the child's social environment may mediate the construction of meaning. Feuerstein and Feuerstein (1991) assert that the mediator guides and extends the child's thinking and processing during shared experiences of meaningful learning such as reading-aloud programs.

Hypotheses

The primary objective of the present study is to examine the multilevel longitudinal effect of the paired intergenerational read aloud program Power Lunch on academically at-risk elementary students based on three main reading-related outcomes: attitudes toward reading, reading motivation, and reading achievement. In addition, this study seeks to shed some light on the interplay of these three outcomes across time.

The contributions of the present study are both applied and theoretical. On one hand, it informs Working In the Schools (WITS), the organization that implements the Power Lunch program, the extent to which four different cohorts of students have experienced any improvements or benefits in the areas of reading attitudes, reading motivation, and reading achievement across time because of their participation. This study will, therefore, further the evidence accumulated of short-term program effectiveness documented in a series of evaluations (Portillo & Weiner, 2002, 2003; Portillo et al., 2004; Portillo & Davis, 2005) by including a number of additional

multilevel longitudinal analyses. On the other hand, this study will help understand the role of reading attitudes and reading motivation in the development of reading skills among children and increase the understanding of how these variables interplay across time while controlling for several variables from a longitudinal and a multilevel perspective. In addition, it will help expand the research on attitudes and motivation, two prominent areas of inquiry in social psychology rarely explored among children.

The present work has numerous advantages compared to past studies that look at reading-related outcomes and read-aloud programs because it addresses many of their shortcomings. As described earlier, it includes a larger combined sample size, an interpretable quasi-experimental design, a set of sound and widely used measures, a larger span of time to test the sustainability of results, multiple sources of information, a number of consecutive implementations across multiple years, and a more complex statistical approach that addresses multilevel longitudinal data. In fact, this study is perhaps among the first ones to assess the longitudinal effect of a paired intergenerational reading-aloud program on academically at-risk elementary students employing multilevel modeling. For a better understanding of the hypotheses of this study, Appendix A includes the methodological design employed in the study. In addition, Appendix B includes a total of 11 Hierarchical Linear Modeling (HLM) equations used to test all hypotheses.

Hypothesis 1. Because little is known about the short and long term impact of early reading interventions from a multilevel perspective, this study will determine how students participating in Power Lunch fared on two measures of reading attitudes (i.e., attitudes toward recreational reading and attitudes toward academic reading) and two measures of intrinsic reading motivation (i.e., topic reading motivation and individual

reading motivation) within the same school year compared to non-participating students. It will also determine how participating students and non-participating students performed on a measure of reading achievement within an interval of two to five years, according to their respective cohort.

For the two measures of reading attitudes (i.e., attitudes toward recreational reading and attitudes toward academic reading) and two measures intrinsic reading motivation (i.e., topic motivation and individual reading motivation), it is hypothesized that students participating in Power Lunch will exhibit more positive attitudes toward recreational and academic reading as well as topic and individual reading motivation than non-participating students by the end of the program after controlling for the effects of grade, gender, cohort, the interactions of group, grade, gender and cohort (i.e., group by grade, group by gender, group by cohort, grade by gender, grade by cohort, gender by cohort), school membership, and the effect of non-measured variables (see Model equations 1 to 4).

For the measure of reading achievement, it is hypothesized that Power Lunch students will outperform non-Power Lunch students within an interval of up to five school years after controlling for the effects of school mobility, grade, gender, cohort, the interactions of group, grade, gender and cohort (i.e., group by grade, group by gender, group by cohort, grade by gender, grade by cohort, gender by cohort), school membership, and the effect of non-measured variables (see Model equation 5). Although differences in reading attitudes, reading motivation, and reading achievement are likely to exist among the 12 schools included in the analyses, no specific predictions are made about where those differences will emerge.

Hypothesis 2. As an extension of the first hypothesis, this study will also examine the role of gender and grade level in predicting reading attitudes and reading motivation. In addition, it will examine the role of gender on reading achievement. Past studies strongly suggest that girls tend to have more positive reading attitudes and reading motivation than boys. In addition, students in higher grade levels tend to have less favorable reading attitudes and reading motivation compared to students in lower grade levels. Research indicates also that girls usually outperform boys in reading achievement.

Based on these findings, it is hypothesized that girls will exhibit more positive recreational and academic reading attitudes, and topic and individual reading motivation than boys by the end of the program after controlling for the effects of group, grade, cohort, the interactions of group, grade, gender and cohort (i.e., group by grade, group by gender, group by cohort, grade by gender, grade by cohort, gender by cohort), school membership, and the effect of non-measured variables (see Model equations 1 to 4). Lower grade level students should also exhibit more positive attitudes toward recreational and academic reading, and topic and individual reading motivation than higher grade level students by the end of the program after controlling for the effects of group, gender, cohort, the interactions of group, grade, gender and cohort (i.e., group x grade, group x gender, group x cohort, grade x gender, grade x cohort, gender x cohort), school membership, and the effect of non-measured variables (see Model equations 1 to 4).

In addition to the hypothesized gender and grade level effects, a separate group by gender interaction effect is expected in favor of Power Lunch students for both types of reading attitudes and reading motivation after controlling for the effects of group, gender, grade, cohort, five remaining interactions of group, grade, gender and cohort (i.e., group

by grade, group by cohort, grade by gender, grade by cohort, gender by cohort), school membership, and the effect of non-measured variables (see Model equations 1 to 4).

A further group by grade interaction effect is expected in favor of Power Lunch students for both types of reading attitudes and intrinsic reading motivation as well, after controlling for the effects of group, gender, grade, cohort, five remaining interactions of group, grade, gender and cohort (i.e., group by gender, group by cohort, grade by gender, grade by cohort, gender by cohort), school membership, and the effect of non-measured variables (see Model equations 1 to 4).

For reading achievement, it is predicted that girls will be more likely to outperform boys across time after controlling for the effects of school mobility, group, cohort, the interactions of group, grade, gender and cohort (i.e., group by grade, group by gender, group by cohort, grade by gender, grade by cohort, gender by cohort), school membership, and the effect of non-measured variables (See Model equation 5). An additional group by gender interaction effect is predicted in favor of Power Lunch participants for reading achievement after controlling for the effects of school mobility, group, grade, cohort, five remaining interactions of group, grade, gender and cohort (i.e., group by grade, group by cohort, grade by gender, grade by cohort, gender by cohort), school membership, and the effect of non-measured variables (see Model equation 5). No specific schools effects are predicted for the second hypothesis either.

Hypothesis 3. Researchers argue that both reading attitudes and reading motivation should be positively associated with each other, but no single study has examined this relationship, especially from a multilevel perspective. The present study will determine if the two dimensions of intrinsic reading motivation (i.e., topic reading

motivation and individual motivation), measured at the beginning (Fall) and at the end (Spring) of the each school year, predict the two dimensions of reading attitudes (i.e., attitudes toward recreational reading and attitudes toward academic reading) taken at pretest and posttest for each student cohort.

More specifically, the present study hypothesizes that both pretest and posttest measures of both dimensions of reading attitudes will be positively predicted by the two dimensions of reading motivation taken at pretest, after controlling for the effects of group, grade, gender, cohort, the interactions of group, grade, gender and cohort (i.e., group by grade, group by gender, group by cohort, grade by gender, grade by cohort, gender by cohort), school membership, and the effect of non-measured variables. Similarly, the present study hypothesizes that posttest measures of both dimensions of reading attitudes will be positively predicted by the two dimensions of reading motivation taken at posttest, after controlling for the same model effects (see Model equations 6 to 9). Table B in Appendix C depicts schematically the 12 effects expected as part of Hypothesis 3.

Hypothesis 4. Related to the association of reading attitudes, reading motivation, and reading achievement, the literature on reading acquisition points out that reading motivation is a better predictor of future reading performance than reading attitudes. Furthermore, the same body of research suggests that reading attitudes and reading motivation are better predictors of future reading performance when all measures are proximal rather than distal, but no study has attempted to examine this claim using both the initial status and the growth rate of reading achievement. Other findings imply that measures of reading motivation completed by teachers are better predictors of reading

achievement than measures completed by students because teachers' reports are more closely guided by the reading performance of the students than the reports offered by students. These two claims have not been tested concurrently in any previous study using longitudinal data and both teacher and student reports.

Based on these findings, it is hypothesized that both pretest and posttest measures of the two dimensions of intrinsic reading motivation (i.e., topic and individual reading motivation) will be better predictors: 1) of students' reading achievement both at the initial status and across time than the two dimensions of reading attitudes (i.e., recreational and academic reading attitudes), taken at the pretest and the posttest; and 2) of initial status of students' reading achievement (i.e., proximal prediction) than of its growth rate (i.e., distal prediction), after controlling for the effects reading attitudes and intrinsic reading motivation, school mobility, group, grade, cohort, the interactions of group, grade, gender and cohort (i.e., group by grade, group by gender, group by cohort, grade by gender, grade by cohort, gender by cohort), school membership, and the effect of non-measured variables (see Model equations 10 and 11). Table C in Appendix D depicts schematically the 16 effects expected as part of Hypothesis 4.

In sum, and expressed in terms of statistical effects, the present study predicts, after controlling for all model effects, the following results:

Hypothesis 1: A group effect for the posttest measures of reading attitudes and intrinsic reading motivation, and group effect for the growth rate of reading achievement.

Hypothesis 2: A gender and grade effects for the posttest measures of reading attitudes and intrinsic reading motivation. Additionally, a group by gender and a group by grade interaction effects for the posttest measures of reading attitudes and intrinsic

reading motivation in favor of participating students. For reading achievement, a gender as well as a group by gender effect is predicted in favor of participating students for their reading growth rate.

Hypothesis 3: A pretest and a posttest topic and individual reading motivation effects for pretest measures of recreational and academic reading attitudes. In addition, this study predicts a posttest topic and individual reading motivation effect for posttest measures of recreational and academic reading attitudes.

Hypothesis 4: A pretest and posttest recreational and academic reading attitude effects for the initial status and growth rate of reading achievement and a pretest and posttest topic and individual reading motivation effects for the initial status and growth rate of reading achievement as well.

CHAPTER THREE

METHOD

Participants

Between the years of 2002 and 2006, Power Lunch was implemented in four occasions and evaluated an equal number of times. Initially, a total of 1,866 students, among participants and non-participants were included in the evaluations of the program. However, more than half of that number was left out and only 866 students were included in the present study. Both the criteria for inclusion and the selection procedures that led to this sample size are presented in the section of sample selection.

All 866 students were distributed across four different cohorts. The first cohort was comprised of 140 students who attended school during the 2002-2003 academic year; 84 students participated in the Power Lunch program and 54 students did not. Cohort 1 students came from three different public schools (Schools F, H, and L). About 28.6% of all cohort students were first graders and 61.4% were third graders. Participating students were 58% female and 42% male. Among control students, 54% were female and 46% were male. On average, treatment students were 7.65 years old (SD = 1.29) and control students were 7.80 years old (SD = 1.41). All cohort 1 students were African-American.

The second cohort included a total of 236 students who attended school during the 2003-2004 academic year; 108 of whom were Power Lunch participants and 128 were not. Cohort 2 students came from five different public schools (Schools A, D, G, I, and

L). About 13.6% of all cohort students were first graders, 29.7% were second graders, and 56.78% were third graders. Participating students were 54% female and 46% male. Among control students, 46% were female and 54% were male. On average, treatment students were 8 years old (*SD* = .90) and control students were 8.12 years old (*SD* = 1.09). All cohort 2 students were African-American.

The third cohort included a total of 295 students who attended school during the 2004-2005 academic year; 169 of whom were Power Lunch participants and 126 were not. Cohort 3 students came from five different public schools (Schools D, G, H, I, and K). About 29% of all cohort students were second graders and 71% were third graders. Participating students were 47% female and 53% male. Among control students, 54% were female and 47% were male. On average, treatment students were 8.23 years old (*SD* = .80) and control students were 8.41 years old (*SD* = 0.98). All cohort 3 students were African-American.

The fourth and last cohort included a total of 195 students who attended school during the 2005-2006 academic year; 86 were Power Lunch participants and 109 were not. Cohort 4 students came from six different public schools (School B, C, E, G, and J). All students were third graders. Participating students were 52% female and 48% male. Among control students, 57% were female and 43% were male. On average, treatment students were 8.39 years old (*SD* = .52) and control students were 8.54 years old (*SD* = 0.74). About 67% of all treatment students were African-American, 16% were Hispanic (16%), and were Asian (17%). Among control students, 55% were African-American, 14% were Hispanic, and 31% were Asian as well. The composition of all cohorts by grade, school, and group condition are presented in Table D in Appendix E.

Students from all four cohorts were distributed across 12 public schools (i.e., Schools A to L) during the initial status year (i.e., Year 0). The majority of the schools were located in socio-economically depressed neighborhoods and areas of the city that were experiencing rapid gentrification. All school were attended by low-income and minority students; between 90% and 95% qualified for free lunches and most students were either African-American or had Hispanic heritage. In addition, most schools were low-academic achieving. In fact, one of them was closed for that reason during the period of 2002 and 2007 and two more were scheduled to close after 2007. Two additional low performing schools were on academic probation during the 2002-2007 period and faced constantly the threat of closing down.

The compounded effect of educational policies based on testing performance, urban gentrification, and low socio-economic status among students is reflected in their high rates of school mobility. Across all cohorts and follow up periods, 44% of students moved to another school between one and four times. As a result, from the original 12 schools attended, students were scattered in 198 schools by the Spring of 2007. Mobility rates for cohorts 1 to 4 were 71%, 55%, 40%, and 19%. Kerbow, Azcoitia, and Buell (2003) report that, on average, 50% of the elementary students in Chicago public schools remain in the same school during a three-year period. The present study's mobility rates are in line with that estimate and indicate that they keep growing with every year added.

Measures

All the measures in this study were developed by other researchers and are known for their wide use among researchers and educators alike. The study measured

specifically three outcomes: attitudes toward reading, reading motivation, and reading achievement.

Attitudes toward reading. Students' attitudes toward reading were measured with the Elementary Reading Attitude Survey (ERAS; McKenna & Kear, 1990, 1999). The ERAS is a public-domain instrument designed especially for students in grades 1 through 6. The complete scale includes 20 items that address two specific types of attitudes toward reading: attitudes toward recreational reading and attitudes toward academic reading. Each attitude type or dimension is measured by a 10-item subscale. Recreational items focus on reading for pleasure and entertainment outside the school setting, while academic items examine reading as it occurs in school settings. An example of a recreational item is "How do you feel about spending free time reading?" An example of an academic item is "How do you feel when the teacher asks you questions about what you read?" The survey may be administered to groups of children and may be read to them or read independently by each child.

All items are accompanied by four pictures of the cartoon character Garfield. In each picture, Garfield has different facial and body expressions that range from *very upset* to *very happy*. Students are instructed to circle the expression that best represents their feelings about each statement. Responses are quantified by assigning 1 to 4 points to item responses, from most negative (*very upset*) to most positive (*very happy*), respectively. Scores can range from 20 to 80 points for the complete scale and from 10 to 40 points for each subscale. A copy of the complete survey is included in Appendix F.

According to McKenna et al. (1995a), the internal consistency of the instrument and its subscales as measured by the alpha coefficient ranges between .74 and .89. In the

present study, alpha coefficients ranged between 0.59 and 0.80 for the recreational reading attitudes subscale and between 0.63 and 0.83 for the academic reading attitudes subscale. Although no previous study has ever reported the multilevel reliabilities for both subscales, they ranged between 0.50 and 0.64 in the present study.

To establish the construct validity of the ERAS, the authors followed a number of procedures. For the recreational subscale, they showed that higher recreational scores were associated with higher library membership and use, and with fewer hours spent watching TV. For the academic subscale, they found that students categorized by their teachers as having a superior reading ability obtained higher attitudinal scores.

Although McKenna's (1995a) two-faceted model has been challenged by Portillo (2008), who advocates the presence of a single factor —at least among young students from grades 1 to 3— three additional studies suggest that the ERAS has indeed two main dimensions (Kazelskis et al., 2004; Thames et al., 2001; Worrell et al., 2007). Because there seems to be more evidence favoring the two-factor model, this study adopted it and used it when reporting any reading attitudes results.

Based on the large number of reading attitudes studies currently available, the ERAS is arguably the most popular instrument used to measure children's reading attitudes among literacy researchers and educators, especially in the U.S. Since its public release, the ERAS has been employed in several studies dealing with reading intervention programs (Angeletti et al., 1996; Blaisdell et al., 1999; Boland-Willms, 1992; Davenport, Arnold, & Lassmann, 2004; Diamond & Onwuegbuzie, 2000, 2001; Fifield & Shepperson, 2005; Fitzgibbons, 1997; Galezio, Nyberg, & Orman, 1994; Jacobson et al. 2001; Kim, 2004; Overett & Donald, 1998; Porter, 1995; Portillo & Weiner, 2002, 2003;

Portillo et al., 2004; Portillo & Davis, 2005; McNinch, 1997; Rains, 1993; Reeves & Thames, 1994; Robertson, 1993; Smith et al., 2000; Usen, 1999), gender-related attitude differences (Cloer & Pearman, 1992; E. McKenna, 1997), reading instruction style (Bottomley et al., 1999; Brungardt, 1994; Dale & Radell, 1995; Friend, 1995; McKenna, Stratton, Grindler, & Jenkins, 1995b), students' disengagement (Beck, 2004), and computer-assisted literacy programs (Mostow et al., 2002; Vollands, Toping, & Evans, 1996, 1999).

The ERAS has been used in other studies dealing with students with learning disabilities (Davis Lazarus & Callahan, 2000) and talented students (Cavazos-Kottke, 2006; Worrell et al., 2007), explorative inquires (Gettys & Fowler, 1996), impact of response format (Smith & Ryan, 1997), and assessment of psychometric-related characteristics such as short and long term reliability (Kazelskis et al., 2005; Kush & Watkins, 1996; Kush, Watkins, McAleer, & Edwards, 1995), validity (Allen, Cipielewski, & Stanovich, 1992), concurrent reliability and validity (McKenna et al., 1995b), as well as factorial structure and factorial invariance (Kazelskis et al., 2004; Portillo, 2008; Thames et al., 2001; Worrell et., 2007).

Reading Motivation. The Teacher Questionnaire on Student Motivation to Read (TQSMR; Sweet et al., 1998) was employed by both treatment and control teachers to measure two types of intrinsic motivation among students: topic and individual. Although the TQSRM includes a total of 24 items distributed among six subscales that measure six reading motivation dimensions, only the topic and individual reading motivation constructs were included in the evaluation of Power Lunch. This was done largely to avoid burdening teachers with lengthy questionnaires. The topic and individual

dimensions were selected among all six dimensions because they were psychometrically the strongest among all (Sweet et al., 1996).

As noted earlier, Sweet and her colleagues (1998) make the distinction between intrinsic and extrinsic motivation and, in the context of the program, intrinsic motivation was deemed more relevant. Four items measure topic motivation and five items measure individual motivation. Topic reading motivation refers to the teacher perceptions of how frequently students show specific reading preferences and read favorite themes or topics. Individual reading motivation refers to the disposition of students to read widely and frequently during long periods of time. An example of a topic reading motivation item is "This student has definite preferences for favorite topics and authors." An example of an individual reading motivation item is "This student is a voracious reader."

All items seek to capture the frequency of specific reading behaviors or tendencies using a 4-point scale that ranges from *rarely* (i.e., the student exhibit this behavior only twice or never) to *often* (i.e., the student exhibit this behavior nearly every day for substantial amounts of time). Teachers are instructed to rate each student using the frequency continuum offered to them. Responses are quantified by assigning 1 to 4 points to item responses, from least frequent (*Rarely*) to most frequent (*Often*), respectively. Scores can range from 4 to 16 points for the topic reading motivation subscale and from 5 to 20 for the individual reading motivation. Items worded negatively were reversed-coded. A copy the two subscales used is included in Appendix G.

Sweet et al. (1998) report reliabilities of .84 and .89 for the topic and individual motivation subscales, respectively. In the present study, alpha coefficients ranged between 0.85 and 0.93 for the topic reading motivation subscale and between 0.75 and

0.91 for the individual reading motivation subscale. Although no previous study has ever reported the multilevel reliabilities for both subscales, the present investigation found that they ranged between 0.77 and 0.79.

Reading achievement. Reading achievement was measured by two different high-stake tests: the Iowa Test of Basic Skills (ITBS) and the Illinois Standard Achievement Test (ISAT). The ITBS is comprised of a set of standardized tests that were administered annually to students in grades 3 to 8. It takes about five and a half hours to administer and is completed during multiple sessions. Some of the areas assessed at the primary levels are: Vocabulary, word analysis, reading comprehension, listening, language, and mathematics. ITBS reading levels are divided in three categories: below promotion range (score below the 23rd percentile), promotion range (score between the 24th and 34th percentile) and immediate promotion range (score equal to or above to 35th percentile). The ISAT measures individual student achievement relative to the Illinois Learning Standards and includes a reading and a math component as well. ISAT reading levels are divided in four different categories: warning, below the standard, meets the standard, and exceeds the standard.

The ITBS results included in this study were collected between the Spring terms of 2003 and 2005. The ISAT results were collected during the Spring terms of 2006 and 2007. The use of two different reading achievement tests in this study was due to changes implemented by Chicago Public Schools (CPS) in the annual measurement of reading achievement among students. Until the 2004-2005 school year, the ITBS was administered in conjunction with the ISAT, but during the school year of 2005-2006, the ITBS was discontinued and the ISAT became the new standard measure of reading

achievement. It should be noted that CPS also made some changes in the metrics of the ISAT used in the 2005-2006 school year in comparison to the versions administered in previous years. Because of the changes in reading achievement tests, direct comparisons across years were not feasible. Furthermore, in the process of data collection it was not possible to obtain all the times the three main pieces of information of students' reading achievement: raw scores, percentiles, and achievement level categories. In some cases, information was available for reading category only, which gave just the achievement range where students fell in (e.g., score between the 24th and 34th percentile). In order to use the scores of the ITBS and ISAT longitudinally and concurrently, results were alternatively dichotomized to reflect two reading levels: Met reading grade standard and did not meet reading grade standard. In the present study, the multilevel reliabilities for the dichotomized measure of reading achievement ranged between 0.38 and 0.51.

Procedures

As a provider of tutoring services for the CPS, WITS has partnered with schools attended primarily by minority and economically underprivileged children for more than 15 years. When Power Lunch was adopted in the Fall of 2001, a number of schools were approached and asked if they wished to implement it solely with elementary students. In each school, teachers and principals helped select one or more targeted classrooms depending on the number of volunteers available for each site. Whenever possible, a control or comparison classroom was also formed for evaluation purposes.

Once all classrooms were selected at each school, teachers sent permission slips to parents to request their authorization to have their children take part in the program

and/or participate in the evaluation. Treatment and control students completed two instruments during the school year both in the Fall and in the Spring. The first survey collected background information and included specific reading-related information such as reading habits at school and home. The second instrument completed was the ERAS (McKenna & Kear, 1990). Pretest measures among students were gathered within the first month of each school year before the program was implemented and posttest measures were gathered within the last month of the school year. Both student instruments were administered to whole classrooms by trained WITS staff who read aloud all items to students. Administering both instruments took approximately 20-25 minutes on average. The application of instruments was always supervised by the classroom teacher.

Treatment and control teachers completed pretest and posttest surveys. They provided background information (e.g., number of days they read aloud to their students), rated their students' reactions to Power Lunch and their how satisfied with it, and gave feedback about its benefits and suggestions to improve it. They also rated their students' perceived reading level, reading confidence and reading motivation, using the individual and topic subscales included in Sweet et al.'s (1998) TQSRM.

Both treatment and control teachers received both sets of surveys during the first month of the school year (September) and were asked to return them a month later so that they had time to get to know their students. Upon returning their surveys, treatment and control teachers received a $15 gift certificate to a local bookstore to compensate their work and time. This same procedure was implemented both during the pretest and the posttest.

Students' standardized reading achievement scores were obtained directly from CPS. WITS collected the identification number of participating and non-participating students and provided them to CPS during the summer of each school year. WITS also requested to CPS the reading scores of past participating and non-participating students as well as information about school transference. With all information compiled by WITS, CPS identified the students and provided all the requested information in electronic format.

Due to the changes in reading achievement tests implemented by CPS, students included in this study took both the ITBS and the ISAT or just the ISAT. More specifically, cohort 1 students took the ITBS three times between 2003 and 2005, and the ISAT twice between 2006 and 2007 (see subscripts A and B in Table A in Appendix A). Similarly, cohort 2 students took the ITBS and ISAT two times each between 2004 and 2007. Cohort 3 students took the ITBS once in the Spring of 2005 and the ISAT twice during the Spring terms of 2006 and 2007. Finally, cohort 4 students took the ISAT only twice during the Spring terms of 2006 and 2007.

Sample selection

The sample selection followed a two-step procedure based on well defined criteria. The number of student assessed in the evaluations of Power Lunch between 2002 and 2007 was 1,866. From that number, students were excluded in the first step whenever any of the four following criteria applied: a) no control condition was available within the same school and grade level; b) no treatment condition was available within the same school and grade level; c) no student unique identifier was available for whole

classrooms; and d) the grade level was higher than third grade. These criteria were used in the first step for three main reasons: a) to preserve the integrity of the study's quasi-experimental design by having treatment and control groups originating within the same schools; b) to ensure that whole classrooms were not missing longitudinal reading achievement information, which was available only if their unique identifiers were known; and c) to keep the results within the grade level boundaries of first and third graders.

After applying the described selection criteria to all cohorts, 170 students were kept from cohort 1; 285 were kept from cohort 2; 325 were kept from cohort 3; and 220 were kept from cohort 4. In total, 1,000 students were kept and 886 were excluded. About 70% of the excluded students were participants who could not be matched to a control group within the same school and grade level, 11% were control students who could not be matched to a treatment group within the same school and grade level (which happened when treatment students exhausted all classrooms and control students were obtained from other participating schools), 10% did not have any longitudinal data available, and 9% were fourth graders.

In the second step of the sample selection, individual students were further excluded from the 1,000 students kept in the first step if they did not have any longitudinal data available, which suggested that they might had left the local schools system. Since students who left could have differed from those may differ from those who did not in a systematic way, both groups were compared statistically based on four variables (i.e., gender, age, grade, and group condition) in order to test for any potential selection bias.

From the 170 cohort 1 students kept, 28 students were excluded in the second step of the sample selection. When both groups were compared, results showed that those who were excluded and those who were ultimately selected for the study did not differ statistically in terms of gender, $\chi^2(1) = 1.90$, $p = .17$; age (8.24 vs. 7.71, respectively), $F(1, 159) = 2.99$, $p = .10$; grade level, $\chi^2(1) = .78$, $p = .34$; and group condition, $\chi^2(1) = 2.94$, $p = .10$.

From the 285 cohort 2 students kept, 48 students were excluded in the second step of the sample selection. When both groups were compared, results showed that those who were excluded and those who were selected for the study did not differ statistically in terms of gender, $\chi^2(1) = .50$, $p = .48$; age (8.06 vs. 7.90, respectively), $F(1, 284) = 1.09$, $p = .30$; and grade level, $\chi^2(2) = 3.27$, $p = .20$. A statistically significant difference was found, however, based on their group condition, $\chi^2(1) = 10.69$, $p < .01$. It was established that while half of the treatment students excluded came from one of the 12 schools (School L), control students came from five different schools in even proportions. School L was one of the schools closed down during the follow up period.

From the 325 cohort 3 students kept, 33 students were excluded in the second step of the sample selection. When both groups were compared, results showed that those who were excluded and those who were selected for the study did not differ statistically in terms of gender, $\chi^2(1) = .91$, $p = .34$; age (8.17 vs. 8.34, respectively), $F(1, 324) = 1.00$, $p = .32$; grade level, $\chi^2(1) = 2.59$, $p = .11$; and group condition, $\chi^2(1) = 2.15$, $p = .14$.

Finally, from the 220 cohort 4 students kept, 25 students were excluded in the second step of the sample selection. When both groups were compared, results showed that those who were excluded and those who were selected for the study did not differ

statistically in terms of gender, χ^2 (1, 219) = .54, p = .46; age (8.44 vs. 8.48, respectively), F(1, 215) = 1.00, p = .76; and group condition, χ^2 (1, 219) = 2.36, p = .13. No grade level comparisons were made because all students were third graders. After applying the selection criteria to all cohorts in the second step, 142 students were kept from cohort 1; 237 were kept from cohort 2; 292 were kept from cohort 3; and 195 were kept from the cohort 4 for a total of 886 students.

Further analyses demonstrated that the treatment and control groups formed based on the 866 students selected for the study did not differ based on gender, age, school mobility, and ethnicity, whenever this latter variable applied. For cohort 1, gender, age, and school mobility results were not statistically significant, χ^2 (1) = .12, p = .73 F(1, 139) = .42, p = .52, and F(1, 141) = .44, p = .51, respectively. For cohort 2, treatment and control students did not significantly differ based on gender, age, and school mobility either, χ^2 (1) = 1.36, p = .24, F(1, 224) = .94, p = .33, and F(1, 235) = 2.04, p = .15, respectively. For cohort 3, no statistically significant differences were established based on gender, age and school mobility between treatment and control students, χ^2 (1) = 2.48, p = .12, F(1, 290) = 1.56, p = .21, and F(1, 290) = .42, p = .52, respectively. No ethnicity group comparisons were made for cohorts 1 to 3 because all students included were African-Americans. Finally, for cohort 4, no statistically significant differences were established based on gender, age, school mobility and ethnicity between treatment and control students, χ^2 (1) = 2.48, p = .12, F(1, 193) = 1.56, p = .21, F(1, 193) = .06, p = .80, and χ^2 (1) = 2.48, p = .12, respectively.

In sum, group comparisons suggested that students who were kept and excluded, after applying the sample selection criteria described earlier, did not differ from each

other across all four cohorts based on their gender, age, grade, and group membership. The only exception to these results emerged for the group variable in the third cohort. Nevertheless, from the 866 students kept in the final composition of the treatment and comparison groups (*N*s = 447 and 419, respectively), not a single statistically significant difference was found across all four cohorts for the variables of gender, age, school mobility, and ethnicity.

CHAPTER FOUR

RESULTS

Data analyses

In order to analyze the data of the present study and test the proposed hypotheses, Hierarchical Linear Modeling (HLM) was employed. In total 11 primary analyses were performed using the multilevel statistical software HLM 6.05 (Raudenbush & Bryk, 2002; Raudenbush et al., 2004). Each of these analyses corresponded to the 11 model equations presented in Appendix B.

Each model equation had three levels. Level-1 included observations nested within time. Outcome variables were modeled by an intercept (i.e., grand mean at initial status), a time variable (i.e., posttest or year), and an error term. No error term was computed when the outcome was binary. Time was dummy-coded (0 = Pretest; 1= Posttest) when reading attitudes and reading motivation where set as outcomes. When reading achievement was the outcome, time corresponded to the annual tests taken during the Spring term of each school year (0 = ITBS taken in 2003; 1 = ITBS taken in 2004; 2 = ITBS taken in 2005; 3 = ISAT taken in 2006; and 4 = ISAT taken in 2007). This arrangement meant that cohort 1 students had five reading achievement points, cohort 2 students had four reading achievement points, cohort 3 students had three reading achievement points, and cohort 4 students had two reading achievement points (for a visual depiction of this arrangement, see Table A, Appendix A).

HLM offered the advantage of entering all reading achievement information available for each student and synthesized it all in one overarching model by averaging the trends for all four cohorts. It is important to note that for all statistical analyses in which reading attitudes and motivation were used as outcomes, they were set as continuous. When the outcome was reading achievement, it was set as a binary (Bernoulli) outcome. For the variable that captured time, either for pre/posttest or year, no particular centering was selected since zero had a specific meaning (i.e., pretest or initial status year) in the coding scheme.

Level-2 included observations nested within students. At Level-2, both the intercept (i.e., initial status) and the time variable (i.e., posttest change or growth rate across years) were modeled as outcomes using several individual-level predictors. Depending on the outcome analyzed, Level -2 included a combination of the following predictors: Pretest and posttest recreational reading attitudes, pretest and posttest academic reading attitudes, pretest and posttest topic reading motivation, pretest and posttest individual reading motivation, school mobility (0 = No school transfer to 4 possible transfers), group (0 = Control; 1 = Treatment), gender (0 = Female; 1 = Male), grade level (0 = Grade 1; 1 = Grade 2; and 2 = Grade 3), cohort (0 = Cohort 1; 1 = Cohort 2; 2 = Cohort 3; and 3 = Cohort 4). It also included six possible interaction terms: Group by grade, group by gender, group by cohort, grade by gender, grade by cohort, and gender by cohort. In addition, only one random effect was entered at Level-2 for the intercept which meant that the effects of the individual-level predictors on the initial status were allowed to vary between students. No random effect was added to the modeled growth rate at Level-2, however.

The location of the random effects was informed by tests of model fit based on deviance statistics and reliability estimates that indicated that having a random effect for the intercept was statistically more appropriate than having a random effect for the growth rate. Information about the model fit results for the majority of the 11 models run (see Appendix B) is presented in the results section. All individual predictors entered at Level 2 were grand mean centered as recommended by Raudenbush and Bryk (2002, p. 35).

Level-3 included observations nested within the 12 initial status schools. For the reading achievement outcome, school membership corresponded to the school at initial status and not to the schools where students moved to in the follow up period, if they happened to transfer out. Ideally, all 198 schools where students ended moving to needed to be entered into each of the models so that school effects and mobility effects were taken into account simultaneously. However, the sparsity of the mobility trends —one third of the 198 schools had only one student observation— prevented such analysis. As an alternative, a variable that captured mobility was created as a continuous variable and added at Level-2 to control for any effect associated with staying or migrating to another school during the follow up periods used in the study. Mobility was not entered as a predictor of reading attitudes and reading motivation because students had to remain by definition in the same school, throughout the whole academic year, in order to have matched pretest and posttest attitudinal and motivational assessments.

Level-3 included two random effects: one that allowed initial status observations to vary and another one that allowed all growth rates to vary from school to school. No school level predictors (e.g., school size) were entered at Level-3.

Treatment of missing data

Missing data were handled in different ways. First, whenever students had at least 80% of the complete data for the measures of reading attitudes and reading motivation, a mean imputation was performed for items that were missing. However, if students had less than 80% of the data or were missing either the complete pretest or posttest assessment of the reading attitudes or reading motivation measures, listwise deletion was employed.

It is necessary to acknowledge that the most complete set of data among all three outcomes measured in the study was that of reading achievement. In addition, more students had more complete data on reading attitudes than on reading motivation, which was reported by teachers. During the multiple implementations of Power Lunch, teachers were encouraged to collaborate, but participation was entirely voluntary. In many cases, it was difficult to obtain full cooperation from teachers, especially from comparison teachers since they saw no direct and immediate benefit in taking part in the evaluation of the program. Although teachers were always compensated for their time and input, many failed to return their completed measures which resulted in unmatched sets of pretest and posttest measures. In other cases, teachers left the school for professional and personal reasons and posttest measures could not be obtained for their respective classrooms.

For these reasons, from the 140 cohort 1 students who had complete longitudinal reading achievement information, only 121 had complete reading attitudes measures, and none had reading motivation measures. Among cohort 2 students, 236 had complete longitudinal reading achievement information, but only 208 had complete measures of reading attitudes, and only 195 had complete measures reading motivation. Among

cohort 3 students, 295 had complete longitudinal reading achievement information, 207 had complete reading attitudes measures, and only 150 had complete reading motivation measures. Finally, from the 195 cohort 4 students who had complete longitudinal reading achievement information, only 169 had complete reading attitudes measures and only 119 had complete reading motivation measures. Cohort 1 students had no reading motivation measures because teachers were not asked to complete any measures until the 2003-2004 implementation of Power Lunch, which corresponds to cohort 2 students.

Although reading achievement information was the most complete among all three outcome variables, some missing data was still present. In many cases, CPS was not able to provide all necessary information because students missed the administration of the tests and had no reading scores available for specific years. In such cases, whenever a student had at least two reading achievement data points, HLM offered the advantage of working with that information to perform the analyses. This allowed the inclusion of more participants in the study, even if they were partially missing some reading achievement information.

Model selection

In order to test the hypotheses of the present study, a series of plausible models were contrasted using their AIC[1] (see Akaike, 1974). The best model was selected by examining their relative distance to the "truth" (see Burnham & Anderson, 2002). The advantage of using AIC when comparing models is that they do not need to be nested within each other, hence, models can have different sets of parameters. The reliability of

[1] AIC: Akaike's information criterion = Model deviance statistic + (Number of parameters x 2)

the random coefficient was also used to select the best model. Whenever a model was between five to 10 AIC units smaller than another model, it was considered to have a better fit. In addition, models with higher reliability coefficients were favored over models with lower reliability. Because no deviance statistic is provided for models with binary outcomes, a Laplace estimation was attempted to compare competing models (Raudenbush et al., 2004). Whenever possible, this estimation was used to compute an AIC to select the best model in conjunction with their reliability coefficient.

Treatment of level of statistical significance (p)

In the scientific community, it is customary for researchers to adopt an *a priori* statistical level of significance to guide the inferences made in the process of hypothesis testing (Shaughnessy, Zechmeister, & Zechmeister, 2000). The consensus is that "outcomes associated with probabilities of less than five times out of 100 ($p < .05$) if the null hypothesis were true are judged to be statistically significant" (Shaughnessy et al., 2000, p. 246). In general, the present study employed this level of statistical probability in order to reject or fail to reject the null hypothesis of no statistical difference. If the probability obtained was lower than .05, the null hypothesis was rejected and the outcome was deemed as statistically significant. However, because of the potential implications of the intervention in the areas of best practices and social policy, the present study could not afford missing meaningful results that were in the vicinity of the target probability and, thus, a less stringent probability value range ($p > .05$, but $< .10$) was also used to judge when to reject or fail to reject the null hypothesis. In this second case, results were deemed only as marginally significant.

This treatment, however, runs the risk of increasing the likelihood of making Type I errors, which would result in reporting false positives; that is, rejecting the null hypothesis when it is actually true or affirming that a difference exists when in fact there is none (Howell, 1997). Therefore, marginally significant findings should be interpreted with some caution.

Recreational and academic reading attitudes

According to Hypothesis 1, students participating in Power Lunch should exhibit more positive attitudes toward recreational and academic reading than non- participating students by the end of the program after controlling for all model effects. From the two attitudinal outcomes, findings supported the posttest group effect prediction for attitudes toward recreational reading only. The study did not find evidence of the expected posttest effect for attitudes toward academic reading and, therefore, failed to reject the null hypothesis of attitudinal difference for academic reading between participating and non-participating students in Power Lunch.

Regarding the models' goodness of fit for both recreational reading attitudes and academic reading attitudes, Table 1 shows AIC estimations and reliability coefficients for the two plausible models (i.e., A and B) that were tested. Results demonstrated that for both attitudinal outcomes, *Model B* (i.e., modeled intercept with random effect and modeled slope with no random effect at Level-2) provided the smallest AIC and the highest reliability, two conditions established *a priori* for model selection. Appendix B includes the equations that represent *Model B* for both attitudinal outcomes (see Model equations 1 and 2).

Table 1. Model Fit for Recreational and Academic Reading Attitudes

Outcome	*Model*	*Deviance*	*Reliability*	*Parameters*	*AIC*	*ΔAIC*
Recreational Reading Attitudes	A	8,852.10	0.21	27	8,906.10	78.14
	B*	8,778.96	0.50	27	8,827.96	
Academic Reading Attitudes	A	8,944.64	0.15	27	8,993.64	147.56
	B*	8,797.08	0.61	27	8,846.08	

Plausible models tested: *Model A* had a modeled intercept with no random effect and a modeled slope with a random effect. *Model B* had a modeled intercept with a random effect and a modeled slope with no random effect. Models with the best goodness of fit are marked with an asterisk. Reliability coefficients for *Model A* correspond to the effect of the modeled slope of Level-1. Reliability coefficients for *Model B* correspond to the intercept of Level-1.

Tables 2 and 3 indicate that the pretest (i.e., β_{00k}) means for recreational reading attitudes and academic reading attitudes among control students, across all schools, were equal to 31.62 and 32.15 after controlling for all model effects. Tables 2 and 3 reveal also that both intercepts were significantly different from zero. Among treatment students, the pretest means (i.e., $\beta_{00k} + \beta_{01k}$) for the same two outcomes were 29.97 and 31.97, respectively, after controlling for all model effects. No statistically significant differences existed between both groups at pretest. Further analyses demonstrated that grade, gender, cohort, and the six possible interaction terms of group, grade, gender, and cohort did not significantly predict students' pretest recreational reading attitudes.

A similar pattern emerged for the students' pretest academic reading attitudes with the exception of a statistically significant grade effect which indicated that academic reading attitudes increased as grade level increased. This non-predicted effect was deemed as secondary for Hypothesis 1. Because of the nature of HLM, all posttest model effects controlled for this or any other significant differences found during the pretest.

Tables 2 and 3 present additionally posttest growth rates (i.e., β_{10k} and β_{11k}) that supported the hypothesized effect for attitudes toward recreational reading only; that is, participating students had significantly more positive recreational reading attitudes than non-participating by the end of the program. Table 2 shows that control students significantly decreased their recreational reading attitudes by 2.18 points (i.e., $\beta_{00k} + \beta_{10k}$) between the pretest and the posttest after controlling for all model effects. Conversely, treatment students gained an average of 1.15 points (i.e., $\beta_{10k} + \beta_{11k}$) between the pretest and the posttest for recreational reading attitudes after controlling for all model effects. This growth was statistically significant in favor of program participants.

Table 2. Final Estimation of Fixed Effects for Recreational Reading Attitudes

Fixed Effect	*Coefficient*	*se*	*t-ratio*	*p*
For Intercept 1, π_{0jk}				
Intercept 2, β_{00k}	31.62	0.31	102.76	< 0.01
Group, β_{01k}	-1.65	1.22	-1.35	0.18
Grade, β_{02k}	0.58	0.75	0.77	0.44
Gender, β_{03k}	-0.40	1.24	-0.32	0.75
Cohort, β_{04k}	0.82	1.05	0.77	0.44
Group x Grade, β_{05k}	0.82	0.68	1.21	0.23
Group x Gender, β_{06k}	0.03	0.85	0.03	0.97
Group x Cohort, β_{07k}	0.02	0.61	0.04	0.97
Grade x Gender, β_{08k}	-0.88	0.68	-1.29	0.20
Grade x Cohort, β_{09k}	-0.34	0.54	-0.64	0.53
Gender x Cohort, β_{010k}	-0.38	0.61	-0.62	0.54
For Posttest slope, π_{1jk}				
Intercept 2, β_{10k}	-2.18	0.26	-8.57	< 0.01
Group, β_{11k}	3.33	1.41	2.37	< 0.05
Grade, β_{12k}	-1.62	0.78	-2.09	< 0.05
Gender, β_{13k}	-2.78	1.43	-1.95	< 0.10
Cohort, β_{14k}	-0.67	1.05	-0.64	0.53
Group x Grade, β_{15k}	-1.34	0.78	-1.72	< 0.10
Group x Gender, β_{16k}	-1.58	0.97	-1.63	< 0.10
Group x Cohort, β_{17k}	-0.28	0.70	-0.40	0.70
Grade x Gender, β_{18k}	1.84	0.78	2.35	< 0.05
Grade x Cohort, β_{19k}	0.68	0.52	1.29	0.20
Gender x Cohort, β_{110k}	0.48	0.70	0.69	0.49

Following Muthén and Curran's (1997) method to calculate effect sizes in growth curve models, which yields Cohen-type effect sizes similar to *d* (Cohen, 1988), the treatment effect over the control group during the posttest was equal to .35 for recreational reading attitudes. Based on Cohen's effect size scale (Small = 0.20, Medium = 0.50, and Large = 0.80), the treatment effect was small to medium in magnitude.

Table 3 shows that treatment students showed a non-significant gain of 0.09 points (i.e., $\beta_{10k} + \beta_{11k}$) in their attitudes toward academic reading which suggests that their attitudes remained stable across time. Control students, on the other hand, experienced a slight but statistically significant drop of 0.93 points (i.e., $\beta_{00k} + \beta_{10k}$) by the end of the program. Figures 1 and 2 illustrate the growth for both types of reading attitudes by group condition after controlling for all model effects. The remaining posttest effects shown in Tables 2 and 3 are examined later.

Table 4 displays estimated variances and related χ^2 statistics from the three-level descomposition of both recreational reading attitudes and academic reading attitudes. Results suggested that residual parameter variance still remains to be explained in π_{0jk} and β_{00k} for both attitudinal outcomes. However, little residual variance remains in β_{10k} to be explained. Alternatively, these results indicated that the effect of non-measured variables was significantly captured by the Level-2 random effect (i.e., r_{0jk}) and by one of the Level-3 random effects (i.e., U_{00}) and that the effects of group, grade, gender, cohort, the interactions of all four variables, and school membership varied across students and schools for recreational and academic reading attitudes. Level-3 random effects indicated additionally that schools differed significantly in their overall initial status for both attitudinal outcomes, but not in their growth rate for either reading attitude outcome.

Table 3. Final Estimation of Fixed Effects for Academic Reading Attitudes

Fixed Effect	*Coefficient*	*se*	*t-ratio*	*p*
For Intercept 1, π_{0jk}				
Intercept 2, β_{00k}	32.15	0.36	89.32	< 0.01
Group, β_{01k}	-0.18	1.26	-0.14	0.89
Grade, β_{02k}	1.88	0.82	2.31	< 0.05
Gender, β_{03k}	-1.67	1.28	-1.31	0.19
Cohort, β_{04k}	0.86	1.16	0.74	0.46
Group x Grade, β_{05k}	-0.39	0.70	-0.56	0.58
Group x Gender, β_{06k}	-0.19	0.87	-0.22	0.83
Group x Cohort, β_{07k}	0.09	0.62	0.15	0.88
Grade x Gender, β_{08k}	0.52	0.70	0.74	0.46
Grade x Cohort, β_{09k}	-0.87	0.59	-1.46	0.14
Gender x Cohort, β_{010k}	-0.69	0.63	-1.09	0.28
For Posttest slope, π_{1jk}				
Intercept 2, β_{10k}	-0.93	0.23	-4.01	< 0.01
Group, β_{11k}	1.02	1.33	0.77	0.44
Grade, β_{12k}	-1.62	0.72	-2.24	< 0.05
Gender, β_{13k}	-2.59	1.35	-1.92	< 0.10
Cohort, β_{14k}	-0.24	0.98	-0.24	0.81
Group x Grade, β_{15k}	-0.33	0.73	-0.45	0.65
Group x Gender, β_{16k}	0.09	0.92	0.09	0.93
Group x Cohort, β_{17k}	-0.37	0.66	-0.56	0.58
Grade x Gender, β_{18k}	1.02	0.74	1.38	0.17
Grade x Cohort, β_{19k}	0.64	0.49	1.32	0.19
Gender x Cohort, β_{110k}	0.77	0.66	1.16	0.25

Figure 1. Recreational Reading Attitudes by Group Condition

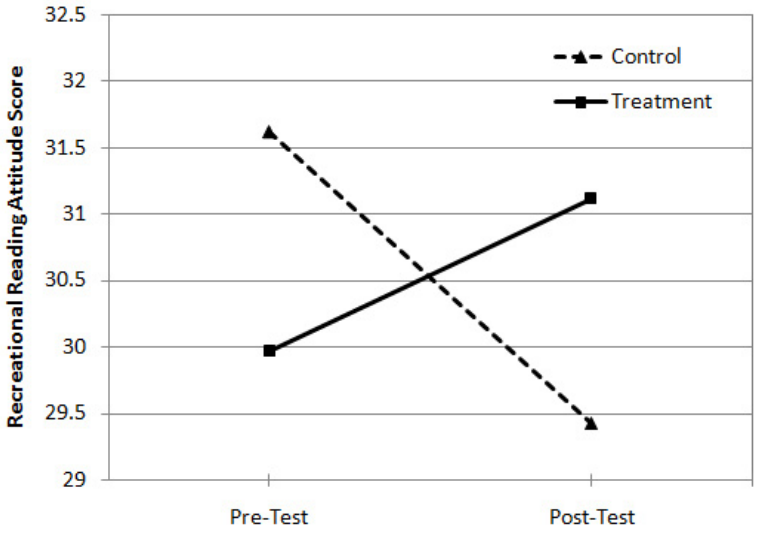


Figure 2. Academic Reading Attitudes by Group Condition

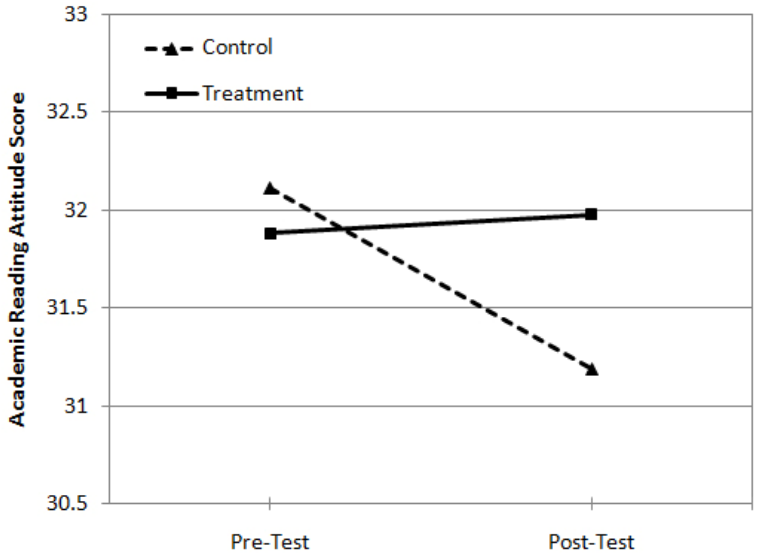


Table 4. Final Estimation of Level-1, Level-2, and Level-3 Variance Components for Recreational and Academic Reading Attitudes

Outcome	*Random Effect*	*Variance Components*	*df*	χ^2	*p*
Recreational Reading Attitudes	Level-1 variance				
	Temporal variation, e_{ijk}	20.53			
	Level-2 (students within schools)				
	Individual initial status, r_{0jk}	10.37	684	1,391.18	< 0.01
	Level-3 (between schools)				
	School mean status, U_{00}	0.54	11	23.12	< 0.05
	School mean growth, U_{10}	0.06	11	15.55	0.16
Academic Reading Attitudes	Level-1 variance				
	Temporal variation, e_{ijk}	18.32			
	Level-2 (students within schools)				
	Individual initial status, r_{0jk}	14.48	684	1,788.32	< 0.01
	Level-3 (between schools)				
	School mean status, U_{00}	0.91	11	28.62	< 0.01
	School mean growth, U_{10}	0.03	11	9.09	> 0.50

Topic and individual reading motivation

According to Hypothesis 1, Power Lunch students should also exhibit more positive topic and individual reading motivation than non-participating students by the end of the program after controlling for all model effects. From the two motivational outcomes, findings supported the posttest group effect predicted for individual motivation to read only. The study did not find evidence of the expected posttest effect for topic reading motivation and, therefore, failed to reject the null hypothesis of motivational difference for thematic reading between participating and non- participating students in Power Lunch.

Regarding the models' goodness of fit for both topic and individual reading motivation, Table 5 shows AIC estimations and reliability coefficients for the two plausible models (i.e., A and B) tested. Just as shown in the model selection for attitudinal outcomes, *Model B* (i.e., modeled intercept with random effect and modeled slope with no random effect at Level 2) provided the smallest AIC and the highest reliability for both motivational outcomes as well. Appendix B includes the equations that represent *Model B* for both motivational outcomes (see Model equations 3 and 4).

It should be recalled that when motivation measures were used in any of the models tested, important changes occurred in the composition of the sample, especially for the variables of grade and cohort. Since no reading motivation assessments were taken for all cohort 1 students, all motivational analyses included only students from cohorts 2 to 4.

Tables 6 and 7 indicate that the pretest (i.e., β_{00k}) means for topic and individual reading motivation among control students, across all schools, were equal to 10.35 and

Table 5. Model Fit for Topic and Individual Reading Motivation

Outcome	*Model*	*Deviance*	*Reliability*	*Parameters*	*AIC*	*ΔAIC*
Topic Reading Motivation	A	5,251.50	0.01	27	5,300.50	260.70
	B*	4,990.80	0.77	27	5,039.80	
Individual Reading Motivation	A	5,577.90	0.01	27	5,626.90	291.09
	B*	5,286.81	0.79	27	5,335.81	

Plausible models tested: *Model A* had a modeled intercept with no random effect and a modeled slope with a random effect. *Model B* had a modeled intercept with a random effect and a modeled slope with no random effect. Models with the best goodness of fit are marked with an asterisk. Reliability coefficients for *Model A* correspond to the effect of the modeled slope of Level-1. Reliability coefficients for *Model B* correspond to the intercept of Level-1.

12.56 after controlling for all model effects. Tables 6 and 7 show also that both intercepts were significantly different from zero. Among treatment students, the pretest means (i.e., $\beta_{00k} + \beta_{01k}$) for the same two outcomes were 11.38 and 12.26, respectively, after controlling for all model effects. No statistically significant differences existed between both groups at pretest for both motivational outcomes. Further analyses demonstrated that grade, gender, cohort, and four of the six possible interaction terms of group, grade, gender, and cohort did not significantly predict students' pretest topic reading motivation. The interaction effects of group by grade as well as group by cohort, however, did predict the initial status of topic reading motivation.

For individual reading motivation, gender, cohort, and three of the six possible interaction terms of group, grade, gender, and cohort were not significant predictors. The interaction effects of group by grade, group by cohort, grade by cohort, and grade significantly predicted its initial status. These statistically significant effects for the initial status of both reading motivation outcomes were non-hypothesized and were treated as secondary. HLM allowed all posttest model effects to control for all statistically significant effects found for both motivational outcomes during the pretest.

Tables 6 and 7 present additionally posttest growth rates (i.e., β_{10k} and β_{11k}) that supported the hypothesized effect for individual reading motivation only; that is, participating students had significantly more positive individual reading motivation than non-participating by the end of the program, but both groups did not significantly differ from each other in their topic reading motivation by the end of the program. Table 6 shows that both control and treatment students made posttest gains: 1.02 points (i.e., β_{10k}) and 0.49 points (i.e., $\beta_{10k} + \beta_{11k}$), respectively, between the pretest and the posttest for

topic reading motivation after controlling for all model effects. Furthermore, the same table indicates that only the gain made by control students was statistically significant, but both groups of students did not significantly differ from each other by the end of the implementation of the Power Lunch program.

Table 7 shows that both control and treatment students significantly increased their individual reading motivation between the pretest and the posttest. Control students increased their pretest scores by 0.61 points (i.e., β_{10k}), but treatment students reported a gain four times larger, equal to 2.42 points (i.e., $\beta_{10k} + \beta_{11k}$). Figures 3 and 4 illustrate the growth for both reading motivation outcomes by group condition after controlling for all model effects. The remaining significant posttest effects shown in Tables 6 and 7 are examined in the analyses pertaining to Hypothesis 2.

Applying once again Muthén and Curran's (1997) method to calculate effect sizes in growth curve models, the treatment effect over the control group during the posttest was equal to .43 for individual reading motivation. Based on Cohen's effect size scale (Small = 0.20, Medium = 0.50, and Large = 0.80), the treatment effect was small to medium in magnitude as occurred with the outcome of recreational reading attitudes.

Table 8 displays estimated variances and related χ^2 statistics from the three-level descomposition of both topic and individual reading motivation. Results suggested that residual parameter variance still remains to be explained in π_{0jk}, β_{00k}, and β_{10k} for topic reading motivation. For individual reading motivation, residual parameter variance still remains to be explained in π_{0jk} only, but little variance remains in β_{00k} and β_{10k} to be explained. Put differently, these results indicated that the effect of non-measured variables was significantly captured by the Level-2 (i.e., r_{0jk}) and Level-3 random effects

Table 6. Final Estimation of Fixed Effects for Topic Reading Motivation

Fixed Effect	*Coefficient*	*se*	*t-ratio*	*p*
For Intercept 1, π_{0jk}				
Intercept 2, β_{00k}	10.35	0.24	43.46	< 0.01
Group, β_{01k}	1.03	0.92	1.12	0.26
Grade, β_{02k}	0.19	0.90	0.21	0.83
Gender, β_{03k}	-1.24	0.90	-1.38	0.17
Cohort, β_{04k}	0.86	1.30	0.66	0.51
Group x Grade, β_{05k}	1.03	0.51	2.01	< 0.05
Group x Gender, β_{06k}	0.13	0.52	0.25	0.80
Group x Cohort, β_{07k}	-1.07	0.36	-2.99	< 0.01
Grade x Gender, β_{08k}	0.39	0.51	0.77	0.44
Grade x Cohort, β_{09k}	-0.30	0.66	-0.46	0.65
Gender x Cohort, β_{010k}	-0.14	0.36	-0.40	0.69
For Posttest slope, π_{1jk}				
Intercept 2, β_{10k}	1.02	0.18	5.80	< 0.01
Group, β_{11k}	-0.53	0.79	-0.67	0.50
Grade, β_{12k}	-3.02	0.74	-4.11	< 0.05
Gender, β_{13k}	1.10	0.78	1.41	0.16
Cohort, β_{14k}	-4.62	1.06	-4.38	< 0.01
Group x Grade, β_{15k}	0.19	0.44	0.43	0.67
Group x Gender, β_{16k}	-0.12	0.45	-0.26	0.80
Group x Cohort, β_{17k}	0.07	0.31	0.22	0.83
Grade x Gender, β_{18k}	-0.58	0.44	-1.31	0.19
Grade x Cohort, β_{19k}	2.11	0.53	3.96	< 0.01
Gender x Cohort, β_{110k}	0.05	0.31	0.15	0.88

Table 7. Final Estimation of Fixed Effects for Individual Reading Motivation

Fixed Effect	*Coefficient*	*se*	*t-ratio*	*p*
For Intercept 1, π_{0jk}				
Intercept 2, β_{00k}	12.56	0.18	68.76	< 0.01
Group, β_{01k}	-0.25	1.07	-0.23	0.82
Grade, β_{02k}	-2.44	0.94	-2.60	< 0.05
Gender, β_{03k}	-1.09	1.06	-1.03	0.30
Cohort, β_{04k}	-1.78	1.33	-1.34	0.18
Group x Grade, β_{05k}	1.88	0.60	3.13	< 0.01
Group x Gender, β_{06k}	0.17	0.61	0.27	0.79
Group x Cohort, β_{07k}	-1.22	0.42	-2.91	< 0.01
Grade x Gender, β_{08k}	0.23	0.60	0.38	0.70
Grade x Cohort, β_{09k}	1.17	0.67	1.76	< 0.10
Gender x Cohort, β_{010k}	-0.21	0.41	-0.49	0.62
For Posttest slope, π_{1jk}				
Intercept 2, β_{10k}	0.61	0.16	3.84	< 0.01
Group, β_{11k}	1.81	0.89	2.03	< 0.05
Grade, β_{12k}	-0.59	0.79	-0.75	0.46
Gender, β_{13k}	1.20	0.88	1.36	0.17
Cohort, β_{14k}	-1.87	1.11	-1.67	< 0.10
Group x Grade, β_{15k}	-0.55	0.50	-1.10	0.27
Group x Gender, β_{16k}	-0.90	0.51	-1.76	< 0.10
Group x Cohort, β_{17k}	-0.26	0.35	-0.74	0.46
Grade x Gender, β_{18k}	-0.93	0.50	-1.88	< 0.10
Grade x Cohort, β_{19k}	0.90	0.56	1.59	0.11
Gender x Cohort, β_{110k}	0.45	0.35	1.30	0.19

Figure 3. Topic Reading Motivation by Group Condition

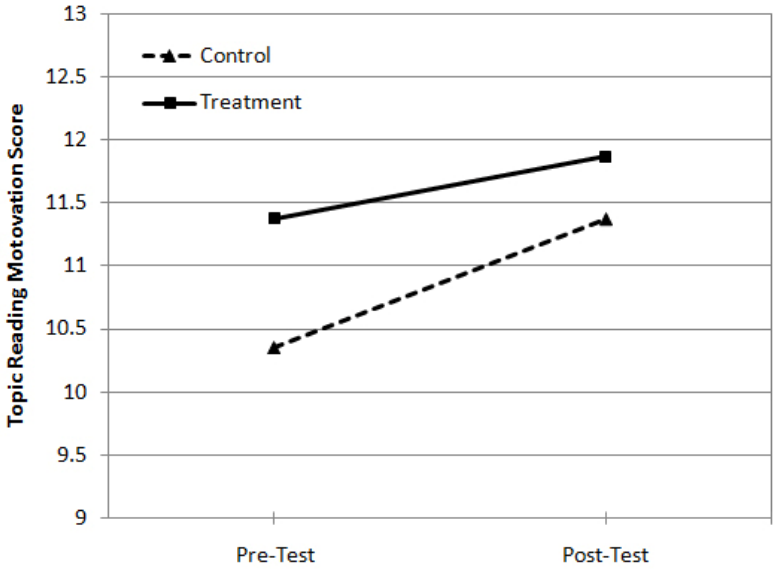
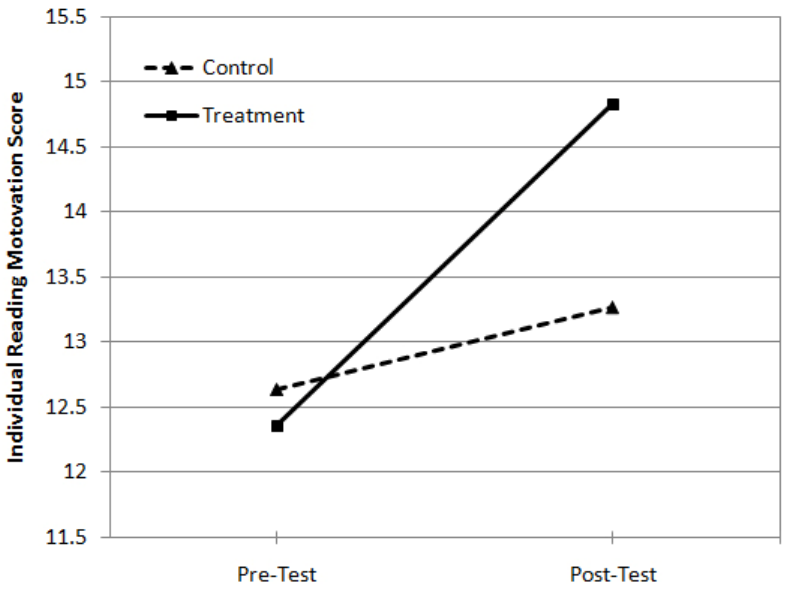


Figure 4. Individual Reading Motivation by Group Condition



(i.e., U_{00} and U_{10}) and that the effects of group, grade, gender, cohort, the interactions of all four variables, and school membership varied across students for topic reading motivation. For individual reading motivation, the effect of non-measured variables was significantly captured by the Level-2 (i.e., r_{0jk}) random effect only, which meant that the effects of group, grade, gender, cohort, the interactions of all four variables, and school membership varied across students. Level-3 random effects (i.e., U_{00} and U_{10}) indicated additionally that schools differed significantly in their overall initial status and in their growth rate when the outcome was topic reading motivation, but not when it was individual reading motivation.

Reading Achievement

Hypothesis 1 predicted that students participating in Power Lunch should outperform non-participating students within an interval of up to five school years, based on their cohort of origin, after controlling for all model effects. Findings showed a trend that seem to support the growth rate effect predicted for reading achievement in favor of students participating in Power Lunch.

Because reading achievement was a binary (Bernoulli) outcome, no deviance statistic is produced by HLM to inform the AIC as done in previous tests of competing models. Alternatively, a Laplace estimation was attempted to establish the AIC associated with the models, as recommended by Raudenbush et al. (2004). However, HLM was not able to compute it for the specified models. Since no statistical criteria could be obtained for model selection purposes for reading achievement, the final model was chosen based on the results of all previous model selection tests. Without exception

Table 8. Final Estimation of Level-1, Level-2, and Level-3 Variance Components for Topic and Individual Reading Motivation

Outcome	*Random Effect*	*Variance Components*	*df*	χ^2	*p*
Topic Reading Motivation	Level-1 variance				
	Temporal variation, e_{ijk}	3.20			
	Level-2 (students within schools)				
	Individual initial status, r_{0jk}	5.44	503	2,258.78	< 0.01
	Level-3 (between schools)				
	School mean status, U_{00}	0.41	10	33.58	< 0.01
	School mean growth, U_{10}	0.19	10	24.91	< 0.01
Individual Reading Motivation	Level-1 variance				
	Temporal variation, e_{ijk}	4.11			
	Level-2 (students within schools)				
	Individual initial status, r_{0jk}	7.80	503	2,466.36	< 0.01
	Level-3 (between schools)				
	School mean status, U_{00}	0.10	10	10.34	0.41
	School mean growth, U_{10}	0.09	10	10.90	0.37

results led to *Model B* as the best one and, therefore, this same model was chosen for the reading achievement outcome. Reliability for reading achievement was equal to 0.50.

Table 9 shows that the reading achievement mean for all control students was equal to -0.02 logits for the initial status (i.e., β_{00k}), across all four cohorts. Furthermore, such result was not significantly different from zero. Among participating students, the reading achievement mean was equal to -0.05 logits for the initial status (i.e., $\beta_{00k} + \beta_{02k}$) across all four cohorts, but it was not significantly different from that of the control students. Further analyses revealed that among all predictors of the initial status of reading achievement, only school mobility (i.e., β_{01k}), cohort (i.e., β_{05k}) and the interaction effect of grade by cohort (i.e., β_{010k}) were statistically significant. These results suggested that students who transferred out to other school(s) had a higher probability of meeting the reading standard at the initial status year (i.e., Year 0) than students who did not. In addition, students in the more recent cohorts and in higher grade levels had also a higher probability of meeting the reading standard than students in older cohorts and in lower grade levels. These statistically significant, non-predicted pretest effects were treated as secondary. HLM allowed all posttest model effects to control for all statistically significant effects found for reading achievement during the pretest.

Table 9 presents also the results for the growth rate of reading achievement synthesized for all four cohorts. The intercept for all control students (i.e., β_{10k}) was equal to -0.13 logits and it was not significantly different from zero. In line with Hypothesis 1, the study found a marginally significant group effect (i.e., β_{12k}) for reading achievement after controlling for all model effects. Treatment students outperformed control students in a period that ranged between one and four years after the program was implemented.

No significant cohort (i.e., β_{15k}) or cohort by group interaction (i.e., β_{18k}) effect was found for this positive trend.

Results illustrated in Figure 5 show that the probability of success in reading achievement was slightly higher and increased progressively for treatment students after controlling for all model effects. Among control students, the probability of success across time became progressively slimmer, although this detriment was not statistically significant. More specifically, Figure 5 indicates that both treatment and control students had an equal probability of success (about 50%) during the Spring of the initial status year (i.e., results collected at the completion of Power Lunch). At Year 1, which was the first year after completing the program, Power Lunch students' probability of success increased to 56%, whereas the probability among control students decreased to 46%. During the following years (2 to 5) the probability of success among Power Lunch students went from 62% to 74%. Conversely, the probability of success for the same period of time went from 44% to 39% among control students. Taken as a whole, and expressed in odds ratio terms, treatment students were 50% more likely to meet their grade reading standard than control students as they advanced to upper grade levels across years.

Furthermore, two secondary and non-hypothesized marginally significant effects that predicted reading achievement across time, after controlling for all other model effects: school mobility or transference (i.e., β_{11k}) and grade level (i.e., β_{13k}). The school mobility effect indicated that the probability of meeting the reading achievement standard across time decreased progressively for students who moved out to other school(s) compared to those students who did not. In addition, results indicated that students in

higher grade levels had a higher chance of succeeding in their reading achievement tests across time compared to students in lower grade levels. Expressed in odds ratio terms, the school mobility effect suggested that students who stayed in their initial status school were 10% more likely to meet the reading achievement standard than those who moved once or more times to other school(s). Moreover, students in higher grade levels were 30% more likely to meet the reading achievement standard than students in lower grade levels across time.

Table 10 presents estimated variances and related χ^2 statistics from the three-level descomposition. Results suggested that residual parameter variance still remains to be explained in π_{0jk} and β_{00k}. Conversely, little residual variance remains in β_{10k} to be explained. Alternatively, these results indicated that the effect of non-measured variables was significantly captured by the Level-2 random effect (i.e., r_{0jk}) and by one of the Level-3 random effects (i.e., U_{00}) and that the effects of school mobility, group, grade, gender, cohort, the interactions of all four variables, and school membership varied across students and schools for reading achievement. Level-3 random effects indicated additionally that schools differed marginally in their overall initial status, but not in their growth rate of reading achievement.

Gender and grade level effects on reading attitudes

According to Hypothesis 2, female students should exhibit more positive attitudes toward recreational and academic reading than male students by the end of the program after controlling for all model effects. Hypothesis 2 further predicted that students in lower grade levels would have more favorable recreational and academic reading

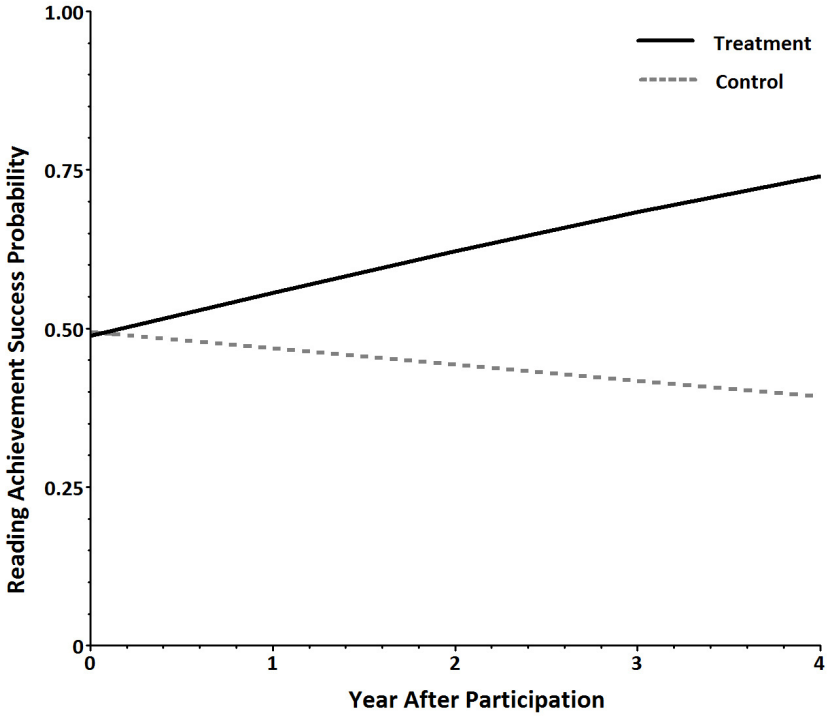
Table 9. Final Estimation of Fixed Effects for Reading Achievement

Fixed Effect	*Coefficient*	*se*	*t-ratio*	*p*
For Intercept 1, π_{0jk}				
Intercept 2, β_{00k}	-0.02	0.23	-0.09	0.93
Transfer, β_{01k}	0.36	0.17	2.12	< 0.05
Group, β_{02k}	-0.03	0.70	-0.04	0.97
Grade, β_{03k}	-0.42	0.39	-1.10	0.27
Gender, β_{04k}	-0.78	0.73	-1.07	0.29
Cohort, β_{05k}	2.09	0.64	3.27	< 0.01
Group x Grade, β_{06k}	0.11	0.38	0.29	0.77
Group x Gender, β_{07k}	0.49	0.57	0.87	0.39
Group x Cohort, β_{08k}	-0.37	0.36	-1.03	0.31
Grade x Gender, β_{09k}	-0.24	0.38	-0.62	0.54
Grade x Cohort, β_{010k}	-0.67	0.32	-2.08	< 0.05
Gender x Cohort, β_{011k}	-0.03	0.36	-0.08	0.94
For Year growth slope, π_{1jk}				
Intercept 2, β_{10k}	-0.10	0.07	-1.56	0.15
Transfer, β_{11k}	-0.10	0.05	-1.86	< 0.10
Group, β_{12k}	0.36	0.23	1.65	< 0.10
Grade, β_{13k}	0.24	0.13	1.90	< 0.10
Gender, β_{14k}	0.07	0.24	0.28	0.78
Cohort, β_{15k}	-0.28	0.20	-1.38	0.17
Group x Grade, β_{16k}	-0.07	0.13	-0.54	0.59
Group x Gender, β_{17k}	-0.16	0.18	-0.88	0.38
Group x Cohort, β_{18k}	0.01	0.11	0.12	0.91
Grade x Gender, β_{19k}	0.08	0.13	0.67	0.50
Grade x Cohort, β_{110k}	0.03	0.10	0.33	0.74
Gender x Cohort, β_{111k}	0.03	0.11	0.32	0.75

Table 10. Final Estimation of Level-1, Leve-2, and Level-3 Variance Components for Reading Achievement

Random Effect	*Variance Components*	*df*	χ^2	*p*
Level-1 variance				
Temporal variation, e_{ijk}	-0.02			
Level-2 (students within schools)				
Individual initial status, r_{0jk}	1.86	843	1,756.36	< 0.01
Level-3 (between schools)				
School mean status, U_{00}	0.13	11	18.08	< 0.10
School mean growth, U_{10}	0.01	11	15.72	0.15

Figure 5. Probability of Succeeding in Reading Achievement Tests (ITBS and/or ISAT)



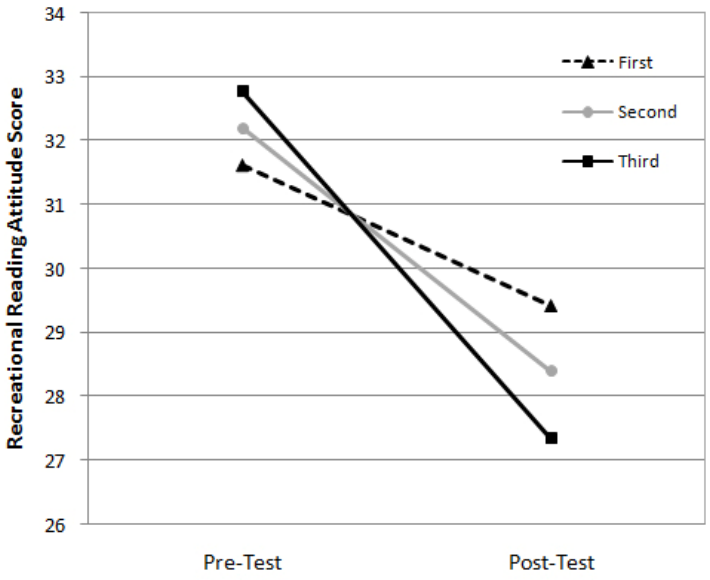
attitudes than students in higher grade levels. A group by gender and a group by grade interaction effect for the posttest measures of both types of reading attitudes were also predicted in favor of Power Lunch participants.

Results for recreational reading attitudes presented in Table 2 followed all the hypothesized effects for the next set of predictors: grade (i.e., β_{12k}), gender (i.e., β_{13k}), group by grade (i.e., β_{15k}), and group by gender (i.e., β_{16k}). The grade effect was statistically significant whereas the effects of gender, group by grade, and group by gender were only marginally significant after controlling for all model effects. A non-predicted grade by gender effect was statistically significant and indicated that the effect of grade was dependent on gender.

The direction of the coefficient obtained for grade (see Table 2) indicates from lower grade level students had more favorable recreational reading attitudes than higher grade level students. Although pretest differences in recreational reading attitudes across grade levels were not statistically significant, Figure 6 shows that higher grade level students had more favorable recreational reading attitudes than students in lower grade levels. Results at posttest showed, nevertheless, exactly the opposite trend. Students in lower grade levels had more positive recreational reading attitudes than students in higher grade levels. As illustrated in Figure 6, the higher the grade level, the larger the drop students experienced in their recreational reading attitudes; that is, recreational reading attitudes became more negative within the school year, especially among older students.

Figure 7 illustrates the gender effect and shows that although female students' recreational reading attitudes were more positive than those held by male students at posttest, as predicted in Hypothesis 2, both girls and boys experienced a drop over time.

Figure 6. Recreational Reading Attitudes by Grade Level



Specifically, female students had a 3.17 point advantage over boys at posttest. No statistically significant pretest differences existed between students from both genders.

Figure 8 depicts the group by grade interaction predicted in Hypothesis 2 and shows that participating students had more favorable recreational attitudes than non-participating students across all grade levels by the end of the school year. In terms of improvement, however, only first grade treatment students exhibited more positive recreational attitudes across time (1.15 point increase). Second graders had a slight drop in their recreational reading attitudes (0.50 point decrease) and third graders showed an even larger drop (2.09 point decrease). Among control groups, students from all grades levels experienced a detriment in their attitudes toward recreational reading.

The group by gender interaction effect on recreational reading attitudes, predicted in Hypothesis 2 and shown in Figure 9, indicated that female and male treatment students had more positive recreational reading attitudes than female and male control students, respectively. Among Power Lunch students, however, only female students exhibited an improvement in their recreational reading attitudes across time (1.15 point increase). Male students, conversely, had a detriment in their recreational attitudes (1.16 point decrease). Among control students, female and male students showed a 2.18 and a 4.96 point decrease, respectively, between the pretest and the posttest. These results suggested that control students' recreational attitudes became more negative across time, especially among male students, when compared to participating students.

Similarly to attitudes toward recreational reading, Hypothesis 2 predicted grade (i.e., β_{12k}), gender (i.e., β_{13k}), group by grade (i.e., β_{15k}) and group by gender (i.e., β_{16k}) effects for posttest academic reading attitudes as well. Results show, however, that only

Figure 7. Recreational Reading Attitudes by Gender

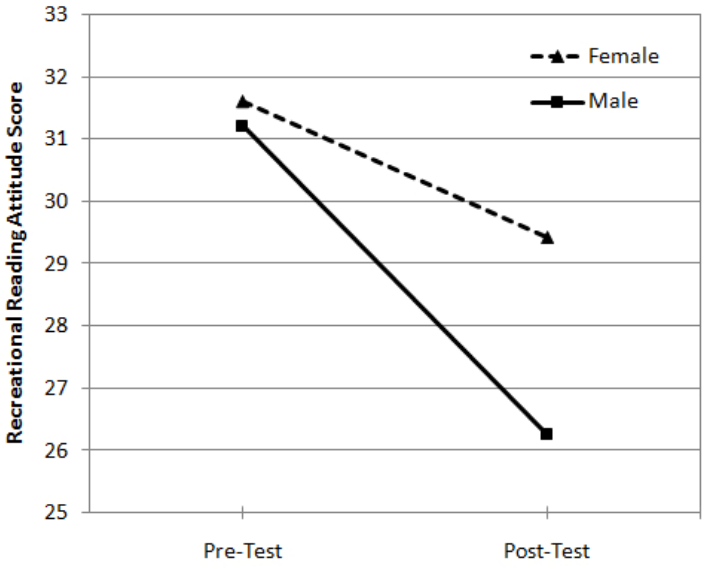


Figure 8. Recreational Reading Attitudes by Group x Grade Interaction Effect

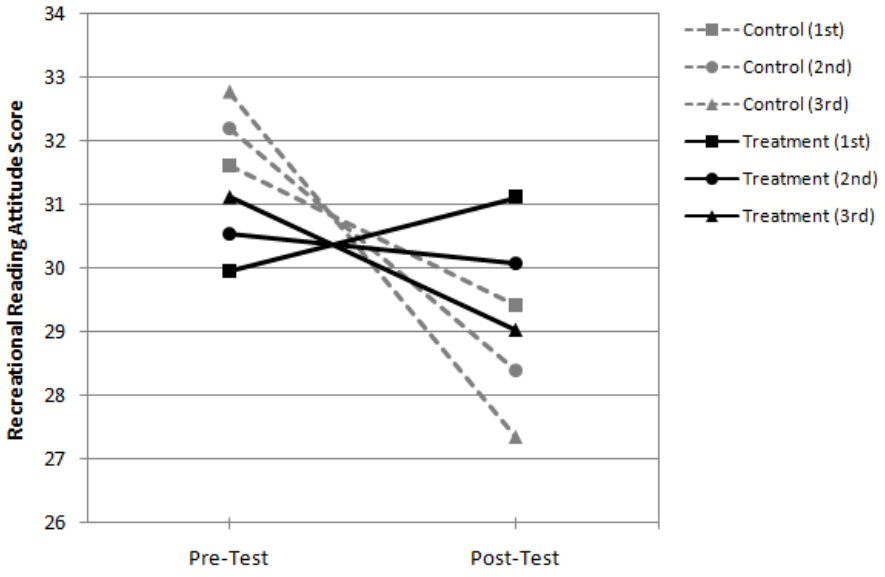
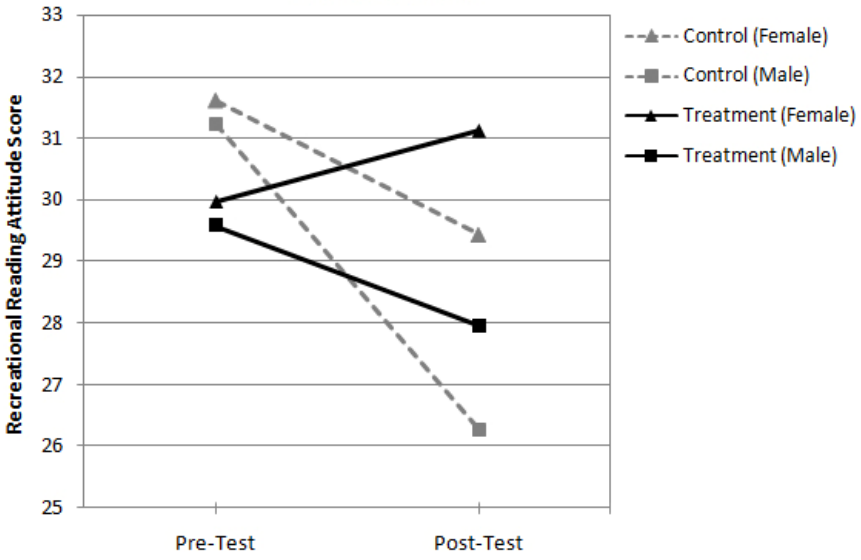


Figure 9. Recreational Reading Attitudes by Group x Gender Interaction Effect



the effect of grade was statistically significant while the obtained gender effect was just marginally significant, after controlling for all model effects. No group by grade (i.e., β_{15k}) and group by gender (i.e., β_{16k}) effects were found.

Opposite to what Hypothesis 2 predicted, results by grade (see Table 3) indicated that students from higher grade levels had more favorable recreational reading attitudes than students from lower grade levels at pretest and posttest. However, all students experienced a drop in their academic attitudinal scores across time and such drop was larger for students in higher grade levels. More specifically, third graders had a 4.17 point decrease, second graders had a 2.55 point decrease, and first graders had a 0.93 point decrease. Figure 10 illustrates the grade effect on academic reading attitudes.

Figure 11 illustrates the gender effect predicted in Hypothesis 2, which shows that female students' attitudes toward academic reading were more positive than those held by male students during the posttest. In fact, the same figure shows that both groups followed opposite trends between the pretest and the posttest. Female students' attitudes became more favorable between the pretest and the posttest, whereas male students' attitudes became more negative between both assessment points. Female students had a 2.29 point increase and male students had a 1.62 point decline between the pretest and the posttest.

Gender and grade level effects on reading motivation

Hypothesis 2 predicted also a grade (i.e., β_{12k}), gender (i.e., β_{13k}), group by grade (i.e., β_{15k}), and group by gender (i.e., β_{16k}) interaction effect for the posttest measures of topic and individual reading motivation. Findings shown in Table 6 indicated that grade

Figure 10. Academic Reading Attitudes by Grade Level

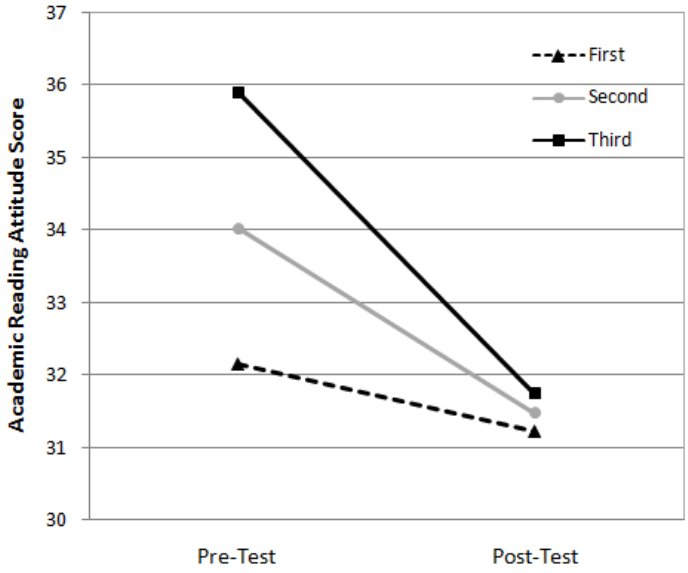
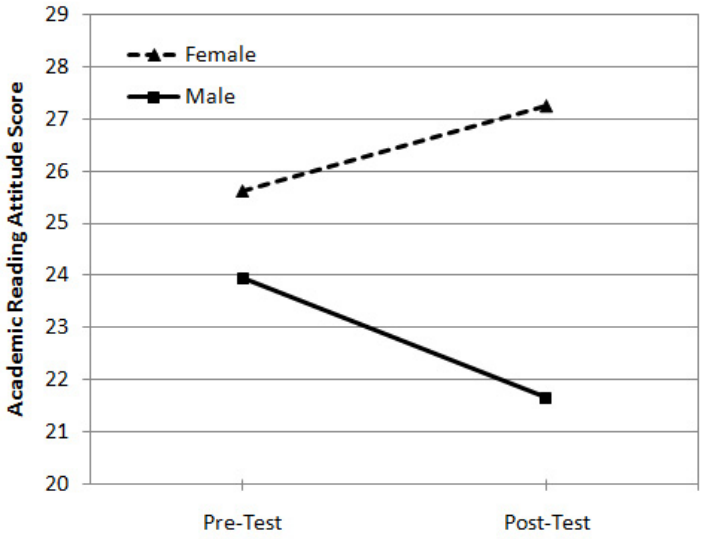


Figure 11. Academic Reading Attitudes by Gender



level was the only statistically significant effect among the four predicted effects for topic reading motivation after controlling for all other model effects.

The direction of the coefficient obtained for grade (see Table 6showed that students from lower grade levels had more favorable topic reading motivation than students from higher grade levels by the end of the program. No statistically significant differences across grades emerged during the pretest for students' topic reading motivation. Figure 12 shows that among all three grade levels, only first graders were able to boost their topic reading motivation by 1.02 points between the pretest and the posttest. Second and third graders, on the other hand, experienced a decline of 2 and 5.02 points between both assessment points.

Two additional statistically significant, non-predicted effects emerged during the posttest. The first one was a cohort effect (i.e., β_{14k}), indicating that students in the older cohorts had higher topic reading motivation scores that students in the more recent cohorts by the end of the program. The second non-hypothesized effect was a grade by cohort interaction effect (i.e., β_{19k}), indicating that students in the older cohorts had higher topic motivation scores than students in the more recent cohorts by the end of the program, but only students in lower grade levels were able to increase their topic reading motivation.

Regarding the second dimension of reading motivation, topic reading motivation, findings shown in Table 7 pointed out that the interaction effect of group by gender (i.e., β_{16k}) was the only marginally significant effect among the four effects predicted after controlling for all model effects. Following the direction predicted in Hypothesis 2, Figure 13 shows that both male and female students participating in Power Lunch had a

more positive individual reading motivation by the end program than both control male and female students. Although female students from both group conditions had a slight non-significant advantage over male students during the pretest such advantage disappeared during the posttest and students from both genders had virtually indistinguishable within-group condition scores during the posttest. However, the same figure shows that the gains were greater among male students, especially in the treatment group condition. Quantitatively stated, male treatment students gained 3.61 points while female treatment students gained 2.42 points. Among control students, gains were half as large (1.80 points) for male students and about one fourth as big for female students (0.66 points).

Two additional marginally, non-hypothesized effects emerged during the posttest as well. The first one was a cohort effect (i.e., β_{14k}), indicating that students in the older cohorts had higher individual reading motivation scores than students in the more recent cohorts by the end of the program. The second non-expected effect was a grade by gender interaction effect (i.e., β_{18k}) indicating that male students improved their individual reading motivation across time more than female students, but such improvement was greater among younger students.

Gender effect on reading achievement

Hypothesis 2 included two additional effects for the reading achievement outcome. Specifically, it predicted a posttest gender (i.e., β_{14k}) effect and a group by gender effect (i.e., β_{17k}). Results presented in Table 9 showed that neither effect was statistically significant.

Figure 12. Topic Reading Motivation by Grade Level

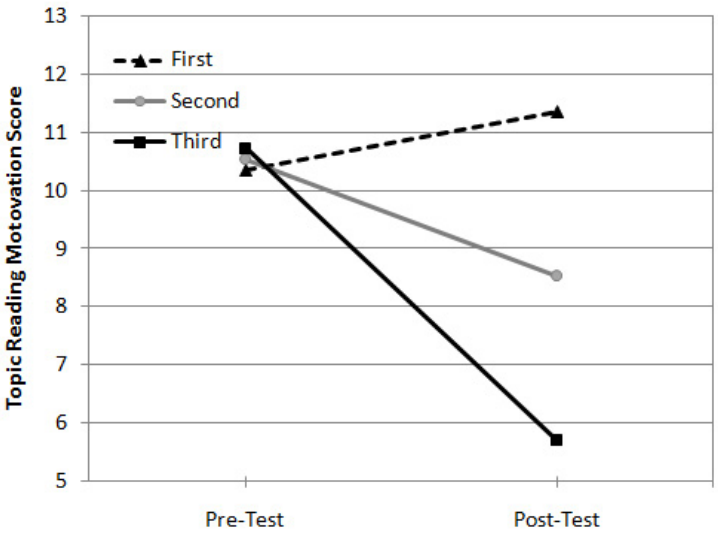
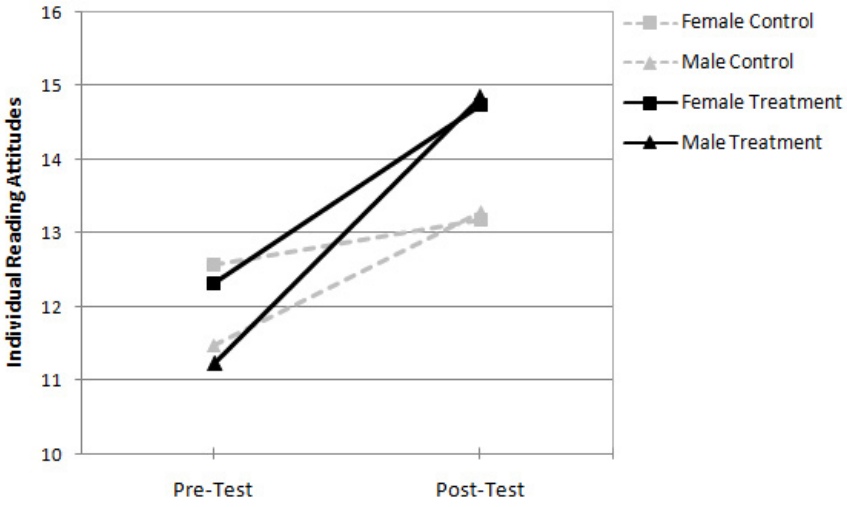


Figure 13. Individual Reading Motivation by Group x Gender Interaction Effect



Recreational reading attitudes predicted by reading motivation

Hypothesis 3 stated that the two dimensions of reading motivation taken at pretest should positively predict students' attitudes toward recreational reading, measured at pretest and posttest after controlling for all model effects. In addition, the two dimensions of intrinsic reading motivation taken at posttest should positively predict students' attitudes toward recreational reading measured at posttest, after controlling for all model effects (see Table B, Appendix C for a schematic depiction of expected effects X_1 to X_6).

Findings showed that both topic and individual reading motivation measured at pretest (labeled with a letter A) failed to predict recreational reading attitudes taken at pretest. In addition, pretest measures of topic reading motivation failed to predict students' posttest recreational attitudes too. However, pretest individual reading motivation marginally predicted posttest recreational reading attitudes after controlling for all model effects. Furthermore, posttest measures of topic motivation (labeled with a letter B) failed to predict students' recreational reading attitudes taken at posttest, but posttest individual reading motivation did so after accounting for all model effects.

Although *Model B* (i.e., modeled intercept with random effect and modeled slope with no random effect) was previously the best model when recreational reading attitudes were used as outcomes, it was still contrasted with *Model A* because Cohort 1 students were excluded from analyses (motivation measures were not taken during the 2002-2003 school year). Table 11 shows that *Model B* still yielded the smallest AIC and the highest reliability of the two models. The equations that represent *Model B* for both types of reading motivation measured at pretest and posttest are included in Appendix B (see Model equations 6 and 7).

Table 11. Model Fit for Recreational Reading Attitudes (A and B)

Outcome	*Model*	*Deviance*	*Reliability*	*Parameters*	*AIC*	*ΔAIC*
Recreational Reading Attitudes (A)	A	6,518.78	0.17	31	6,580.78	57.71
	B*	6,461.07	0.51	31	6,523.07	
Recreational Reading Attitudes (B)	A	6,523.37	0.15	29	6,581.37	58.82
	B*	6,464.55	0.51	29	6,522.55	

Plausible models tested: *Model A* had a modeled intercept with no random effect and a modeled slope with a random effect. *Model B* had a modeled intercept with a random effect and a modeled slope with no random effect. Models with the best goodness of fit are marked with an asterisk. Reliability coefficients for *Model A* correspond to the effect of the modeled slope of Level-1. Reliability coefficients for *Model B* correspond to the intercept of Level-1. Recreational reading attitudes (A) were used as outcomes when pretest measures of reading motivation were entered as Level-2 predictors. Recreational reading attitudes (B) were used as outcomes when posttest measures of reading motivation were entered as Level-2 predictors.

According to results shown in Table 12, the direction of the coefficient of the posttest recreational reading attitude effect for the pretest measure of individual reading motivation (i.e., β_{12k}) was inversed to what Hypothesis 3 predicted; that is, students with lower pretest individual reading motivation ratings exhibited more positive levels of recreational reading attitudes during the posttest.

In Table 13, the direction of the coefficient of the posttest recreational reading attitude effect for the posttest measure of individual reading motivation (i.e., β_{12k}) was positive as Hypothesis 3 predicted. That is, students with higher posttest individual reading motivation ratings exhibited more positive levels of recreational reading attitudes during the posttest.

Lastly, Table 14 presents estimated variances and related χ^2 statistics from the three-level descomposition. Results suggested that residual parameter variance still remains to be explained in π_{0jk}, β_{00k}, and β_{10k} when pretest and posttest measures of topic and individual reading motivation were entered, in addition to other variables, as predictors of students' recreational reading attitudes. Alternatively, this suggested that the effect of non-measured variables was significantly captured by the Level-2 (i.e., r_{0jk}) and Level-3 random effects too (i.e., U_{00} and U_{10}) and that the effects of pretest and posttest measures of topic and individual reading motivation, group, grade, gender, cohort, the interactions of all four variables, and school membership varied across students and schools for academic reading attitudes. Level-3 random effects indicated additionally that schools differed significantly in their overall initial status and marginally in their growth rate for recreational reading attitudes when pretest and posttest topic and individual reading motivation were entered at Level-2 as predictors with all other variables.

Table 12. Final Estimation of Fixed Effects for Recreational Reading Attitudes (A)

Fixed Effect	*Coefficient*	*se*	*t-ratio*	*p*
For Intercept 1, π_{0jk}				
Intercept 2, β_{00k}	31.60	0.35	90.63	< 0.01
Pre-Topic, β_{01k}	0.14	0.12	1.17	0.24
Pre-Individual, β_{02k}	0.07	0.10	0.71	0.48
Group, β_{03k}	-8.13	2.98	-2.73	< 0.01
Grade, β_{04k}	6.44	3.07	2.10	< 0.05
Gender, β_{05k}	3.72	2.49	1.50	0.14
Cohort, β_{06k}	3.35	3.47	0.97	0.34
Group x Grade, β_{07k}	-0.82	0.28	-2.96	< 0.01
Group x Gender, β_{08k}	-0.24	0.96	-0.25	0.80
Group x Cohort, β_{09k}	2.45	0.93	2.62	< 0.01
Grade x Gender, β_{010k}	-2.10	0.94	-2.24	< 0.05
Grade x Cohort, β_{011k}	-1.89	1.25	-1.51	0.13
Gender x Cohort, β_{012k}	-0.08	0.63	-0.13	0.90
For Year slope, π_{1jk}				
Intercept 2, β_{10k}	-2.26	0.36	-6.37	< 0.01
Pre-Topic, β_{11k}	0.13	0.13	1.01	0.32
Pre-Individual, β_{12k}	-0.19	0.11	-1.70	< 0.10
Group, β_{13k}	9.86	3.40	2.90	< 0.01
Grade, β_{14k}	-8.81	3.38	-2.61	< 0.05
Gender, β_{15k}	-9.03	2.86	-2.16	< 0.01
Cohort, β_{16k}	-5.22	3.79	-1.38	0.17
Group x Grade, β_{17k}	0.13	0.32	0.43	0.67
Group x Gender, β_{18k}	-1.08	1.10	-0.98	0.33
Group x Cohort, β_{19k}	-3.07	1.01	-2.88	< 0.01
Grade x Gender, β_{110k}	3.81	1.08	3.53	< 0.01
Grade x Cohort, β_{111k}	2.68	1.37	1.96	< 0.10
Gender x Cohort, β_{112k}	-0.24	0.75	-0.32	0.75

Table 13. Final Estimation of Fixed Effects for Recreational Reading Attitudes (B)

Fixed Effect	*Coefficient*	*se*	*t-ratio*	*p*
For Intercept 1, π_{0jk}				
Intercept 2, β_{00k}	31.60	0.35	89.67	< 0.01
Group, β_{01k}	-7.83	2.98	-2.63	< 0.01
Grade, β_{02k}	6.64	3.05	2.18	< 0.05
Gender, β_{03k}	3.38	2.49	1.36	0.17
Cohort, β_{04k}	3.48	3.45	1.01	0.31
Group x Grade, β_{05k}	-0.86	0.28	-3.10	< 0.01
Group x Gender, β_{06k}	-0.30	0.96	-0.23	0.82
Group x Cohort, β_{07k}	2.39	0.93	2.55	< 0.05
Grade x Gender, β_{08k}	-2.02	0.94	-2.15	< 0.05
Grade x Cohort, β_{09k}	-1.95	1.24	-1.57	0.12
Gender x Cohort, β_{010k}	-0.12	0.65	-0.18	0.86
For Year slope, π_{1jk}				
Intercept 2, β_{10k}	-2.28	0.36	-6.41	< 0.01
Post-Topic, β_{11k}	-0.07	0.12	-0.58	0.56
Post-Individual, β_{12k}	0.22	0.10	2.18	< 0.05
Group, β_{13k}	9.44	3.40	2.78	< 0.01
Grade, β_{14k}	-7.63	3.35	-2.28	< 0.05
Gender, β_{15k}	-9.09	2.86	-3.18	< 0.01
Cohort, β_{16k}	-3.44	3.77	-0.91	0.36
Group x Grade, β_{17k}	0.19	0.32	0.89	0.55
Group x Gender, β_{18k}	-0.93	1.10	-0.84	0.40
Group x Cohort, β_{19k}	-2.99	1.07	-2.80	< 0.01
Grade x Gender, β_{110k}	3.95	1.08	3.66	< 0.01
Grade x Cohort, β_{111k}	2.11	1.36	1.55	0.12
Gender x Cohort, β_{112k}	-0.28	0.75	-0.37	0.71

Table 14. Final Estimation of Level-1, Level-2, and Level-3 Variance Components for Recreational Reading Attitudes (A and B)

Outcome	*Random Effect*	*Variance Components*	*df*	χ^2	*p*
Recreational Reading Attitudes (A)	Level-1 variance				
	Temporal variation, e_{ijk}	19.32			
	Level-2 (students within schools)				
	Individual initial status, r_{0jk}	9.89	501	1,034.63	< 0.01
	Level-3 (between schools)				
	School mean status, U_{00}	0.62	10	21.79	< 0.05
	School mean growth, U_{10}	0.49	10	17.33	< 0.10
Recreational Reading Attitudes (B)	Level-1 variance				
	Temporal variation, e_{ijk}	19.35			
	Level-2 (students within schools)				
	Individual initial status, r_{0jk}	9.94	503	1,036.54	< 0.01
	Level-3 (between schools)				
	School mean status, U_{00}	0.81	10	22.10	< 0.05
	School mean growth, U_{10}	0.70	10	17.10	< 0.10

Academic reading attitudes predicted by reading motivation

Hypothesis 3 stated also that the two dimensions of reading motivation measured during the pretest should also positively predict students' pretest and posttest academic reading attitudes after controlling for all model effects. Furthermore, the two dimensions of reading motivation measured during the posttest should also positively predict students' posttest academic reading attitudes after controlling for all model effects (see Table B, Appendix C for a schematic depiction of expected effects X_7 to X_{12}).

Although findings showed that pretest topic reading motivation failed to predict pretest and posttest academic reading attitudes, pretest measures of individual reading motivation predicted academic reading attitudes marginally at the pretest and significantly at the posttest, after controlling for all model effects. On the other hand, topic reading motivation taken at posttest failed to predict attitudes toward academic reading measured during the posttest, but individual reading motivation did so after controlling for all model effects.

Models *A* and *B* were contrasted again to establish which was the best, when academic reading attitudes were used as outcomes and pretest and posttest reading motivation measures were used as Level-2 predictors. Table 15 shows that *Model B* was superior than *Model A*. The equations that represent *Model B* for both dimensions of reading motivation measured at pretest and posttest are included in Appendix B (see Model equations 8 and 9).

According to results shown in Table 16, the direction of the coefficient of the pretest academic reading attitude effect for the pretest measure of individual reading motivation (i.e., β_{02k}) followed the direction predicted by Hypothesis 3 predicted:

Table 15. Model Fit for Academic Reading Attitudes (A and B)

Outcome	*Model*	*Deviance*	*Reliability*	*Parameters*	*AIC*	*ΔAIC*
Academic Reading Attitudes (A)	A*	6,518.78	0.17	31	6,580.78	57.71
	B*	6,461.07	0.51	31	6,523.07	
Academic Reading Attitudes (B)	A*	6,572.89	0.14	29	6,630.89	123.54
	B*	6,449.35	0.64	29	6,507.35	

Plausible models tested: *Model A* had a modeled intercept with no random effect and a modeled slope with a random effect. *Model B* had a modeled intercept with a random effect and a modeled slope with no random effect. Models with the best goodness of fit are marked with an asterisk. Reliability coefficients for *Model A* correspond to the effect of the modeled slope of Level-1. Reliability coefficients for *Model B* correspond to the intercept of Level-1. Academic reading attitudes (A) were used as outcomes when pretest measures of reading motivation were entered as Level-2 predictors. Academic reading attitudes (B) were used as outcomes when posttest measures of reading motivation were entered as Level-2 predictors.

higher pretest individual reading motivation predicted more favorable academic reading attitudes during the pretest after controlling for all model effects. However, the direction of the coefficient of the pretest academic reading attitude effect for the posttest measure of individual reading motivation (i.e., β_{12k}) was reversed and indicated that higher pretest individual reading motivation was associated with more negative posttest academic reading attitudes, after controlling for all model effects. This pattern was congruent with results showing that reading attitudes were usually more negative during the posttest than during the pretest which explains why the coefficient was negative for posttest academic reading attitudes (i.e., β_{12k}), but positive for pretest academic reading attitudes (i.e., β_{02k}).

In Table 17, the direction of the coefficient of the posttest recreational reading attitude effect for the posttest measure of individual reading motivation (i.e., β_{12k}) was positive as Hypothesis 3 predicted; that is, higher posttest individual reading motivation predicted more favorable academic reading attitudes at posttest after controlling for all model effects.

Lastly, Table 18 presents estimated variances and related χ^2 statistics from the three-level descomposition. Results suggested that residual parameter variance still remains to be explained in π_{0jk} and β_{00k}, when pretest and posttest measures of topic and individual reading motivation were entered, in addition to other variables, as predictors of students' recreational reading attitudes. Conversely, little residual variance remains in β_{10k} to be explained. These results indicated that the effect of non-measured variables was significantly captured by the Level-2 (i.e., r_{0jk}) and by one Level-3 random effect too (i.e., U_{00}) and that the effects of pretest and posttest measures of topic and individual reading motivation, group, grade, gender, cohort, the interactions of all four variables, and school

Table 16. Final Estimation of Fixed Effects for Academic Reading Attitudes (A)

Fixed Effect	*Coefficient*	*se*	*t-ratio*	*p*
For Intercept 1, π_{0jk}				
Intercept 2, β_{00k}	31.90	0.49	65.04	< 0.01
Pre-Topic, β_{01k}	0.11	0.12	0.93	0.35
Pre-Individual, β_{02k}	0.18	0.10	1.82	< 0.10
Group, β_{03k}	-6.84	3.05	-2.24	< 0.05
Grade, β_{04k}	10.12	3.35	3.02	< 0.01
Gender, β_{05k}	2.56	2.54	1.01	0.31
Cohort, β_{06k}	7.67	3.89	1.97	< 0.05
Group x Grade, β_{07k}	-0.77	0.28	-2.70	< 0.01
Group x Gender, β_{08k}	-0.51	0.98	-0.52	0.60
Group x Cohort, β_{09k}	1.78	0.96	1.87	< 0.10
Grade x Gender, β_{010k}	-1.40	0.96	-1.46	0.15
Grade x Cohort, β_{011k}	-3.40	1.39	-2.44	< 0.05
Gender x Cohort, β_{012k}	-0.06	0.67	-0.09	0.93
For Posttest slope, π_{1jk}				
Intercept 2, β_{10k}	-1.00	0.27	-3.69	< 0.01
Pre-Topic, β_{11k}	0.03	0.12	0.23	0.82
Pre-Individual, β_{12k}	-0.20	0.10	-2.02	< 0.05
Group, β_{13k}	7.66	3.05	2.51	< 0.05
Grade, β_{14k}	-4.24	2.82	-1.51	0.13
Gender, β_{15k}	-8.18	2.61	-3.14	< 0.01
Cohort, β_{16k}	-0.51	3.15	-1.16	0.87
Group x Grade, β_{17k}	0.19	0.28	0.68	0.50
Group x Gender, β_{18k}	-0.14	1.00	-0.14	0.89
Group x Cohort, β_{19k}	-2.44	0.96	-2.55	< 0.05
Grade x Gender, β_{110k}	2.81	0.98	2.86	< 0.01
Grade x Cohort, β_{111k}	1.00	1.14	0.88	0.38
Gender x Cohort, β_{112k}	0.25	0.68	0.37	0.71

Table 17. Final Estimation of Fixed Effects for Academic Reading Attitudes (B)

Fixed Effect	*Coefficient*	*se*	*t-ratio*	*p*
For Intercept 1, π_{0jk}				
Intercept 2, β_{00k}	31.90	0.49	65.44	< 0.01
Group, β_{01k}	-6.28	3.06	-2.06	< 0.05
Grade, β_{02k}	10.03	3.33	3.08	< 0.01
Gender, β_{03k}	2.13	2.54	0.84	0.40
Cohort, β_{04k}	7.47	3.86	1.94	< 0.10
Group x Grade, β_{05k}	-0.80	0.29	-2.81	< 0.01
Group x Gender, β_{06k}	-0.46	0.98	-0.47	0.64
Group x Cohort, β_{07k}	1.66	0.96	1.74	< 0.10
Grade x Gender, β_{08k}	-1.29	0.96	-1.35	0.18
Grade x Cohort, β_{09k}	-3.33	1.38	-2.41	< 0.05
Gender x Cohort, β_{010k}	-0.12	0.67	-0.17	0.86
For Year slope, π_{1jk}				
Intercept 2, β_{10k}	-1.00	0.27	-3.66	< 0.01
Post-Topic, β_{11k}	-0.06	0.11	-0.55	0.58
Post-Individual, β_{12k}	0.18	0.10	1.89	< 0.10
Group, β_{13k}	7.10	3.07	2.32	< 0.05
Grade, β_{14k}	-3.39	2.82	-1.20	0.23
Gender, β_{15k}	-7.99	2.62	-3.05	< 0.01
Cohort, β_{16k}	0.76	3.15	0.24	0.81
Group x Grade, β_{17k}	0.25	0.28	0.89	0.38
Group x Gender, β_{18k}	-0.03	0.96	-0.03	0.98
Group x Cohort, β_{19k}	-2.33	0.96	-2.42	< 0.05
Grade x Gender, β_{110k}	2.85	0.99	2.88	< 0.01
Grade x Cohort, β_{111k}	0.58	1.14	0.51	0.61
Gender x Cohort, β_{112k}	0.25	0.69	0.36	0.72

membership varied across students and schools for academic reading attitudes. The significant Level-3 random effect (i.e., U_{00}) indicated additionally that schools differed in their overall initial status, but not in their growth rate (i.e., U_{10}) for academic reading attitudes when pretest and posttest measures of reading motivation were entered as Level-2 predictors.

Reading achievement predicted by attitudes toward reading and reading motivation

Hypothesis 4 predicted that the two dimensions of intrinsic reading motivation measured during the pretest and the posttest should be better predictors than the two dimensions of reading attitudes of the initial status of students' reading achievement (i.e., proximal prediction) than of its growth rate (i.e., distal prediction) after controlling for all model effects (see Table C, Appendix D for a schematic depiction of expected effects X_1 to X_{16}).

Results did not support the predicted positive attitudinal effects for pretest measures of recreational and academic attitudes toward reading on the initial status of reading achievement (i.e., within the same school year). However, results offered partial support for one of the two predicted positive pretest reading motivation effects after controlling for all model effects. More specifically, findings revealed that pretest individual reading motivation predicted reading achievement during the initial status, but pretest topic motivation failed to do so. In addition, findings showed that pretest individual reading motivation predicted the growth rate of reading achievement, but pretest recreational and academic reading attitudes and pretest topic reading motivation did not.

Table 18. Final Estimation of Level-1, Level-2, and Level-3 Variance Components for Academic Reading Attitudes (A and B)

Outcome	*Random Effect*	*Variance Components*	*df*	χ^2	*p*
Academic Reading Attitudes (A)	Level-1 variance				
	Temporal variation, e_{ijk}	16.09			
	Level-2 (students within schools)				
	Individual initial status, r_{0jk}	14.23	501	1,420.63	< 0.01
	Level-3 (between schools)				
	School mean status, U_{00}	1.87	10	37.66	< 0.01
	School mean growth, U_{10}	0.12	10	8.77	> 0.50
Academic Reading Attitudes (B)	Level-1 variance				
	Temporal variation, e_{ijk}	16.33			
	Level-2 (students within schools)				
	Individual initial status, r_{0jk}	14.26	503	1,409.02	< 0.01
	Level-3 (between schools)				
	School mean status, U_{00}	1.83	10	36.11	< 0.01
	School mean growth, U_{10}	0.13	10	8.10	> 0.50

On the other hand, results offered no support for the predicted positive effect of posttest reading attitudes on the initial status of reading achievement stated in Hypothesis 4, but they offered partial support for the predicted positive effect of posttest reading motivation on the initial status of reading achievement after controlling for all model effects. In particular, findings showed that posttest measures of recreational and academic attitudes toward reading failed to predict reading achievement during the initial status (i.e., within the same school year). In the case of intrinsic reading motivation, posttest topic motivation failed to predict reading achievement during the initial status too, but posttest individual reading motivation did predict it as hypothesized. Lastly, findings offered no support for the predicted positive effects of posttest recreational and academic reading attitudes as well as posttest topic reading motivation on the growth rate of reading achievement stated in Hypothesis 4. However, posttest individual reading motivation predicted the growth rate of reading achievement.

As described earlier, HLM does not produce deviance statistic for binary outcomes such as reading achievement and, thus, no AIC could be computed for model selection purposes. Although a Laplace estimation was attempted to establish the AIC associated with the models, as recommended by Raudenbush et al. (2004), HLM was not able to compute it once again. Because no statistical criteria could be obtained to inform model selection for reading achievement, *Model B* was chosen based on the results of all previous model selection tests. Without exception, previous results led to *Model B* as the best one and, therefore, this same model was selected for the reading achievement outcome. Reliability was equal to 0.35 for pretest reading attitudes and reading motivation as predictors of reading achievement (A) and to 0.37 for posttest reading

attitudes and reading motivation as predictors of reading achievement (B). The equations that represent *Model B* for both models that predicted reading achievement based on pretest and posttest measures of reading attitudes and reading motivation are included in Appendix B (see Model equations 10 and 11).

Regarding the positive pretest individual reading motivation effect on the initial status of reading achievement, results in Table 19 show that it was statistically significant and equal to 0.39 logits. Expressed in odds ratio terms, students who received higher pretest ratings in the measure of individual reading motivation by their teachers, during the Fall, were 50% more likely to succeed in their reading achievement test by the end of the school year, in the Spring, than students who received lower ratings. Contrary to the predicted positive effects of pretest reading attitudes and pretest reading motivation measures on the growth rate of reading achievement, Table 19 shows a single marginally significant negative individual motivation effect (i.e., β_{14k}) equal to -0.05 logits. In odds ratio terms, it suggested that students who received more positive pretest individual reading motivation ratings the during the initial status year were 5% less likely to meet the reading standard across time. This finding indicated, alternatively, that pretest measures of reading motivation were better predictors of proximal reading achievement than distal reading achievement as stated in Hypothesis 4.

Table 19 includes also two secondary, non-hypothesized statistically significant effects during the pretest: a group effect (i.e., β_{06k}) and a group by grade effect (i.e., β_{010k}). The direction of the coefficients suggested that participating students and especially those in higher grade levels were more likely to succeed in their reading achievement tests during the initial status year.

Table 19. Final Estimation of Fixed Effects for Reading Achievement (A)

Fixed Effect	*Coefficient*	*se*	*t-ratio*	*p*
For Intercept 1, π_{0jk}				
Intercept 2, β_{00k}	-0.24	0.34	-0.70	0.50
Pre-Recreational, β_{01k}	-0.05	0.05	-0.93	0.35
Pre-Academic, β_{02k}	0.03	0.05	-0.50	0.62
Pre-Topic, β_{03k}	0.14	0.11	1.28	0.20
Pre-Individual, β_{04k}	0.39	0.10	4.02	< 0.01
Transfer, β_{04k}	0.36	0.33	1.10	0.27
Group, β_{06k}	2.68	1.36	1.97	< 0.05
Grade, β_{07k}	-0.39	1.48	-0.27	0.79
Gender, β_{08k}	-0.06	1.28	-0.04	0.97
Cohort, β_{09k}	2.19	2.40	0.91	0.36
Group x Grade, β_{010k}	-1.15	0.68	-1.68	< 0.10
Group x Gender, β_{011k}	0.66	0.86	0.77	0.44
Group x Cohort, β_{012k}	-0.69	0.79	-0.88	0.38
Grade x Gender, β_{013k}	0.45	0.66	0.68	0.50
Grade x Cohort, β_{014k}	-0.56	1.25	-0.45	0.65
Gender x Cohort, β_{015k}	-1.16	0.79	-1.46	0.15
For Year growth slope, π_{1jk}				
Intercept 2, β_{10k}	-0.06	0.10	-0.63	0.54
Pre-Recreational, β_{11k}	0.01	0.01	0.76	0.45
Pre-Academic, β_{12k}	-0.01	0.02	-0.95	0.34
Pre-Topic, β_{13k}	-0.03	0.03	-0.96	0.34
Pre-Individual, β_{14k}	-0.05	0.03	-1.73	< 0.10
Transfer, β_{15k}	-0.08	0.10	-0.77	0.44
Group, β_{16k}	-0.26	0.43	-0.61	0.54
Grade, β_{17k}	0.49	0.46	1.07	0.28
Gender, β_{18k}	0.08	0.41	0.18	0.86
Cohort, β_{19k}	0.24	0.73	0.33	0.74
Group x Grade, β_{110k}	0.22	0.22	0.99	0.32
Group x Gender, β_{111k}	-0.31	0.27	-1.15	0.25
Group x Cohort, β_{112k}	0.13	0.23	0.56	0.58
Grade x Gender, β_{113k}	-0.14	0.22	-0.66	0.51
Grade x Cohort, β_{114k}	-0.23	0.38	-0.61	0.54
Gender x Cohort, β_{115k}	0.31	0.23	1.35	0.18

Results presented in Table 20 followed the predicted positive effect of posttest individual reading motivation (i.e., β_{04k}) on the initial status of reading achievement after controlling for all model effects. The statistically significant effect of individual reading motivation on reading achievement' initial status was equal to 0.56 logits. Expressed in odds ratio terms, students with higher posttest individual reading motivation scores, as reported by teachers in the Spring of the school year, were 80% more likely to succeed in their reading achievement test by the end of the school year, in the Spring, than those with lower scores. These two findings pointed out that posttest academic reading motivation was a better proximal predictor of reading achievement than pretest academic reading motivation.

Further findings showed no support for the positive effects of posttest measures of reading attitudes and reading motivation measures on the growth rate of reading achievement stated in Hypothesis 4. To the contrary, Table 20 shows a single statistically significant negative individual motivation effect (i.e., β_{14k}), equal to -0.09 logits. In odds ratio terms, this result suggested that students with more positive individual reading motivation scores during the posttest of the initial status year were 10% less likely to meet the reading achievement standard across time than students with more negative scores. This finding indicated that reading motivation was a better predictor of proximal reading achievement than distal reading achievement as anticipated in Hypothesis 4.

Table 20 includes a non-hypothesized statistically significant group effect (i.e., β_{06k}) and a marginally significant gender by cohort effect (i.e., β_{015k}) on the initial status of reading achievement. The direction of the coefficients indicated that participating students were more likely to succeed in their reading achievement tests than non-

participating students during the initial status year. In addition, female students were more likely to do better in the reading achievement tests than male students, especially in the latter cohorts, during the initial status.

Table 21 presents estimated variances and related χ^2 statistics from the three-level descomposition. Results suggested that residual parameter variance still remains to be explained in π_{0jk}. Conversely, little residual variance remains in β_{00k} and β_{10k} to be explained. Alternatively, these results indicated that the effect of non-measured variables was significantly captured by the Level-2 random effect (i.e., r_{0jk}) and that the effects of pretest and posttest reading attitudes and reading motivation, school mobility, group, grade, gender, cohort, the interactions of all four variables, and school membership varied across students for reading achievement. All Level-3 random effects (i.e., U_{00} and U_{10}) effects were not statistically significant, thus, indicating that schools did not differ in their overall initial status and growth rate for reading achievement when predicted by pretest and posttest measures of reading attitudes and reading motivation.

Table 20. Final Estimation of Fixed Effects for Reading Achievement (B)

Fixed Effect	*Coefficient*	*se*	*t-ratio*	*p*
For Intercept 1, π_{0jk}				
Intercept 2, β_{00k}	-0.13	0.32	-0.42	0.68
Post-Recreational, β_{01k}	0.03	0.05	0.55	0.58
Post-Academic, β_{02k}	-0.07	0.05	-1.45	0.15
Post-Topic, β_{03k}	-0.15	0.11	-1.31	0.19
Post-Individual, β_{04k}	0.56	0.10	5.54	< 0.01
Transfer, β_{04k}	0.46	0.32	1.44	0.15
Group, β_{06k}	2.68	1.33	2.02	< 0.05
Grade, β_{07k}	0.41	1.50	0.27	0.79
Gender, β_{08k}	-0.54	1.28	-0.42	0.67
Cohort, β_{09k}	3.65	2.47	1.48	0.14
Group x Grade, β_{010k}	-1.02	0.65	-1.56	0.12
Group x Gender, β_{011k}	1.29	0.84	1.53	0.13
Group x Cohort, β_{012k}	-0.98	0.78	-1.25	0.21
Grade x Gender, β_{013k}	0.79	0.65	1.23	0.23
Grade x Cohort, β_{014k}	-1.20	1.28	-0.94	0.35
Gender x Cohort, β_{015k}	-1.35	0.78	-1.72	< 0.10
For Year growth slope, π_{1jk}				
Intercept 2, β_{10k}	-0.07	0.10	-0.67	0.52
Post-Recreational, β_{11k}	-0.01	0.01	-0.70	0.49
Post-Academic, β_{12k}	0.01	0.01	0.97	0.33
Post-Topic, β_{13k}	0.05	0.03	1.51	0.13
Post-Individual, β_{14k}	-0.09	0.03	-3.36	< 0.01
Transfer, β_{15k}	-0.08	0.10	-0.87	0.38
Group, β_{16k}	-0.32	0.38	-0.83	0.40
Grade, β_{17k}	0.23	0.43	0.53	0.60
Gender, β_{18k}	0.09	0.37	0.24	0.81
Cohort, β_{19k}	-0.08	0.70	-0.11	0.92
Group x Grade, β_{110k}	0.23	0.19	1.17	0.24
Group x Gender, β_{111k}	-0.38	0.24	-1.59	0.11
Group x Cohort, β_{112k}	0.16	0.21	0.77	0.44
Grade x Gender, β_{113k}	-0.14	0.19	-0.72	0.47
Grade x Cohort, β_{114k}	-0.07	0.36	-0.20	0.84
Gender x Cohort, β_{115k}	0.30	0.21	1.43	0.15

Table 21. Final Estimation of Level-1, Level-2, and Level-3 Variance Components for Academic Achievement (A and B)

Outcome	*Random Effect*	*Variance Components*	*df*	χ^2	*p*
Reading Achievement (A)	Level-2 (students within schools)				
	Individual initial status, r_{0jk}	1.14	498	781.20	< 0.01
	Level-3 (between schools)				
	School mean status, U_{00}	0.17	10	10.06	0.44
	School mean growth, U_{10}	0.02	10	9.51	> 0.50
Reading Achievement (B)	Level-2 (students within schools)				
	Individual initial status, r_{0jk}	1.20	498	805.50	< 0.01
	Level-3 (between schools)				
	School mean status, U_{00}	0.05	10	6.69	> 0.50
	School mean growth, U_{10}	0.03	10	13.32	0.21

CHAPTER FIVE

DISCUSSION

Reading is an essential skill to succeed not only in school, but also in life. Many poor children, especially children of color, enter school with little exposure to books and reading which puts them at-risk for academic failure (Arnold & Doctoroff, 2003; Vernon-Feagans et al., 2001). Research shows that when children start accumulating academic deficits early on in school, they are less likely to benefit from their education and more likely to fall behind their peers as they advance to upper grade levels (Durlak, 1995).

Besides regular schooling, site-based reading programs, in collaboration with community tutors and mentors, offer one of the strategies available to help economically disadvantaged children improve their literacy skills (Ellis et al., 2001; Fashola, 2002; Mandell Morrow & Gee Woo, 2001; Michael, 1990). Early literacy interventions such as reading-aloud programs promote in an engaging way the development of reading skills and the appreciation of reading for pleasure (Moss et al., 1999). Paired intergenerational read-aloud programs, in particular, let children and caring adults interact and exchange meaningful stories trough reading and discussions about the content of books. Their benefits include also the enhancement of children's listening comprehension, vocabulary and decoding skills, as well as the promotion of interest in reading and healthy reading attitudes and motivation to read (Anderson et al., 1984; Butler, 1980; Dwyer & Isabel, 1990; Elkind, 1989; Kimmel & Segel, 1988).

The effectiveness of early reading interventions and tutoring programs for academically at-risk students is still subject to debate among practitioners and researchers despite their wide application in school and community settings. This is due in part to several studies and evaluations that show mixed results or no positive outcomes associated with reading interventions. Based on an extensive literature review of studies and evaluations of several interventions, the present study argues that a great deal of research suffers from serious methodological shortcomings that contribute to misrepresent the impact of such interventions, thus, leaving much of the criticisms unfounded. In fact, and in line with many of the findings established here, a burgeoning body of evidence indicates that many interventions seem to be rather effective (Gordon et al., 2007; Ritter et al., 2006; Zief et al., 2006).

Some of the most widespread shortcomings identified include extremely small samples, uninterpretable designs, non-validated outcome measures, short term assessments, single implementations, and non-multilevel approaches to data analysis. This study addressed all the previously mentioned limitations and focused on the longitudinal effects of a paired intergenerational reading aloud program on academically at-risk elementary students across three main reading-related outcomes (i.e., attitudes toward reading, reading motivation, and reading achievement). Specifically, it included a larger combined sample size across four student cohorts ($N = 866$) attending 12 Chicago public schools, an interpretable quasi-experimental design, a set of sound and widely used measures, a larger span of time to test the sustainability of results up to five years after the intervention, a number of consecutive implementations across multiple years, and a more appropriate statistical approach that addresses multilevel longitudinal data. In

addition, it is based on multiple sources of reading-related outcome data (i.e., student, teacher, and school data). The present study is perhaps among the first to assess the effect of an early reading intervention among academically at-risk elementary students employing a multilevel analysis.

The contributions pursued by this study were both applied and theoretical. From an applied point of view, it sought to inform the organization implementing Power Lunch the extent to which four different groups or cohorts of students benefited in the areas of reading attitudes, reading motivation, and reading achievement across time because of their participation. In the same vein, it attempted to expand the evidence accumulated regarding early reading interventions, especially of intergenerational paired reading-aloud programs, for future best practices. From a theoretical perspective, this study sought to understand the role of reading attitudes and reading motivation in the development of reading among children and increase the knowledge of how these variables interplay across time while controlling for several predictors such as gender, grade level, and school mobility from a longitudinal and a multilevel perspective. As an extension of this last goal, the present study should also contribute to expand the research on attitudes and motivation, two prominent areas of inquiry in social psychology hardly researched among children.

Based on past research, this study proposed four generative hypotheses, each of which contained several specific predictions. In total, 11 different multilevel models were performed to test all hypothesized effects (see Appendix B, Model equations 1 to 11). The first hypothesis captured the effect of participating in the Power Lunch program across the three main reading outcomes measured in the study: reading attitudes, reading

motivation, and reading achievement. In particular, Hypothesis 1 predicted that students participating in Power Lunch would exhibit more positive attitudes toward recreational and academic reading as well as topic and individual reading motivation than non-participating students by the end of the program after controlling for the effects of grade, gender, cohort, the interaction effects of group, grade, gender and cohort (i.e., group by grade, group by gender, group by cohort, grade by gender, grade by cohort, gender by cohort), school membership, and the effect of non-measured variables (see Model equations 1 to 4). In addition, Hypothesis 1 predicted that students participating in Power Lunch would outperform non-Power Lunch students in their reading achievement within an interval of up to five school years after controlling for the effects of school mobility, grade, gender, cohort, the interaction effects of group, grade, gender and cohort (i.e., group by grade, group by gender, group by cohort, grade by gender, grade by cohort, gender by cohort), school membership, and the effect of non-measured variables (see Model equation 5).

From the two types of attitudinal outcomes measured in the study, findings associated with recreational reading attitudes were the only ones that supported the posttest group effect predicted in Hypothesis 1. Although findings for academic reading attitudes were in agreement with the posttest group effect predicted in Hypothesis 1, they were not statistically significant. Multilevel results for attitudes toward recreational reading showed that students who participated and who did not participate in Power Lunch were not significantly different from each other at pretest, across all four cohorts, after controlling for all model effects. At posttest, however, students participating in Power Lunch had more positive recreational reading attitudes than students who were not

part of the program as predicted in Hypothesis 1. The gain exhibited by treatment students was significantly different than the posttest recreational reading attitudes of control students. The same results indicated that control students showed a statistically significant decline between the pretest and the posttest in their recreational reading attitudes.

Multilevel findings for attitudes toward academic reading showed that students who participated and who did not participate in Power Lunch did not significantly differed at pretest, across all four cohorts, after controlling for all model effects as well. At posttest, treatment students' academic reading attitudes were virtually the same than those shown during the pretest. Non-participating students showed a slight, but statistically significant decline in their academic reading attitudes between the pretest and the posttest. Although Power Lunch students had more positive attitudes toward academic reading at posttest as predicted in Hypothesis 1, by virtue of remaining stable across time, they were not statistically different from the attitudes exhibited by non-Power Lunch students, which became significantly more negative across time.

An overwhelming amount of research shows that students' reading attitudes tend to deteriorate within the school year and as they advance to upper grade levels (e.g., Barnett & Irwin, 1994; Davis Lazarus & Callahan, 2000; Diamond & Onwuegbuzie, 2000; Estes, 1971; Fitzgibbons, 1997; Kush & Watkins, 1996; McKenna et al., 1995; Shapiro & White, 1991; Tunnell et al., 1988a, 1988b). The resulting trend obtained for students who did not participate in Power Lunch for both recreational and academic reading attitudes followed exactly the expected downward direction. For students who participated in Power Lunch, their recreational reading attitudes became more positive

and their academic reading attitudes remained stable throughout the entire school year. These trends were indicative of a positive and a buffering program participation effect for recreational and academic reading attitudes, respectively. Interestingly, the pattern obtained seems quite logical based on the nature of the intervention students received; the Power Lunch program is an intervention designed primarily to instill reading as a recreational rather than as an academic activity.

Hypothesis 1 predicted that students participating in Power Lunch would also exhibit a more positive topic and individual reading motivation than non-participating students by the end of the program. In actuality, findings revealed that this prediction was confirmed for one type of reading motivation only, individual reading motivation. Although findings for topic reading motivation were in agreement with the posttest group effect predicted in Hypothesis 1, they were not statistically significant. Multilevel results for individual reading motivation showed no statistically significant differences between treatment and control students at pretest, across the three cohorts included in the analysis, after controlling for all model effects. At posttest, however, students participating in Power Lunch had a more positive individual reading motivation than students who were not part of the program, just as predicted in Hypothesis 1. The gain exhibited by treatment students was significantly different than the posttest recreational reading attitudes of control students. The same results showed that control students' individual reading motivation became significantly more positive between the pretest and the posttest, but such gain was only a third of that obtained by treatment students.

Multilevel findings for topic reading motivation showed that students who participated and who did not participate in Power Lunch did not significantly differed at

pretest, across the three cohorts included in the analysis, after controlling for all model effects as well. At posttest, both treatment and control students improved their topic motivation slightly, but results were statistically significant for control students only. Although students participating in Power Lunch still managed to have more positive individual reading motivation scores by the end of the program, as predicted in Hypothesis 1, they were not statistically different from those obtained by non-Power Lunch students.

Although research on reading motivation among children is less conclusive about how it fluctuates across time, it seems to indicate that reading motivation tends to deteriorate within the school year and as students advance to upper grade levels, similarly to what has been found for reading attitudes (Baker & Wigfield, 1999; Gambrell et al., 1996; Harter, 1981; Wigfield & Guthrie, 1997). Anders Mazzoni et al. (1999) report, however, findings that show gains in first graders and a plateau among second graders throughout the course of one whole school year. In line with the incremental trend and contrary to the expected deterioration of reading motivation, results showed that both participating and non-participating students raised their reading motivation across time according to teacher ratings. For topic reading motivation, the gains of both groups were statistically indistinguishable by the end of the program, but for individual reading motivation results suggested that treatment students raised it three times more than control students between the pretest and the posttest. These findings suggest that participating students displayed a greater disposition to read more frequently and widely during extended periods of time than non-participating students, but both groups developed topic preferences at a similar rate.

Using Muthén and Curran's (1997) method to calculate effect sizes in growth curve models similar to Cohen's *d* (Cohen, 1988), the treatment effect over the control group during the posttest was equal to .35 for recreational reading attitudes and .43 for individual reading motivation. Based on Cohen's effect size scale (Small = 0.20, Medium = 0.50, and Large = 0.80), both treatment effects were small to medium in magnitude.

Besides predicting treatment effects on students' reading attitudes and reading motivation, Hypothesis 1 predicted a treatment effect on students' reading achievement growth rate. Results showed that the program did not have an immediate effect on reading achievement right at the end of the intervention. Both treatment and control students had about a 50/50 chance of success in their standardized reading achievement test. The anticipated participation effect, however, started emerging one year after completing the program (i.e., Year 1). By then, the probability of success for Power Lunch students had increased to 56% and decreased to 46% among control students. In the subsequent years (2 to 5), the probability of success went progressively up from 62% to 74% among Power Lunch students and progressively down among control students, from 44% to 39%. Taken as a whole, and expressed in odds ratio terms, treatment students were 50% more likely to succeed in their standardized reading achievement test than control students as they advanced in grade levels.

Although the longitudinal participation effect found for reading achievement in favor of Power Lunch students was just marginally significant, the probability trend obtained was academically meaningful and illustrative of the rate of change of reading skills. Conversely, control students showed a non-significant negative growth rate for reading achievement that could easily plunge further and become statistically significant

after the fifth follow up year. Obviously, this same diverging pattern is suggesting that former Power Lunch participants are likely to continue having a better a chance of succeeding at reading and school while students who never participated in the program will have a harder time at school and are at-risk of continue falling behind their peers, just as some researchers warn (see Durlak, 1995).

The implications of reading achievement findings reported in this study are critical. First, they suggest that changing reading skills in academically at-risk children takes a significant amount of time. This rather intuitive conclusion, however, raises the issue of when one should expect meaningful, if not statistically significant, changes to occur. Whenever an intervention does not yield immediate results, researchers should weigh the risks of missing its potential benefits if the intervention is discontinued. In addition, the findings related to reading achievement emphasize the importance of tracking relevant information for extended periods of time. Had the present study relied solely on the results gathered during the initial year (i.e., Year 0), the intervention would have been wrongly judged as ineffective in the area of reading achievement.

The present study suggests that both migrating to a different school and students' grade level have an effect on reading achievement as well. The high school mobility rates of elementary students in Chicago public schools documented here are in line with what others have reported (Kerbow et al., 2003). As one can expect, such instability in the life of students has a negative impact on their academic achievement. In a study on school mobility, Kirkpatrick and Lash (1990) found that each school migration was associated with a one month decline in reading achievement. In the present study, the school mobility effect indicated that the probability of meeting the reading achievement standard

across time decreased progressively for students who transferred out to other school(s) compared to those who did not. In particular, results showed that students who never transferred out were 10% more likely to meet the reading achievement standard than those who moved to other school(s).

Regarding the grade effect on reading achievement, the study found that students in higher grade levels were 30% more likely to meet the reading achievement standard than students in lower grade levels across time. Past research (Torgesen, 2004) indicates that interventions are more effective in younger students and third grade is still within the boundaries of early reading intervention, but it is not entirely clear why the intervention was more effective among third graders compared to second and first graders.

The present study examined also the role of gender and grade level and their interaction with program participation in predicting reading attitudes and reading motivation. A similar analysis was performed for the role of gender and its interaction with program participation on reading achievement. Past studies (Diamond & Onwuegbuzie, 2000; Fitzgibbons, 1997; Friend, 1995; McKenna et al., 1995; Wallbrown et al., 1981) strongly suggest that girls tend to have more positive reading attitudes and reading motivation than boys. In addition, students in higher grade levels tend to have less favorable reading attitudes and reading motivation compared to students in lower grade levels (Baker & Wigfield, 1999; Gambrell et al., 1996; Harter, 1981; Wigfield & Guthrie, 1997). Furthermore, research indicates that girls usually outperform boys in reading achievement (McKenna et al., 1995).

Hypothesis 2 predicted a gender and grade effect for the posttest measures of reading attitudes and intrinsic reading motivation. Additionally, a group by gender and a

group by grade interaction effect for posttest measures of reading attitudes and intrinsic reading motivation were predicted in favor of Power Lunch participants. Finally, for reading achievement, a gender and a group by gender effect in favor of Power Lunch participants was predicted too.

Results for posttest measures of recreational reading attitudes were in agreement with the hypothesized effects of gender, grade, group by gender, and group by grade. Regarding the gender effect, although female students had more positive recreational reading attitudes than male students at posttest, as predicted in Hypothesis 2, both boys and girls experienced a marginally significant decline over time. The interaction effect of gender and group condition showed that female and male treatment students had more positive recreational reading attitudes than female and male control students by the end of the program, but only female treatment students improved their recreational reading attitudes across time. Control students' recreational attitudes became more negative across time, especially among male students, when compared to male treatment students.

Related to the hypothesized grade level effect, results showed that students in lower grade levels had more positive recreational reading attitudes than students in higher grade levels by the end of the program. However, recreational reading attitudes became more negative within the school year, especially among students in higher grade levels. The group by grade interaction effect results, on the other hand, showed that Power Lunch students had more favorable recreational attitudes than non-Power Lunch students across all grade levels by the end of the school year, but only first grade treatment students exhibited more positive recreational attitudes across time. Second and third graders, on the contrary, experienced a decline in their recreational reading attitudes.

Among control groups, students from all grade levels experienced a greater detriment in their attitudes toward recreational reading across time.

From the gender, grade, group by gender, and group by grade effects expected for academic reading attitudes, the present study found evidence for the first two only. In agreement with what was hypothesized, female students' attitudes toward academic reading were more positive than those held by male students during the posttest. Furthermore, only female students' attitudes became more favorable toward academic reading between the pretest and the posttest, whereas male students' academic reading attitudes became more negative across time.

The grade level effect on academic reading attitudes was opposite to what was originally hypothesized. In particular, findings indicated that students from higher grade levels had more favorable attitudes toward academic reading than students from lower grade levels not only during the posttest, but also during the pretest. However, all students experienced a statistically significant decline in their academic reading attitude scores across time, especially among students in higher grade levels.

Results for both types of intrinsic reading motivation revealed that from the gender, grade, group by gender, and group by grade expected effects, only two effects emerged: a grade effect on topic reading motivation and a group by gender interaction effect for individual reading motivation. The direction of the coefficient obtained for the grade level effect was in line with Hypothesis 2 and indicated that students from lower grade levels had more favorable topic reading motivation than students from higher grade levels by the end of the program. However, among all grade levels, only first graders were able to boost their topic reading motivation across time.

Following the direction predicted in Hypothesis 2 as well, results showed that both male and female students participating in Power Lunch had a more positive individual reading motivation by the end program than both control male and female students. Although both groups experienced an increment in their individual reading motivation, this was greater among male students, especially those participating in the program.

In addition to the hypothesized effects, two types of non-expected effects emerged for both types of reading motivation during the posttest. First, a cohort effect was identified for both topic and individual reading motivation which indicated that students in the older cohorts had higher reading motivation scores than students in the more recent cohorts by the end of the program. Second, two separate interaction effects were identified as well: a grade by cohort interaction effect for topic reading motivation and a grade by gender interaction effect for individual reading motivation. As indicated before, the first interaction effect suggested that students in older cohorts had higher topic motivation scores than students in the more recent cohorts by the end of the program, but only students in lower grade levels were able to increase their topic reading motivation. The second interaction effect indicated that male students improved their individual reading motivation across time more than female students, but such improvement was greater among students in lower grade levels. No particular explanation or theoretical underpinning can be provided to account for any of these three non-hypothesized effects.

Two final additional posttest effects were expected for reading achievement as part of Hypothesis 2: a gender effect and a group by gender effect. Results indicated that neither effect was statistically significant.

Researchers argue that both constructs of attitudes and motivation should be positively associated with each other (Eagly & Chaiken, 1993), particularly in the area of reading (Wigfield, 1997), but no single study has examined this relationship. As such, Hypothesis 3 stated that the two dimensions of intrinsic reading motivation taken at pretest should positively predict students' attitudes toward recreational and academic reading measured at pretest and posttest after controlling for all model effects. In addition, the two dimensions of intrinsic reading motivation taken at posttest should positively predict students' attitudes toward recreational and academic reading measured at posttest after controlling for all model effects.

In the case of recreational reading attitudes, results were contrary to what Hypothesis 3 predicted. In particular, pretest measures of topic and individual reading motivation did not predict pretest recreational reading attitudes. Furthermore, pretest measures of topic reading motivation failed to predict students' posttest recreational attitudes too, but pretest measures of individual reading motivation marginally predicted posttest recreational reading attitudes after controlling for all model effects. The effect suggested, however, an inverse pattern of association: students with lower pretest individual reading motivation ratings exhibited more positive levels of recreational reading attitudes during the posttest. On the other hand, posttest topic reading motivation did not predict students' recreational reading attitudes taken during the posttest after accounting for all model effects, but posttest individual reading motivation did in accordance to the direction predicted in Hypothesis 3; that is, students with higher posttest individual reading scores exhibited more favorable attitudes toward recreational reading.

In the case of academic reading attitudes, results partially supported what Hypothesis 3 predicted. On the one hand, pretest measures of topic reading motivation failed to predict attitudes toward academic reading both at pretest and posttest. In addition, posttest topic reading motivation failed to predict attitudes toward academic reading during the posttest as well. On the other hand, pretest individual reading motivation predicted academic reading attitudes marginally at the pretest and significantly at the posttest. Posttest individual reading motivation also predicted positively posttest academic reading attitudes marginally. The direction of these effects suggested that higher pretest individual reading motivation scores were associated with higher pretest academic reading attitudes, as stated in hypothesis 3, but higher pretest individual reading motivation scores were associated with lower posttest academic reading attitudes, contrary to what Hypothesis 3 proposed. A similar trend emerged as well with pretest individual reading motivation and posttest recreational reading attitudes. The direction of the remaining effect suggested that higher posttest individual reading motivation scores were associated with higher posttest academic reading attitudes.

This pattern of findings is congruent with results showing that reading attitudes tended to be more negative during the posttest than during the pretest while reading motivation tended to go up across time. This trend could explain why pretest individual reading motivation is negatively associated with posttest recreational and academic reading attitudes, but positively associated with pretest academic reading attitudes. Interestingly, posttest individual reading motivation was associated positively with both recreational and academic reading attitudes measure during the posttest too. This pattern indicates that students who improved their individual reading motivation by the end of

the program exhibited more favorable recreational reading attitudes and academic reading attitudes as well.

An alternative explanation to this pattern is that students who harbor more positive reading attitudes have higher intrinsic (individual) reading motivation. Although the intuitive linkage between attitudes toward and reading motivation has been proposed before (Wigfield, 1997), no previous study had corroborated such claim. This finding is especially noteworthy because predicting students' reading attitudes based on teacher ratings of reading motivation, in a systematic way, is very problematic. Even in the presence of the attitude-motivation association found in the present study, topic reading motivation showed no relationship with either type of reading attitude. One of the reasons this is likely to happen is because students and teachers based their attitudes and motivation reports on different information (Carr & Kurtz, 1991, 1994; Rueda et al., 2004). In a study where teacher and student reports of reading motivation were not associated, Rueda et al. (2004) argued that teacher reports seemed more influenced by students' reading achievement levels than students themselves. Young students are more likely to use their feelings because they do not possess the ability to make inferences about their reading attitudes or motivation based on past reading success or failure (Cafferty, 1993). As a result, teacher and student reports are incongruent with each other. More congruency should emerge, nevertheless, as students grow older because they should be more able to develop an appraisal informed by their experiences of academic failure or success.

The last hypothesis of the study, Hypothesis 4, focused on the assertion made by several researchers that reading attitudes and reading motivation should predict future

reading performance (e.g., Gottfried, 1990; McKenna, 1994; McKenna et al., 1995; Morgan & Fuchs, 2007; Swanson, 1982; Walberg & Tsai, 1985; see also Stevenson & Newman, 1986). It specifically examined if reading attitudes and reading motivation were better predictors of proximal rather than distal future reading performance as some claim (Smith, 1990; Smith et al., 1999). Furthermore, the study postulated too that measures of reading motivation completed by teachers should be better predictors of reading achievement than measures completed by students because teachers' information are more closely guided by the reading performance of the students (Carr & Kurtz, 1991, 1994; Rueda et al., 2004). These two claims have not been tested concurrently in any previous study using longitudinal data and both teacher and student reports.

Hypothesis 4 predicted that the two dimensions of intrinsic reading motivation measured during the pretest and the posttest should be better predictors than the two dimensions of reading attitudes. In addition, they should be better predictors of the initial status of students' reading achievement (i.e., proximal prediction) than of its growth rate (i.e., distal prediction) after controlling for all model effects.

For both recreational and academic attitudes toward reading, results offered no support for the predicted positive effects of pretest and posttest reading attitudes on both the initial status and the growth rate of reading achievement proposed in Hypothesis 4. In fact, further results showed that a similar situation occurred with pretest and posttest measures of topic reading motivation; both of them failed to predict the initial status and the growth rate of students' reading achievement.

Findings revealed that only individual reading motivation predicted students' reading achievement at the initial status and across time. However, the direction of the

hypothesized effects of individual reading motivation coincided only with the effect on reading achievement's initial status, not with the effect on its growth rate. More specifically, students who received higher pretest and posttest scores in the measure of individual reading motivation from their teachers —during the Fall and the Spring within the same school year— were 50% and 80%, respectively, more likely to succeed in their reading achievement test during the initial status year than students who received lower motivation scores at both times. Contrary to what was expected in Hypothesis 4, a negative effect for both pretest and posttest individual reading motivation was found for students' reading achievement growth rate. That is, students who received more positive individual reading motivation scores during the pretest and posttest were 5% and 10%, respectively, less likely to meet the reading standard across time than students who received more negative pretest and posttest individual reading motivation scores.

These findings showed that measures of students' reading attitudes or the affect associated with two types of reading attitudes, recreational and academic, failed to predict reading achievement both during its initial status as well as during its growth rate. Intrinsic reading motivation, on the other hand, particularly individual reading motivation, predicted positively students' reading achievement at the initial status, but negatively its growth rate. This indicated not only that intrinsic individual reading motivation, or avid engagement in reading behavior, was a better predictor than reading attitudes, but also that it worked better as a predictor of proximal reading achievement than distal reading achievement as anticipated.

Although the link between attitudes and behaviors has remained the driving force of the applied value of attitudes (Eagly & Chaiken, 1993), pairing children's reading

attitudes and reading achievement directly may be problematic in a longitudinal context for various reasons. First, reading achievement is the product of reading behavior, not the behavior itself. Second, attitudes among children are dominated by affect, but as they grow older they are likely to develop cognitive and behavioral aspects too (Petty & Cacioppo, 1986a, 1986b), which were not captured by the reading attitude measure used in the present study and which could have arguably increased the predictive power of reading attitudes. Third, young children tend to not guide their feelings about reading based on past academic experiences (Cafferty, 1993) and, thus, reading achievement may not be relevant to their reading attitudes. These same arguments can explain why measures of intrinsic motivation, which tapped into the frequency of reading behavior or reading behavior disposition, were able to predict reading achievement —at least during its initial status— as past research suggests (Baker & Wigfield, 1999; Schunk & Zimmerman, 2008; Wigfield, 1997; Wigfield & Eccles, 2002; Wigfield & Guthrie, 1997).

The lack of association between a specific dimension of reading motivation and reading achievement reported in the present study has emerged in other studies as well (Baker & Wigfield, 1999; Wigfield & Guthrie, 1997). Using an instrument that measured 11 dimensions of reading motivation, Baker and Wigfield (1999) found that the relationship between different reading motivation dimensions and reading achievement was moderated by race. Among African-American students, only three of the 11 dimensions were associated with reading achievement, but among white students all 11 dimensions were associated with reading achievement. Although Sweet et al. (1998), the authors of the reading motivation instrument used in the present study, did not explore the role of race/ethnicity in the relationship between reading motivation and achievement,

a moderating effect cannot be completely rule out. Future studies conducted with more diverse student samples should verify if race/ethnicity moderates the link between reading motivation and achievement.

The results of the present study suggested that the Power Lunch program was effective in promoting positive reading attitudes and reading motivation as short term outcomes, and reading achievement as a long term outcome. However, this conclusion needs to be qualified at various levels. First, the program was not effective across all types of reading attitudes and reading motivation. Its strength was specifically in the improvement of attitudes toward recreational reading and individual reading motivation. Although the intervention seemed to have impacted reading achievement across all participating students, the trend shown is just an average of all cohorts and follow-up periods. It is not clear if this same trend would have emerged had all cohorts been followed up an equal number of years. For the attitudinal and motivational outcomes, the program was in some case more effective for female than for male students or for younger versus older students. This indicated that the program could not completely override the influences of gender and grade level shown in past research.

In addition, many of the gains shown by the program were statistically speaking only marginally significant. This is especially troubling because of the numerous statistical tests conducted throughout the study. The reliability coefficients of many of the outcomes were less than desirable and this raises some important questions about the quality of the outcome measures. Unfortunately, low reliabilities are also produced when the number of clusters used in models, as it occurred in the present study, is too small (see Raudensush & Bryk, 2002).

In addition, most students scored fairly high to begin with in both the measures of reading attitudes and reading motivation. Attitudinal gains were, for instance, below the 2.5-point mark that McKenna and Kear (1990) recommend for a meaningful change for each reading attitude dimension. The large size of the sample used in the study may have contributed to make even small differences significantly or marginally significant. In the case of reading achievement, however, the divergent trend was meaningful beyond its statistical significance because it showed that reading achievement trend was noticeably different between treatment and comparison students. The small-to-medium treatment effect sizes observed are, however, in line with what has been reported in meta-analytic reviews of various types of youth interventions (DuBois et al., 2002; Ritter et al., 2006; Zief et al., 2006).

A critical issue that the study did not address about the program has to do with the specific processes or mechanisms that made students' reading attitudes, reading motivation, and reading achievement change. Although a series of psychosocial processes that may have led to attitude (i.e., persuasion, cognitive dissonance, mere exposure, and social influence) and motivation change (i.e., influence on ability beliefs and achievement goals), it is not clear which one was the dominant or how they interacted with the intervention. The same could be said about the learning and cognitive mechanisms (e.g., decoding, vocabulary development) involved in the process of reading acquisition or improvement. Unfortunately, when working with quasi-experiments or social programs, it is difficult to identify what element of the treatment was responsible of the results. At the end, only an overall effect is available as evidence of program success (Shaughnessy et al., 2000).

The present study possesses other important limitations that stem from its methodological design and the analytical technique employed. Both reading attitudes and reading motivation were not assessed beyond one year and two points. This precluded a more in depth understanding of how these two elements of reading vary across time and influence reading achievement. Although multilevel analysis was the most appropriate statistical technique, none of the models included school (Level-3) variables (e.g., total number of students, average classroom size) that could have shown the role played by contextual variables in the success of the program. Finally, the appropriateness of the Bernoulli model used to test reading achievement effect could not be tested statistically and, thus, other plausible models could have been applied as well.

It is not known either the impact of the changes that occurred in the metrics of reading achievement measures (ITBS and ISAT) across time, implemented by Chicago Public Schools. The binary conversion used here was perhaps too coarse to show smaller, but meaningful changes or changes in specific areas of reading (e.g., comprehension).

Future applications of Power Lunch may maximize its potential benefits by making a series of small implementation changes. First, the program should be offered to students for more than one consecutive year whenever possible. This could help students maintain and possibly boost gains in reading motivation, attitudes toward reading, and reading achievement. Second, findings from past research and from the present study suggest that male students are at a greater risk of becoming struggling readers and, thus, greater attention should be paid to boys participating in the intervention. Some of the programmatic aspects that could be modified are increasing the number of male reading tutors participating in the program (currently at 30%), and selecting reading material that

contain topics or themes (e.g., sports, cars) most likely to be read by boys. Third, the program should be offered to younger students whenever possible. Findings from this and other studies emphasize the importance of promoting literacy early on during the first formative years of schooling. In order to enhance reading outcomes among older students, the intervention could tie both program and classroom content (e.g., use same books and expand the diversity of texts used) so that students stay engaged in common reading activities between every weekly program sessions.

In summary, and from a multilevel longitudinal perspective, the present study tested the effect of the intergenerational reading-aloud program Power Lunch and provided evidence that it had a positive effect on academically at-risk elementary students' reading attitudes, reading motivation, and reading achievement. The findings of this study suggest that community members involved in read-aloud programs run by small organizations can make a long lasting, if modest, impact on the literacy of children and, potentially, their lives.

APPENDIX A

SUMMARY OF THE METHODOLOGICAL DESIGN

Table A. Summary of the Methodological Design

COHORTS	SCHOOL YEAR AND TERM									
	2002-2003		2003-2004		2004-2005		2005-2006		2006-2007	
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
2002-2003	O_{12} X $O_{123(A)}$			$O_{3(A)}$		$O_{3(A)}$		$O_{3(B)}$		$O_{3(B)}$
	O_{12}	$O_{123(A)}$		$O_{3(A)}$		$O_{3(A)}$		$O_{3(B)}$		$O_{3(B)}$
2003-2004			O_{12} X $O_{123(A)}$			$O_{3(A)}$		$O_{3(B)}$		$O_{3(B)}$
			O_{12}	$O_{123(A)}$		$O_{3(A)}$		$O_{3(B)}$		$O_{3(B)}$
2004-2005					O_{12} X $O_{123(A)}$			$O_{3(B)}$		$O_{3(B)}$
					O_{12}	$O_{123(A)}$		$O_{3(B)}$		$O_{3(B)}$
2005-2006							O_{12} X $O_{123(B)}$			$O_{3(B)}$
							O_{12}	$O_{123(B)}$		$O_{3(B)}$

Note: X represents treatment implementation; O_{12} corresponds to pretest measures of reading attitudes and reading motivation; $O_{123(A)}$ corresponds to posttest measures of reading attitudes and reading motivation plus posttest only Iowa Test of Basic Skills (ITBS) reading score; $O_{123(B)}$ corresponds to posttest measures of reading attitudes and reading motivation plus posttest only Illinois Standards Achievement Test (ISAT) reading score; $O_{3(A)}$ corresponds to ITBS reading score follow ups; $O_{3(B)}$ corresponds to ISAT reading score follow ups.

APPENDIX B

HIERARCHICAL LINEAR MODELLING EQUATIONS FOR HYPOTHESES

EQUATION 1. Recreational Reading Attitudes

Level-1 Model

$$\text{Recreational Reading Attitudes}_{ijk} = \pi_{0jk} + \pi_{1jk}\,(\text{Posttest}_{ijk}) + e_{ijk}$$

Level-2 Model

$$\pi_{0jk} = \beta_{00k} + \beta_{01k}\,(\text{Group}_{jk} - \overline{\text{Group}}..) + \beta_{02k}\,(\text{Grade}_{jk} - \overline{\text{Grade}}..) + \beta_{03k}\,(\text{Gender}_{jk} - \overline{\text{Gender}}..) + \beta_{04k}\,(\text{Cohort}_{jk} - \overline{\text{Cohort}}..) + \beta_{05k}\,(\text{Group x Grade}_{jk} - \overline{\text{Group x Grade}}..) + \beta_{06k}\,(\text{Group x Gender}_{jk} - \overline{\text{Group x Gender}}..) + \beta_{07k}\,(\text{Group x Cohort}_{jk} - \overline{\text{Group x Cohort}}..) + \beta_{08k}\,(\text{Grade x Gender}_{jk} - \overline{\text{Grade x Gender}}..) + \beta_{09k}\,(\text{Grade x Cohort}_{jk} - \overline{\text{Grade x Cohort}}..) + \beta_{010k}\,(\text{Gender x Cohort}_{jk} - \overline{\text{Gender x Cohort}}..) + r_{0jk}$$

$$\pi_{1jk} = \beta_{10k} + \beta_{11k}\,(\text{Group}_{jk} - \overline{\text{Group}}..) + \beta_{12k}\,(\text{Grade}_{jk} - \overline{\text{Grade}}..) + \beta_{13k}\,(\text{Gender}_{jk} - \overline{\text{Gender}}..) + \beta_{14k}\,(\text{Cohort}_{jk} - \overline{\text{Cohort}}..) + \beta_{15k}\,(\text{Group x Grade}_{jk} - \overline{\text{Group x Grade}}..) + \beta_{16k}\,(\text{Group x Gender}_{jk} - \overline{\text{Group x Gender}}..) + \beta_{17k}\,(\text{Group x Cohort}_{jk} - \overline{\text{Group x Cohort}}..) + \beta_{18k}\,(\text{Grade x Gender}_{jk} - \overline{\text{Grade x Gender}}..) + \beta_{19k}\,(\text{Grade x Cohort}_{jk} - \overline{\text{Grade x Cohort}}..) + \beta_{110k}\,(\text{Gender x Cohort}_{jk} - \overline{\text{Gender x Cohort}}..)$$

Level-3 Model

$$\beta_{00k} = \gamma_{000} + U_{00k}$$
$$\beta_{01k} = \gamma_{010}$$
$$\beta_{02k} = \gamma_{020}$$
$$\beta_{03k} = \gamma_{030}$$
$$\beta_{04k} = \gamma_{040}$$
$$\beta_{05k} = \gamma_{050}$$
$$\beta_{06k} = \gamma_{060}$$
$$\beta_{07k} = \gamma_{070}$$
$$\beta_{08k} = \gamma_{080}$$
$$\beta_{09k} = \gamma_{090}$$
$$\beta_{010k} = \gamma_{0100}$$
$$\beta_{10k} = \gamma_{100} + U_{010k}$$
$$\beta_{11k} = \gamma_{110}$$
$$\beta_{12k} = \gamma_{120}$$
$$\beta_{13k} = \gamma_{130}$$
$$\beta_{14k} = \gamma_{140}$$
$$\beta_{15k} = \gamma_{150}$$
$$\beta_{16k} = \gamma_{160}$$
$$\beta_{17k} = \gamma_{170}$$
$$\beta_{18k} = \gamma_{180}$$
$$\beta_{19k} = \gamma_{190}$$
$$\beta_{110k} = \gamma_{1100}$$

EQUATION 2. Academic Reading Attitudes

Level-1 Model

$$\text{Academic Reading Attitudes}_{ijk} = \pi_{0jk} + \pi_{1jk}\,(\text{Posttest}_{ijk}) + e_{ijk}$$

Level-2 Model

$$\pi_{0jk} = \beta_{00k} + \beta_{01k}\,(\text{Group}_{jk} - \overline{\text{Group}}..) + \beta_{02k}\,(\text{Grade}_{jk} - \overline{\text{Grade}}..) + \beta_{03k}\,(\text{Gender}_{jk} - \overline{\text{Gender}}..) + \beta_{04k}\,(\text{Cohort}_{jk} - \overline{\text{Cohort}}..) + \beta_{05k}\,(\text{Group x Grade}_{jk} - \overline{\text{Group x Grade}}..) + \beta_{06k}\,(\text{Group x Gender}_{jk} - \overline{\text{Group x Gender}}..) + \beta_{07k}\,(\text{Group x Cohort}_{jk} - \overline{\text{Group x Cohort}}..) + \beta_{08k}\,(\text{Grade x Gender}_{jk} - \overline{\text{Grade x Gender}}..) + \beta_{09k}\,(\text{Grade x Cohort}_{jk} - \overline{\text{Grade x Cohort}}..) + \beta_{010k}\,(\text{Gender x Cohort}_{jk} - \overline{\text{Gender x Cohort}}..) + r_{0jk}$$

$$\pi_{1jk} = \beta_{10k} + \beta_{11k}\,(\text{Group}_{jk} - \overline{\text{Group}}..) + \beta_{12k}\,(\text{Grade}_{jk} - \overline{\text{Grade}}..) + \beta_{13k}\,(\text{Gender}_{jk} - \overline{\text{Gender}}..) + \beta_{14k}\,(\text{Cohort}_{jk} - \overline{\text{Cohort}}..) + \beta_{15k}\,(\text{Group x Grade}_{jk} - \overline{\text{Group x Grade}}..) + \beta_{16k}\,(\text{Group x Gender}_{jk} - \overline{\text{Group x Gender}}..) + \beta_{17k}\,(\text{Group x Cohort}_{jk} - \overline{\text{Group x Cohort}}..) + \beta_{18k}\,(\text{Grade x Gender}_{jk} - \overline{\text{Grade x Gender}}..) + \beta_{19k}\,(\text{Grade x Cohort}_{jk} - \overline{\text{Grade x Cohort}}..) + \beta_{110k}\,(\text{Gender x Cohort}_{jk} - \overline{\text{Gender x Cohort}}..)$$

Level-3 Model

$$\beta_{00k} = \gamma_{000} + U_{00k}$$
$$\beta_{01k} = \gamma_{010}$$
$$\beta_{02k} = \gamma_{020}$$
$$\beta_{03k} = \gamma_{030}$$
$$\beta_{04k} = \gamma_{040}$$
$$\beta_{05k} = \gamma_{050}$$
$$\beta_{06k} = \gamma_{060}$$
$$\beta_{07k} = \gamma_{070}$$
$$\beta_{08k} = \gamma_{080}$$
$$\beta_{09k} = \gamma_{090}$$
$$\beta_{010k} = \gamma_{0100}$$
$$\beta_{10k} = \gamma_{100} + U_{010k}$$
$$\beta_{11k} = \gamma_{110}$$
$$\beta_{12k} = \gamma_{120}$$
$$\beta_{13k} = \gamma_{130}$$
$$\beta_{14k} = \gamma_{140}$$
$$\beta_{15k} = \gamma_{150}$$
$$\beta_{16k} = \gamma_{160}$$
$$\beta_{17k} = \gamma_{170}$$
$$\beta_{18k} = \gamma_{180}$$
$$\beta_{19k} = \gamma_{190}$$
$$\beta_{110k} = \gamma_{1100}$$

EQUATION 3. Topic Reading Motivation

Level-1 Model

$$\text{Topic Reading Attitudes}_{ijk} = \pi_{0jk} + \pi_{1jk}(\text{Posttest}_{ijk}) + e_{ijk}$$

Level-2 Model

$$\pi_{0jk} = \beta_{00k} + \beta_{01k}(\text{Group}_{jk} - \overline{\text{Group}}..) + \beta_{02k}(\text{Grade}_{jk} - \overline{\text{Grade}}..) + \beta_{03k}(\text{Gender}_{jk} - \overline{\text{Gender}}..) + \beta_{04k}(\text{Cohort}_{jk} - \overline{\text{Cohort}}..) + \beta_{05k}(\text{Group x Grade}_{jk} - \overline{\text{Group x Grade}}..) + \beta_{06k}(\text{Group x Gender}_{jk} - \overline{\text{Group x Gender}}..) + \beta_{07k}(\text{Group x Cohort}_{jk} - \overline{\text{Group x Cohort}}..) + \beta_{08k}(\text{Grade x Gender}_{jk} - \overline{\text{Grade x Gender}}..) + \beta_{09k}(\text{Grade x Cohort}_{jk} - \overline{\text{Grade x Cohort}}..) + \beta_{010k}(\text{Gender x Cohort}_{jk} - \overline{\text{Gender x Cohort}}..) + r_{0jk}$$

$$\pi_{1jk} = \beta_{10k} + \beta_{11k}(\text{Group}_{jk} - \overline{\text{Group}}..) + \beta_{12k}(\text{Grade}_{jk} - \overline{\text{Grade}}..) + \beta_{13k}(\text{Gender}_{jk} - \overline{\text{Gender}}..) + \beta_{14k}(\text{Cohort}_{jk} - \overline{\text{Cohort}}..) + \beta_{15k}(\text{Group x Grade}_{jk} - \overline{\text{Group x Grade}}..) + \beta_{16k}(\text{Group x Gender}_{jk} - \overline{\text{Group x Gender}}..) + \beta_{17k}(\text{Group x Cohort}_{jk} - \overline{\text{Group x Cohort}}..) + \beta_{18k}(\text{Grade x Gender}_{jk} - \overline{\text{Grade x Gender}}..) + \beta_{19k}(\text{Grade x Cohort}_{jk} - \overline{\text{Grade x Cohort}}..) + \beta_{110k}(\text{Gender x Cohort}_{jk} - \overline{\text{Gender x Cohort}}..)$$

Level-3 Model

$$\beta_{00k} = \gamma_{000} + U_{00k}$$
$$\beta_{01k} = \gamma_{010}$$
$$\beta_{02k} = \gamma_{020}$$
$$\beta_{03k} = \gamma_{030}$$
$$\beta_{04k} = \gamma_{040}$$
$$\beta_{05k} = \gamma_{050}$$
$$\beta_{06k} = \gamma_{060}$$
$$\beta_{07k} = \gamma_{070}$$
$$\beta_{08k} = \gamma_{080}$$
$$\beta_{09k} = \gamma_{090}$$
$$\beta_{010k} = \gamma_{0100}$$
$$\beta_{10k} = \gamma_{100} + U_{010k}$$
$$\beta_{11k} = \gamma_{110}$$
$$\beta_{12k} = \gamma_{120}$$
$$\beta_{13k} = \gamma_{130}$$
$$\beta_{14k} = \gamma_{140}$$
$$\beta_{15k} = \gamma_{150}$$
$$\beta_{16k} = \gamma_{160}$$
$$\beta_{17k} = \gamma_{170}$$
$$\beta_{18k} = \gamma_{180}$$
$$\beta_{19k} = \gamma_{190}$$
$$\beta_{110k} = \gamma_{1100}$$

EQUATION 4. Individual Reading Motivation

Level-1 Model

$$\text{Individual Reading Attitudes}_{ijk} = \pi_{0jk} + \pi_{1jk}\,(\text{Posttest}_{ijk}) + e_{ijk}$$

Level-2 Model

$$\pi_{0jk} = \beta_{00k} + \beta_{01k}\,(\text{Group}_{jk} - \overline{\text{Group}}..) + \beta_{02k}\,(\text{Grade}_{jk} - \overline{\text{Grade}}..) + \beta_{03k}\,(\text{Gender}_{jk} - \overline{\text{Gender}}..) + \beta_{04k}\,(\text{Cohort}_{jk} - \overline{\text{Cohort}}..) + \beta_{05k}\,(\text{Group x Grade}_{jk} - \overline{\text{Group x Grade}}..) + \beta_{06k}\,(\text{Group x Gender}_{jk} - \overline{\text{Group x Gender}}..) + \beta_{07k}\,(\text{Group x Cohort}_{jk} - \overline{\text{Group x Cohort}}..) + \beta_{08k}\,(\text{Grade x Gender}_{jk} - \overline{\text{Grade x Gender}}..) + \beta_{09k}\,(\text{Grade x Cohort}_{jk} - \overline{\text{Grade x Cohort}}..) + \beta_{010k}\,(\text{Gender x Cohort}_{jk} - \overline{\text{Gender x Cohort}}..) + r_{0jk}$$

$$\pi_{1jk} = \beta_{10k} + \beta_{11k}\,(\text{Group}_{jk} - \overline{\text{Group}}..) + \beta_{12k}\,(\text{Grade}_{jk} - \overline{\text{Grade}}..) + \beta_{13k}\,(\text{Gender}_{jk} - \overline{\text{Gender}}..) + \beta_{14k}\,(\text{Cohort}_{jk} - \overline{\text{Cohort}}..) + \beta_{15k}\,(\text{Group x Grade}_{jk} - \overline{\text{Group x Grade}}..) + \beta_{16k}\,(\text{Group x Gender}_{jk} - \overline{\text{Group x Gender}}..) + \beta_{17k}\,(\text{Group x Cohort}_{jk} - \overline{\text{Group x Cohort}}..) + \beta_{18k}\,(\text{Grade x Gender}_{jk} - \overline{\text{Grade x Gender}}..) + \beta_{19k}\,(\text{Grade x Cohort}_{jk} - \overline{\text{Grade x Cohort}}..) + \beta_{110k}\,(\text{Gender x Cohort}_{jk} - \overline{\text{Gender x Cohort}}..)$$

Level-3 Model

$$\beta_{00k} = \gamma_{000} + U_{00k}$$
$$\beta_{01k} = \gamma_{010}$$
$$\beta_{02k} = \gamma_{020}$$
$$\beta_{03k} = \gamma_{030}$$
$$\beta_{04k} = \gamma_{040}$$
$$\beta_{05k} = \gamma_{050}$$
$$\beta_{06k} = \gamma_{060}$$
$$\beta_{07k} = \gamma_{070}$$
$$\beta_{08k} = \gamma_{080}$$
$$\beta_{09k} = \gamma_{090}$$
$$\beta_{010k} = \gamma_{0100}$$
$$\beta_{10k} = \gamma_{100} + U_{010k}$$
$$\beta_{11k} = \gamma_{110}$$
$$\beta_{12k} = \gamma_{120}$$
$$\beta_{13k} = \gamma_{130}$$
$$\beta_{14k} = \gamma_{140}$$
$$\beta_{15k} = \gamma_{150}$$
$$\beta_{16k} = \gamma_{160}$$
$$\beta_{17k} = \gamma_{170}$$
$$\beta_{18k} = \gamma_{180}$$
$$\beta_{19k} = \gamma_{190}$$
$$\beta_{110k} = \gamma_{1100}$$

EQUATION 5. Reading Achievement

Level-1 Model

$$\text{Reading Achievement}_{ijk} = \pi_{0jk} + \pi_{1jk}\,(\text{Year}_{ijk})$$

Level-2 Model

$$\pi_{0jk} = \beta_{00k} + \beta_{01k}\,(\text{Group}_{jk} - \overline{\text{Group}}..) + \beta_{02k}\,(\text{Grade}_{jk} - \overline{\text{Grade}}..) + \beta_{03k}\,(\text{Gender}_{jk} - \overline{\text{Gender}}..) + \beta_{04k}\,(\text{Cohort}_{jk} - \overline{\text{Cohort}}..) + \beta_{05k}\,(\text{Group x Grade}_{jk} - \overline{\text{Group x Grade}}..) + \beta_{06k}\,(\text{Group x Gender}_{jk} - \overline{\text{Group x Gender}}..) + \beta_{07k}\,(\text{Group x Cohort}_{jk} - \overline{\text{Group x Cohort}}..) + \beta_{08k}\,(\text{Grade x Gender}_{jk} - \overline{\text{Grade x Gender}}..) + \beta_{09k}\,(\text{Grade x Cohort}_{jk} - \overline{\text{Grade x Cohort}}..) + \beta_{010k}\,(\text{Gender x Cohort}_{jk} - \overline{\text{Gender x Cohort}}..) + r_{0jk}$$

$$\pi_{1jk} = \beta_{10k} + \beta_{11k}\,(\text{Group}_{jk} - \overline{\text{Group}}..) + \beta_{12k}\,(\text{Grade}_{jk} - \overline{\text{Grade}}..) + \beta_{13k}\,(\text{Gender}_{jk} - \overline{\text{Gender}}..) + \beta_{14k}\,(\text{Cohort}_{jk} - \overline{\text{Cohort}}..) + \beta_{15k}\,(\text{Group x Grade}_{jk} - \overline{\text{Group x Grade}}..) + \beta_{16k}\,(\text{Group x Gender}_{jk} - \overline{\text{Group x Gender}}..) + \beta_{17k}\,(\text{Group x Cohort}_{jk} - \overline{\text{Group x Cohort}}..) + \beta_{18k}\,(\text{Grade x Gender}_{jk} - \overline{\text{Grade x Gender}}..) + \beta_{19k}\,(\text{Grade x Cohort}_{jk} - \overline{\text{Grade x Cohort}}..) + \beta_{110k}\,(\text{Gender x Cohort}_{jk} - \overline{\text{Gender x Cohort}}..)$$

Level-3 Model

$$\beta_{00k} = \gamma_{000} + U_{00k}$$
$$\beta_{01k} = \gamma_{010}$$
$$\beta_{02k} = \gamma_{020}$$
$$\beta_{03k} = \gamma_{030}$$
$$\beta_{04k} = \gamma_{040}$$
$$\beta_{05k} = \gamma_{050}$$
$$\beta_{06k} = \gamma_{060}$$
$$\beta_{07k} = \gamma_{070}$$
$$\beta_{08k} = \gamma_{080}$$
$$\beta_{09k} = \gamma_{090}$$
$$\beta_{010k} = \gamma_{0100}$$
$$\beta_{10k} = \gamma_{100} + U_{010k}$$
$$\beta_{11k} = \gamma_{110}$$
$$\beta_{12k} = \gamma_{120}$$
$$\beta_{13k} = \gamma_{130}$$
$$\beta_{14k} = \gamma_{140}$$
$$\beta_{15k} = \gamma_{150}$$
$$\beta_{16k} = \gamma_{160}$$
$$\beta_{17k} = \gamma_{170}$$
$$\beta_{18k} = \gamma_{180}$$
$$\beta_{19k} = \gamma_{190}$$
$$\beta_{110k} = \gamma_{1100}$$

EQUATION 6. Recreational Reading Attitudes by Pretest Reading Motivation

Level-1 Model

$$\text{Recreational Reading Attitudes}_{ijk} = \pi_{0jk} + \pi_{1jk}\,(\text{Posttest}_{ijk}) + e_{ijk}$$

Level-2 Model

$$\pi_{0jk} = \beta_{00k} + \beta_{01k}\,(\text{Pretest Topic Motivation}_{jk} - \overline{\text{Pretest Topic Motivation..}}) + \beta_{02k}\,(\text{Pretest Individual Motivation}_{jk} - \overline{\text{Pretest Individual Motivation..}}) + \beta_{03k}\,(\text{Group}_{jk} - \overline{\text{Group..}}) + \beta_{04k}\,(\text{Grade}_{jk} - \overline{\text{Grade..}}) + \beta_{05k}\,(\text{Gender}_{jk} - \overline{\text{Gender..}}) + \beta_{06k}\,(\text{Cohort}_{jk} - \overline{\text{Cohort..}}) + \beta_{07k}\,(\text{Group x Grade}_{jk} - \overline{\text{Group x Grade..}}) + \beta_{08k}\,(\text{Group x Gender}_{jk} - \overline{\text{Group x Gender..}}) + \beta_{09k}\,(\text{Group x Cohort}_{jk} - \overline{\text{Group x Cohort..}}) + \beta_{010k}\,(\text{Grade x Gender}_{jk} - \overline{\text{Grade x Gender..}}) + \beta_{011k}\,(\text{Grade x Cohort}_{jk} - \overline{\text{Grade x Cohort..}}) + \beta_{012k}\,(\text{Gender x Cohort}_{jk} - \overline{\text{Gender x Cohort..}}) + r_{0jk}$$

$$\pi_{1jk} = \beta_{10k} + \beta_{11k}\,(\text{Pretest Topic Motivation}_{jk} - \overline{\text{Pretest Topic Motivation..}}) + \beta_{12k}\,(\text{Pretest Individual Motivation}_{jk} - \overline{\text{Pretest Individual Motivation..}}) + \beta_{13k}\,(\text{Group}_{jk} - \overline{\text{Group..}}) + \beta_{14k}\,(\text{Grade}_{jk} - \overline{\text{Grade..}}) + \beta_{15k}\,(\text{Gender}_{jk} - \overline{\text{Gender..}}) + \beta_{16k}\,(\text{Cohort}_{jk} - \overline{\text{Cohort..}}) + \beta_{17k}\,(\text{Group x Grade}_{jk} - \overline{\text{Group x Grade..}}) + \beta_{18k}\,(\text{Group x Gender}_{jk} - \overline{\text{Group x Gender..}}) + \beta_{19k}\,(\text{Group x Cohort}_{jk} - \overline{\text{Group x Cohort..}}) + \beta_{110k}\,(\text{Grade x Gender}_{jk} - \overline{\text{Grade x Gender..}}) + \beta_{111k}\,(\text{Grade x Cohort}_{jk} - \overline{\text{Grade x Cohort..}}) + \beta_{112k}\,(\text{Gender x Cohort}_{jk} - \overline{\text{Gender x Cohort..}})$$

Level-3 Model

$$\beta_{00k} = \gamma_{000} + U_{00k}$$
$$\beta_{01k} = \gamma_{010}$$
$$\beta_{02k} = \gamma_{020}$$
$$\beta_{03k} = \gamma_{030}$$
$$\beta_{04k} = \gamma_{040}$$
$$\beta_{05k} = \gamma_{050}$$
$$\beta_{06k} = \gamma_{060}$$
$$\beta_{07k} = \gamma_{070}$$
$$\beta_{08k} = \gamma_{080}$$
$$\beta_{09k} = \gamma_{090}$$
$$\beta_{010k} = \gamma_{0100}$$
$$\beta_{10k} = \gamma_{100} + U_{010k}$$
$$\beta_{11k} = \gamma_{110}$$
$$\beta_{12k} = \gamma_{120}$$
$$\beta_{13k} = \gamma_{130}$$
$$\beta_{14k} = \gamma_{140}$$
$$\beta_{15k} = \gamma_{150}$$
$$\beta_{16k} = \gamma_{160}$$
$$\beta_{17k} = \gamma_{170}$$
$$\beta_{18k} = \gamma_{180}$$
$$\beta_{19k} = \gamma_{190}$$
$$\beta_{110k} = \gamma_{1100}$$

EQUATION 7. Recreational Reading Attitudes by Posttest Reading Motivation

Level-1 Model

$$\text{Recreational Reading Attitudes}_{ijk} = \pi_{0jk} + \pi_{1jk}\,(\text{Posttest}_{ijk}) + e_{ijk}$$

Level-2 Model

$$\pi_{0jk} = \beta_{00k} + \beta_{01k}\,(\text{Group}_{jk} - \overline{\text{Group}}..) + \beta_{02k}\,(\text{Grade}_{jk} - \overline{\text{Grade}}..) + \beta_{03k}\,(\text{Gender}_{jk} - \overline{\text{Gender}}..) + \beta_{04k}\,(\text{Cohort}_{jk} - \overline{\text{Cohort}}..) + \beta_{05k}\,(\text{Group x Grade}_{jk} - \overline{\text{Group x Grade}}..) + \beta_{06k}\,(\text{Group x Gender}_{jk} - \overline{\text{Group x Gender}}..) + \beta_{07k}\,(\text{Group x Cohort}_{jk} - \overline{\text{Group x Cohort}}..) + \beta_{08k}\,(\text{Grade x Gender}_{jk} - \overline{\text{Grade x Gender}}..) + \beta_{09k}\,(\text{Grade x Cohort}_{jk} - \overline{\text{Grade x Cohort}}..) + \beta_{010k}\,(\text{Gender x Cohort}_{jk} - \overline{\text{Gender x Cohort}}..) + r_{0jk}$$

$$\pi_{1jk} = \beta_{10k} + \beta_{11k}\,(\text{Posttest Topic Motivation}_{jk} - \overline{\text{Posttest Topic Motivation}}..) + \beta_{12k}\,(\text{Posttest Individual Motivation}_{jk} - \overline{\text{Posttest Individual Motivation}}..) + \beta_{13k}\,(\text{Group}_{jk} - \text{Group}..) + \beta_{14k}\,(\text{Grade}_{jk} - \overline{\text{Grade}}..) + \beta_{15k}\,(\text{Gender}_{jk} - \overline{\text{Gender}}..) + \beta_{16k}\,(\text{Cohort}_{jk} - \overline{\text{Cohort}}..) + \beta_{17k}\,(\text{Group x Grade}_{jk} - \overline{\text{Group x Grade}}..) + \beta_{18k}\,(\text{Group x Gender}_{jk} - \overline{\text{Group x Gender}}..) + \beta_{19k}\,(\text{Group x Cohort}_{jk} - \overline{\text{Group x Cohort}}..) + \beta_{110k}\,(\text{Grade x Gender}_{jk} - \overline{\text{Grade x Gender}}..) + \beta_{111k}\,(\text{Grade x Cohort}_{jk} - \overline{\text{Grade x Cohort}}..) + \beta_{112k}\,(\text{Gender x Cohort}_{jk} - \overline{\text{Gender x Cohort}}..)$$

Level-3 Model

$$\beta_{00k} = \gamma_{000} + U_{00k}$$
$$\beta_{01k} = \gamma_{010}$$
$$\beta_{02k} = \gamma_{020}$$
$$\beta_{03k} = \gamma_{030}$$
$$\beta_{04k} = \gamma_{040}$$
$$\beta_{05k} = \gamma_{050}$$
$$\beta_{06k} = \gamma_{060}$$
$$\beta_{07k} = \gamma_{070}$$
$$\beta_{08k} = \gamma_{080}$$
$$\beta_{09k} = \gamma_{090}$$
$$\beta_{010k} = \gamma_{0100}$$
$$\beta_{10k} = \gamma_{100} + U_{010k}$$
$$\beta_{11k} = \gamma_{110}$$
$$\beta_{12k} = \gamma_{120}$$
$$\beta_{13k} = \gamma_{130}$$
$$\beta_{14k} = \gamma_{140}$$
$$\beta_{15k} = \gamma_{150}$$
$$\beta_{16k} = \gamma_{160}$$
$$\beta_{17k} = \gamma_{170}$$
$$\beta_{18k} = \gamma_{180}$$
$$\beta_{19k} = \gamma_{190}$$
$$\beta_{110k} = \gamma_{1100}$$

EQUATION 8. Academic Reading Attitudes by Pretest Reading Motivation

Level-1 Model

$$\text{Academic Reading Attitudes}_{ijk} = \pi_{0jk} + \pi_{1jk}\,(\text{Posttest}_{ijk}) + e_{ijk}$$

Level-2 Model

$$\pi_{0jk} = \beta_{00k} + \beta_{01k}\,(\text{Pretest Topic Motivation}_{jk} - \overline{\text{Pretest Topic Motivation..}}) + \beta_{02k}\,(\text{Pretest Individual Motivation}_{jk} - \overline{\text{Pretest Individual Motivation..}}) + \beta_{03k}\,(\text{Group}_{jk} - \overline{\text{Group..}}) + \beta_{04k}\,(\text{Grade}_{jk} - \overline{\text{Grade..}}) + \beta_{05k}\,(\text{Gender}_{jk} - \overline{\text{Gender..}}) + \beta_{06k}\,(\text{Cohort}_{jk} - \overline{\text{Cohort..}}) + \beta_{07k}\,(\text{Group x Grade}_{jk} - \overline{\text{Group x Grade..}}) + \beta_{08k}\,(\text{Group x Gender}_{jk} - \overline{\text{Group x Gender..}}) + \beta_{09k}\,(\text{Group x Cohort}_{jk} - \overline{\text{Group x Cohort..}}) + \beta_{010k}\,(\text{Grade x Gender}_{jk} - \overline{\text{Grade x Gender..}}) + \beta_{011k}\,(\text{Grade x Cohort}_{jk} - \overline{\text{Grade x Cohort..}}) + \beta_{012k}\,(\text{Gender x Cohort}_{jk} - \overline{\text{Gender x Cohort..}}) + r_{0jk}$$

$$\pi_{1jk} = \beta_{10k} + \beta_{11k}\,(\text{Pretest Topic Motivation}_{jk} - \overline{\text{Pretest Topic Motivation..}}) + \beta_{12k}\,(\text{Pretest Individual Motivation}_{jk} - \overline{\text{Pretest Individual Motivation..}}) + \beta_{13k}\,(\text{Group}_{jk} - \overline{\text{Group..}}) + \beta_{14k}\,(\text{Grade}_{jk} - \overline{\text{Grade..}}) + \beta_{15k}\,(\text{Gender}_{jk} - \overline{\text{Gender..}}) + \beta_{16k}\,(\text{Cohort}_{jk} - \overline{\text{Cohort..}}) + \beta_{17k}\,(\text{Group x Grade}_{jk} - \overline{\text{Group x Grade..}}) + \beta_{18k}\,(\text{Group x Gender}_{jk} - \overline{\text{Group x Gender..}}) + \beta_{19k}\,(\text{Group x Cohort}_{jk} - \overline{\text{Group x Cohort..}}) + \beta_{110k}\,(\text{Grade x Gender}_{jk} - \overline{\text{Grade x Gender..}}) + \beta_{111k}\,(\text{Grade x Cohort}_{jk} - \overline{\text{Grade x Cohort..}}) + \beta_{112k}\,(\text{Gender x Cohort}_{jk} - \overline{\text{Gender x Cohort..}})$$

Level-3 Model

$$\beta_{00k} = \gamma_{000} + U_{00k}$$
$$\beta_{01k} = \gamma_{010}$$
$$\beta_{02k} = \gamma_{020}$$
$$\beta_{03k} = \gamma_{030}$$
$$\beta_{04k} = \gamma_{040}$$
$$\beta_{05k} = \gamma_{050}$$
$$\beta_{06k} = \gamma_{060}$$
$$\beta_{07k} = \gamma_{070}$$
$$\beta_{08k} = \gamma_{080}$$
$$\beta_{09k} = \gamma_{090}$$
$$\beta_{010k} = \gamma_{0100}$$
$$\beta_{10k} = \gamma_{100} + U_{010k}$$
$$\beta_{11k} = \gamma_{110}$$
$$\beta_{12k} = \gamma_{120}$$
$$\beta_{13k} = \gamma_{130}$$
$$\beta_{14k} = \gamma_{140}$$
$$\beta_{15k} = \gamma_{150}$$
$$\beta_{16k} = \gamma_{160}$$
$$\beta_{17k} = \gamma_{170}$$
$$\beta_{18k} = \gamma_{180}$$
$$\beta_{19k} = \gamma_{190}$$
$$\beta_{110k} = \gamma_{1100}$$

EQUATION 9. Academic Reading Attitudes by Posttest Reading Motivation

Level-1 Model

$$\text{Recreational Reading Attitudes}_{ijk} = \pi_{0jk} + \pi_{1jk}\,(\text{Posttest}_{ijk}) + e_{ijk}$$

Level-2 Model

$$\pi_{0jk} = \beta_{00k} + \beta_{01k}\,(\text{Group}_{jk} - \overline{\text{Group}}..) + \beta_{02k}\,(\text{Grade}_{jk} - \overline{\text{Grade}}..) + \beta_{03k}\,(\text{Gender}_{jk} - \overline{\text{Gender}}..) + \beta_{04k}\,(\text{Cohort}_{jk} - \overline{\text{Cohort}}..) + \beta_{05k}\,(\text{Group x Grade}_{jk} - \overline{\text{Group x Grade}}..) + \beta_{06k}\,(\text{Group x Gender}_{jk} - \overline{\text{Group x Gender}}..) + \beta_{07k}\,(\text{Group x Cohort}_{jk} - \overline{\text{Group x Cohort}}..) + \beta_{08k}\,(\text{Grade x Gender}_{jk} - \overline{\text{Grade x Gender}}..) + \beta_{09k}\,(\text{Grade x Cohort}_{jk} - \overline{\text{Grade x Cohort}}..) + \beta_{010k}\,(\text{Gender x Cohort}_{jk} - \overline{\text{Gender x Cohort}}..) + r_{0jk}$$

$$\pi_{1jk} = \beta_{10k} + \beta_{11k}\,(\text{Posttest Topic Motivation}_{jk} - \overline{\text{Posttest Topic Motivation}}..) + \beta_{12k}\,(\text{Posttest Individual Motivation}_{jk} - \overline{\text{Posttest Individual Motivation}}..) + \beta_{13k}\,(\text{Group}_{jk} - \text{Group}..) + \beta_{14k}\,(\text{Grade}_{jk} - \overline{\text{Grade}}..) + \beta_{15k}\,(\text{Gender}_{jk} - \overline{\text{Gender}}..) + \beta_{16k}\,(\text{Cohort}_{jk} - \overline{\text{Cohort}}..) + \beta_{17k}\,(\text{Group x Grade}_{jk} - \overline{\text{Group x Grade}}..) + \beta_{18k}\,(\text{Group x Gender}_{jk} - \overline{\text{Group x Gender}}..) + \beta_{19k}\,(\text{Group x Cohort}_{jk} - \overline{\text{Group x Cohort}}..) + \beta_{110k}\,(\text{Grade x Gender}_{jk} - \overline{\text{Grade x Gender}}..) + \beta_{111k}\,(\text{Grade x Cohort}_{jk} - \overline{\text{Grade x Cohort}}..) + \beta_{112k}\,(\text{Gender x Cohort}_{jk} - \overline{\text{Gender x Cohort}}..)$$

Level-3 Model

$$\beta_{00k} = \gamma_{000} + U_{00k}$$
$$\beta_{01k} = \gamma_{010}$$
$$\beta_{02k} = \gamma_{020}$$
$$\beta_{03k} = \gamma_{030}$$
$$\beta_{04k} = \gamma_{040}$$
$$\beta_{05k} = \gamma_{050}$$
$$\beta_{06k} = \gamma_{060}$$
$$\beta_{07k} = \gamma_{070}$$
$$\beta_{08k} = \gamma_{080}$$
$$\beta_{09k} = \gamma_{090}$$
$$\beta_{010k} = \gamma_{0100}$$
$$\beta_{10k} = \gamma_{100} + U_{010k}$$
$$\beta_{11k} = \gamma_{110}$$
$$\beta_{12k} = \gamma_{120}$$
$$\beta_{13k} = \gamma_{130}$$
$$\beta_{14k} = \gamma_{140}$$
$$\beta_{15k} = \gamma_{150}$$
$$\beta_{16k} = \gamma_{160}$$
$$\beta_{17k} = \gamma_{170}$$
$$\beta_{18k} = \gamma_{180}$$
$$\beta_{19k} = \gamma_{190}$$
$$\beta_{110k} = \gamma_{1100}$$

EQUATION 10. Reading Achievement Predicted by Pretest Attitudes and Motivation

Level-1 Model

$$\text{Reading Achievement}_{ijk} = \pi_{0jk} + \pi_{1jk}\,(\text{Year}_{ijk})$$

$$\pi_{0jk} = \beta_{00k} + \beta_{01k}\,(\text{Pretest Recreational Attitudes}_{jk} - \overline{\text{Pretest Recreational Attitudes}}..) + \beta_{02k}\,(\text{Pretest Academic Attitudes}_{jk} - \overline{\text{Pretest Academic Attitudes}}..) + \beta_{03k}\,(\text{Pretest Topic Motivation}_{jk} - \overline{\text{Pretest Topic Motivation}}..) + \beta_{04k}\,(\text{Pretest Individual Motivation}_{jk} - \overline{\text{Pretest Individual Motivation}}..) + \beta_{05k}\,(\text{Group}_{jk} - \overline{\text{Group}}..) + \beta_{06k}\,(\text{Grade}_{jk} - \overline{\text{Grade}}..) + \beta_{07k}\,(\text{Gender}_{jk} - \overline{\text{Gender}}..) + \beta_{08k}\,(\text{Cohort}_{jk} - \overline{\text{Cohort}}..) + \beta_{09k}\,(\text{Group x Grade}_{jk} - \overline{\text{Group x Grade}}..) + \beta_{010k}\,(\text{Group x Gender}_{jk} - \overline{\text{Group x Gender}}..) + \beta_{011}\,(\text{Group x Cohort}_{jk} - \overline{\text{Group x Cohort}}..) + \beta_{012k}\,(\text{Grade x Gender}_{jk} - \overline{\text{Grade x Gender}}..) + \beta_{013k}\,(\text{Grade x Cohort}_{jk} - \overline{\text{Grade x Cohort}}..) + \beta_{014k}\,(\text{Gender x Cohort}_{jk} - \overline{\text{Gender x Cohort}}..) + r_{0jk}$$

$$\pi_{1jk} = \beta_{10k} + \beta_{11k}\,(\text{Pretest Recreational Attitudes}_{jk} - \overline{\text{Pretest Recreational Attitudes}}..) + \beta_{12k}\,(\text{Pretest Academic Attitudes}_{jk} - \overline{\text{Pretest Academic Attitudes}}..) + \beta_{13k}\,(\text{Pretest Topic Motivation}_{jk} - \overline{\text{Pretest Topic Motivation}}..) + \beta_{14k}\,(\text{Pretest Individual Motivation}_{jk} - \overline{\text{Pretest Individual Motivation}}..) + \beta_{15k}\,(\text{Group}_{jk} - \overline{\text{Group}}..) + \beta_{16k}\,(\text{Grade}_{jk} - \overline{\text{Grade}}..) + \beta_{17k}\,(\text{Gender}_{jk} - \overline{\text{Gender}}..) + \beta_{18k}\,(\text{Cohort}_{jk} - \overline{\text{Cohort}}..) + \beta_{19k}\,(\text{Group x Grade}_{jk} - \overline{\text{Group x Grade}}..) + \beta_{110k}\,(\text{Group x Gender}_{jk} - \overline{\text{Group x Gender}}..) + \beta_{111}\,(\text{Group x Cohort}_{jk} - \overline{\text{Group x Cohort}}..) + \beta_{112k}\,(\text{Grade x Gender}_{jk} - \overline{\text{Grade x Gender}}..) + \beta_{113k}\,(\text{Grade x Cohort}_{jk} - \overline{\text{Grade x Cohort}}..) + \beta_{114k}\,(\text{Gender x Cohort}_{jk} - \overline{\text{Gender x Cohort}}..)$$

Level-3 Model

$$\beta_{00k} = \gamma_{000} + U_{00k}$$
$$\beta_{01k} = \gamma_{010}$$
$$\beta_{02k} = \gamma_{020}$$
$$\beta_{03k} = \gamma_{030}$$
$$\beta_{04k} = \gamma_{040}$$
$$\beta_{05k} = \gamma_{050}$$
$$\beta_{06k} = \gamma_{060}$$
$$\beta_{07k} = \gamma_{070}$$
$$\beta_{08k} = \gamma_{080}$$
$$\beta_{09k} = \gamma_{090}$$
$$\beta_{010k} = \gamma_{0100}$$
$$\beta_{10k} = \gamma_{100} + U_{010k}$$
$$\beta_{11k} = \gamma_{110}$$
$$\beta_{12k} = \gamma_{120}$$
$$\beta_{13k} = \gamma_{130}$$
$$\beta_{14k} = \gamma_{140}$$
$$\beta_{15k} = \gamma_{150}$$
$$\beta_{16k} = \gamma_{160}$$
$$\beta_{17k} = \gamma_{170}$$
$$\beta_{18k} = \gamma_{180}$$
$$\beta_{19k} = \gamma_{190}$$
$$\beta_{110k} = \gamma_{1100}$$

EQUATION 11. Reading Achievement Predicted by Posttest Attitudes and Motivation

Level-1 Model

$$\text{Reading Achievement}_{ijk} = \pi_{0jk} + \pi_{1jk}\,(\text{Year}_{ijk})$$

$$\pi_{0jk} = \beta_{00k} + \beta_{01k}\,(\text{Posttest Recreational Attitudes}_{jk} - \overline{\text{Posttest Recreational Attitudes}}..) + \beta_{02k}\,(\text{Posttest Academic Attitudes}_{jk} - \overline{\text{Posttest Academic Attitudes}}..) + \beta_{03k}\,(\text{Posttest Topic Motivation}_{jk} - \overline{\text{Posttest Topic Motivation}}..) + \beta_{04k}\,(\text{Posttest Individual Motivation}_{jk} - \overline{\text{Posttest Individual Motivation}}..) + \beta_{05k}\,(\text{Group}_{jk} - \overline{\text{Group}}..) + \beta_{06k}\,(\text{Grade}_{jk} - \overline{\text{Grade}}..) + \beta_{07k}\,(\text{Gender}_{jk} - \overline{\text{Gender}}..) + \beta_{08k}\,(\text{Cohort}_{jk} - \overline{\text{Cohort}}..) + \beta_{09k}\,(\text{Group x Grade}_{jk} - \overline{\text{Group x Grade}}..) + \beta_{010k}\,(\text{Group x Gender}_{jk} - \overline{\text{Group x Gender}}..) + \beta_{011}\,(\text{Group x Cohort}_{jk} - \overline{\text{Group x Cohort}}..) + \beta_{012k}\,(\text{Grade x Gender}_{jk} - \overline{\text{Grade x Gender}}..) + \beta_{013k}\,(\text{Grade x Cohort}_{jk} - \overline{\text{Grade x Cohort}}..) + \beta_{014k}\,(\text{Gender x Cohort}_{jk} - \overline{\text{Gender x Cohort}}..) + r_{0jk}$$

$$\pi_{1jk} = \beta_{10k} + \beta_{11k}\,(\text{Posttest Recreational Attitudes}_{jk} - \overline{\text{Posttest Recreational Attitudes}}..) + \beta_{12k}\,(\text{Posttest Academic Attitudes}_{jk} - \overline{\text{Posttest Academic Attitudes}}..) + \beta_{13k}\,(\text{Posttest Topic Motivation}_{jk} - \overline{\text{Posttest Topic Motivation}}..) + \beta_{14k}\,(\text{Posttest Individual Motivation}_{jk} - \overline{\text{Posttest Individual Motivation}}..) + \beta_{15k}\,(\text{Group}_{jk} - \overline{\text{Group}}..) + \beta_{16k}\,(\text{Grade}_{jk} - \overline{\text{Grade}}..) + \beta_{17k}\,(\text{Gender}_{jk} - \overline{\text{Gender}}..) + \beta_{18k}\,(\text{Cohort}_{jk} - \overline{\text{Cohort}}..) + \beta_{19k}\,(\text{Group x Grade}_{jk} - \overline{\text{Group x Grade}}..) + \beta_{110k}\,(\text{Group x Gender}_{jk} - \overline{\text{Group x Gender}}..) + \beta_{111}\,(\overline{\text{Group x}}\ \text{Cohort}_{jk} - \overline{\text{Group x Cohort}}..) + \beta_{112k}\,(\text{Grade x Gender}_{jk} - \overline{\text{Grade x Gender}}..) + \beta_{113k}\,(\text{Grade x Cohort}_{jk} - \overline{\text{Grade x Cohort}}..) + \beta_{114k}\,(\text{Gender x Cohort}_{jk} - \overline{\text{Gender x Cohort}}..)$$

Level-3 Model

$$\beta_{00k} = \gamma_{000} + U_{00k}$$
$$\beta_{01k} = \gamma_{010}$$
$$\beta_{02k} = \gamma_{020}$$
$$\beta_{03k} = \gamma_{030}$$
$$\beta_{04k} = \gamma_{040}$$
$$\beta_{05k} = \gamma_{050}$$
$$\beta_{06k} = \gamma_{060}$$
$$\beta_{07k} = \gamma_{070}$$
$$\beta_{08k} = \gamma_{080}$$
$$\beta_{09k} = \gamma_{090}$$
$$\beta_{010k} = \gamma_{0100}$$
$$\beta_{10k} = \gamma_{100} + U_{010k}$$
$$\beta_{11k} = \gamma_{110}$$
$$\beta_{12k} = \gamma_{120}$$
$$\beta_{13k} = \gamma_{130}$$
$$\beta_{14k} = \gamma_{140}$$
$$\beta_{15k} = \gamma_{150}$$
$$\beta_{16k} = \gamma_{160}$$
$$\beta_{17k} = \gamma_{170}$$
$$\beta_{18k} = \gamma_{180}$$
$$\beta_{19k} = \gamma_{190}$$
$$\beta_{110k} = \gamma_{1100}$$

APPENDIX C

SCHEMATIC DEPICTION OF HYPOTHESIZED EFFECTS ASSOCIATED WITH THE PREDICTION OF READING ATTITUDES BY READING MOTIVATION

Table B. Hypothesized Effects Associated to the Prediction of Reading Attitudes by Reading Motivation.

PREDICTORS	RECREATIONAL READING ATTITUDES		ACADEMIC READING ATTITUDES	
	Pretest	Posttest	Pretest	Posttest
TOPIC MOTIVATION				
Pretest	X_1	X_3	X_7	X_9
Posttest		X_5		X_{11}
INDIVIDUAL MOTIVATION				
Pretest	X_2	X_4	X_8	X_{10}
Posttest		X_6		X_{12}

Note: Each X represents one of 12 expected positive effects (e.g., X_1 = pretest topic reading motivation positively predicts pretest attitudes toward recreational reading).

APPENDIX D

SCHEMATIC DEPICTION OF HYPOTHESIZED EFFECTS ASSOCIATED WITH THE PREDICTION OF READING ACHIEVEMENT BY ATTITUDES TOWARD READING AND READING MOTIVATION

Table C. Hypothesized Effects Associated to the Prediction of Reading Achievement by Reading Attitudes and Reading Motivation

PREDICTORS	READING ACHIEVEMENT	
	Initial Status	Growth Rate
RECREATIONAL ATTTITUDES		
Pretest	X_1	X_5
Posttest	X_9	X_{13}
ACADEMIC ATTITUDES		
Pretest	X_2	X_6
Posttest	X_{10}	X_{14}
TOPIC MOTIVATION		
Pretest	X_3	X_7
Posttest	X_{11}	X_{15}
INDIVIDUAL MOTIVATION		
Pretest	X_4	X_8
Posttest	X_{12}	X_{16}

Note: Each X represents one of 16 expected positive effects (e.g., X_1 = pretest topic reading motivation and pretest attitudes toward recreational reading positively predict reading achievement at the initial status).

APPENDIX E

SAMPLE COMPOSITION FOR ALL COHORTS (2002-2007)

Table D. Student Sample Composition by Cohort, School, Grade, and Group Condition

Cohort/Schools	First Grade		Second Grade		Third Grade		Totals
	Control	Treatment	Control	Treatment	Control	Treatment	
2002-2003							
School F	22	32	0	0	0	0	54
School H	0	0	0	0	15	15	30
School L	0	0	0	0	19	37	56
2003-2004							
School A	0	0	0	0	16	6	22
School G	0	0	25	20	0	0	45
School D	0	0	0	0	23	35	58
School H	21	11	0	0	0	0	32
School L	0	0	13	12	30	24	79
2004-2005							
School G	0	0	0	0	23	23	46
School D	0	0	0	0	22	25	47
School H	0	0	0	0	22	24	46
School I	0	0	17	34	0	0	51
School K	0	0	23	12	19	51	105
2005-2006							
School G	0	0	0	0	18	14	32
School C	0	0	0	0	40	18	58
School B	0	0	0	0	15	13	28
School E	0	0	0	0	24	23	47
School L	0	0	0	0	12	18	30
Totals	43	43	78	78	298	326	866

APPENDIX F

THE ELEMENTARY READING ATTITUDE SURVEY (ERAS)

ELEMENTARY READING ATTITUDE SURVEY

SCHOOL: _____ **GRADE:** _____ **NAME:** _____

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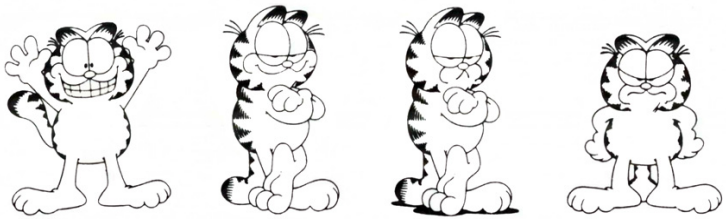
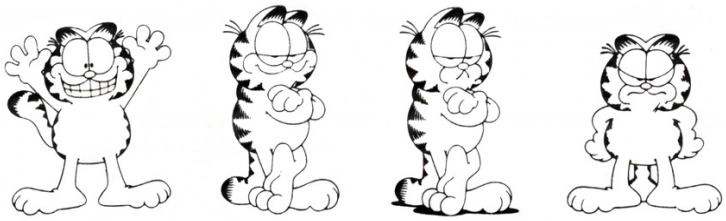
1. How do you feel when you read a book on a rainy Saturday?

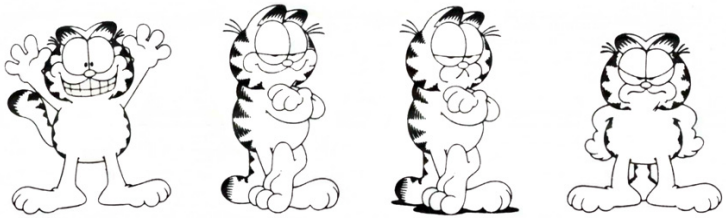
2. How do you feel when you read a book in school during free time?



3. How do you feel about reading a book for fun at home?



4. How do feel about getting a book for a present?



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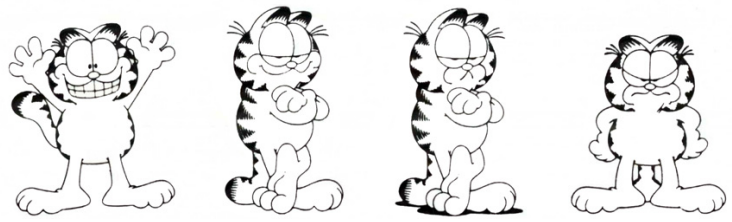
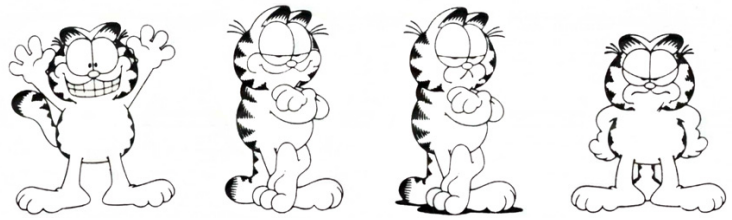
5. How do you feel about spending free time reading?

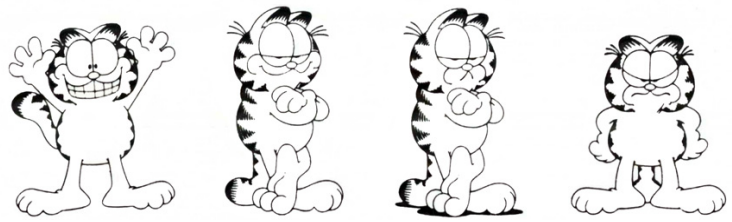
6. How do you feel about starting a new book?



7. How do you fee about reading during summer vacation?



8. How do you feel about reading instead of playing?



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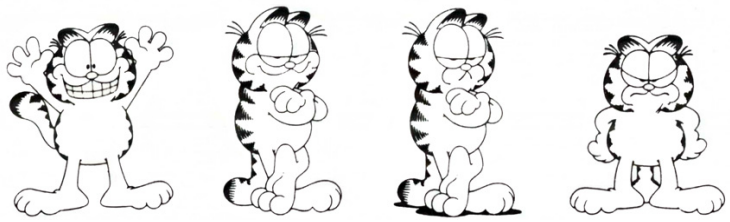
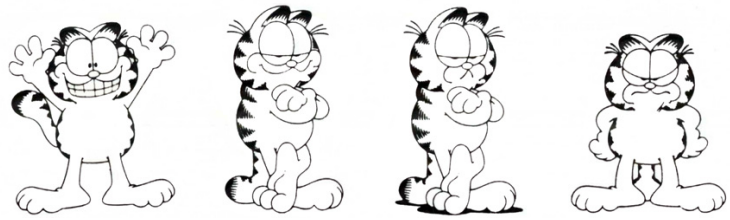
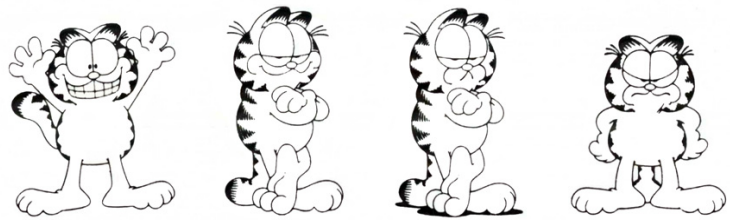
9. How do you feel about going to a bookstore?



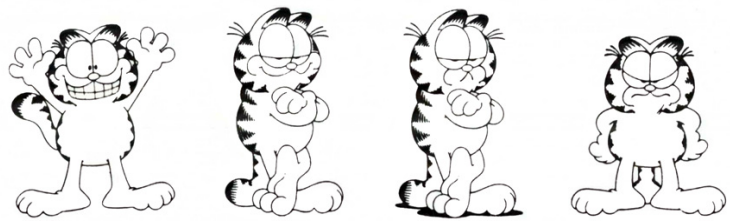
10. How do you feel about reading different kinds of books?



11. How do you feel when the teacher asks you questions about what you read?



12. How do you feel about doing reading workbook pages and worksheets?



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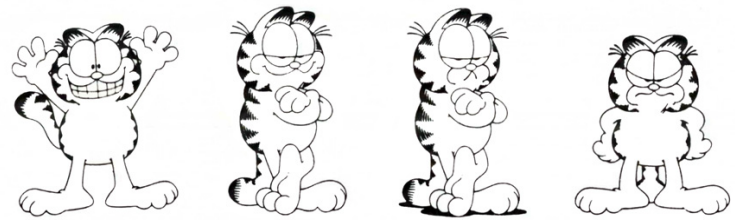
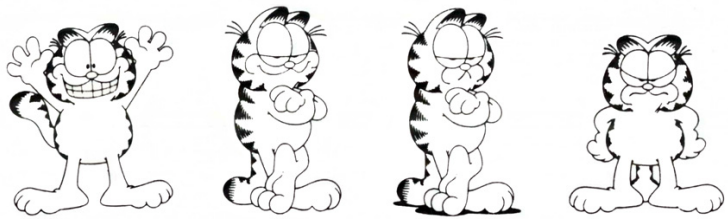
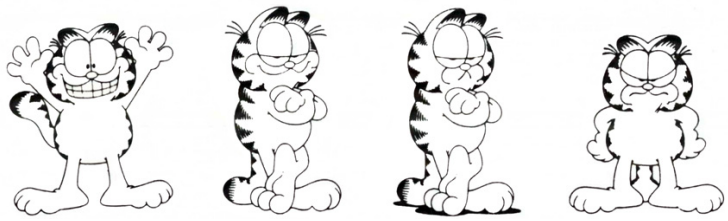
13. How do you feel about reading in schools?



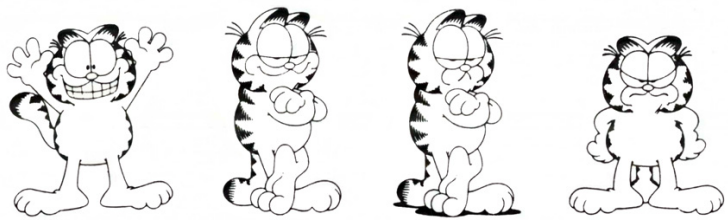
14. How do you feel about reading your school books?



15. How do you feel about learning from a book?



16. How do you feel when it's time for reading class?



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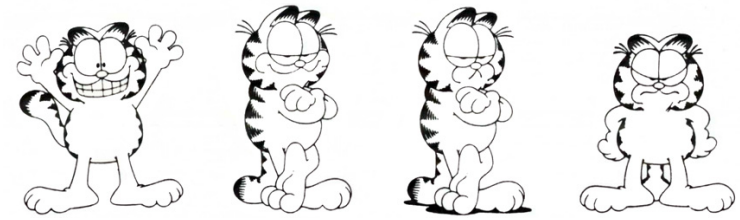
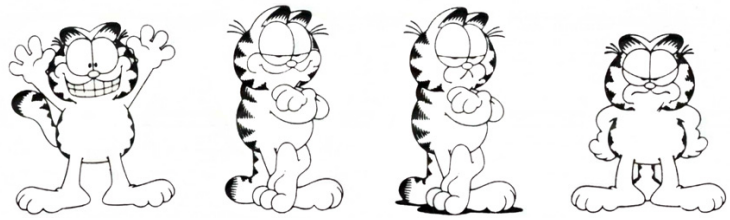
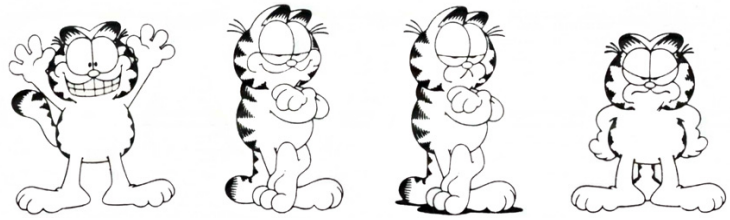
17. How do you feel about the stories you read in reading class?



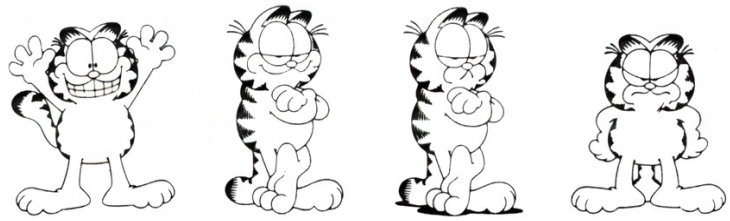
18. How do you feel when you read aloud in class?



19. How do you feel about using a dictionary?



20. How do you feel about taking a reading test?



APPENDIX G

THE TEACHER QUESTIONNAIRE ON STUDENT MOTIVATION TO READ: TOPIC READING MOTIVATION SUBSCALE AND INDIVIDUAL READING MOTIVATION SUBSCALE

Directions: For the following items, please circle the number that best describes the frequency with which the student displays the behavior. Use the descriptions offered below to guide your choices.

Rarely = You have observed the student exhibit this behavior only once, twice or never
Seldom = You have observed the student exhibit this behavior several times over a two month period
Sometimes = The student exhibits this behavior once or twice a week
Often = The student exhibits this behavior nearly every day for substantial amounts of time

This student…(Please select only one number per row)		**Rarely**	**Seldom**	**Sometimes**	**Often**
1.	Has definite preferences for favorite topics and authors	**(1)**	**(2)**	**(3)**	**(4)**
2.	Has no specialized reading interest*	**(1)**	**(2)**	**(3)**	**(4)**
3.	Spends long time reading about topics he/she likes	**(1)**	**(2)**	**(3)**	**(4)**
4.	Chooses to read about favorite topics	**(1)**	**(2)**	**(3)**	**(4)**
5.	Is easily distracted while reading*	**(1)**	**(2)**	**(3)**	**(4)**
6.	Is a voracious reader	**(1)**	**(2)**	**(3)**	**(4)**
7.	"Hides" in books	**(1)**	**(2)**	**(3)**	**(4)**
8.	Is easily discouraged when he/she encounters difficult text*	**(1)**	**(2)**	**(3)**	**(4)**
9.	Is enthusiastic about reading	**(1)**	**(2)**	**(3)**	**(4)**

Note: The first four items correspond to the topic reading motivation subscale while the remaining five correspond to the individual reading motivation. Items with an asterisk are reversed-coded items.

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VITA

Nelson Antonio Portillo Peña was born in San Salvador, El Salvador. In October 1998, he received his bachelor's degree in Psychology from the Universidad Centroamericana "José Simeón Cañas" (UCA). At UCA, Mr. Portillo worked a at the Instituto Universitario de Opinión Pública (IUDOP) between 1996 and 1998. In 1999, he was awarded a Fulbright scholarship to pursue a Master of Arts in Applied Social Psychology at Loyola University Chicago, which he completed in 2002.

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The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the dissertation is now given final approval by the committee with reference to content and form.

The dissertation is therefore accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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