

**The Effect of Social Skills on Academic Achievement of
Linguistically Diverse Elementary Students:
Concurrent and Longitudinal Analysis**

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ABSTRACT

Due to the difference in cultures and languages, language minority students, who are mostly immigrant students, are confronted with more demands than are mainstream students (Ogden, Sorlie, & Hagen, 2007). Further, when they are limited in English proficiency (LEP), they tend to perform at lower levels in school and to be at risk of school failure. Based on the previous studies that addressed the importance of students' social skills for school success, this study examined the social development of the language minority immigrant students from kindergarten to fifth grade and investigated the longitudinal effect of their social skills on their academic performance in comparison with the English-speaking mainstream students.

Using a nationally representative database, the Early Childhood Longitudinal Study – Kindergarten Class of 1998-1999 (ECLS-K), this study first investigated the concurrent association between social skills and the academic achievement of fifth-grade students, and the profiles of their social skills during the first six years of schooling to identify the relative importance of various aspects of social skills that are related to academic performance. Next, the language minority student group, which was further divided based on their LEP status at kindergarten, was examined and compared with the mainstream student group with respect to their development patterns and levels of social skills from kindergarten to fifth grade. As a final step, the longitudinal effect of students' social skills on their reading and math performance was estimated and tested using the two-level hierarchical growth model.

The result identified *approaches to learning* as the most important aspect of social skills related to academic achievement. Language minority immigrant students from families living in poverty displayed extremely unstable development in all aspects of social skills, including their *approaches to learning*. In addition, the longitudinal effect of the social skills on reading and math performance was significant for all students but larger for the students in poverty regardless of the language minority status. The positive effect of improved social skills was the largest for the group of students who displayed the most unstable social development, which were the language minority immigrant students who did not show LEP at kindergarten and who were living in poverty. This result suggests the needs of students living in poverty, especially language minority students, for relevant supports and intervention.

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Chapter One:

Introduction

School is a social environment where expectations and norms are established so that students engage in class activities by self-regulating and interacting harmoniously with peers and teachers (Belsky, Booth-LaForce, Bradley, Campbell, et al., 2006). In the classroom, students learn not only the academic content of their lessons, but also the way to acquire academic content through interaction with others (Westby, 1997).

Consequently, social skills are essential for students to learn through schooling along with academic skills. Emotional control enables students to focus their attention and to engage in class activities by interacting positively with peers and teachers (Lopes & Salovey, 2006). Conversely, schools must promote students' social and emotional development in order to produce not only knowledgeable but also responsible and good citizens (Zins, Bloodworth, Weissberg & Walberg, 2007). Moreover, several researchers have reported that there is a significant relationship between students' social behaviors and their academic outcomes (DiPerna, Volpe & Elliott, 2001; Malecki & Elliott, 2002; McClelland & Morrison, 2003; Wentzel, 1991, 1993; Yen, Konold & McDermott, 2004).

Given the importance of social skills to school success, it should be noted that students who have immigrated from different cultures and speak different languages can experience difficulties in understanding and adapting to the established social expectations and norms that are new and sometimes confusing to them. Ogden, Sorlie, and Hagen (2007) even contend that the immigrant status itself is a risk factor for school failure because immigrant students are confronted with greater demands than mainstream students due to their different languages and cultures. This was evidenced in

the No Child Left Behind (NCLB) implementation report (Le Floch, Martinez, O'Day, Stecher, Taylor, Cook, et al., 2007), which showed that students with limited English proficiency (LEP) constitute a subgroup that is at risk of failure to make adequate yearly progress (AYP).

LEP students are mostly first- and second-generation immigrant students who speak a language other than English at home, and they comprise 5% of the U. S. student population (Fix & Passel, 2003). Immigrant children, including those with LEP, are educationally disadvantaged because of their minority status and low socioeconomic status (Kao, 2004; Zhou, 1997). Immigrant students who entered American schools have displayed a great deal of variation in academic performance. Some immigrant students, such as those who are without LEP despite speaking a non-English language at home, surpass their native English-speaking peers in academic performance (Stiefel, Schwartz & Conger, 2003), while other immigrant students, such as those with LEP, struggle and lag behind their peers, exhibiting poor academic performance (Brisk, Barnhardt, Herrera, & Rochon, 2002).

With the recent unprecedented increase in immigrants, the importance of research on the academic achievement of their school-age children cannot be overemphasized. Considering that social skills are important non-achievement factors significantly associated with academic performance (DiPerna et al., 2001; Elliott, DiPerna, Mroch, & Lang, 2004; Malecki & Elliott, 2002; Wentzel, 1991, 1993), the social skills of immigrant students, including those with LEP, need to be examined to better evaluate their learning and adjustment in their host country.

Using a nationally representative dataset, the Early Childhood Longitudinal Study – Kindergarten Class of 1998-1999 (ECLS-K), this study investigates the associative relationship between various aspects of social skills (*approaches to learning, self-control, interpersonal skills, externalizing problem behaviors, and internalizing problem behaviors*) and the academic achievement of fifth-grade students in order to validate such relationships and identify specific aspects of students' social skills that contribute to their academic performance. In addition to the validation of the relationship using the cross-sectional data, this study also examines and compares the development of subdivided aspects of students' social skills by their achievement level and by their language status (mainstream English-speaking or language minority immigrant) over six years, from kindergarten to fifth grade. Further, using the longitudinal data, this study investigates and estimates the longitudinal effect of social skills on academic performance for both non-immigrant and immigrant student groups.

Problem Statement

The Relationship between Students' Social Skills and Academic Achievement

In addition to cognitive ability, many factors influence a student's academic performance. Acquiring knowledge on such factors helps researchers understand how students learn to facilitate their learning. According to Wang, Haertel, and Walberg (1993) who investigated learners' contexts and characteristics using the results of various empirical studies as well as meta-analyses and textbooks, student characteristics was the most significant determinants of student achievement among the three constructs (student characteristics, classroom practices, and home and community educational contexts) that

directly influence students' learning. As an important student characteristic, social skills have been studied extensively by researchers.

Research on children's social skills has encompassed various aspects of behaviors without specifying those facets (McClelland, Morrison & Holmes, 2000). The aspects of social skills dealt with in research include peer relations, behavior problems, and classroom behaviors, and they were studied for their relationship with school adjustment, academic failure and achievement.

Although research has covered each of these social domains in relation with academic achievement, few studies have examined social skills that combine all these facets to investigate the relative importance of each aspect. In addition, despite the extant research evidence, the positive relationship of prosocial behaviors with academic achievement is neglected by educators and parents (Elliott, Malecki & Demaray, 2001). Furthermore, accountability imposed on public schools by the NCLB Act of 2002 for the academic performance of students force schools to focus on preparing students for the high stakes tests. Schools are unwilling to invest time and efforts in activities or programs they are not certain about bringing gains in students' test scores (Zins et al., 2007). Subsequently, proponents of social emotional learning address the need for strong empirical evidence, acknowledging the lack of such evidence regarding the positive effect of improved social skills on students' academic performance (Lopes & Salovey, 2006; Zins et al., 2007).

Social Skills of Language Minority Immigrant Students

Social skills of language minority immigrant students in the US has seldom been assessed or studied. A study conducted in the Netherlands by Crijnen, Bengi-Arslan, and

Verhulst (2000) on the behavioral and emotional adjustment of Turkish immigrant students aged 4 to 17 demonstrated the higher internalizing problems of these immigrant students than non-immigrant Dutch students of the same age. The internalizing problems measured in their study included three scales: withdrawn, somatic complaints, and anxious/depressed. This higher level of internalizing problems for immigrant students in the Netherlands was confirmed in other studies (Diler, Avci & Seydaoglu, 2003; Reijneveld, Harland, Brugman, Verhulst & Verloove-Vanhorick, 2005). Worse yet, their cultural and language barriers rendered them not able to express themselves appropriately and caused their problems to remain undetected in the host country. Their internalizing problems were shown to be recognizable not by non-immigrant teachers but only by immigrant teachers who understood their language and culture (Crijnen et al., 2000).

Nonetheless, immigrant students who are mostly language minority students (Fuligni, 1997) showed relatively high *approaches to learning* compared to the mainstream students, according to the analysis result of the Program for International Student Assessment (PISA) 2003 (Schleicher, 2006). The *approaches to learning* measured in PISA 2003 study included students' interest and motivation in relation with math, engagement in school, and positive attitudes towards schooling. With the influence of immigrant parents' hopes for their children's socioeconomic prospects, immigrant students aspire to attend to college (Kao & Tienda, 1995). Parents' strong emphasis on the importance of education, which was often shared with students, was significantly correlated with academic achievement (Fuligni, 1997). However, these high expectations imposed on immigrant students also led to the development of high internalizing problems, including anxiety and depression, according to Crijnen et al. (2000).

The high *approaches to learning* of immigrant students despite their lower academic performance than mainstream students, provides opportunities for schools and policy makers to seek ways to close their achievement gap (Schleicher, 2006). At the same time, however, other aspects of social skills including internalizing problem behaviors need to be examined to provide the immigrant students with supports that meet their needs.

Need and Purpose for the Study

As mentioned earlier, research on children's social skills has encompassed various different aspects without specifying those facets (McClelland et al., 2000). This has shed light on a growing need to identify the specific aspects of social skills that are directly connected to academic performance. Identifying the problems and providing the necessary support for immigrant students who are struggling both emotionally and academically is compelling, considering the recent abrupt increase in the number of immigrant students in American schools. Given the limited resources of these schools, strong empirical evidence on the positive relationship between improved social skills and academic performance is demanded.

The purpose of this study is to investigate the longitudinal relationship between social skills and the academic achievement for students from kindergarten to fifth grade, focusing on language minority students who are mostly immigrant students. Despite the great deal of effort made to link the causal relation of students' social behaviors to their academic achievement, the longitudinal effects of students' social skills on their academic performance, let alone its relation to immigrant students, has seldom been studied. The strength of longitudinal analysis is that, in non-experimental design, it

provides firmer grounds for causation than does cross-sectional research (Pedhazur & Schmelkin, 1991). By investigating and estimating the significant longitudinal effect of students' social skills on their academic performance, this study provides the basis for empirical evidence in the relationship.

In addition, this study seeks to identify the specific aspects of social skills that affect academic performance of students by using subdivided aspects of social skills that may affect academic performance for both English-speaking and non-English-speaking students. This study focuses on immigrant students' social skills that are closely associated with their success in school. By examining and comparing the development of social skills between mainstream English-speaking students and language minority immigrant students from kindergarten to fifth grade, this study attempts to identify the needs of the immigrant student population so that they can be provided with the timely and necessary support.

Research Questions

Based on the problems described above, this study seeks to identify specific aspects of social skills that affect the academic performance of students. In addition, this study examines and compares the development of subdivided aspects of social skills of mainstream English-speaking students with language minority students to identify potential needs of the immigrant student population that require support. Furthermore, this study attempts to investigate and estimate the effect of social skills on academic performance to provide the research base for empirical evidence.

Three research questions guiding this study are as follows:

- (1) Can the achievement level of fifth-grade students be predicted reliably with their social skills? Which of the five subscales of social skills (*approaches to learning, self-control, interpersonal skills, externalizing problem behaviors, and internalizing problem behaviors*) significantly contribute in predicting the achievement level of fifth-grade students?
- (2) Do the development patterns of students' social skills differ by their achievement level and by their language status when examined longitudinally from kindergarten to fifth grade?
- (3) What is the longitudinal effect of students' social skills on their academic performance? Does it differ by student's language-status (i.e., English-speaking, Non-English-speaking without LEP, and Non-English-speaking with LEP)?

Definitions of Variables To be Used in the Study

Social Skills

Conceptual definition: According to Elliott and Gresham (1987), the definitions of children's social skills used in research are divided into three groups; peer acceptance, social behaviors, and social validity. The third definition of social validity is the most comprehensive, as it combines the first two definitions of peer acceptance and social behaviors. The social skills in the social validity definition is the child's behaviors in specific situation that reflect the child's attitude toward the acceptance by peers and adults, academic competence, self-concept, and psychological adjustment (Elliott & Gresham, 1987).

Operational definition: Social skills are subdivided and operationalized by five domains – *approaches to learning, self-control, interpersonal skills, externalizing problem behavior, and internalizing problem behavior.*

The ECLS-K data that is used in this study adapted the teacher rated Social Skills Rating Scale: Elementary Scale A (SSRS; Gresham & Elliott, 1990, as cited in Tourangeau, Brick, Wan, Weant, & Nord, et al., 2004) for measuring the above mentioned five aspects of social skills. The items for each scale were described in the Methods section of this paper.

Language Minority Immigrant Students

Conceptual definition: Language minorities are non-native speakers of English (Davis, 1999), and most of them are immigrant students (Fuligini, 1997).

This study uses the language minority status as a grouping measure between mainstream non-immigrant students and immigrant students, for the comparison of the development of social skills and their effect on the academic performance of students. Since LEP status among language minority students takes major role in determining academic performance of the immigrant students, LEP status among the language minority students is selected to subdivide the immigrant student group. Furthermore, most of the first- and second-generation immigrant students (more than 80%) were LEP who have lived in the US more than 5 years, and 60% of LEP were US-born (Fix & Passel, 2003). For these reasons, language proficiency among the language minority students is considered to make analyses more valid than other immigration status measures such as birthplace or US residence years.

Operational definition: The language that a child and his or her parents speak at home was measured. Students are grouped as language minority immigrant students if the child and his or her parents speak non-English at home.

Significance

This study has educational significance and extends professionals' understanding of the effect of students' social skills on academic performance. This study not only validates the significance of a relationship between social skills and academic achievement, but also further specifying and identifying different aspects of the social skills for their relative importance in the relationship. Furthermore, this study provides the research base for empirical evidence of the effect of students' social skills on academic achievement through longitudinal analyses.

This study also identifies areas where immigrant students require support not only for their adjustment in the new country but also for potential improvement of their academic achievements in their early schooling. Therefore, it is policy-relevant as well. Immigrant students are educationally disadvantaged in many ways (Kao, 2004; Zhou, 1997). It is important to find modifiable factors and intervene in time for their success in school and in life in their host country.

This study utilizes the data from a nationally representative sample. With appropriate weighting, this increases the generalizability of the study's findings.

Limitations

The analyses are based on a secondary data collected from a national survey that did not employ random assignment. Therefore, this study is not an experimental study in which random assignment makes possible plausible causal-effect association, and

consequently confounds results. Caution needs to be taken in interpreting the results by deferring the positing of a direct causal inference between the students' social skills and their academic performance. Nonetheless, utilizing the strength of the longitudinal study in non-experimental design, this study provides the research base for the longitudinal relationship between the students' social skills and their academic achievement. In addition, the secondary data limits the variables researchers can use to those that are available only in the dataset.

Chapter Two: Literature Review

In this chapter, the literature related to this study is reviewed. This chapter is organized into three broad sections: (a) social skills and academic performance, (b) academic performance and social skills of immigrant students, and (c) intervention for students' social skills. Each section contains subsections. In the first section, each of the five subscales of social skills (*approaches to learning, self-control, interpersonal skills, externalizing problem behavior, and internalizing problem behavior*) is reviewed in relation to academic performance, comprising four subsections in which two problem behaviors are combined. The second section is composed of two subsections: one reviewing literature on the academic performance of immigrant students; the other, the social skills of immigrant students. In the third section, literature related to intervention for students' social skills is reviewed, and the need for support and intervention comprise two subsections.

Social Skills and Academic Performance

Theories on children's social development have posited the importance of social skills on their school success. With a well-known theory that linked social behaviors with academic achievement for causal relationship, Vygotsky (1978) suggested that the development of new skills and ideas is done through social functioning with peers and adults. Learning is acquired through social process at an inter-psychological level, and then, development of the child's mental functioning is followed at an intra-psychological level. That is, children learn through interacting with people who are intellectually more

advanced than them and complete developmental processes by internalizing them (Vygotsky, 1978).

Bandura (1986) also proposed an influential theory: that children's learning is acquired by observing or listening to others, and then by imitating them. The cognitive skills and behaviors of humans are modeled by observation, and learning is obtained from the rules that form such models. Therefore, observational learning goes through an attentional process in which people selectively attend to information for modeling their cognitive skills and behaviors. Consequently, from the developmental perspective, older children present more proficiency than younger ones in their observational learning, because older children are generally more mature and have more experience than younger children (Bandura, 1986).

Through positive interactions with peers during academic activities, students develop cognitive and problem-solving ability (Webb, 1989); through their antisocial behavior, students are isolated from classroom activities and lose opportunities for the social exchange of academic information (Wentzel, 1993). Social skills are strategies and tactics required in daily life to effectively interact with other people (Walker, Schwarz, Nippold, Irvin, & Noell, 1994). Thus, when a child's social skills are deemed effective, he or she is considered to have social competence and predicted to be successful in school (Walker et al., 1994).

Specifically, to be successful in school, students need to learn not only academic content, but also how to acquire academic content through classroom discourse (Westby, 1997). Classroom discourse involves interaction with teachers and peers, and is based on a procedural knowledge of social participation structure in which, according to Westby

(1997), information sources are relayed or withheld, and communicative rights are allocated among the participating members.

What are the social skills teachers expect from students in the classroom? Lane, Pierson, and Givner (2003) conducted a research that investigated the social skills on which teachers place importance by surveying 366 teachers from kindergarten through high school in three Southern California school districts. Their findings showed that cooperation (e.g., “attends to your instructions,” “finishes class assignments within time limits,” “ignores peers distractions when doing class work”) and self-control (e.g., “controls temper in conflict situations with peers,” “responds appropriately to peer pressure,” “receives criticism well”), were the skills teachers considered significantly more critical than assertion skill (e.g., “invites others to join in activities,” “appropriately questions rules that may be unfair”). Of the total 30 items of the Social Skills Rating System (SSRS; Gresham & Elliott, 1990, as cited in Lane et al., 2003) that teachers rated for the importance in their study, the items that teachers across all school levels agreed upon as significantly important are two items (“follows directions” and “attends to your instructions”) out of 10 cooperation items, and three items (“controls temper in conflict situations with peers,” “controls temper in conflict situations with adults,” and “appropriately responds to physical aggression from peers”) out of 10 self-control items.

Social skills that ECLS-K adapted from teacher-rated SSRS contain three aspects of social behavior (*approaches to learning*, *self-control*, and *interpersonal skills*), and two problem behaviors (*externalizing problem behaviors* and *internalizing problem behaviors*). Literature regarding the relationship between each of these aspects and academic performance were reviewed in the following.

Approaches to Learning

McClelland and Morrison (2003) also employed the teacher ratings of SSRS in their study together with the Child Behavior Rating Scale (CBRS; a teacher-rated form; Bronson, Goodson, Layzer, & Love, 1990, as cited in McClelland & Morrison, 2003) to investigate the social skills and mastery skills of 72 preschool children. The teachers rated the three subscales of children's social skills (cooperation, self-control and assertion) and mastery skills (e.g., "ability to plan, organize, and complete tasks, cooperate with peers, and regulate their behavior") of the participating children with the SSRS and CBRS respectively. McClelland and Morrison (2003) differentiated these social skills collectively from other social skills such as interpersonal skills (e.g., "interacting positively with peers, sharing, and respecting other children"), and treated the differentiated skills as a single higher-order construct, calling them "learning-related skills." McClelland and Morrison (2003) demonstrated that such learning-related skills have emerged as early as preschool age in children, using confirmatory factor analysis.

Learning-related skills have been also termed in research as executive functioning skills, self-regulation, mastery skills, and social competence (McClelland & Morrison, 2003). These learning-related social skills were shown to be a significant predictor of students' academic performance at both the beginning of kindergarten and the end of the second grade after controlling for background variables including IQ (McClelland, Morrison, & Holmes, 2000). Posner and Rothbart (2000) emphasized the early development of self-regulation – which is one of the alternative terms for learning-related skills – by addressing that children's ability to regulate attention develops from the age of three to the early school years. McClelland et al. (2000) maintained that it is important to

identify children with poor learning-related skills early for intervention, because children with poor learning-related skills performed significantly lower than their peers in kindergarten and continued performing poorly until the second grade.

A study done by Yen and colleagues (2004) also demonstrated that learning behaviors uniquely contribute to academic achievement beyond students' cognitive ability between the ages of six and seventeen, using the Learning Behaviors Scale (LBS; McDermott, 1999, as cited in Yen et al., 2004). McDermott (1999) presented four dimensions of learning-related behavior through the instrument validation study: "Competence Motivation, Attitude toward Learning, Attention/Persistence, and Strategy/Flexibility." These four dimensions were further explained in the study of Fantuzzo, Perry, and McDermott (2004): Competence Motivation refers to how much that the child wants to know and try to understand, Attention/Persistence refers to how attentive and persistent a child is, Strategy/Flexibility refers to how a child approaches and solve problems, and Attitude toward Learning refers how appropriately children interact with peers and teachers. These four dimensions of learning behavior appear to have convergence and to overlap with the three subscales of SSRS.

The cooperation skills that teachers in all grade levels considered critical for classroom success (Lane et al., 2003) were included in the *approaches to learning* subscale of social skills in the ECLS-K dataset. The term *approaches to learning* was also discussed in the National Education Goals established in 1990 by the president and by the governors of all 50 states. The general definition used for *approaches to learning* was the learning styles of children – that is, how they respond to new tasks (Kagan, Moore, & Bredikamp, 1995). The National Education Goal Panels (NEGP) further

refined this definition to include “their initiative, task persistence, and attentiveness; their approach to reflection and interpretation; their capacity for invention and imagination; and their cognitive approaches to tasks.”

The first goal of the National Education Goals was the readiness of all children when they start school, and five dimensions – “Physical Well-being and Motor Development, Social and Emotional Development, Approaches to Learning, Language Development, and Cognition and General Knowledge” – were considered as key to achieving this first goal (Kagan et al., 1995). According to the National Education Goals Panel (NEGP), the construct *approaches to learning* is the most important, yet the least-researched one among the above described five components of school readiness for preschool children (Kagan et al., 1995). Regardless of how it is termed, learning-related skills (or *approaches to learning*) have been shown to be an aspect of social skills that takes an important role in students’ learning. *Approaches to learning*, which is one of the subscales of social skills in the ECLS-K dataset, included items that overlap with those of the cooperation (e.g., “attends to your instructions”) defined by the SSRS.

Self-Control

Another social skill upon which school teachers of all school levels placed importance for classroom success was self-control, according to the study of Lane et al. (2003). The items included “controls temper in conflict situations with peers,” “controls temper in conflict situations with adults,” and “appropriately responds to physical aggression from peers” (Lane et al., 2003). Self-control was defined as a situation where one behaves appropriately when he or she is, in fact, more likely to behave inappropriately (Pressley, 1979). Lack of self-control in children has been explained with

various theories: psychologists explain it as a deficiency of superego functioning, cognitive developmentalists as a less-developed intelligence, and learning theorists as a shortage of learning (Pressley, 1979).

Development of children's self-control ability during the early school years is important because they encounter situations requiring self-control more frequently as they move up to higher grades in school. Children's self-control ability to engage and stay on tasks during the early school years contributes to improving their academic achievement by increasing their learning opportunities (Normandeu & Guay, 1998).

Research has focused on the cognitive aspect of self-control when studying the relationship between self-control and academic performance. Humphrey (1982) defined cognitive self-control as the capability of the child to plan, evaluate, and self-regulate activities that take problem-solving and attention. He further emphasized that self-control is positively related to IQ. Normandeu and Guay (1998) demonstrated, with teacher-rated behavior data of 291 kindergarten children, that cognitive self-control mediated the social behaviors of kindergarten children and predicted their reading and math achievement a year later, even with intellectual abilities controlled for. The cognitive self-control construct Normandeu and Guay (1998) examined in their study was particularly related to children's capacity to deal with school tasks.

Research has also focused on the emotional aspect of self-control when self-control is related to academic performance. Teachers view students who are lacking in this aspect of behavior as troublesome, according to Graziano, Reavis, Keane, and Calkins (2006). However, studies on emotional control during early childhood are less frequent than those during adolescence (Graziano et al., 2006); worse yet, studies on

emotional control for children who are developmentally normal are rare (Valiente, Lemery-Chalfant, & Castro, 2007). In a recent study, Trentacosta and Izard (2007) demonstrated, using Structural Equation Modeling (SEM), that kindergarten children's ability to emotionally regulate themselves affected their academic performance indirectly through attention. In other words, Trentacosta and Izard (2007) found that children's ability to control emotion has a direct impact on attention. For this reason, they addressed the need for early identification of children with attention problems to avoid risk for academic failure.

The self-control subscale in the ECLS-K study included items that measured not only attention, but also emotions and behaviors exhibited by students when interacting with their peers and teachers.

Interpersonal Skills

Social skills that have been covered in research include several different aspects including peer relation, prosocial behaviors, and cooperation (McClelland et al., 2000). They are not distinct but interconnected and somewhat overlapped in the social domains. Particularly when it comes to the relationship between social process and academic process, social skills are based on numerous theoretical assumptions that render numerous variables (Anderman & Kaplan, 2008). Recently, researchers differentiated learning-related aspects of social skills from other social skills such as interpersonal skills (McClelland & Morrison, 2003; McClelland et al., 2000). In general, interpersonal skills include the domains of peer relations and prosocial behaviors, while learning-related social skills include behaviors that are related specifically to classroom behaviors such as attentiveness, task persistence, independence, and cooperation.

Research focused on the subject of interpersonal skills for kindergarten children has also shown its association with school performance and adjustment (Ladd, 1990; Ladd & Price, 1987). In addition, multiple regression analysis by Wentzel (1991) using data from 12- and 13-year-old students showed that socially responsible behavior predicted students' grades after controlling for other confounding individual variables. In other research, Wentzel (1993) also found that prosocial behavior significantly predicted students' standardized achievement test scores even when most confounding variables, including students' IQ, were controlled for. Malecki and Elliott (2002) conducted a similar study examining the association of social skills with academic achievement for third and fourth graders, and confirmed this significant relationship. DiPerna and colleagues (2001) employed SEM, and showed that motivation derived by prior achievement and interpersonal skills promoted academic achievement by strengthening study skills and engagement. That is, the effect of students' interpersonal skills on their academic performance was mediated by the motivation for learning.

With regard to interpersonal relationships specifically with peers, Ryan (2001) demonstrated that peer group influences students' liking of school, by analyzing middle school students' social networks. Furthermore, low-achieving students in middle childhood were likely to display depressive symptom when they have few friends, while such symptoms are not likely to be present when they have numerous friends (Schwartz, Gorman, Duong, & Nakamoto, 2008).

Studies investigating the effect of students' interpersonal relationships specifically with teachers, characterized a relationship that is close but without conflict or dependency as the one that supports students' motivation and academic achievement

(Patrick, Mantzicopoulos, Samarapungavan, & French, 2008). Despite that motivation for learning mediated the effect of interpersonal relationships on academic performance as DiPerna et al. (2001) demonstrated with SEM, students' relationship with teachers relating to motivation have been seldom studied for young students in early schooling (Anderman & Kaplan, 2008; Patrick et al., 2008). One study, which investigated kindergarten students' relationships with their science teachers in relation to their motivation (Patrick et. al, 2008), revealed that children with low motivation and competence in science had the lowest rate of supportive interaction with their teachers in learning-related matters, and the highest rate of non-supportive interaction with their teachers in nonlearning-related matters (such as conduct problems). Patrick et al.'s study finding indicates the need for more learning-related supports from teachers who have children with low motivation and competence.

Externalizing and Internalizing Problem Behaviors

Among three measures of peer relations including social preference, peer-rated aggression, and peer-rated withdrawal, aggression was the only significant predictor of school outcome when academic achievement, ethnicity, and socioeconomic status were accounted for (Risi, Gerhardstein, & Kistner, 2003). The school outcome Risi et al. (2003) considered in their study included not only drop-outs, but also other non-graduates of high school. Thus, their study underscores the impact of externalizing behavior, such as aggression, on educational outcome above and beyond academic performance.

Studies on externalizing problem of children in early schooling emphasized the differences among children based on gender and family income. Boys were shown to display more aggression and disruptive behaviors than girls (Fleming, Catalano, Oxford,

& Harachi, 2002; Lutz, Fantuzzo, & McDermott, 2002) and children from poor families had a tendency to have more antisocial problem behaviors than those from non-poor families (Brooks-Gunn & Duncan, 1997; Fleming et al., 2002).

Masten and her colleagues (1995) identified three dimensions of competence – “academic achievement, social competence, and conduct” – in elementary school students. They investigated the development of these dimensions later in high school, and found that the conduct which pertains to antisocial behavior, such as breaking rules, was prominently stable over time. Moreover, such continued antisocial behavior was shown to increase the negative effects on academic achievement (Masten, Roisman, Burt, Obradovic et al., 2005).

Masten et al. (2005) also conducted a longitudinal study investigating the relationship among externalizing problem behavior, internalizing problem behavior, and academic achievement over 20 years, and they demonstrated that children who exhibited externalizing problem behavior perform poorly by adolescence and develop internalizing problem behavior in young adulthood regardless of gender.

Although little effect of internalizing problem behavior on academic achievement over time was found in the study of Mastern et al. (2005), evidence of the negative impact of internalizing problem behavior on academic performance was demonstrated in numerous studies. Siu (2007) addressed the difficulty of noticing students’ internalizing problem behavior in his study by contrasting the internalizing problem behavior to the externalizing problem behavior. Internalizing problem behaviors were described as covert because they develop when over-controlled, and display inner-directed patterns of

behavior, whereas externalizing problem behaviors develop when under-controlled, and display outer-directed patterns of behavior (Siu, 2007).

Even though they can easily go unnoticed, the effects of internalizing problem behavior, which include anxiety, depression, and social withdrawal, cannot go unnoticed. Rapport, Denney, Chung, and Hustace (2001) demonstrated the negative impact of students' internalizing problem behavior on their academic performance through their classroom performance and through their selected cognitive functions after their intelligence was controlled for. The construct, cognitive function, in their study referred to students' ability to be vigilant for memorizing and information processing. Rapport et al. (2001) emphasized the significantly negative relationship between students' internalizing problem behavior and their cognitive functions in predicting academic performance.

With regard to gender difference in the internalizing problem behaviors, study findings have been inconclusive. A recent longitudinal study of Sterba, Prinstein, and Cox (2007) examined the developmental trajectories of internalizing problem from age 2 to 11 years and they found that twice number of girls showed high levels of internalizing problems that remained stable, whereas more number of boys showed decreasing or increasing trajectories of the problem.

As to the anxiety, it was shown that students with high anxiety were significantly more negative about their own ability and performance, and had more difficulty concentrating than their peers (Hembree, 1988; Zatz & Chassin, 1983). In a study conducted by Normandeau and Guay (1998) on the influence of preschool children's behaviors including teacher-rated aggression, anxiety, withdrawal, and prosocial behavior,

only anxiety directly impacted academic achievement with significance, while other behaviors influence academic achievement indirectly through their self-concept.

With regard to depression, symptoms students exhibited were not different across ages, and they included difficulties in thinking and thoughts of suicide (Lewinsohn, Rohde & Seeley, 1998). Lewinsohn et al. (1998) addressed the difficulty of recognizing depression and the importance of clinical screening by psychologists for adolescents. The recursive relationship between depression and academic performance was also shown to be valid. That is, low school performance of elementary students was shown to be a significant predictor of their depressive symptoms (Schwartz & Gorman, 2008). In addition, when connecting with interpersonal relationships, Schwartz and Gorman (2008) maintained that low-performing students with few friends were more likely to have depressive symptoms, while those with many friends were not.

Research on the internalizing problem behaviors of children in early schooling has been neglected due to the perceived lack of their capability to have such problems (Sterba et al., 2007). As a significant factor influencing children's internalizing problem, however, early experience of poverty during childhood was shown to yield high level of depression that lasted until middle childhood (McLeod & Shanahan, 1996). McLeod and Shanahan (1996) demonstrated that children who were in poor families at age four had lasting high level of depressive symptoms through age nine. Further, subsequent continual poverty experience was shown to increase the rate of antisocial behavior of children (McLeod & Shanahan, 1996).

Academic Performance and Social Skills of Language Minority Immigrant Students

Academic Performance

Language-minority students are those who do not speak English at home, and most of them are immigrant students (Fuligni, 1997). Immigrant students' status, per se, is a risk factor for school failure due to the greater challenges they confront than non-immigrant students do (Ogden et al., 2007), because they are loaded with a greater amount of materials to understand due to their different language and culture. Ogden and colleagues (2007) stressed the social hardship of immigrant students by illustrating that the immigrant students in Norway had difficulties in understanding not only the language, but also the norms, rules, and expectations of their host culture.

With the recent unprecedented increase in the number of immigrants in the U.S., the educational needs of their children are growing rapidly. Recent immigrants are more diverse in their countries of origin and socioeconomic backgrounds than in the past (Zhou, 1997), with more immigration from Mexico, Latin America, and Asia during the past decades than from Europe and Canada (Fix & Passel, 2003). Notwithstanding the diversities, immigrant children are more likely to come from poor and low SES households than their mainstream counterparts (Kao, 2004). According to Fix and Passel (2003), children of immigrants represented 25% of children in poverty in year 2000.

Despite the importance and the challenge of educating this enlarging student population, research on the academic performance of this new generation of immigrants has been neglected (Zhou, 1997). When academic performance is viewed as representing the levels of adaptation for young immigrants (Zhou, 1997), immigrant children who entered American schools exhibit somewhat extremes in this regard. That is, while some

immigrant students surpassed their non-immigrant mainstream peers in academic performance, other immigrant students fell behind, failed at school, and became gang members – even among the Asian students from suburban middle-class who used to be viewed as the “model-minority” (Zhou, 1997).

LEP was demonstrated to be a risk factor for school failure among elementary students in the study of Edl, Jones, and Estell (2008) in which Latino students with LEP had consistently lower ratings on teacher-rated academic competence than Latino students without LEP. The achievement gap between LEP and English-speaking mainstream students was shown to develop in early schooling and continues to widen as they advanced through school (Denton, West, & Walston 2003; U.S. Department of Education, 2004). A performance report published by the US Department of Education (2004) showed that the percentage of LEP students who met the AYP in 2003 was only 50% for third grade students and 9% for high school students in reading performance, whereas it was 100% and 95% for mainstream third grade and high school students respectively.

Social Skills

Numerous research studies have been conducted, searching for factors that affect and promote the academic performance of immigrant students. Even though social skills have been studied as one of the student characteristics that have significance in determining student achievement (Wang et al., 1993), research on the social skills of immigrant students is scarce.

According to the analysis result of the PISA 2003 (Schleicher, 2006), immigrant students showed relatively high approaches to learning when compared to native

mainstream students. The result of the PISA 2003 study also showed that a positive attitude for learning was stronger for the first-generation immigrant students than for the second-generation students or native mainstream students. This high *approach to learning* of immigrant students can serve as a basis for educators and policy makers to develop interventions and policies to promote the academic achievement of immigrant students (Schleicher, 2006).

Education is viewed as a means for social advancement (Zhou, 1997). Immigrant parental optimism about their children's socioeconomic prospects influences and motivates immigrant students to pursue higher education (Kao & Tienda, 1995). Parents' strong emphasis on the importance of education, which is often shared with students, showed a stronger association with academic achievement than did socioeconomic status (Fuligni, 1997), reflecting their high *approaches to learning*.

On the other hand, Crijnen et al. (2000) addressed that such high expectations imposed on immigrant students led to the development of high internalizing problems including anxiety and depression. Crijnen et al. (2000) conducted a study on the behavioral and emotional adjustment of Turkish immigrant students in the Netherlands, and demonstrated higher internalizing problems in the immigrant students than in the non-immigrant Dutch students. Among their findings, it was worthy of attention that these high levels of anxiety and depression in immigrant students were detectable only by immigrant teachers. That is, the higher internalizing problems of immigrant students were not properly recognized by non-immigrant Dutch teachers.

Furthermore, Reijneveld et al. (2005) illustrated a lower correlation between the clinical assessment and parental assessment of immigrant students' problem behaviors

than that of non-immigrant students. In other words, even clinical assessment was not properly diagnosing the problem behaviors of immigrant students. Worse yet, their language and cultural barriers caused their problems to remain undetected in the host country (Crijnen et al., 2000).

Kirova (2007) explained that, when children first acquire a new language, many feel inferior and become silent out of a fear of being laughed at. Apparently, the language barriers of LEP students led them to feel inferior and to become silent, and thus unable to express themselves appropriately. Considering the difficulty in identifying such problems of immigrant students, they deserve extra attention. Study on the Turkish immigrant students in Netherlands (Murad, Joung, Lenthe, Bengi-Arslan, & Crijnen., 2003) also showed a higher rate of withdrawal behavior problem for the immigrant students than for the non-immigrant Dutch students, and this was the most pronounced difference between the two groups when they were compared for problem behaviors.

A research conducted in Sweden by Sundell and Collbiörnsen (1999, as cited in Ogden et al., 2007) demonstrated that immigrant students were consistently rejected by peers, along with noisy boys and shy, withdrawn students, among second grade students. Their study showed that the students' lack of social skills was the main reason for the social rejection, and such rejection in turn undermined the academic performance of the rejected children. Ogden et al. (2007) maintained that the difficulties immigrant students experience with social acceptance prohibit them from acquiring social competence, which is, according to Masten et al. (1995), one of the three dimensions of children's competence along with academic achievement and conduct.

Notwithstanding the high internalizing problems and withdrawn behaviors of immigrant students in addition to social rejection from peers, research on their mental health has been neglected compared to the amount of research that has been done on the educational adaptation of immigrant students (Suarez-Orozco, Todorova, Qin, Villarruel, & Luster, 2006). Research has shown that the advantage from the positive processes exhibited in immigrant families erodes with time; and thus, later generations of immigrants displayed deterioration in mental health with more juvenile delinquencies such as use of tobacco, drugs, and violence (Georgiades, Boyle & Duku, 2007). This is somewhat contradictory to the findings of Yeh's study (2003), in which Asian youth who assimilated to American culture to a greater degree exhibited fewer mental health symptoms, because the stress inherent to the process of acculturation impacted the most on their mental health problems. Yeh (2003) argued that cultural stress from a lack of ability to negotiate across two cultures causes immigrant students mental health problems, since they lose a sense of belonging to either culture. The mixed findings of these studies appear to signify the mental health problems that can present regardless of generation or degree of acculturation.

Nonetheless, the family of immigrant students has a moderating effect on the mental health problems of immigrant students (Georgiades et al., 2007). However, immigrant and minority parents have limited access to social capital due to their lack of language skills and varying social customs (Kao & Rutherford, 2007), and were thus restrained from helping their children academically. In this regard, a study on elementary students in Netherland conducted by Vedder, Boekaerts, and Seegers (2005) highlighted the importance of the teacher's role by showing that immigrant students in Netherland

rely more on their teachers for academic support than on their parents, while non-immigrant Dutch students do the contrary.

Intervention for Students' Social Skills

Provided that social skills are associated with academic performance (Wentzel, 1991, 1993; Malecki & Elliott, 2002; DiPerna et al, 2001; Elliott et al., 2004), it can be posited that improving such skills of low achieving students would be conducive in promoting their achievement. A number of studies have reported the successful outcomes of social skills training and intervention. McIntosh, Vaughn, and Zaragoza (1991) reviewed 22 studies that evaluated the effects of such programs in order to find important factors that contribute to students' success in school; however, they concluded that the studies lacked empirical evidence to support the program effects. Another meta-analysis conducted by Schneider (1992) on 79 studies about the effectiveness of social skills training and intervention concluded that there was moderate short term effectiveness in social skill training.

Recent studies that used experimental design for the effect of school counselor-led social skill training intervention program on the academic performance of students in two districts of Florida showed significant improvement in both reading and math for elementary and middle school students (Miranda, Webb, & Brigman & Peluso, 2007, June; Campbell, Brigman & Brigman, 2005). The social skills training program tested in these studies was a school-counselor-led group intervention program which taught students goal-setting and problem-solving so that they could apply the learned skills in the classroom. These studies were meaningful in that they used random assignment for the causal relationship of the program to students' academic performance. However, the

studies are subject to bias, because they lack in generalizability by covering narrow geographic areas with small sample sizes.

Subsequently, there still exists a lack of strong empirical evidence on the positive effect of improved social skills on students' academic performance (Lopes & Salovey, 2006; Zins et al., 2007). From the preceding literature review on the relationship between students' social skills and their academic achievement, however, the need for support and intervention, especially for immigrant students, is apparent.

The Need for Support

Regardless of immigration student status, lower elementary students were reported to exhibit more internalizing problem behaviors when there was insufficient emotional support in the classrooms (Belsky et al., 2006). The importance of support in the classroom, especially for immigrant students, was emphasized in the study of Vedder et al. (2005), in which the low school adjustment and motivation of Turkish and Moroccan elementary students in the Netherlands due to their experiences with learning difficulties in the classroom was modified by the students' perception of teacher support. These immigrant students in the Netherlands showed more reliance on teachers for instructional support than on their parents, when compared to the non-immigrant Dutch students. The need for a more supportive role by teachers towards younger students with low performance and low motivation was also demonstrated in the study of Patrick et al., (2008). In their study, kindergarten children with low motivation and competence in science had the lowest rate of supportive interaction with their teachers in learning-related matters, and the highest rate of non-supportive interaction with their teachers in nonlearning-related matters.

In relation to learning-related social skills, which were differentiated from other social skills by McClelland and her colleagues (2000; 2003) and which were considered most important in school readiness according to NEGP (Kagan et al., 1995), the early identification of and intervention for this skill in children is important because they develop as early as at age three and continue impacting their academic performance (McClelland et al., 2000; Posner & Rothbart, 2000). Pelco and Reed-Victor (2007) illustrated the learning-related social skills that need to be instructed by integrating them into the curriculum of elementary schools. The skills enumerated for instruction included specific classroom behaviors such as “how to talk inside the classroom” and “how to wait one’s turn” for lower grade students, and “how to take notes” and “how to organize a notebook and backpack” for upper-grade students. Pelco & Reed-Victor (2007) also addressed the importance of providing these direct instructions from the teacher, who is available to students throughout the school day, rather than from school support personnel, because such instruction requires working knowledge to make use of opportunities to provide practice in the classroom.

The Need for Intervention

As Ogden et al. (2007) pointed out, immigrant student status is a risk factor since they are confronted with greater demands than non-immigrant students are, due to differences in language and societal norms. In response to excessive demands, according to Thoresen and Eagleston (1983), children and adolescents who are equipped with insufficient resources tend to be socially withdrawn, abuse drugs, and play truancy. Thoresen and Eagleston (1983) addressed the role of social skills as potential resources, because social support provided from friendship can offset demands and capacitate them

to accommodate demands. The mediating role of friends and social network was also demonstrated for depressive symptoms of low achieving students in the study of Schwartz and Gorman (2008), as those with many friends were less likely to display depressive symptoms while those with few were likely to display such symptoms.

From the developmental perspective, social skills that are integrated with adaptive behaviors constitute social competence (Gresham & Elliott, 1987). Gresham and Elliott (1987) further illustrated that social competence is a multifaceted construct which enables children to accommodate environmental demands and assume responsibility. The recent study conducted by Henricsson and Rydell (2006) regarding the effect of Swedish elementary children's social competence on their academic performance showed that there is a moderating effect of social competence on the academic performance of students who used to have internalizing problem behaviors. Social competence Henricsson and Rydell (2006) used in their study captured the aspect of prosocial behavior (such as "give compliments to peers" and "show generosity towards peers") and social initiative (such as "suggests activities and games to play with peers" and "invites shy children to participate in play"). Specifically, exhibition of high levels of social competence enabled the children who formerly had internalizing problem behaviors, in particular, to attain a high level of peer acceptance and academic performance. The findings of Henricsson and Rydell (2006) underscored the importance of the prosocial behaviors and social initiative as a protective factor for students with internalizing problem behavior. When considering that children who have an internalizing problem usually have low levels of social competence (Henricsson & Rydell, 2006), there is a need for social skills training focused on prosocial behaviors and social initiative.

Summary

The literature reviewed in this chapter presents a need for further study of social skills that combines the various aspects of social skills in order to investigate the relative importance of each facet in relation to academic achievement. In addition, the need for study on immigrant students' unexplored social skills is evident in order to identify specific facets of their social skills that require supports.

Social skills are important student characteristics that determine student academic performance, and this study explores the significance of the various aspects of social skills, with a special focus on the language minority immigrant student population – LEP students in particular – to provide insight into policy for supporting appropriate intervention or remedial programs tailored to meet their needs.

By examining the development of their social skills during their early schooling, this study contributes to identifying specific areas where immigrant students require support not only for their adjustment, but for potential improvement of their academic achievement so that they can work to their maximum potential through their schooling and through their life.

Chapter Three:

Methods

The purpose of this chapter is to provide detailed information about the methodology adopted in this study. This chapter contains descriptions of the ECLS-K data, and the variables and analyses this study uses.

Data

This study uses data contained in the Early Childhood Longitudinal Study – Kindergarten Class of 1998-99 (ECLS-K), a nationally representative longitudinal dataset from the National Center for Education Statistics (NCES) of the U.S. Department of Education.

For the first step of the analysis, the data collected during the spring semester of fifth grade is used to examine the cross-sectional associative relationship of students' social skills and their academic performances. For the next step of the analysis, the data from the four waves of the spring semester of kindergarten, first, third, and fifth grade are used to investigate the longitudinal relationship between the students' social skills and their academic performances for six years, for both mainstream English-speaking students and non-English speaking language minority students.

The ECLS-K was designed to provide an assessment of the various developmental aspects of children from the onset of their formal schooling through their progress during the elementary school years. Initial data collection of the ECLS-K began in the fall of 1998. The six waves of data were collected by the spring of 2004. The data collection method used a multistage probability sample design in which the primary sampling units were counties. The second-stage units were schools within the sampled

counties, whereas the final stage units were the students within those schools. The advantage of the probability sampling is that it allows the validity of the estimate statistics as an inference to the population (Pedhazur & Schmelkin, 1991).

The data in ECLS-K study was collected from teachers, parents and schools via surveys, interviews, and field observations. The dataset provides the information regarding the relationships of the children with their peers and teachers in the context of the school environment over the years of their early schooling. The longitudinal nature of the data allows the researcher to examine the children's experiences in early school years and to study their relationship to the developmental variations of cognitive, social and emotional skills among children (Tourangeau, Nord, Le, Pollack et al., 2006).

To use the language minority status as a grouping measure between native English-speaking non-immigrant students and immigrant students in comparing the developmental trajectories of social skills and their effect on student academic performance, data regarding the languages that students use at home were selected. Of the total 21,260 kindergarteners in the ECLS-K base year data, 2,783 children came from families in which a language other than English was spoken at home; this language minority group accounted for 12% of kindergarten students in 1998, when the full weight of data was applied to the sample to be representative of the population. After the selection of valid data and the deletion of the cases that have missing data on students' performance and teachers' social ratings, the data from 10,038 students were included in the analyses. Due to the exclusion of the missing data, the study is inevitably subject to selection bias; which is reduced in this study by controlling for the theoretically important confounding factors.

Variables

Social Skills

Two main variables are chosen: teacher-rated social skills for individual students and students' IRT-scaled achievement scores. With regard to the first variable, the ECLS-K data contained five subscales of teacher-rated social skills, which were adapted from the Social Skills Rating Scale: Elementary Scale A (SSRS; Gresham & Elliott, 1990, as cited in Tourangeau et al., 2004). The five subscales include three prosocial behaviors (*approaches to learning, self-control, and interpersonal skills*) and two problem behaviors (*externalizing problem behaviors and internalizing problem behaviors*).

Each subscale consists of four to seven items, depending on the subscale and the grade they were measured. That is, one item each for *approaches to learning* and *externalizing problem behaviors* was added from third grade to increase the variance (Tourangeau, et al., 2006). Each item shown in Table 3.1 was measured on a four-point scale ranging from 1 (*never*) to 4 (*very often*). Each student's scores on these items were averaged for each of five subscales of social skills. These same five measures were repeatedly collected from kindergarten through fifth-grade using the same instrument, meeting the requirement of invariant measurements across waves of data in longitudinal analysis. As presented in Table 1, there is evidence that the five measures of social skills are highly reliable, with alphas ranging from .77 to .91 for fifth grade students (Tourangeau et al., 2006). Although, only 26 items were used in the ECLS-K dataset out of the original 57 items of SSRS Elementary Level form, the five measures of social skills were shown to retain external validity by exhibiting significant correlations with the

same five social skills their parents rated in home environment, which ranged from .13 to .24.

Table 3.1. *Survey Items for the Five Subscales of Social Skills*

| <i>Social Skills</i> | <i>Items</i> | <i>Reliability (Cronbach Alpha)</i> |
|---|--|---|
| Approaches to Learning (6 to 7 items) | Attentiveness Task persistence Eagerness to learn Learning independence Flexibility Organization Classroom rule conformity (for third and fifth grade only) | .91 |
| Self-Control (4 items) | Respecting the property rights of others Controlling temper Accepting peer ideas for group activities Responding appropriately to pressure from peers | .79 |
| Interpersonal Skills (5 items) | Forming and maintaining friendships Getting along with people who are different Comforting or helping other children Expressing feelings, ideas, and opinions in positive ways Showing sensitivity to the feelings of others | .88 |
| Externalizing Problem Behaviors (5 to 6 items) | Child argues Child fights Child gets angry Child acts impulsively Child disturbs ongoing activities Child talks during quiet study time (for third and fifth grade only) | .89 |
| Internalizing Problem Behaviors (4 items) | Presence of anxiety Presence of loneliness Presence of low self-esteem Presence of sadness | .77 |

SOURCE: User's manual for the ECLS-K public-use data file and electronic code book, U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K).

Academic Performance

To compare the achievement growth of three language-status groups, four waves of IRT-scaled achievement scores from the spring terms of kindergarten, first grade, third grade, and fifth grade (1998 -2004) are used. The IRT scales score is chosen among three available scores of the ECLS-K data (Raw score, T score, and IRT score) as a measure of the academic performance, due to its strengths in longitudinal analysis. An IRT scale score estimates the examinee's ability and the item characteristics (i.e., item difficulty, discrimination, and guessing) separately, and thus, an estimated plausible value can be obtained for each student's proficiency rather than the student's observed score. The IRT scale score has a major advantage over other scores with respect to analyzing student's growth trajectories because it ensures that the scores at different time points are measured on a comparable scale, which is an important condition for a longitudinal dataset (Hox, 2002).

Achievement Groups

Two types of groupings are made according to the needs at each phase of analysis in performing comparisons and analyses. The first grouping forms achievement-level groups based on the fifth-grade academic performance to examine the concurrent association of students' academic performance with social skills. Students are divided into three achievement level groups based on fifth-grade reading, math, and science performance. In forming these three ability groups, students' performances in all three subject areas are considered to assess their overall academic level.

Students with scores in the top 25% in all three subjects are assigned to the high-achieving group, whereas students with scores in the bottom 25% in all three subjects are

assigned to the low-achieving group. Subsequently, students with scores in the middle 50% in all three subjects are assigned to the middle-achieving group. As a result, 1408, 1969, and 1261 students are assigned to the high, middle, and low achievement groups, respectively. The full weight (C6CW0) is applied for this cross-sectional data of the fifth grade students to create a nationally representative sample. Each of the high, middle, and low achievement groups represents 13%, 18%, and 16% of the student population, respectively as shown in Table 3.2, comprising 47% of the fifth-grade student population. Those students who performed well in one subject but poor in other subject were not assigned to these distinctive level groups, and thus excluded from the analysis.

Table 3.2. *Demographic Information of the Achievement Groups*

| | | Achievement Group | | | All |
|---|------------------------------------|-------------------|-------------------|-------------------|--------------------|
| | | High | Middle | Low | Students |
| Frequency | Weighted (%) | 422172 (13.3%) | 582930 (18.3%) | 505224 (15.9%) | 3178644 (100%) |
| | Unweighted (%) | 1408 (14.0%) | 1969 (19.6%) | 1261 (12.6%) | 10038 (100%) |
| SES | Mean (SD) | .60 (.75) | -.05 (.74) | -.55 (.66) | -.02 (.80) |
| In Poverty | Frequency (% Within Group) | 25390 (6.0%) | 92461 (15.9%) | 226275 (44.8%) | 617757 (19.4%) |
| Gender | Girls (% Within Group) | 165028 (39.1%) | 284418 (48.8%) | 263536 (52.2%) | 1573186 (49.5%) |
| Race/Ethnicity (% within Achievement Group) | White | 80.7% | 63.5% | 33.2% | |
| | Black | 3.6% | 11.3% | 32.2% | |
| | Hispanic | 8.1% | 20.5% | 27.9% | |
| | Asian | 4.1% | 1.5% | .9% | |
| | Hawaiian,Pacific Islander | .2% | .3% | .8% | |
| | American Indian More than one race | .4% 2.9% | .8% 2.1% | 3.5% 1.5% | |

As shown in the demographic information of Table 3.2, the high achieving group was comprised of more number of boys (61%) than girls (39%) while the middle and low achieving groups were comprised of almost equivalent gender ratio with 49% and 52% of girls respectively.

The SES of each group had the same rank order with the achievement level, as the high achieving group had the highest mean SES of .60, the middle achieving group had second highest mean SES of -.05, and the low achieving group had the lowest mean SES of -.55. While 19% of fifth-grade student population came from families with incomes lower than the household-level poverty threshold set by the U.S. Census Bureau, 45% of low achieving students were from poor families. The percentage of students from poor families comprised only 6% of the high achieving student group and 16% of the middle achieving student group.

In race/ethnicity composition, the percentage of whites (81% in the high achieving group vs. 33% in the low achieving group) and Asians (4.1% in the high vs. .9% in the low) was larger in the high achieving group than in the low achieving group, while the percentage of blacks (4% in the high vs. 32% in the low) and Hispanics (8% in the high vs. 28% in the low) was larger in the low achieving group than in the high achieving group.

Language-Status Groups

The second grouping (separately from the above-mentioned three achievement groups) forms three language-status groups based on home language and English proficiency; one mainstream English-speaking student group and two non-English-speaking immigrant student groups (with LEP and without LEP) are formed. Non-

English speaking language minority students are categorized into two groups according to their English fluency level at the beginning of the kindergarten year, which is based on whether they were put in English as a second language (ESL) classes in kindergarten. Among all non-English home language students, 39 % of the students were placed in either in-class or pull-out ESL classes during kindergarten. The attendance in those ESL classes is used as a proxy for LEP status at the beginning of school. Those who had LEP are grouped and referred to as the *LEP-at-K* group. Students who spoke non-English at home but who were not put in ESL classes are grouped separately as the *Non-LEP* group.

Because the LEP status is one of the risk factors that has major impact on the academic performance of the immigrant students (Le Flock et al., 2007), this study uses the language minority status as a grouping measure between native English-speaking non-immigrant students and immigrant students. LEP is used as a grouping measure subdividing language minority immigrant student group; the use of language minority status and LEP status as grouping measures for the immigrant students is considered more valid than the use of other indicators of immigration status such as birth place or U.S. residence years. Furthermore, these other indicators of immigration status are considered not useful to distinguish LEP students among immigrant students because most of the first- and second-generation immigrant students (more than 80%) were LEP who have lived in United States more than five years, and 60% of LEP students were U.S. born (Fix & Passel, 2003).

Liu, Thurlow, Thompson and Albus (1999) employed the same grouping method in reporting academic performance of language minority students in Minnesota. According to Liu et al. (1999), *Non-LEP* students are those who are evaluated to have

English proficiency by school evaluators, or those who are not receiving ESL services by their parents' choice. *Non-LEP* students are hypothesized to perform better academically and with proficiency in English in this study than are the LEP students. This study compares the differences in social skills and their effects on the academic achievement of the three groups – English-speaking students (*English-speaking*), language-minority immigrant students without LEP (*Non-LEP*), and language-minority immigrant students who had LEP at kindergarten (*LEP-at-K*).

Table 3.3. *Demographic Information of the Language-Status Groups*

| | | Language-Status Group | | | All |
|--|------------------------------|-----------------------|------------------|------------------|-------------------|
| | | English | Non-LEP | LEP-at-K | Students |
| Frequency | Weighted (%) | 3202628 (88.7%) | 191847 (5.3%) | 216094 (6.0%) | 3610569 (100%) |
| | Unweighted (%) | 8677 (86.4%) | 688 (6.9%) | 673 (6.7%) | 10038 (100%) |
| SES | Mean | .06 | -.29 | -.71 | -.02 |
| | (SD) | (.78) | (.78) | (.61) | (.80) |
| | Range | [-4.75, 2.75] | [-4.18, 2.69] | [-4.75, 1.99] | [-4.75, 2.75] |
| In Poverty | Frequency | 554020 | 68710 | 111931 | 734660 |
| | % Within Group | (17.3%) | (35.8%) | (51.8%) | (20.3%) |
| Gender | Girls | 1556492 | 105574 | 107374 | 1769440 |
| | % Within Group | (48.6%) | (55.0%) | (49.7%) | (49.0%) |
| Race/Ethnicity (% within Language- Status Group) | White | 65.7% | 10.7% | 3.0% | |
| | Black | 17.4% | 2.3% | 1.0% | |
| | Hispanic | 10.7% | 71.4% | 87.9% | |
| | Asian | 1.3% | 13.1% | 6.6% | |
| | Hawaiian,Pacific Islander | .5% | 1.5% | 1.1% | |
| | American Indian | 1.8% | .4% | .4% | |
| | More than one race | 2.6% | .5% | - | |

As shown in the demographic information on the language-status groups of Table 3.3, the language minority immigrant student group constituted of about 14% of the student population, and each of *Non-LEP* and *LEP-at-K* comprised half of the language minority student population.

Both of the two language minority groups had lower SES family backgrounds than did the English-speaking mainstream student group. Students who had LEP at kindergarten (*LEP-at-K*) came from families with the lowest SES of -.71 among the three language-status groups, and this was even lower than the SES of low achieving student group (-.55) in Table 3.2. The students who did not have LEP (*non-LEP*) came from families of -.29 SES which was still lower than the average SES of all students. Subsequently, more than half of *LEP-at-K* student group (52%) came from the families with income lower than the household-level poverty threshold of U.S. census, while it was 36% for *Non-LEP* student group and 17% for the English-speaking mainstream student group.

In terms of gender composition for each of language-status group, *Non-LEP group* had slightly larger percentage of female students than other groups.

With regard to the Race and Ethnicity composition of the language-status groups, Hispanic constituted the large percentage of the both language minority groups, and the *Non-LEP* group was comprised of more Whites and Asians than the *LEP-at-K* group.

For the investigation of the longitudinal relationship between students' social skills and academic achievement in addition to their concurrent relationships, the teacher-rated five subscales of social skills at each of the four points in time (spring semester of kindergarten, first, third, and fifth [1999–2004]) are used. The longitudinal panel weight

(C2_6FC0), which encompasses the four waves of data, is employed to allow the representation of the full student population (i.e., generalizability) for the analysis.

Covariates

Students' gender, socioeconomic status (SES), and household-level poverty status were considered to be covariates in the relationship between their social skills and academic achievement, based on literature showing the gender gap (Fleming et al., 2002; Lutz et al., 2002) and family-income gap (Brooks-Gunn & Duncan, 1997; Fleming et al., 2002; McLeod & Shanahan, 1996) in terms of children's problem behaviors.

The SES variable of the ECLS-K data was a composite of five factors: education and occupations of father and mother, and household income. Each of the five factors was first normalized with standard distribution of zero mean and one standard deviation, and then the standard scores were averaged to make the SES variable (Tourangeau et al., 2006). Thus, the zero value of SES represents the student from an average level of SES.

Household-level poverty status was determined based on the household income and the number of household members (Tourangeau et al., 2006). Households with incomes less than the official poverty threshold set by the U.S. Census Bureau (Tourangeau et al., 2006) were considered to be in poverty. Thus, children in impoverished households are considered to experience the difficulty of having basic needs of food, clothing and shelter (Brooks-gunn & Duncan, 1997). Brooks-gunn and Duncan (1997) maintained that despite the large literature on poverty's effect on children, many studies neglect the necessary disentanglement of the confounding effect of poverty.

Analysis

Concurrent Relationship: Discriminant Analysis

Using the teacher-rated five subscales of social skills data and the academic performance data of fifth-grade students, a discriminant analysis is first performed. The goal of this analysis is to predict the group membership in different achievement levels from the teacher ratings on the five subscales of social skills (i.e., with the group membership as the dependent variable and the scores on social skills as predictors). Therefore, the analysis answers the question: Can achievement levels of fifth-grade students be reliably determined by a set of five subscales of teacher ratings on their social skills?

Discriminant analysis shares common aspects of multivariate analysis of variance (MANOVA) in which group membership is tested for its association with differences in mean of combined predictors (Tabachnick & Fidell, 2007). The two methods are different in specifying independent and dependent variables: in MANOVA, teacher -ratings on five social skills become dependent variables, and the achievement groups are independent variables; in discriminant analysis, the dependent and independent variables are switched. Therefore, in discriminant analysis, emphasis is on the reliable predictability of the combination of the teacher-rated five subscales of social skills for achievement levels, whereas in MANOVA, emphasis is on the achievement group's association with mean difference in the combination of the five subscales of social skills.

Advantage of choosing discriminant analysis over MANOVA in this study is that the discriminant analysis performs more tasks than MANOVA. That is, it carries out classification by putting individual students into achievement-level groups, and evaluates

the adequacy of such classification. More importantly, it further informs the dimension(s) that groups differ and their relative importance through the loadings of each predictor on the discriminant function(s). Since the discriminant function is the combination of predictors that classify groups, the magnitude of correlations between the predictors and the discriminant functions reflects their relative importance in the separation of groups (Tabachnick & Fidell, 2007).

Both discriminant analysis and MANOVA are robust to violation of homogeneity of variance-covariance, because they are one-way analysis on a linear combination of dependent variables (or predictors) that maximizes group difference (Tabachnick & Fidell, 2007). The classification process, however, is sensitive to violation of homogeneity of variance-covariance, because cases have a tendency to be classified into more heterogeneous groups (Tabachnick & Fidell, 2007). This study modified the classification procedure by setting a priori probability to group size due to unequal group sizes among the achievement-level groups. Therefore, the probability with which a student is assigned to a group takes account of the percentage of students who are classified to each group by chance alone.

This study conducts discriminant analysis to examine the associative relationships between students' social skills and academic performances as well as the predictability of students' scores on the teacher-rated five subscales of social skills for their academic achievement-level group membership (i.e., high, middle, or low achievement). Additionally, discriminant analysis renders the classification function(s) that predict students' achievement levels and informs the dimension(s) along which high-, middle-, and low-achievers differ. Consequently, they answer the first research question

of this study: Can achievement levels of fifth-grade students be predicted reliably with their social skills? Which of the five subscales of social skills (*approaches to learning, self-control, interpersonal skills, externalizing problem behaviors, and internalizing problem behaviors*) significantly contribute in predicting the achievement level of fifth-grade students?

Longitudinal Relationship: Profile Analysis

For the next step, a repeated measures design of the generalized linear model (GLM) is used for profile analysis, which compares the developmental growth of the five subscales of social skills among the three achievement-level groups and among the three language-status groups. The graphic presentation of GLM enables a visual examination of the difference in the developmental growth of students' social skills, which is caused by students' achievement levels and by students' language status, and thus it facilitates the understanding of their longitudinal relationships.

Profile analysis embedded in GLM is a multivariate approach to repeated measures, which requires the same scaling for all measures and the larger sample size for the smallest group than the number of dependent variables (Tabachnick & Fidell, 2007). Use of the same scaling for all dependent variables is required for the commensurability, and the sample size for the smallest group larger than the number of dependent variables is required for the power of the test and for the homogeneity of variance-covariance matrices (Tabachnick & Fidell, 2007). This study does not violate these required conditions because sufficiently large numbers of students are repeatedly measured on their same skill over four time points on the same scale. Each of five subscales of teacher-rated social skills is measured at kindergarten, first, third, and fifth grade to be tested for

the effect of the student's language status and the effect of student's achievement level. In profile analysis, because it tests each hypothesis as if in a one-way design, unequal sample size is not an issue (Tabachnick & Fidell, 2007).

Univariate repeated measure analysis assumes sphericity. However, the sphericity assumption is not necessary in the multivariate approach (Stevens, 2002). Sphericity refers to the equal correlation between measures in different time point, which is likely to be violated in this study because social skills between the two close time points would be larger than those between the two distant time points. With repeated measures from a large dataset in which violation of sphericity is likely, profile analysis is a strategic alternative to repeated measures analysis of variance, because the multivariate model of profile analysis is more forgiving for nonexperimental design than the univariate model (Tabachnick & Fidell, 2007).

The profile analysis evaluates three tests for each type of group (achievement-level groups and language-status groups), as follows: (a) whether profiles of the three groups are parallel without interaction, (b) if they are parallel, whether they change over time, and (c) whether there is an overall group difference in terms of each subscale of social skills. In other words, the first test evaluates the equivalence of developmental growth patterns of each of the five subscales of social skills among three groups. The second test evaluates the equivalence of the skills over time. Consequently, the second test is contingent upon the first test, because if the first test resulted in a non-parallel growth pattern, there is no need for the second test. Finally, the third test evaluates whether one group has higher score on skills than other groups regardless of whether their growth patterns are parallel or not. Therefore, they answer the second research

question of this study: Do the development patterns of students' social skills differ by their achievement level and by their language status when examined longitudinally from kindergarten to fifth grade?

Longitudinal Relationship: Hierarchical Linear Model (HLM)

As a last step, the longitudinal effect of social skills on the reading and math performance of the three language-status groups is investigated with a two-level growth curve model using HLM. HLM is an advanced alternative to repeated measures design because the difference in developmental growth among individual students can be evaluated by analyzing each case separately over time (Tabachnick & Fidell, 2007).

As an advanced and complex technique, HLM accommodates hierarchical structures that are frequent in educational research, such as individual students nested within classes, classes nested within schools, schools nested within districts, and so on. When applying ordinary least square regression on data with such hierarchy, individual students and schools are all treated as being on same level, and thus researchers commit fallacy in interpreting the results. That is, individual-level results are applied and interpreted at the school level, inflating Type I errors by including spurious relationships. Or group-level results are applied and interpreted at the individual level, decreasing power by losing information (Tabachnick & Fidell, 2007).

HLM takes into account the hierarchical structure by treating individual intercept and slopes as outcome variables in the higher level of analysis and allowing them to vary randomly over the group population (Raudenbush & Bryk, 2002). Individual slopes can also be treated as nonrandom if between-group variability is strictly a function of group-level predictors (Raudenbush & Bryk, 2002). Thereby, with separate regression equation

at group level, it can include predictors at both individual and school levels (Tabachnick & Fidell, 2007).

With longitudinal data, this study uses a two-level growth model employing HLM. In a two-level growth model, the lower level is repeated measures and the higher level is the individuals. Therefore, in this study, level 1 of analysis is the grades when students' performances were assessed, and the level 2 is individual students. That is, academic performance scores at each grade are nested within individual students.

As an advanced alternative to repeated measures design, HLM has several advantages. First, HLM does not require complete and balanced design because it assumes that data are missing at random. Therefore, each individual student does not need to have same number of observations, and each observation does not need to have equal intervals for each individual.

Second, by specifying random intercept and slope for the regression equation at the individual level, each individual has his/her own regression equation. Thus, it is possible to test individual differences in their mean score (intercept) and in their developmental growth pattern (slope) over the repeated measures.

Third, it does not require sphericity, which refers to the independence of errors over time, because it tests the growth pattern (slope) itself over time with linear regression for each individual student (Tabachnick & Fidell, 2007).

As a final advantage of HLM, time-related variable can be entered in the lowest level of analysis in addition to the time variable itself as a predictor, with the use of time-varying covariates (Tabachnick & Fidell, 2007). That is, in this study, by adding time-squared at level 1, quadratic growth patterns for each individual student can be evaluated,

and by adding social skills at level 1, linear relationships between social skills and the academic performance (dependent variable) for each individual student can be evaluated. These predictors at each level also allow investigating the cross-level interaction. The cross-level interaction in this study tests whether individual characteristics (language-status or achievement-level) moderate the relationship between students' social skills and academic performances.

The results of HLM analysis provide estimates of the gains in academic performance over time and their significance levels. With the flexibility of HLM in handling unbalanced design, growth trajectories for the three language-status groups can be estimated without bias, despite the differences in sample size among the three groups.

The HLM model delivers the reasoning for change as it presents change within-child and variations of change between-children (Singer & Willett, 2003). In this study, the level 1 model describes the performance changes of an individual student over time, and the level 2 model depicts the variation of performance growth among students due to specific language status.

In the HLM model this study employs, the mean composite score of the five measures of social skills at each of the four waves is specified at level 1 as a time-varying covariate. This integrates the developmental changes of individual students' social skills into the academic performance growth of individual students over time at level 1. Consequently, the cross-level interaction of the time-varying covariate (i.e., social skills) with the three language-status groups enables testing of significance and estimating of the effect of social skills on student academic achievement for each group.

The students' socioeconomic status (SES) is controlled at level 2 of the

individual student level to exclude its confounding. Thus, with the level 2 model, native English-speaking students from an average SES family (zero value of mean SES) serve as the reference group.

In this study, a series of preliminary analyses were performed to choose a growth model with a good fit to the data. A quadratic model that captures the arch-shape curvature of the growth patterns for both reading and math performance is adopted for the analysis, because the quadratic baseline model had a significantly better fit than the linear model for both reading ($\Delta \chi^2_{df=4} = 17919.39, p < .01$) and math ($\Delta \chi^2_{df=4} = 13032.51, p < .01$).

The level-1 model is specified as follows, with the reading and math achievement at time t of student i :

$$Y_{it} = \pi_{0i} + \pi_{1i}(Grade)_{it} + \pi_{2i}(Grade)_{it}^2 + \pi_{3i}(SocialSkills)_{it} + e_{it},$$

where

Y_{it} is a reading or math achievement score at a time t for each child i .

$(Grade)_{it}$ is the four time points of kindergarten, first grade, third grade, and fifth grade.

$(Grade)_{it}^2$ is the square of the four time points.

$(SocialSkills)_{it}$ is the mean composite score of five social skills at the four time points.

In creating the mean composite score, two of the negative social skill measures of *externalizing problem behaviors* and *internalizing problem behaviors* were reverse-coded so that all five skills measure the positive skills.

π_{0i} is the initial status of child i , representing the expected reading performance for child i in the spring term of kindergarten.

π_{1i} is the initial growth rate for child i in kindergarten.

π_{2i} is the rate of acceleration for child i – it is a deceleration rate in this case due to the downward curvature.

π_{3i} is the social skills effect – that is, the estimate of the yearly reading or math gains by unit increase in social skills.

In order to investigate the effects of social skills on the reading and math performance of students in different language-status groups, the two groups (*non-LEP* and *LEP-at-K*) are specified at level 2, and the models are applied separately for boys and girls in two different family economic conditions based on the poverty status. Thus, four separate models (boys in poverty, girls in poverty, boys in non-poverty, and girls in non-poverty) enable examining and testing gender-specific effects of improved social skills under different household economic conditions, and thereby disentangle both gender and poverty effects.

In addition, socioeconomic status (SES) which remained significant even after the poverty status is considered in the analysis, is controlled in each model for the effects of social skills on longitudinal growth of student performance. That is, students' SES is controlled for all coefficients of level 1 – the initial reading or math score (π_{0i}), the initial growth rate (π_{1i}), rate of acceleration (π_{2i}), and social skills effect (π_{3i}). In this way, the effect of social-class is eliminated in each model before examining the moderating effects of language-status group. At level 2, English-speaking mainstream boys and girls from average SES families serve as the reference group. Thus, the level 2 final model is specified as follows:

$$\pi_{0i} = \beta_{00} + \beta_{01}(SES) + \beta_{02}(Non-LEP) + \beta_{03}(LEP\ at\ K) + r_{0i},$$

$$\pi_{1i} = \beta_{10} + \beta_{11}(SES) + \beta_{12}(Non-LEP) + \beta_{13}(LEP\ at\ K) + r_{1i},$$

$$\pi_{2i} = \beta_{20} + \beta_{21}(SES) + \beta_{22}(Non-LEP) + \beta_{23}(LEP\ at\ K) + r_{2i},\ and$$

$$\pi_{3i} = \beta_{30} + \beta_{31}(SES) + \beta_{32}(Non-LEP) + \beta_{33}(LEP\ at\ K)$$

where

β_{00} , β_{10} , and β_{20} represent the initial reading score, initial growth rate, and the acceleration rate of the reference group, respectively.

β_{30} represents the effect of social skills on the reference group, which is *English-speaking* students.

β_{01} indicates how students from an SES family one unit higher than the reference group scored differently in reading and math during the kindergarten year.

β_{11} and β_{21} represent the gap on the initial growth rate and the rate of acceleration in reading performance due to the SES.

β_{02} represents the extent to which non-LEP students score differently from the reference group at kindergarten.

β_{12} and β_{22} represent the gap between the non-LEP student group and the reference group on the initial growth rate and the rate of acceleration in reading performance.

β_{03} represents the difference in initial reading scores of the LEP-at-K students from the reference group at kindergarten.

β_{13} and β_{23} indicate the gap between the LEP-at-K group and the reference group on initial growth rate and rate of acceleration.

β_{31} represents the difference in the effect of social skills on the academic performance due to the disparity in SES, thereby alleviating the potential selection bias that any non-experimental data inevitably has in analyzing the effect of social skills.

β_{32} and β_{33} represent the difference in score gain of *non-LEP* and *LEP-at-K* group from the mainstream English-speaking student group respectively.

Therefore, with β_{32} and β_{33} as the focus of this study that represent the differential effect of social skills on the academic performance of the *non-LEP* group and the *LEP-at-K* group respectively in comparison with the *English-speaking* group, the hypotheses to be tested from this model are

$$\begin{cases} H_0 : \beta_{30} = \beta_{32} = \beta_{33} = 0 \\ H_1 : \beta_{30} \neq \beta_{32} \neq \beta_{33} \neq 0 \end{cases}$$

These hypotheses tests the effect of social skills on the academic performance of the reference group (i.e., *English-speaking*) (β_{30}) and the differential effect of social skills on academic performance for the *Non-LEP* group (β_{32}) and for the *LEP-at-K* group (β_{33}).

Consequently, they answer the remaining part of the third research question of this study:

What is the longitudinal effect of students' social skills on their academic performance? Does it differ by student's language status (i.e., English speaking, Non-English speaking without LEP, and Non-English speaking with LEP)?

As shown in the descriptive statistics for the language-status groups in each of the four models in Table 3.4, both language minority groups of *Non-LEP* and *LEP-at-K* students constituted larger percentage in poverty group (32% for boys and 30% for girls) than in non-poverty group (10% each for boys and girls). Mean SES for the students from poverty families was $-.77$ for boys and $-.80$ for girls; which was close to the mean SES of all *LEP-at-K* students ($-.71$) shown in Table 3.3. Naturally, the ranges of SES for the poverty group were lower, from -4.75 to 1.53 for both genders than those for non-poverty group, from -1.66 to 2.67 for boys and from -3.61 to 2.75 for girls.

Table 3.4. *Descriptive Statistics for the Gender/Poverty HLM models*

| | | Poverty | | Non-poverty | |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | Boys | Girls | Boys | Girls |
| Group | <i>English</i> | 68% | 70% | 90% | 90% |
| Composition (% Within Group) | <i>Non-LEP</i> | 12% | 10% | 6% | 6% |
| | <i>LEP-at-K</i> | 20% | 20% | 4% | 4% |
| SES | Mean | $-.77$ | $-.80$ | $.24$ | $.25$ |
| | (SD) | $(.67)$ | $(.68)$ | $(.70)$ | $(.70)$ |
| | Range | $[-4.75, 1.53]$ | $[-4.75, 1.53]$ | $[-1.66, 2.67]$ | $[-3.61, 2.75]$ |

Chapter Four:

Results

This chapter presents the results of the statistical analyses described in Chapter 3. This chapter comprises four sections: The first section presents the results of the preliminary analysis; the second, the outcomes of the discriminant analyses, examining the concurrent relationship between the fifth-grade students' social skills and their academic performance; the third, the growth trajectories of social skills for the achievement groups and the language-status groups using the profile analysis; and the fourth, the results of the two-level hierarchical growth model, scrutinizing the longitudinal effect of students' social skills on their reading and math performance.

Preliminary Analysis

In this section, descriptive statistics and inter-correlations among the variables were presented separately for the achievement groups and for the language-status groups, correspondingly with the two separate longitudinal analyses for the achievement groups and for the language-status groups.

Descriptive Statistics for the Achievement Groups

The descriptive statistics of the fifth-grade students' performance in three subjects, reading, math, and science, are shown in Table 4.1 with those of the overall student population and the three achievement groups. After deleting missing data on performance, 10038 students' data were used for the assignment of students to different achievement levels. When the full weight was applied, this sample represented the 3,178,644 fifth graders. The mean scores of reading, math, and science for the fifth-grade student population were 138, 112, and 57, respectively. The large differences in mean

scores among these subjects were due to the varying number of questions on the different subject tests and the diverse content with different difficulty levels. The IRT scale scores represent the estimated number of questions students would have answered correctly if they had encountered all questions (186 in reading, 153 in math, and 92 in science) included on tests from kindergarten to fifth grade (Tourangeau et al., 2006).

Students who scored in the top 25% in all three subjects constituted 13% of the fifth-grade student population, with IRT scaled scores of 168 (reading), 139 (math), and 76 (science), whereas those who scored in the bottom 25% in all three subjects constituted 16% of the fifth-grade population, with IRT scaled scores of 102 (reading), 78 (math), and 36 (science). The scores of middle achieving students were 141 (reading), 116 (math), and 59 (science), and they were slightly higher than the population mean, that is, by 3 points in reading, by 4 in math, and by 2 in science.

Table 4.1. Descriptive Statistics for the Achievement Groups

| | Weighted Frequency | | Mean (SD) | CV |
|------------------------|-----------------------|---------|----------------|-----|
| All students | 3178644 (100%) | Reading | 138.29 (24.08) | 17% |
| | | Math | 112.43 (22.27) | 20% |
| | | Science | 57.26 (14.50) | 25% |
| High achieving group | 422172 (13.3%) | Reading | 167.94 (6.39) | 4% |
| | | Math | 138.84 (5.44) | 4% |
| | | Science | 75.54 (4.36) | 6% |
| Middle achieving group | 582930 (18.3%) | Reading | 140.83 (8.04) | 6% |
| | | Math | 116.08 (7.71) | 7% |
| | | Science | 58.77 (5.19) | 9% |
| Low achieving group | 505224 (15.9%) | Reading | 102.33 (15.63) | 15% |
| | | Math | 78.21 (13.28) | 17% |
| | | Science | 35.78 (8.03) | 22% |

Standard deviation was larger for the lower achieving group than for the higher achieving group. Although the standard deviation for the reading performance appeared to be larger than other subjects, the coefficient of variation (CV), which measures the ratio of standard deviation over the mean for standardized comparison, showed little differences among the different subjects, ranging from only 0% to 8%.

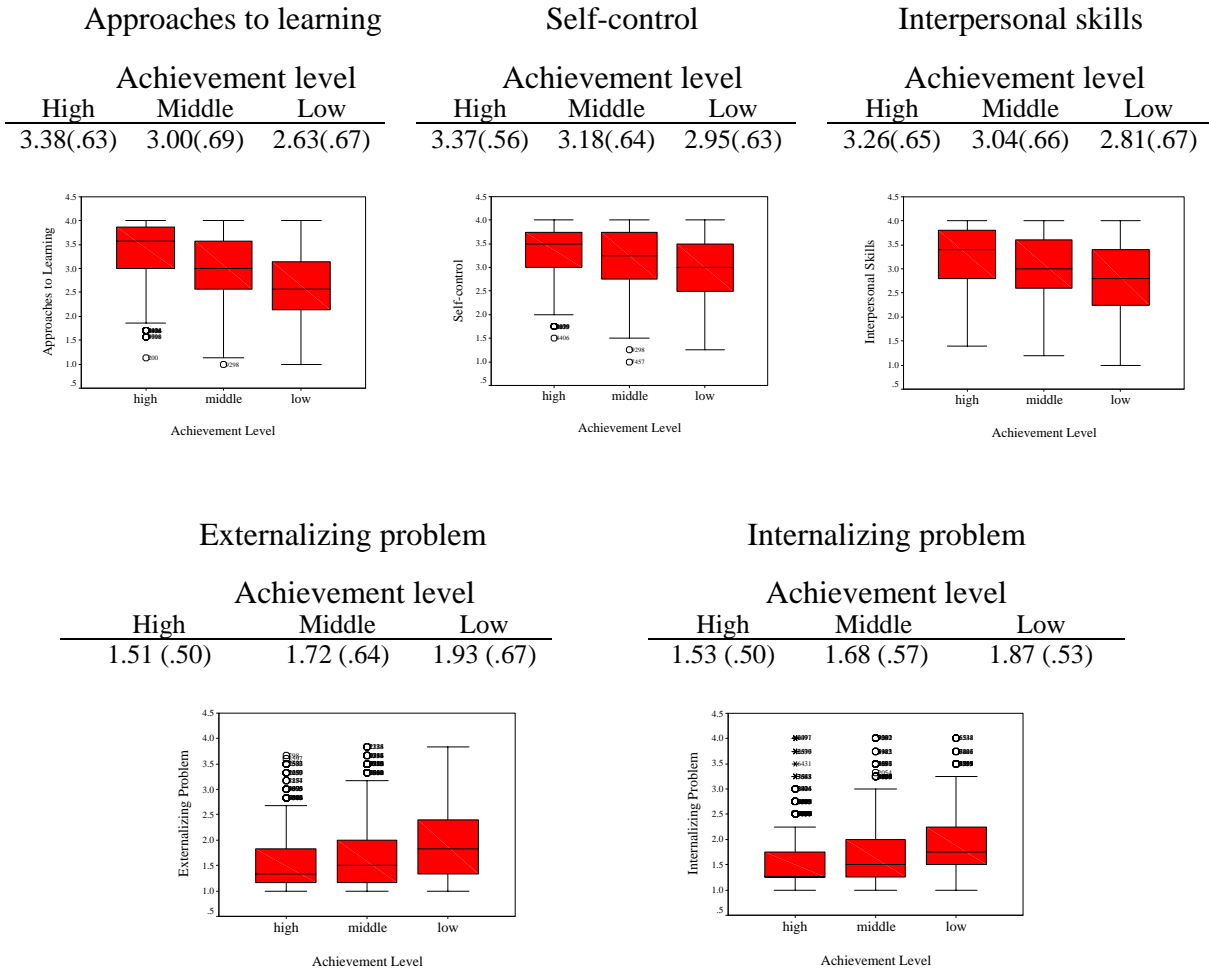
Five subscales of teacher-rated social skills of the fifth-grade students were shown in Figure 4.1 with descriptive statistics and box plots for the three achievement groups. The figure displays higher ratings for high achievers in three prosocial behaviors, *approaches to learning*, *self-control*, and *interpersonal skills*, than low achievers, and lower ratings (i.e. good behaviors) for high achievers in the two antisocial behaviors of *externalizing* and *internalizing problem behaviors* than low achievers.

The mean ratings on the three prosocial skills – *approaches to learning*, *self-control*, and *interpersonal skills* – for the high and middle achievers were at or above the score of 3 (*often*), while those for the low achievers were lower than 3. That is, on average, high and middle achieving students exhibited these three prosocial behaviors *often* or more frequently, while low achieving students exhibited these behaviors less frequently than *often*. The mean ratings of the two problem behaviors for the high and middle achievers were between 1 (*never*) and 2 (*sometimes*), but those for the low achieving students were closer to 2 than those for the high or middle achieving students.

In general, the standard deviations of these five subscales of social skills appear to be relatively large, ranging from .50 to .69. Subsequently, the fairly large overlaps of the skill ratings among the groups suggest the need for analysis to verify whether the

achievement groups can be successfully separated by students' social skills. Therefore, the associative relationship between students' social skills and their academic achievement can be confirmed.

Figure 4.1. Five Subscales of Social Skills by the Achievement Level



() indicates Standard Deviation

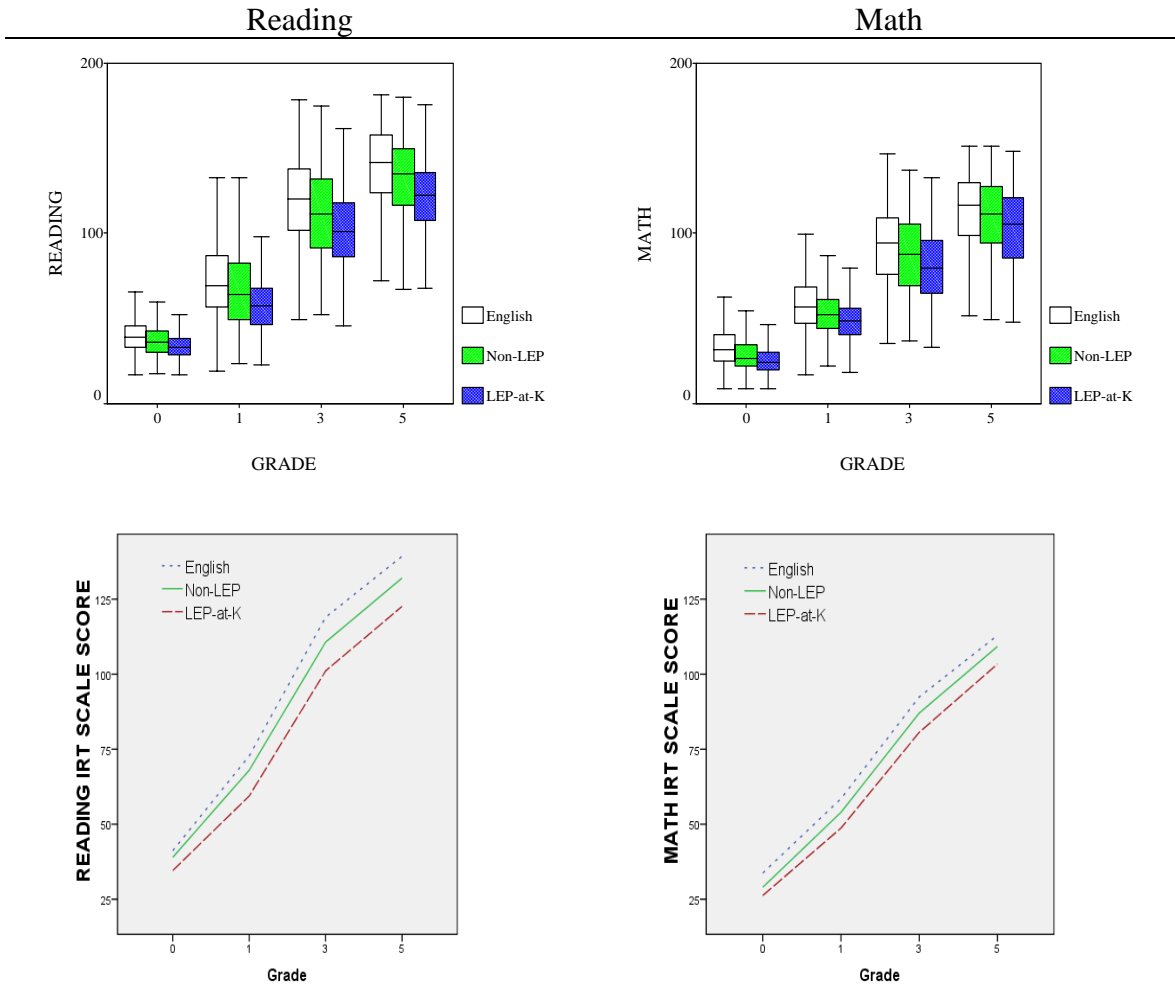
Descriptive Statistics for the Language-Status Groups

As shown in Table 4.2 which presents the descriptive statistics of the academic performance by the language-status groups, both of the two language minority groups had lower scores than the English-speaking mainstream students in both reading and math, with the *LEP-at-K* group being the lowest of the three groups. The box plots presented in Figure 4.2 showed a larger variance in both subjects as they advance through schools. The performance growth curves in both reading and math showed arch-shaped curvature with fan-spread patterns among the three groups, indicating that the achievement gap of the two non-English speaking immigrant students from the English-speaking mainstream students widens as they advanced through school.

Table 4.2. Descriptive Statistics of Academic Performance – Language-Status Groups

| | | | Language-Status Group | | | All Students |
|----------------------|---------------------|-----------------------|-----------------------|-------------|-------------|--------------|
| | | | English-speaking | Non-LEP | LEP-at-K | |
| Academic Performance | Reading Mean(SD) | Kinder | 41.2(13.5) | 39.0(16.0) | 34.6(9.1) | 40.9(13.6) |
| | | 1 st grade | 72.8(22.6) | 68.0(23.6) | 59.4(17.1) | 71.9(22.7) |
| | | 3 rd grade | 119.0(25.3) | 110.7(26.8) | 101.1(22.8) | 117.5(25.7) |
| | | 5 th grade | 139.3(23.7) | 132.0(24.9) | 122.6(22.1) | 137.9(24.0) |
| | Math Mean(SD) | Kinder | 33.7(11.5) | 29.0(10.8) | 26.2(9.6) | 33.0(11.6) |
| | | 1 st grade | 58.5(16.6) | 54.0(15.4) | 48.7(13.4) | 57.7(16.6) |
| | | 3 rd grade | 92.4(21.7) | 87.0(22.9) | 80.6(20.5) | 91.4(21.9) |
| | | 5 th grade | 113.0(21.9) | 109.3(23.3) | 103.4(22.4) | 112.2(22.1) |

Figure 4.2. Academic Performance of the Language-Status Groups



Inter-Correlations for the Achievement Groups

The Pearson's bivariate correlation coefficients (r) were calculated for the performance scores in three subjects, the achievement groups, the five subscales of social skills, and the covariates, using the fifth-grade data, as shown in Table 4.3. For the bivariate correlation calculation, each of three achievement group was dummy coded with 1 and 0. Gender was also dummy coded as 1 for female and 0 for male. For the poverty variable, those who were below the poverty threshold were coded 1, and those who were at or above were coded 0. That is, the correlation coefficient (r) for the high achievement group indicates the magnitude of correlation of being in the high achievement group with the rest of the variables. The same interpretation applies to the correlation coefficient (r) for the middle and low achievement groups, female, and poverty variables.

All correlation coefficients were significant at the significance level of .01. As expected, the high achievement group had strong positive correlation coefficients in all three subjects of reading ($r = .48$), math ($r = .46$) and science ($r = .49$), validating that students in the high achievement group demonstrated high performance in the three subjects. In contrast, the low achievement group displayed a strong negative correlation in the three subjects of reading ($r = -.65$), math ($r = -.67$), and science ($r = -.64$), confirming that students with low achievement exhibited low performance in these subjects. Finally, although the middle achievement group showed a relatively low correlation with the three subjects of reading ($r = .05$), math ($r = .08$), and science ($r = .05$), the positive relationship was still statistically significant, mainly due to the large sample size.

Among the five measures of social skills, *approaches to learning* had the strongest correlation with the three subjects of reading ($r = .37$), math ($r = .35$), and science ($r = .28$). That is, students with higher *approaches to learning* scores performed better in reading, math, and science. *Self-control* and *interpersonal skills* had a moderately strong positive correlation with all three subjects (r ranging from .18 to .24). *Externalizing problem behaviors* and *internalizing problem behaviors* were both negatively correlated (r ranging from -.16 to -.24) with all three subjects with a similar magnitude.

In sum, inter-correlation among the variables indicated that students with higher scores on *approaches to learning*, *self-control*, and *interpersonal skills* were likely to perform better in reading, math, and science, whereas students with higher scores on *externalizing* and *internalizing problem behaviors* were likely to perform worse in those three subjects. Among the three subjects, reading showed the strongest correlation with all five measures of social skills, whereas science had the least strong correlation. This suggests that reading performance was more strongly associated with social skills than science performance.

Approaches to learning indicated strong positive associations with *self-control* ($r=.68$) and *interpersonal skills* ($r=.72$), while it was negatively correlated with two problem behaviors; *externalizing problem behaviors* ($r=-.60$) and *internalizing problem behaviors* ($r=-.40$). In other words, students with high *approaches to learning* scores were likely to display high *self-control* and *interpersonal skills* but low *externalizing problem behaviors* and *internalizing problem behaviors*.

Significantly positive correlation of girls with reading ($r=.06$) and their negative

correlation with math ($r=-.09$) and science ($r=-.13$), albeit weak, indicated that girls were likely to perform better in reading but worse in math and science than boys, or conversely, boys were likely to perform better in math and science but worse in reading than girls.

Poverty status was negatively correlated with all except the low achieving group ($r=.28$), both of externalizing ($r=.11$) and internalizing ($r=.10$) problem behaviors, and female ($r=.02$). In other words, students from poor families were more likely to be low achievers, to exhibit externalizing and internalizing problems more frequently than other students, and to be female. They also were likely to perform low in all three subjects, reading ($r=-.31$), math ($r=-.30$) and science ($r=-.33$), and to be low in all three prosocial behaviors: *approaches to learning* ($r=-.15$), *self-control* ($r=-.11$) and *interpersonal skills* ($r=-.12$).

The SES variable was positively correlated with most of the variables but not with the middle ($r=-.03$) and low achievers ($r=-.30$), and both externalizing ($r=-.16$) and internalizing ($r=-.13$) problem behaviors. That is, the students in low SES were more likely to be middle or low achievers and to exhibit externalizing and internalizing problems more frequently than students in high SES. In the higher SES, students were likely to be high achievers ($r=.30$), to perform high in all three subjects: reading ($r=.45$), math ($r=.43$) and science ($r=.45$), and to score high in all three prosocial behaviors: *approaches to learning* ($r=.24$), *self-control* ($r=.17$), and *interpersonal skills* ($r=.18$). Overall, the SES had slightly stronger correlations with academic performance and social skills than the poverty status.

Table 4.3. *Inter-Correlations for the Achievement Groups*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|----|
| 1. Reading | | | | | | | | | | | | | | |
| 2. Math | .76* | | | | | | | | | | | | | |
| 3. Science | .77* | .76* | | | | | | | | | | | | |
| 4. High achieving | .48* | .46* | .49* | | | | | | | | | | | |
| 5. Middle achieving | .05* | .08* | .05* | -.19* | | | | | | | | | | |
| 6. Low achieving | -.65* | -.67* | -.64* | -.17* | -.21* | | | | | | | | | |
| 7. Approaches to learning | .37* | .35* | .28* | .21* | -.02* | -.24* | | | | | | | | |
| 8. Self-control | .23* | .21* | .19* | .11* | -.01* | -.19* | .68* | | | | | | | |
| 9. Interpersonal skills | .24* | .22* | .18* | .13* | -.00* | -.17* | .72* | .81* | | | | | | |
| 10. Externalizing problem | -.24* | -.21* | -.20* | -.12* | .01* | .17* | -.60* | -.72* | -.65* | | | | | |
| 11. Internalizing problem | -.21* | -.22* | -.16* | -.11* | -.01* | .16* | -.40* | -.33* | -.39* | .30* | | | | |
| 12. Gender (female) | .06* | -.09* | -.13* | -.08* | -.01* | .02* | .28* | .21* | .25* | -.24* | -.06* | | | |
| 13. Poverty | -.31* | -.30* | -.33* | -.13* | -.04* | .28* | -.15* | -.11* | -.12* | .11* | .10* | .02* | | |
| 14. SES | .45* | .43* | .45* | .30* | -.03* | -.30* | .24* | .17* | .18* | -.16* | -.13* | .02* | -.50* | |

*p<.01

Inter-Correlations for the Language-Status Groups

The Pearson's bivariate correlation coefficients (r) were also calculated for the performance scores in reading and math, the language-status groups, the five subscales of social skills, and the three covariates, using the longitudinal data, as shown in Table 4.4. Each of three language-status groups was dummy coded again with 1 and 0. The gender and poverty variables were coded in the same way as they were in the achievement group – 1 for female, and for those who were below the poverty threshold. That is, the correlation coefficient (r) in Table 4.4 indicates the magnitude of correlation of being in the mainstream English-speaking student group, being in the non-LEP group, being in the LEP group, being female, and being in poverty with the rest of the variables.

The English-speaking mainstream students showed a weak but positive correlation to both reading ($r=.04$) and math ($r=.06$). They were statistically significant mainly due to the large sample size. In contrast, albeit weak, non-English speaking immigrant student groups displayed negative correlations with two subjects: reading ($r= -.02$ for *non-LEP* and $r= -.03$ for *LEP-at-K*) and math ($r=-.03$ for *non-LEP* and $r=-.06$ for *LEP-at-K*). This suggests that immigrant students were likely to perform low in both subjects.

As with the achievement group, among the five measures of social skills, *approaches to learning* showed moderate but the strongest correlation with reading ($r=.15$) and math ($r=.15$) in equal magnitude. In other words, students with higher *approaches to learning* scores were likely to perform better in reading and math from kindergarten to fifth grade. *Self-control* and *interpersonal skills* also showed a moderately strong positive correlation with reading ($r=.11$ for *self-control* and $r= .07$ for

interpersonal skills) and math ($r = .11$ for *self-control* and $r = .07$ for *interpersonal skills*). Both *externalizing problem behaviors* and *internalizing problem behaviors* were negatively correlated with both reading ($r = -.07$ for *externalizing problem behaviors* and $r = -.03$ for *internalizing problem behaviors*) and math ($r = -.06$ for *externalizing problem behaviors* and $r = -.04$ for *internalizing problem behaviors*).

That is, students with higher scores on *approaches to learning*, *self-control*, and *interpersonal skills* were likely to perform well, whereas students with higher scores on *externalizing* and *internalizing problem behaviors* were likely to perform poorly in both reading and math, from kindergarten to fifth grade. While the magnitude of the correlation of these social skills was slightly stronger with reading than with math or science for the fifth-grade achievement groups (as shown in Table 4.3), they were almost equivalent when examined from kindergarten to fifth grade for the language-status groups.

Approaches to learning which was considered as the most important dimension for children's school readiness by NEGP (Kagan et al., 1995) was shown to have positive but weak correlation with immigrant students ($r = .01$ for both *non-LEP* and *LEP-at-K*). *Approaches to learning* exhibited a strong positive correlation with *self-control* ($r = .66$) and *interpersonal skills* ($r = .71$), while it was negatively correlated with the problem behaviors of *externalizing problem behaviors* ($r = -.56$) and *internalizing problem behaviors* ($r = -.42$). These correlations were at a similar level with those of the achievement groups. In other words, students with high *approaches to learning* were likely to display high *self-control* and *interpersonal skills* but low *externalizing problem behaviors* and *internalizing problem behaviors* consistently from kindergarten to fifth grade. However, this did not seem to be applicable to the immigrant students because

immigrant students were shown to have high scores in both *approaches to learning* and *internalizing problem behaviors*, according to the literature reviewed in Chapter 2.

Female students in the language-status groups also showed a significantly positive correlation with reading ($r=.04$) and negative correlation with math ($r=-.04$), indicating that girls were likely to perform better in reading but worse in math than boys.

Poverty status was negatively correlated with all except the *non-LEP* group ($r=.09$) and *LEP-at-K* group ($r=.20$), both of *externalizing* ($r=.09$) and *internalizing* ($r=.09$) *problem behaviors*, and female ($r=.03$). In other words, students from poor families were likely to be in the *non-LEP* group of *LEP-at-K* group, to exhibit externalizing and internalizing problems more frequently than other students, and to be female. They were also likely to perform low in both reading ($r=-.12$) and math ($r=-.14$) and to be low in all three prosocial behaviors: *approaches to learning* ($r=-.13$), *self-control* ($r=-.10$), and *interpersonal skills* ($r=-.12$).

The SES variable was positively correlated with most variables but not with *non-LEP* ($r=-.08$) and *LEP-at-K* group ($-.22$), and both *externalizing* ($r=-.15$) and *internalizing* ($r=-.12$) *problem behaviors*. That is, *non-LEP* or *LEP-at-K* students were likely to be from low SES families, and students exhibiting externalizing and internalizing problems more frequently than other students were likely to be from low SES families. The higher the SES students were likely to perform high in both reading ($r=.19$) and math ($r=.21$), to be English-speaking mainstream students ($r=.22$), and to be high in all three prosocial behaviors: *approaches to learning* ($r=.22$), *self-control* ($r=.16$), and *interpersonal skills* ($r=.18$). Overall, the SES had slightly stronger correlation with academic performance and social skills than the poverty status.

Table 4.4. *Inter-correlations for the Language-status Groups*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|--------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|----|----|
| 1 Read | | | | | | | | | | | | | | |
| 2 Math | .93* | | | | | | | | | | | | | |
| 3 English | .04* | .06* | | | | | | | | | | | | |
| 4 Non-LEP | -.02* | -.03* | -.66* | | | | | | | | | | | |
| 5 LEP-at-K | -.03* | -.06* | -.71* | -.06* | | | | | | | | | | |
| 6 Approaches to Learning | .15* | .15* | -.01* | .01* | .01* | | | | | | | | | |
| 7 Self-control | .11* | .11* | -.02* | .02* | .02* | .66* | | | | | | | | |
| 8 Interpersonal Skills | .07* | .07* | -.01* | .01* | -.01* | .71* | .81* | | | | | | | |
| 9 Externalizing Problem | -.07* | -.06* | .06* | -.04* | -.04* | -.56* | -.73* | -.64* | | | | | | |
| 10 Internalizing Problem | -.03* | -.04* | .02* | -.01* | -.03* | -.42* | -.32* | -.38* | .32* | | | | | |
| 11 Gender (female) | .04* | -.04* | -.02* | .03* | .00* | .24* | .19* | .21* | -.22* | -.05* | | | | |
| 12 Poverty | -.12* | -.14* | -.21* | .09* | .20* | -.13* | -.10* | -.12* | .09* | .09* | .03* | | | |
| 13 SES | .19* | .21* | .22* | -.08* | -.22* | .22* | .16* | .18* | -.15* | -.12* | .03* | -.50* | | |

*p<.01

Concurrent Relationship: Discriminant Analysis

The discriminant analysis was performed to verify the relationship between students' social skills and academic performance, and to find out the relative importance of the five aspects of social skills – *approaches to learning, self-control, interpersonal skills, externalizing problem behavior* and *internalizing problem behavior*. With a prior probability applied to the groups to alleviate the violation of equal variance assumption, the discriminant analysis results produced two significant functions that successfully classified students into three achievement groups. With the two functions, 49.9% of the total students in the original achievement groups were correctly classified. This indicates that students' social skill levels significantly predicted group membership despite the large variance of all five subscales of social skills for each achievement group that was shown in the box plot of Figure 4.1.

This result confirms that the high achievers had higher ratings on the three prosocial behaviors of *approaches to learning, interpersonal skills and self-control*, and lower ratings on the two problem behaviors of *externalizing problem behaviors and internalizing problem behaviors* than the middle or low achievers. In the same manner, the opposite held for the low achievers.

All five measures of social skills were significant, but *approaches to learning* was shown to have the most importance among them in separating the students into the different achievement groups through the discriminant functions, because it had the highest correlation coefficient over .90 while others had less than .60. Table 4.5 presents the correlation coefficients of the five subscales of social skills with the first discrimination function in the order of correlation size: *Approaches to learning* was .94,

externalizing problem behaviors, -.58; interpersonal skills, .57; internalizing problem behaviors, .57; and self-control, .56.

Table 4.5. *Discriminant Analysis of the Function 1 for the Achievement Groups*

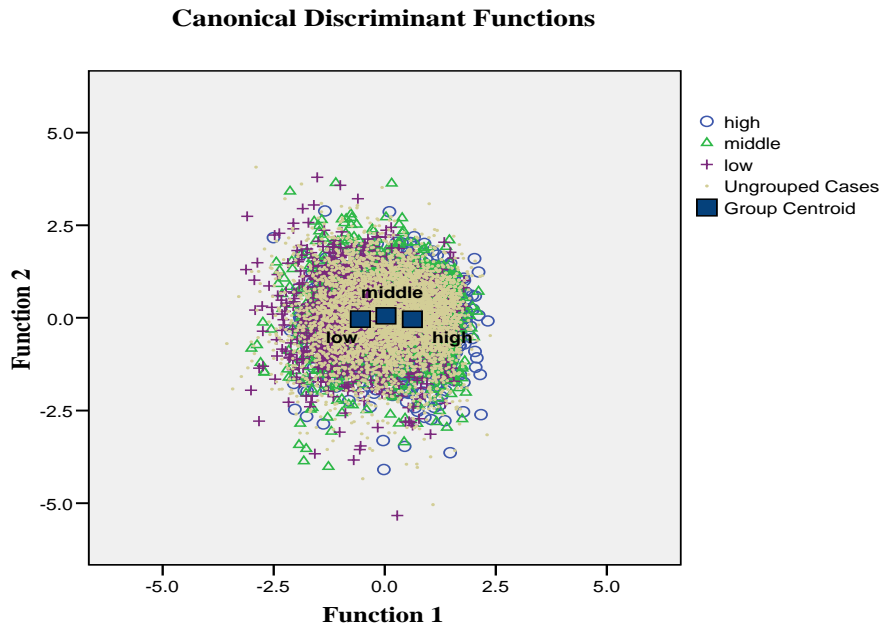
| | Function 1 | | |
|------------------------------------|------------|----|---------|
| Approaches to Learning | | | .94* |
| Externalizing Problem Behaviors | | | -.58* |
| Interpersonal Skills | | | .57* |
| Internalizing Problem Behaviors | | | -.57* |
| Self-control | | | .56* |
| Eigen Value | | | .22 |
| Canonical Correlation | | | .43 |
| Squared Canonical Correlation | | | .18 |
| | χ^2 | df | p-value |
| Function 1 and Function 2 combined | 267496.8 | 10 | .000 |
| Function 2 | 3610.9 | 4 | .000 |

* indicates significant level at 0.05

As shown in Figure 4.3, the three achievement groups were distinguished in terms of the first function, as the first function accounted for 18% of the total relationship between students' social skills and achievement level (squared canonical correlation = .18). Specifically, the high achievement group had the highest function value, whereas the low achievement group had the lowest function value. The three groups were not clearly distinguished in terms of the second function because the second function accounted for virtually zero percent of the relationship between the predictors and group membership (squared canonical correlation = .00). Since the relationship that the second function produced between the predictors and the groups was too small, it was excluded

from the interpretation.

Figure 4.3. Discriminant Functions for the Achievement Groups



Longitudinal Relationship: Profile Analysis

The repeated measures design of the generalized linear model (GLM) was used for the profile analysis of the five aspects of social skills while the gender, poverty status, and SES were controlled for. All of these five subscales of students' social skills were verified to be reliable constructs in determining students' achievement levels through the discriminant function in the previous section. The profile analysis enables the examining of the development trajectories of these social skills to identify the difference in change patterns and in their levels among the students in the three achievement groups and in the three language-status groups during their first six school years, from kindergarten to fifth grade. Thus, the profile analysis was performed separately for the achievement group and

for the language-status groups.

Development Trajectories of Social Skills for the Achievement Groups

The results showed that all five measures of social skills for the three achieving groups changed significantly over the six years, even after the gender, poverty status, and SES were controlled as covariates. Further, the developmental patterns of students' social skills differed depending on the group membership as shown in Table 4.6.

Specifically, the multivariate test showed significant deviation from flatness for *approaches to learning* ($F = 4422.9, p < .01$), *self-control* ($F = 769.4, p < .01$), *interpersonal skills* ($F = 2166.2, p < .01$), *externalizing problem behaviors* ($F = 2357.6, p < .01$), and *internalizing problem behaviors* ($F = 1670.2, p < .01$). In other words, significant changes occurred in all five measures of social skills over the six years from kindergarten to fifth grade.

These significant changes presented even after controlling for the effect of gender as a covariate on all five subscales of *approaches to learning* ($F = 6230.4, p < .01$), *self-control* ($F = 2362.0, p < .01$), *interpersonal skills* ($F = 3134.1, p < .01$), *externalizing problem behaviors* ($F = 574.8, p < .01$), and *internalizing problem behaviors* ($F = 1344.4, p < .01$), after controlling for the significant effect of poverty status as a second covariate on all five subscales of *approaches to learning* ($F = 4277.7, p < .01$), *self-control* ($F = 151.1, p < .01$), *interpersonal skills* ($F = 1983.3, p < .01$), *externalizing problem behaviors* ($F = 3051.5, p < .01$), and *internalizing problem behaviors* ($F = 663.0, p < .01$), and after controlling for the significant effect of SES as a third covariate on all five subscales of *approaches to learning* ($F = 3573.9, p < .01$), *self-control* ($F = 1269.8, p < .01$), *interpersonal skills* ($F = 2667.5, p < .01$), *externalizing problem behaviors* ($F =$

5514.3, $p < .01$), and *internalizing problem behaviors* ($F = 2648.8$, $p < .01$).

Furthermore, the interaction effect of social skills with the group membership shown in the multivariate test indicated significant deviation from parallelism, that is, significantly different development patterns among the three groups in *approaches to learning* ($F = 6310.8$, $p < .01$), *self-control* ($F = 1136.6$, $p < .01$), *interpersonal skills* ($F = 3464.7$, $p < .01$), *externalizing problem behaviors* ($F = 600.8$, $p < .01$), and *internalizing problem behaviors* ($F = 3857.2$, $p < .01$). The largest F-test value of *approaches to learning* in social skills ($F=4422.9$) and in the interaction effect of the social skills with the group ($F=6310.8$) of multivariate tests among the five subscales of social skills suggested that *approaches to learning* has exhibited the most fluctuation over the six years and the most significantly different change patterns among the three achievement groups..

In addition, as shown in the results of between-subject effects for the three achievement groups in Table 4.6, there was a significant group difference in *approaches to learning* ($F = 231719.0$, $p < .01$), *self-control* ($F = 47205.0$, $p < .01$), *interpersonal skills* ($F = 62130.6$, $p < .01$), *externalizing problem behaviors* ($F = 34388.2$, $p < .01$), and *internalizing problem behaviors* ($F = 47533.8$, $p < .01$), indicating the different levels of social skills among the three groups for all five skills.

These significant differences in levels of skill presented even after controlling for the effect of gender as a covariate on all five subscales of *approaches to learning* ($F = 158529.8$, $p < .01$), *self-control* ($F = 101460.5$, $p < .01$), *interpersonal skills* ($F = 128557.0$, $p < .01$), *externalizing problem behaviors* ($F = 111044.7$, $p < .01$), and *internalizing problem behaviors* ($F = 22528.8$, $p < .01$), after controlling for the effect of

poverty status as a second covariate on all five subscales of *approaches to learning* ($F = 1983.9, p < .01$), *self-control* ($F = 10374.6, p < .01$), *interpersonal skills* ($F = 9569.6, p < .01$), *externalizing problem behaviors* ($F = 7452.7, p < .01$), and *internalizing problem behaviors* ($F = 1495.8, p < .01$), and after controlling for the significant effect of SES as a third covariate on all five subscales of *approaches to learning* ($F = 5128.0, p < .01$), *self-control* ($F = 7150.6, p < .01$), *interpersonal skills* ($F = 8251.5, p < .01$), *externalizing problem behaviors* ($F = 7320.7, p < .01$), and *internalizing problem behaviors* ($F = 5840.0, p < .01$).

The effect sizes measured by the partial η^2 for the group difference were .34 for *approaches to learning*, .12 for *self-control*, .15 for *interpersonal skills*, .09 for *externalizing problem behaviors*, and .13 for *internalizing problem behaviors*. The largest F-test value ($F = 231719.6$) and effect size ($\eta^2 = .34$) of *approaches to learning* confirms the preceding discriminant analysis in that *approaches to learning* showed the most importance in separating the achievement groups with the largest correlation with the discriminant function

The graphical presentation of the profiles of the five measures of social skills in Figure 4.4 enables visual verification of the largest dispersion of the profile in *approaches to learning* among the five aspects of social skills. This result confirms the findings of the previous studies that identified the students' level of cooperation (which is composed of the overlapping items of *approaches to learning* in ECLS-K dataset) as a significantly important skill in the classroom from the teachers' perspective (Lane, Givner & Pierson, 2003), and the findings that addressed the *approaches to learning* as the most important component for the children's school readiness (Kagan et al., 1995).

This result also supports the previous study of McClelland et al. (2000) which differentiated the students' learning-related skills from other social skills as a significant predictor of their academic performance.

The profiles in Figure 4.4 also displayed more fluctuation over the years for *externalizing problem behavior* than *internalizing problem behavior*. The F-values for the *externalizing problem behavior* (F=2357.6) were larger than that of *internalizing problem behavior* (F=1670.2). The students in the low achievement group, however, exhibited larger unstable development patterns in *internalizing problem behaviors* by showing sharp escalation from first grade (Time point 2) to third grade (Time point 3).

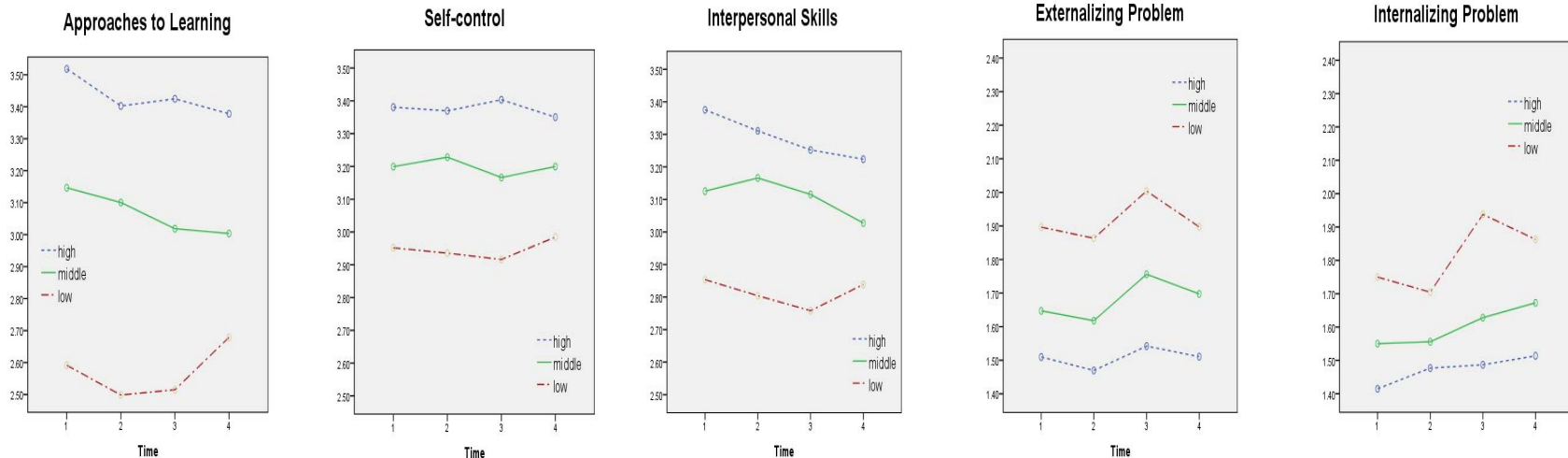
The profiles in Figure 4.4 also exhibited that the three prosocial behaviors (*approaches to learning, self-control, and interpersonal skills*) were consistently higher, and the two problem behaviors (*externalizing problem behaviors and internalizing problem behaviors*) were consistently lower for the high achievers than for the low achievers during the first six school years from kindergarten to fifth grade, indicating that the significant associative relationship between students' social skills and academic achievement holds for the longitudinal relationship as well as for the concurrent relationship.

Table 4.6. Profile Analysis for the Achievement Groups

| | | Approach to Learning | | Self-control | | Interpersonal Skills | | Externalizing Problem | | Internalizing Problem | |
|--------------------------|-----------------------|----------------------|------|--------------|------|----------------------|------|-----------------------|------|-----------------------|------|
| | | F | p | F | p | F | p | F | p | F | p |
| Multivariate tests | Social skills | 4422.9 | .000 | 796.4 | .000 | 2166.2 | .000 | 2357.6 | .000 | 1670.2 | .000 |
| | Social skills×Gender | 6230.4 | .000 | 2362.0 | .000 | 3134.1 | .000 | 574.8 | .000 | 1344.4 | .000 |
| | Social skills×Poverty | 4277.7 | .000 | 151.1 | .000 | 1983.3 | .000 | 3051.5 | .000 | 663.0 | .000 |
| | Social skills×SES | 3573.9 | .000 | 1269.8 | .000 | 2667.5 | .000 | 5514.3 | .000 | 2648.8 | .000 |
| | Social skills×Group | 6310.8 | .000 | 1136.6 | .000 | 3464.7 | .000 | 600.8 | .000 | 3857.2 | .000 |
| Between-subjects effects | Gender | 158529.8 | .000 | 101460.5 | .000 | 128557.0 | .000 | 111044.7 | .000 | 22528.8 | .000 |
| | Poverty | 1983.9 | .000 | 10374.6 | .000 | 9569.6 | .000 | 7452.7 | .000 | 1495.8 | .000 |
| | SES | 5128.0 | .000 | 7150.6 | .000 | 8251.5 | .000 | 7320.7 | .000 | 5840.0 | .000 |
| | Groups | 231719.6 | .000 | 47205.0 | .000 | 62130.6 | .000 | 34388.2 | .000 | 47533.8 | .000 |

Figure 4.4. Social Skills of Achievement Groups

Five subscales of social skills



Development Trajectories of Social Skills for the Language-Status Group

The profile analysis of the GLM was performed again to compare the five aspects of social skills of the students in three language-status groups this time, with gender, poverty status, and SES controlled as covariates. The results of the profile analysis for the three language-status groups also showed that all five measures of social skills changed significantly over the first six school years. Further, the development patterns of students' social skills differed depending on the group membership, as shown in Table 4.7.

Specifically, students in all three language-status groups experienced significant changes in all five measures of social skills over the six years period from kindergarten to fifth grade, after gender, poverty status, and SES were controlled for, because the multivariate test showed a significant deviance from flatness in *approaches to learning* ($F = 2308.6, p < .01$), *self-control* ($F = 1560.6, p < .01$), *interpersonal skills* ($F = 2838.2, p < .01$), *externalizing problem behaviors* ($F = 1531.5, p < .01$), and *internalizing problem behaviors* ($F = 2088.0, p < .01$). These significant changes in skills presented even after controlling for the significant effect of gender as a covariate on all five subscales of *approaches to learning* ($F = 5533.0, p < .01$), *self-control* ($F = 1748.7, p < .01$), *interpersonal skills* ($F = 4403.4, p < .01$), *externalizing problem behaviors* ($F = 307.5, p < .01$), and *internalizing problem behaviors* ($F = 2140.0, p < .01$), after controlling for the significant effect of poverty status as second covariate on all five subscales of *approaches to learning* ($F = 2887.5, p < .01$), *self-control* ($F = 560.6, p < .01$), *interpersonal skills* ($F = 1789.2, p < .01$), *externalizing problem behaviors* ($F = 3815.4, p < .01$), and *internalizing problem behaviors* ($F = 1703.5, p < .01$), and after controlling for

significant effect of SES as the third covariate on all five subscales of *approaches to learning* ($F = 6339.8, p < .01$), *self-control* ($F = 1459.0, p < .01$), *interpersonal skills* ($F = 1620.9, p < .01$), *externalizing problem behaviors* ($F = 7459.8, p < .01$), and *internalizing problem behaviors* ($F = 3250.9, p < .01$).

The significant interaction effect of social skills with the language-status groups shown in the multivariate test indicated significantly different development patterns among the three language-status groups in all five subscale of social skills: *approaches to learning* ($F = 3680.2, p < .01$), *self-control* ($F = 2508.9, p < .01$), *interpersonal skills* ($F = 4856.4, p < .01$), *externalizing problem behaviors* ($F = 993.1, p < .01$), and *internalizing problem behaviors* ($F = 2070.2, p < .01$).

In addition, the results of the between-subject effects for the three language-status groups in Table 4.7 also illustrated a significant group difference in the level of *approaches to learning* ($F = 8906.0, p < .01$), *self-control* ($F = 8469.9, p < .01$), *interpersonal skills* ($F = 6450.8, p < .01$), *externalizing problem behaviors* ($F = 17411.7, p < .01$), and *internalizing problem behaviors* ($F = 7794.0, p < .01$) even after the gender, poverty, and SES were controlled for. In other words, the three groups exhibited different levels of skills in all five aspects of social skills even after gender, poverty, and SES were controlled.

Gender was shown to be a significant covariate in explaining the difference among the three language-status groups in all five subscales of social skills: *approaches to learning* ($F = 245004.1, p < .01$), *self-control* ($F = 156249.6, p < .01$), *interpersonal skills* ($F = 217298.3, p < .01$), *externalizing problem behaviors* ($F = 185685.9, p < .01$), and *internalizing problem behaviors* ($F = 19753.9, p < .01$). The poverty status was also

shown to be a significant covariate in explaining the difference among the three language-status groups in all five subscales of social skills: *approaches to learning* ($F = 5679.8, p < .01$), *self-control* ($F = 10536.9, p < .01$), *interpersonal skills* ($F = 9497.4, p < .01$), *externalizing problem behaviors* ($F = 7275.8, p < .01$), and *internalizing problem behaviors* ($F = 9412.9, p < .01$). The SES was a significant covariate in addition to gender and poverty in explaining the difference among the three language-status groups in all five subscales of social skills: *approaches to learning* ($F = 151603.3, p < .01$), *self-control* ($F = 82007.5, p < .01$), *interpersonal skills* ($F = 102304.3, p < .01$), *externalizing problem behaviors* ($F = 73194.1, p < .01$), and *internalizing problem behaviors* ($F = 51872.9, p < .01$).

With gender being a significant covariate in explaining the difference among the three language-status groups in terms of the five aspects of social skills, the profiles were presented by gender; the profiles of girls in Figure 4.5 and that of boys in Figure 4.6. In addition, the profiles of each gender for the five subscales of social skills were presented by the poverty status of their family. This enabled examining of gender-specific development trajectories under different economic conditions of family. The profiles were presented in an equal interval of .1 to make the degrees of changes comparable between the separate plots, with the three prosocial skills ranging from 2.5 to 3.5, and the two problem behaviors ranging from 1.4 to 2.4.

Table 4.7. Profile Analysis for the Language-status Groups

| | | Approach to Learning | | Self-control | | Interpersonal Skills | | Externalizing Problem | | Internalizing Problem | |
|--------------------------|-----------------------|----------------------|------|--------------|------|----------------------|------|-----------------------|------|-----------------------|------|
| | | F | p | F | p | F | p | F | p | F | p |
| Multivariate tests | Social skills | 2308.6 | .000 | 1560.6 | .000 | 2838.2 | .000 | 1531.5 | .000 | 2088.0 | .000 |
| | Social skills×Gender | 5533.0 | .000 | 1748.7 | .000 | 4403.4 | .000 | 307.5 | .000 | 2140.0 | .000 |
| | Social skills×Poverty | 2887.5 | .000 | 560.6 | .000 | 1789.2 | .000 | 3815.4 | .000 | 1703.5 | .000 |
| | Social skills×SES | 6339.8 | .000 | 1459.0 | .000 | 1620.9 | .000 | 7459.8 | .000 | 3250.9 | .000 |
| | Social skills×Group | 3680.2 | .000 | 2508.9 | .000 | 4856.4 | .000 | 993.1 | .000 | 2070.2 | .000 |
| Between-subjects effects | Gender | 245004.1 | .000 | 156249.6 | .000 | 217298.3 | .000 | 185685.9 | .000 | 19753.9 | .000 |
| | Poverty | 5679.8 | .000 | 10536.9 | .000 | 9497.4 | .000 | 7275.8 | .000 | 9412.9 | .000 |
| | SES | 151603.3 | .000 | 82007.5 | .000 | 102304.3 | .000 | 73194.1 | .000 | 51872.9 | .000 |
| | Groups | 8906.0 | .000 | 8469.9 | .000 | 6450.8 | .000 | 17411.7 | .000 | 7794.0 | .000 |

The profiles for the three groups in poverty exhibited strikingly different change patterns from each other, running a wide range of scale in a disrodinal manner with large fluctuations for both genders, especially for the two language minority student groups, in all five subscales of social skills. In contrast, the profiles of the three groups in non-poverty exhibited relatively stable and similar change patterns running a narrow range in scale compared to the students in poverty in all five subscales of social skills.

Specifically, in terms of *approaches to learning*, which was shown to be the most important aspect among the five social skills in separating students into different achievement levels, the profiles of the girls from poor families ranged from 2.6 (between *sometimes* and *often*) to 3.3 (between *often* to *very often*) with unstable trajectories, especially for both *non-LEP* and *LEP-at-K* groups. *Non-LEP* girls and the *LEP-at-K* girls from poor families displayed a dramatic drop in this skill in third and first grade, respectively. On the other hand, the profiles of the girls from non-poor families ranged high and narrow from 3.2 to 3.4 (between *often* to *very often*) exhibiting relatively small drops and parallel change patterns among the students in three groups, with a decreasing trajectory from kindergarten to first grade and an increasing trajectory from third grade. The *LEP-at-K* girls from poor families exhibited the highest *approaches to learning* scores among the students in poverty, partly confirming the result of the PISA 2003 study (Schleicher, 2006) which showed relatively high *approaches to learning* for immigrant students.

In the profile of *approaches to learning* for boys, the unstable, totally different, and unparallel change patterns, running wide range was also shown for the students from poor families. The profiles of boys from poor families ranged from 2.5 (between

sometimes and *often*) to 3.0 (*often*) with unstable trajectories for both *non-LEP* and *LEP-at-K* group. The *non-LEP* boys from poor families displayed a dramatic drop in this skill at third grade similarly with non-LEP girls from poor family. However, the boys did not regain the skill by the fifth grade, whereas girls regained it more than fully with a remarkable increase by fifth grade. The *LEP-at-K* boys from poor families displayed a drop in this skill at fifth grade after an increasing trajectory by third grade. All the boys, both in poverty and non-poverty, exhibited a decrease in this skill at the fifth grade, while most of the girls exhibited an increase at fifth grade. The profiles of the boys from non-poor families ranged narrower than boys from poor families, ranging from 2.8 (close to *often*) to 3.1 (close to *often*) with relatively stable and parallel change patterns among the students in the three groups. Subsequently, the PISA 2003 study (Schleicher, 2006) result of relatively high *approaches to learning* of immigrant students appeared not to be relevant to the *non-LEP* students from poor families due to their unstable change patterns.

In two other prosocial behaviors, *self-control* and *interpersonal skills*, the profiles of the three language groups in poverty also displayed unparallel change patterns running wide ranges. However, the change patterns of each language-status group of the same family economic condition were relatively similar across the three skills, especially for girls. That is, the profiles of *non-LEP* girls in poverty displayed a sharp drop at third grade but a dramatic increase by fifth grade in all three prosocial skills, whereas those of *LEP-at-K* girls in poverty displayed the increase in third grade but a decrease by fifth grade in all three prosocial skills. The profiles of the immigrant boys in poverty were similar with those of the girls in the same economic condition in that the *non-LEP* students in poverty displayed a decrease at third grade but an increase by fifth grade,

while the *LEP-at-K* displayed an increase at third grade but a decrease by fifth grade in all three prosocial skills. The profiles of mainstream students in poverty displayed relatively stable but decreasing trajectories for boys.

The profiles of the three prosocial skills for both genders from non-poor families were relatively stable with a decreasing trajectory for boys (except for the *LEP-at-K*) and with an increasing trajectory for girls. Both language minority immigrant student groups from non-poor families consistently showed higher ratings in all three prosocial skills from first grade to fifth grade. In addition, girls from non-poor families had higher ratings in all three prosocial skills than boys of the same economic condition.

The profiles of *externalizing problem behavior* revealed higher ratings for boys than for girls, and high and unstable change patterns for the poverty group than for the non-poverty group across gender. The *non-LEP* group from poor families displayed the most unstable change patterns for both genders. The profiles of the girls from poor families ranged from 1.4 to 1.8 (between *never* and *sometimes*) with the largest fluctuation for *non-LEP*, while the profiles of the boys from poor families ranged from 1.6 (between *never* and *sometimes*) to 2.1 (close to *sometimes*) with unstable trajectories for both *non-LEP* and *LEP-at-K*. That is, the *non-LEP* boys and girls in poverty displayed a sharp increase in this problem behavior at third grade, and the *LEP-at-K* boys but not girls displayed a sharp increase at fifth grade. On the other hand, the profiles of the students from non-poor families ranged relatively low and narrow from 1.3 to 1.6 for girls and from 1.6 to 1.9 (between *never* to *sometimes*) for boys, with relatively stable and parallel change patterns with a decreasing trajectory from third grade except for the *non-LEP* boys who showed an increase from third grade. However, all language minority

immigrant student groups commonly exhibited consistently lower level of externalizing problem behaviors than mainstream students regardless of gender or economic condition.

The profiles of *internalizing problem behavior* revealed distinctive gender difference in developmental change patterns for the language minority immigrant students. That is, while the profiles of boys were likely to be ordinal, displaying consistently lower problems from first to fifth grade, with the *LEP-at-K* boys as the lowest among the three groups, the profiles of girls were disordinal showing the most unstable change pattern for *LEP-at-K* girls within the non-poverty group and the most unstable change pattern for *non-LEP* girls within the poverty group.

The profiles of *internalizing problem behavior* for girls from poor families ranged from 1.4 (between *never* and *sometimes*) to 2.1 (close to *sometimes*), and the profiles of the girls from non-poor families ranged from 1.4 to 1.7 (between *never* and *sometimes*). The profiles of the boys from poor families ranged from 1.5 (between *never* and *sometimes*) to 1.9 (close to *sometimes*), and the profiles of the boys from non-poor families ranged from 1.5 to 1.7 (between *never* and *sometimes*). The profile of the *non-LEP* girls in poverty displayed a sharp increase at third grade but decrease by fifth grade offsetting the previous increase in this problem behavior, but the *LEP-at-K* girls in non-poverty displayed an increase in this problem at fifth grade. For the boys from poor families, a fairly large increase was shown at third grade for *non-LEP* and at fifth grade for *LEP-at-K*, but they both were consistently lower than the ratings of mainstream boys in poverty. The gender difference (elevated internalizing problem for girls) shown in the study of Sterba et al. (2007) was not apparent in the profiles of this study. All mainstream students exhibited increasing trajectories in *internalizing problem behaviors*, except for

the boys in poverty who already had a high level of internalizing problem.

In general, girls displayed slightly higher level of prosocial behaviors and lower level of in problem behaviors than boys of the same economic condition. The profiles of English-speaking mainstream students from poor families were relatively stable, but exhibited decreasing trajectories in prosocial behaviors and increasing trajectories in problem behaviors over the first six years of schooling. The profiles of the boys from non-poor families were also relatively stable but exhibited decreasing trajectories except for the *LEP-at-K* group in prosocial behaviors.

Non-LEP students from poor families exhibited a decrease in prosocial skills and an increase in problem behaviors at third grade, although they regained the skills and reduce the problem behaviors by fifth grade. The fluctuation was larger for the girls than for boys. *LEP-at-K* students from poor families, on the other hand, exhibited an increase in prosocial skills at third grade but a decrease at fifth grade. The problem behaviors of the boys in *LEP-at-K* group were also increased at fifth grade.

Figure 4.5. Social skills of Girls in Language-status Groups

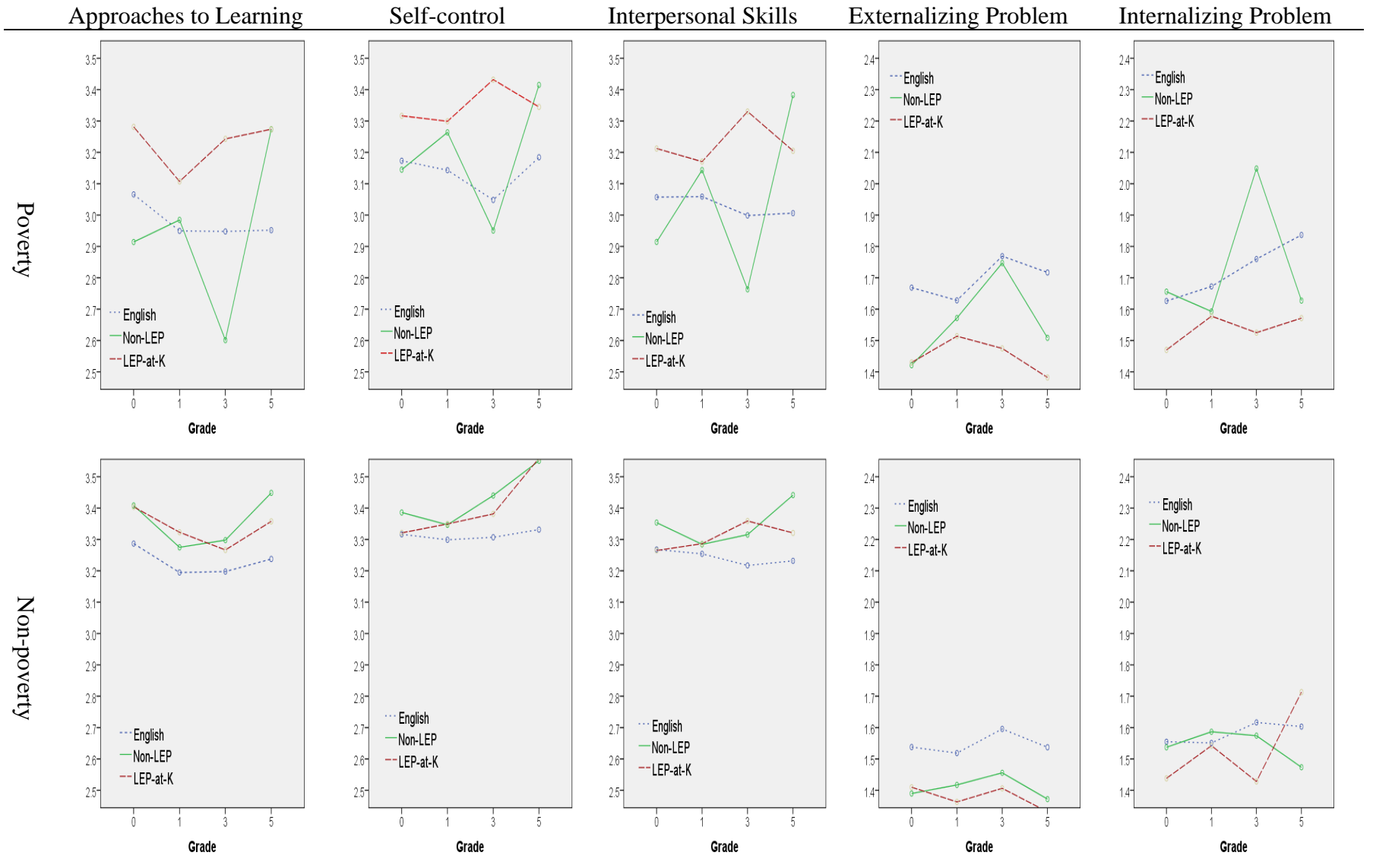
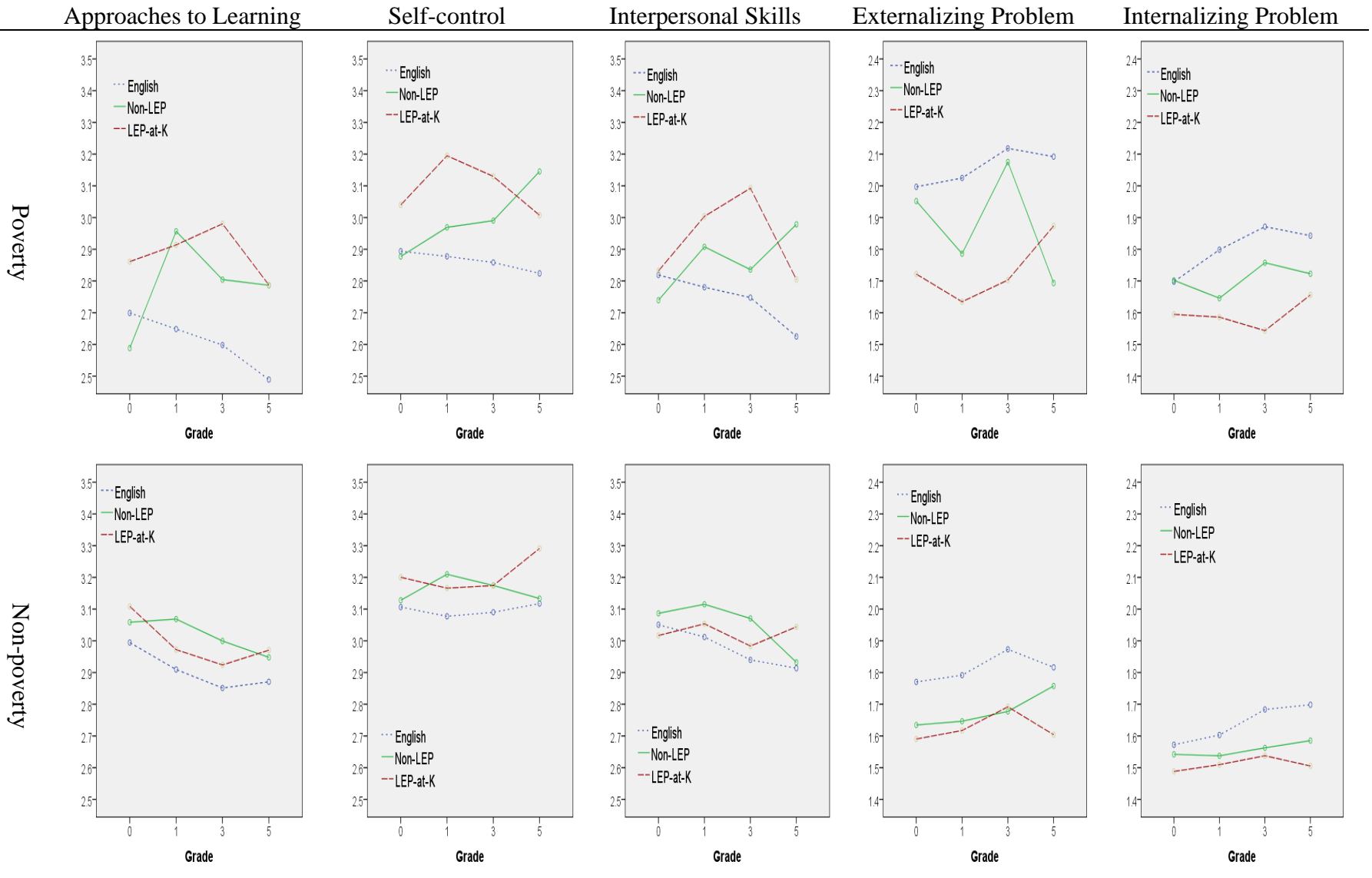


Figure 4.6. Social skills of Boys in Language-status Groups



Longitudinal Relationship: Hierarchical Linear Model (HLM)

As a final step, the longitudinal effect of social skills on reading and math achievements over the six years from kindergarten to fifth grade was investigated using the two-level HLM growth model, and the results of the analysis for the language-status groups are presented from Table 4.9 to Table 4.12.

In order to take account of the gender difference in social skills development, the effect of students' social skills on their reading and math performances was investigated separately for boys and for girls. Further, each of the gender-specific effects was examined by students' poverty level. That is, the data of boys and girls from families below the household-level poverty threshold were separately examined from the data of boys and girls from families at or above the poverty threshold. These separate models allowed for the estimation and testing of the gender-specific effects of social skills on reading and math performance in the two different family contexts created by household-level poverty. SES, which takes parents' educations and occupations into consideration, in addition to household income, was further controlled in each model because it remained significant even after the household-level poverty condition of the student's family was considered in the model.

Overall, the correlation for the random components of HLM analysis, which depicted the average interrelationship between the initial scores and the growth rate, showed a fan-spread pattern at the initial growth (a positive correlation between the intercept and the linear slope), and then a catch-up pattern of growth (a negative correlation between the intercept and the quadratic slope) in both reading and math. In other words, students with a high initial score in both reading and math at kindergarten

showed faster growth initially, but the growth was slower later than others, while students with a low initial score showed the opposite.

As shown in Table 4.8, the stronger positive correlation between the initial scores and the initial growth rate for all students in math ($r=.79$) than in reading ($r=.53$) indicated that the math performance of the higher scorers at kindergarten grew faster than lower scorers, widening the achievement gap to a greater extent in math than in reading. However, the negative correlation between the initial scores and the acceleration rate for all students in both reading ($r=-.71$) and math ($r=-.86$) indicated that the higher scorers' achievement growth slowed down to a greater extent than the low scorers with time. This deceleration was stronger for math performance, thus more rapidly closing the initial gap which was wider than in reading.

Consequently, the higher positive correlation (linear slope) between the initial scores and the initial growth rate of students in poverty for both reading ($r=.91$ for boys and $r=.93$ for girls) and math ($r=.78$ for boys and $r=.97$ for girls) than in non-poverty indicated the gap widened faster among the students within the poverty group than within the non-poverty group.

Table 4.8. *Correlations for the Random Components of HLM Growth Model*

| | Initial Status | | | | | | | | | |
|--|----------------|------|-------------|------|------|---------|------|-------------|------|------|
| | Reading | | | | | Math | | | | |
| | Poverty | | Non-poverty | | All | Poverty | | Non-poverty | | All |
| Boys | Girls | Boys | Girls | Boys | | Girls | Boys | Girls | | |
| Initial Growth (Linear slope) | .91 | .93 | .49 | .39 | .53 | .78 | .97 | .70 | .84 | .79 |
| Acceleration Rate (Quadratic slope) | -.98 | -.98 | -.66 | -.64 | -.71 | -.58 | -.94 | -.84 | -.87 | -.86 |

As shown in Table 4.9 which presents the HLM growth model for reading performance of the girls, there was a significant positive effect of improved social skills on the reading performance of girls in both poor ($\beta_{30}=5.8, p<.01$) and non-poor families ($\beta_{30}=3.1, p<.01$). In other words, a unit increase in social skills was associated with gains in reading scores of almost 6 points per year on average for the mainstream female students from poor families, and 3 points for the mainstream female students from non-poor families. Thus, the benefit was larger for the girls of poor families by 3 points per year on average.

The positive effect of improved social skills was not significantly different for *non-LEP* female students from both poor families ($\beta_{32}=-1.2, p>.05$) and non-poor families ($\beta_{32}=1.8, p>.05$) with a difference in score gains by -1.2 points per year on average for the *non-LEP* girls of poor families compared to mainstream girls of poor families, and by 1.8 points per year on average for the *non-LEP* girls of non-poor families compared to mainstream girls of non-poor families. Although, the effect of the improved social skills on the reading scores of the *non-LEP* girls from poor family ($\beta_{32}=-1.2, p>.05$) was lower than that of the reference group by 1.2 points, this was not significant. This result suggests the equivalent benefit of the improved social skills for the *non-LEP* female students and the mainstream female students – that is larger benefit for the girls from poor families than the girls from non-poor families by 3 points per year on average.

The positive effect of improved social skills were not significantly different for *LEP-at-K* female students from both poor families ($\beta_{33}=2.5, p>.05$) and non-poor families ($\beta_{33}=-.3, p>.05$) with the difference in score gains by 2.5 points per year on

average for the *LEP-at-K* girls of poor families compared to mainstream girls of poor families, and by -.3 points per year on average for the *LEP-at-K* girls of non-poor families compared to mainstream girls of non-poor families. This also suggests the equivalent benefit for the *LEP-at-K* female students with the mainstream female students from the improved social skills – that is, a larger benefit for the girls from poor families than the girls from non-poor families by 3 points per year on average.

The differential effect of improved social skills due to the SES gap was not significant for both groups: girls from poor families ($\beta_{31} = 2.2, p > .05$) and girls from non-poor families ($\beta_{31} = -.3, p > .05$). In other words, SES did not moderate the effect of the social skills on reading performance of female students. However, the SES remained significant among girls from non-poor families in the initial status ($\beta_{01} = 7.4, p < .01$), initial growth rate ($\beta_{11} = 3.3, p < .01$), and acceleration rate ($\beta_{21} = -.5, p < .01$), indicating an increase in initial reading scores at the kindergarten of the girls from non-poor families by 7 points on average, an increase in the initial growth from kindergarten to first grade by 3 points, and a decrease in acceleration rate (i.e. deceleration) by .5 points – the initial growth rate was reduced by greater than .5 per year due to the quadratic function. However, the SES remained significant only in the initial growth rate for the girls from poor families ($\beta_{11} = 3.0, p < .05$) at the significance level of .05.

The gap in the initial reading score between the girls from poor families ($\beta_{00} = 20.2$) and non-poor families ($\beta_{00} = 31.7$) was notably large, almost 12 points. Worse yet, the lower initial growth rate for the girls from poor families ($\beta_{10} = 32.1$) than that for the girls from non-poor families ($\beta_{10} = 36.3$) was further widening the reading

achievement gap, exhibiting fan-spread patterns. However, this gap was narrowed by the weaker deceleration rate of the girls from poor families ($\beta_{20}=-2.6$) than that of the girls from non-poor families ($\beta_{20}=-3.3$), exhibiting catch-up patterns. The gap was able to be further narrowed by the effect of social skills which was larger for the girls from the poor families ($\beta_{30}=5.8$) than for the girls from the non-poor families ($\beta_{30}=3.1$).

The significant random effects at the individual level for the initial status ($\chi^2=1394.2, p<.01$), initial growth rate ($\chi^2=1516.0, p<.01$), and acceleration rate ($\chi^2=1193.2, p<.01$) of the girls from poor families, and the initial status ($\chi^2=12478.5, p<.01$), initial growth rate ($\chi^2=6308.3, p<.01$), and acceleration rate ($\chi^2=5287.4, p<.01$) of the girls from non-poor families indicated that there still remained some variance to be explained.

Table 4.9. HLM Growth Models for Girls in Language-Status Groups – Reading

| Fixed Effect | Poverty | | | Non-poverty | | | | |
|--|-----------|------|----------|----------------------------|-----------|--------|----------|------|
| | β | SE | t | β | SE | t | | |
| Initial status, π_{0i} | | | | | | | | |
| INTERCEPT, β_{00} | 20.2** | 5.02 | 4.02 | 31.7** | 1.85 | 17.16 | | |
| SES gap, β_{01} | -3.1 | 4.86 | -.64 | 7.4* | 2.89 | 2.55 | | |
| Non-LEP, β_{02} | 1.3 | 6.66 | .19 | -4.8 | 6.26 | -.77 | | |
| LEP-at-K, β_{03} | -13.8 | 7.58 | -1.83 | -4.8 | 7.83 | -.61 | | |
| Initial growth rate, π_{1i} | | | | | | | | |
| INTERCEPT, β_{10} | 32.1** | 1.37 | 23.45 | 36.3** | .44 | 82.79 | | |
| SES gap, β_{11} | 3.0* | 1.16 | 2.54 | 3.3** | .67 | 4.91 | | |
| Language status gap for non-LEP, β_{12} | -3.0 | 3.31 | -.92 | -.9 | 1.35 | -.65 | | |
| Language status gap for LEP-at-K, β_{13} | 2.9 | 1.84 | 1.58 | -2.7* | 1.37 | -2.00 | | |
| Rate of acceleration, π_{2i} | | | | | | | | |
| INTERCEPT, β_{20} | -2.6** | .22 | -11.61 | -3.3** | .07 | -41.89 | | |
| SES gap, β_{21} | -.3 | .21 | -1.65 | -.5** | .11 | -4.68 | | |
| Language status gap for non-LEP, β_{22} | .5 | .51 | .90 | .0 | .23 | .20 | | |
| Language status gap for LEP-at-K, β_{23} | -.5 | .34 | -1.45 | .4 | .24 | 1.59 | | |
| Social skills effect, π_{3i} | | | | | | | | |
| INTERCEPT, β_{30} | 5.8** | 1.63 | 3.55 | 3.1** | .53 | 5.82 | | |
| SES gap, β_{31} | 2.2 | 1.51 | 1.47 | -.3 | .78 | -.35 | | |
| Language status gap for non-LEP, β_{32} | -1.2 | 2.14 | -.55 | 1.8 | 1.81 | .98 | | |
| Language status gap for LEP-at-K, β_{33} | 2.5 | 2.33 | 1.09 | -.3 | 2.21 | -.16 | | |
| Random Effect | Variance | | | | Variance | | | |
| | Component | df | χ^2 | p | Component | df | χ^2 | P |
| Level 1 | | | | | | | | |
| Temporal variation, e_{ii} | 55.90 | | | | 71.18 | | | |
| Level 2 (individual level) | | | | | | | | |
| Initial status, r_{oi} | 33.04 | 718 | 1394.2 | .000 | 159.81 | 3854 | 12478.5 | .000 |
| Initial growth rate, r_{1i} | 98.41 | 718 | 1516.0 | .000 | 58.55 | 3854 | 6308.3 | .000 |
| Rate of acceleration, r_{2i} | 2.23 | 718 | 1193.2 | .000 | 1.28 | 3854 | 5287.4 | .000 |
| Deviance = 22499.22 df=23 | | | | Deviance = 120670.32 df=23 | | | | |

** p<.01, *p<.05

For the reading performance of the boys, as presented in Table 4.10, there was also a significant positive effect of improved social skills on the reading performance in both poor ($\beta_{30}=5.8$, $p<.01$) and non-poor families ($\beta_{30}=4.0$, $p<.01$). That is, a unit increase in social skills was associated with gains in reading score of almost 6 points per year on average for the mainstream male students from poor families, and 4 points for the mainstream male students from non-poor families. The size of the reading score gain for the boys from poor families was equivalent with that for girls from poor families, whereas the size of the reading score gains for boys from non-poor families was 1 point higher than that for girls from non-poor families. Thus, the positive effect of social skills was larger for the boys of poor families by almost 2 points per year on average than the boys from non-poor families.

The positive effect of improved social skills was significantly higher for *non-LEP* boys from poor families ($\beta_{32}=5.3$, $p<.01$), whereas it was not significantly different for *non-LEP* boys from non-poor families ($\beta_{32}=.2$, $p>.05$). That is, the *non-LEP* boys from poor families scored 5 points higher per year on average than the mainstream boys from poor families, rendering a total of 11 points of annual reading score gains from a unit improvement of social skills.

This larger benefit on the reading performance of the boys from poor families contrasted with the negative benefit of the reading performance of the girls from the same economic condition ($\beta_{32}=-1.2$, $p>.05$). It was interpreted that boys from poor families benefit the most from the improved social skills among *non-LEP* students in terms of reading achievement.

The differential effect of improved social skills on the reading performance of *non-LEP* boys from non-poor families ($\beta_{32}=.2$) were virtually zero, indicating an equivalent benefit with the referenced mainstream boys from non-poor families ($\beta_{32}=4$).

The positive effect of improved social skills were not significantly different for *LEP-at-K* boys from both poor families ($\beta_{33}=1.6, p>.05$) and non-poor families ($\beta_{33}=.6, p>.05$) with the difference in score gains by 1.6 points per year on average for the *LEP-at-K* boys from poor families compared to mainstream boys from poor families, and by .6 points per year on average for the *LEP-at-K* boys from non-poor families compared to mainstream boys from non-poor families. This also suggests the equivalent benefit for the *LEP-at-K* male students with the mainstream male students from the improvement of social skills – that is, a larger benefit for the boys from poor families than the boys from non-poor families by 2 points per year on average.

The differential effect of improved social skills due to the SES gap was significant for the boys from poor families ($\beta_{31}=3.7, p<.05$) at the significance level of .05, but was not significant for the boys from non-poor families ($\beta_{31}=-.7, p>.05$). In other words, SES did moderate the effect of social skills on the reading performance of boys from poor families, while it did not in the case of the boys from non-poor families. The SES also remained significant among boys from non-poor families in the initial status ($\beta_{01}=8.3, p<.01$), initial growth rate ($\beta_{11}=4.1, p<.01$), and acceleration rate ($\beta_{21}=-.5, p<.01$), indicating an increase in initial reading score at the kindergarten in the boys from non-poor families by 8 points on average, increase in the initial growth from kindergarten to first grade by 4 points, and the decrease in acceleration rate (i.e. deceleration) by .5 points. The extent to which SES gap affects these three coefficients of

the boys from non-poor families was similar to that of the girls from the same family economic condition. In the case of the boys from poor families, the SES was not significant in any of these three coefficients.

The effect of poverty gap on the initial reading scores for boys was almost 8 points, and was smaller than that between girls (which was almost 12 points). However, the initial reading scores for boys were relatively lower than those for girls. The effect of gender gap on the initial reading score was .7 points for the students from poor families (β_{00} =19.5 for boys vs. 20.2 for girls) and 4.7 points for the students from non-poor families (β_{00} =27.0 for boys vs. 31.7 for girls). The lower initial growth rate for the boys from poor families (β_{10} = 30.2) compared to boys from non-poor families (β_{10} =34.7) was further widening the reading achievement gap between the boys in different economic condition, exhibiting a fan-spread pattern. Further, these initial growth rates for the boys were also relatively lower than those for the girls, further widening the gender gap in reading. However, the gap between boys in different economic conditions was narrowed by the weaker deceleration rate of the boys from poor families (β_{20} =-2.4) compared to boys from non-poor families (β_{20} =-3.0), exhibiting a catch-up pattern. This gap was able to be further narrowed by the effect of social skills which was larger for the boys from poor families (β_{30} =5.8) than for the girls from non-poor families (β_{30} =4.0). In the case of *non-LEP* boys from poor families, the significantly positive effect of improved social skills was narrowing this reading gap faster.

The significant random effects at the individual level for the initial status (χ^2 =1237.9, p <.01), initial growth rate (χ^2 =1251.3, p <.01), and acceleration rate

($\chi^2=1006.0$, $p<.01$) of the boys from poor families, and the initial status ($\chi^2=12000.7$, $p<.01$), initial growth rate ($\chi^2=7493.4$, $p<.01$) and acceleration rate ($\chi^2=6209.5$, $p<.01$) of the boys from non-poor families indicated that there still remained some variance to be explained as well.

Table 4.10. *HLM Growth Models for Boys in Language-Status Groups – Reading*

| Fixed Effect | Poverty | | | Non-poverty | | | | |
|--|-----------|------|----------|---------------------------|-----------|--------|----------|------|
| | β | SE | t | β | SE | t | | |
| Initial status, π_{0i} | | | | | | | | |
| INTERCEPT, β_{00} | 19.5** | 5.19 | 3.76 | 27.0** | 1.64 | 16.51 | | |
| SES gap, β_{01} | -7.8 | 4.58 | -1.69 | 8.3** | 3.17 | 2.62 | | |
| Non-LEP, β_{02} | -17.5** | 6.64 | -2.64 | -2.2 | 5.73 | -.38 | | |
| LEP-at-K, β_{03} | -9.6 | 5.30 | -1.82 | -7.0 | 6.45 | -1.09 | | |
| Initial growth rate, π_{1i} | | | | | | | | |
| INTERCEPT, β_{10} | 30.2** | 1.77 | 17.07 | 34.7** | .46 | 75.55 | | |
| SES gap, β_{11} | .7 | 1.72 | .44 | 4.1** | .60 | 6.85 | | |
| Language status gap for non-LEP, β_{12} | -1.7 | 2.74 | -.63 | .2 | 1.29 | .14 | | |
| Language status gap for LEP-at-K, β_{13} | -6.3** | 1.97 | -3.20 | -1.8 | 1.54 | -1.20 | | |
| Rate of acceleration, π_{2i} | | | | | | | | |
| INTERCEPT, β_{20} | -2.4** | .28 | -8.59 | -3.0** | .08 | -37.42 | | |
| SES gap, β_{21} | -.1 | .23 | -.44 | -.5** | .10 | -4.84 | | |
| Language status gap for non-LEP, β_{22} | .1 | .46 | .33 | -.0 | .24 | -.17 | | |
| Language status gap for LEP-at-K, β_{23} | 1.15** | .32 | 3.57 | .2 | .27 | .87 | | |
| Social skills effect, π_{3i} | | | | | | | | |
| INTERCEPT, β_{30} | 5.8** | 1.92 | 3.04 | 4.0** | .55 | 7.31 | | |
| SES gap, β_{31} | 3.7* | 1.58 | 2.31 | -.7 | .92 | -.82 | | |
| Language status gap for non-LEP, β_{32} | 5.3* | 2.35 | 2.26 | .2 | 1.67 | .14 | | |
| Language status gap for LEP-at-K, β_{33} | 1.6 | 1.75 | .91 | .6 | 2.13 | .26 | | |
| Random Effect | | | | | | | | |
| | Variance | | | | Variance | | | |
| | Component | df | χ^2 | p | Component | df | χ^2 | p |
| Level 1 | | | | | | | | |
| Temporal variation, e_{ii} | 67.76 | | | | 67.05 | | | |
| Level 2 (individual level) | | | | | | | | |
| Initial status, r_{oi} | 51.53 | 634 | 1237.9 | .000 | 117.13 | 3863 | 12000.7 | .000 |
| Initial growth rate, r_{1i} | 116.48 | 634 | 1251.3 | .000 | 85.54 | 3863 | 7493.4 | .000 |
| Rate of acceleration, r_{2i} | 2.76 | 634 | 1006.0 | .000 | 2.04 | 3863 | 6209.5 | .000 |
| Deviance = 20891.45 df=23 | | | | Deviance = 121265.3 df=23 | | | | |

** p<.01, *p<.05

Table 4.11 presents the HLM growth model for math performance of the girls. For girls, there was a significant positive effect of improved social skills on the math performance in both poor ($\beta_{30}=4.1, p<.01$) and non-poor families ($\beta_{30}=2.7, p<.01$). In other words, a unit increase in social skills was associated with gains in math scores of 4 points per year on average for the mainstream female students from poor families, and almost 3 points for the mainstream female students from non-poor families. Thus, the benefit was slightly larger for the girls of poor families by 1 point per year on average, although it was smaller than the benefit for reading performance which was almost 3 points per year on average.

The positive effect of improved social skills was significantly higher for the *non-LEP* girls from poor families ($\beta_{32}=3.4, p<.05$) at the significance level of .05, but was not significantly different for *non-LEP* girls from non-poor families ($\beta_{32}=.1, p>.05$). That is, the *non-LEP* girls from poor families scored 3 points higher per year on average than the mainstream girls from poor families, rendering a total of almost 8 points of annual math score gains ($4.1+3.4$) from a unit improvement of social skills.

The differential effect of the improved social skills on the math performance of the *non-LEP* girls from non-poor families ($\beta_{32}=.1$) were virtually zero, indicating an equivalent benefit with the referenced mainstream girls from non-poor families ($\beta_{32}=2.7$).

The positive effect of improved social skills was not significantly different for *LEP-at-K* girls from both poor families ($\beta_{33}=-.1, p>.05$) and non-poor families ($\beta_{33}=2.8, p>.05$). The results also suggest the equivalent benefit for the *LEP-at-K* female students with the mainstream female students from the improvement of social skills – that is, a larger benefit for the girls from poor families by 1.4 points per year on average.

The differential effect of improved social skills due to the SES gap was not significant for both groups of girls from poor families ($\beta_{31} = 1.2, p > .05$) and girls from non-poor families ($\beta_{31} = -.1, p > .05$). In other words, SES did not moderate the effect of social skills on the math performance of female students. However, the SES remained significant among the girls from non-poor families in the initial status ($\beta_{01} = 5.2, p < .01$), initial growth rate ($\beta_{11} = 2.3, p < .01$), and acceleration rate ($\beta_{21} = -.2, p < .01$), indicating the increase in initial math score at the kindergarten of the girls from non-poor families by 5 points on average, increase in the initial growth from kindergarten to first grade by 2 points, and the decrease in acceleration rate (i.e. deceleration) by .2 points – the initial growth rate was reduced by greater than .2 points per year due to the quadratic function. However, the SES did not remain significant in any of the three coefficients for the girls from poor families.

The gap in the initial math score between the girls from poor families ($\beta_{00} = 18.0$) and non-poor families ($\beta_{00} = 24.8$) was almost 8 points, and the lower initial growth rate for the girls from poor families ($\beta_{10} = 21.2$) compared to the girls from non-poor family ($\beta_{10} = 24.8$) was further widening the math achievement gap between the two groups, exhibiting a fan-spread pattern. However, this gap was narrowed by the weaker deceleration rate of the girls from poor families ($\beta_{20} = -1.3$) compared to the girls from non-poor families ($\beta_{20} = -1.9$), exhibiting a catch-up pattern. This gap was able to be further narrowed by the effect of social skills which was larger for the girls from the poor families ($\beta_{30} = 4.1$) than for the girls from the non-poor families ($\beta_{30} = 2.7$).

The significant random effects at the individual level for the initial status ($\chi^2=1607.7$, $p<.01$), initial growth rate ($\chi^2=1024.5$, $p<.01$), and acceleration rate ($\chi^2=858.2$, $p<.01$) of the girls from poor families, and the initial status ($\chi^2=9597.4$, $p<.01$), initial growth rate ($\chi^2=6050.8$, $p<.01$) and acceleration rate ($\chi^2=5192.6$, $p<.01$) of the girls from non-poor families indicated that there still remained some variance to be explained.

Table 4.11. *HLM Growth Models for Girls in Language-Status Groups – Math*

| Fixed Effect | Poverty | | | Non-poverty | | | | |
|--|--------------------|------|----------|----------------------------|--------------------|--------|----------|------|
| | β | SE | t | β | SE | t | | |
| Initial status, π_{0i} | | | | | | | | |
| INTERCEPT, β_{00} | 18.0** | 3.87 | 4.67 | 24.8** | 1.40 | 17.70 | | |
| SES gap, β_{01} | .7 | 3.85 | .18 | 5.2* | 2.03 | 2.56 | | |
| Non-LEP, β_{02} | -12.8* | 4.98 | -2.58 | -2.5 | 3.64 | -.69 | | |
| LEP-at-K, β_{03} | -.93 | 5.78 | -.16 | -13.0* | 5.73 | -2.26 | | |
| Initial growth rate, π_{1i} | | | | | | | | |
| INTERCEPT, β_{10} | 21.2** | .88 | 24.03 | 24.8** | .31 | 81.28 | | |
| SES gap, β_{11} | .0 | .97 | .01 | 2.3** | .45 | 5.12 | | |
| Language status gap for non-LEP, β_{12} | .5 | 1.67 | .29 | 1.3 | .85 | 1.51 | | |
| Language status gap for LEP-at-K, β_{13} | .3 | 1.15 | .25 | -2.1 | 1.24 | -1.70 | | |
| Rate of acceleration, π_{2i} | | | | | | | | |
| INTERCEPT, β_{20} | -1.3** | .15 | -8.88 | -1.9** | .05 | -33.85 | | |
| SES gap, β_{21} | .2 | .15 | 1.30 | -.2** | .08 | -3.15 | | |
| Language status gap for non-LEP, β_{22} | -.0 | .28 | -.10 | -.1 | .14 | -.84 | | |
| Language status gap for LEP-at-K, β_{23} | .1 | .21 | .66 | .5* | .23 | 2.05 | | |
| Social skills effect, π_{3i} | | | | | | | | |
| INTERCEPT, β_{30} | 4.1** | 1.18 | 3.46 | 2.7** | .42 | 6.56 | | |
| SES gap, β_{31} | 1.2 | 1.18 | 1.02 | -.1 | .62 | -.19 | | |
| Language status gap for non-LEP, β_{32} | 3.4* | 1.54 | 2.17 | .1 | 1.06 | .10 | | |
| Language status gap for LEP-at-K, β_{33} | -.1 | 1.83 | -.08 | 2.8 | 1.77 | 1.59 | | |
| Random Effect | | | | | | | | |
| | Variance Component | df | χ^2 | p | Variance Component | df | χ^2 | p |
| Level 1 | | | | | | | | |
| Temporal variation, e_{it} | 39.36 | | | | 43.02 | | | |
| Level 2 (individual level) | | | | | | | | |
| Initial status, r_{oi} | 32.67 | 718 | 1607.7 | .000 | 61.44 | 3854 | 9597.4 | .000 |
| Initial growth rate, r_{1i} | 29.89 | 718 | 1024.5 | .000 | 28.80 | 3854 | 6050.8 | .000 |
| Rate of acceleration, r_{2i} | .42 | 718 | 858.2 | .000 | .59 | 3854 | 5192.6 | .000 |
| Deviance = 21361.87 df=23 | | | | Deviance = 113109.04 df=23 | | | | |

** p<.01, *p<.05

As shown in Table 4.12 which presents the HLM growth model for math performance of the boys, there was also a significant positive effect of improved social skills on the math performance of boys in both poor ($\beta_{30}=5.7, p<.01$) and non-poor families ($\beta_{30}=2.1, p<.01$). In other words, a unit increase in social skills was associated with gains in math score of almost 6 points per year on average for the mainstream male students from poor families, and 2 points for the mainstream male students from non-poor families. The size of the math score gain for the boys from poor families was larger than that for girls from the same economic condition by almost 2 points, whereas the size of the math score gain for boys from non-poor families was almost 1 point lower than that for girls from the same non-poor condition. The benefit of social skills on math performance was larger for the boys of poor families than the boys from non-poor families by almost 3 points per year on average.

The positive effect of improved social skills was not significantly different for *non-LEP* boys both from poor families ($\beta_{32}=1.3, p>.05$) and from non-poor families ($\beta_{32}=1.0, p>.05$), indicating the equivalent benefit in terms of math achievement from the improved social skills with a referenced group of each model. When considering that *non-LEP* girls from poor families had a significantly higher math score gain ($\beta_{32}=3.4$) than the mainstream girls from poor families, girls appear to benefit more in terms of math achievement among the *non-LEP* students.

The positive effect of improved social skills were not significantly different for *LEP-at-K* boys from both poor families ($\beta_{33}=-.9, p>.05$) and non-poor families ($\beta_{33}=2.7, p>.05$) with a difference in score gains by -.9 points per year on average for the *LEP-at-K* boys of poor families compared to mainstream boys of poor families, and by almost 3

points per year on average for the *LEP-at-K* boys of non-poor families compared to mainstream boys of non-poor families. This also suggests the equivalent benefit for the *LEP-at-K* male students with the mainstream male students from the improvement of social skills – that is, a larger benefit for the boys from poor families by almost 3 points per year on average.

The differential effect of improved social skills due to the SES gap was significant for the boys from poor families ($\beta_{31}=3.3, p<.01$), but was not significant for the boys from non-poor families ($\beta_{31}=-.2, p>.05$). In other words, SES did moderate the effect of the social skills on math performance of boys from poor families, while it did not in the case of the boys from non-poor families. The SES also remained significant among the boys from non-poor families in the initial status ($\beta_{01}=6.5, p<.01$), initial growth rate ($\beta_{11}=3.4, p<.01$), and acceleration rate ($\beta_{21}=-.4, p<.01$), indicating the increase in initial math score at the kindergarten of the boys from non-poor families by almost 7 points on average, increase in the initial growth from kindergarten to first grade by 3 points, and the decrease in acceleration rate (i.e. deceleration) by .4 points. The extent to which SES gap affects these three coefficients of the boys from non-poor families was slightly higher than that of the girls from the same family economic condition.

In addition, girls had generally higher initial score and initial growth rate except for the math performance of non-poverty group. The initial score (27.5 for boys vs. 24.8 for girls) and the initial growth rate (26.7 for boys vs. 24.8 for girls) were higher for the boys from non-poor families than for girls of the same economic condition. However, the

larger benefit of improved social skills for girls from non-poor families (2.7 for girls vs. 2.1 for boys) on their math achievement was able to narrow this gap as well.

The initial math score gap between the boys from poor families and non-poor families was 14 points, whereas it was 7 points between girls of different economic condition. In addition, the SES gap on the initial math score for boys from poor families ($\beta_{01} = -8.2$, $p < .05$) was negative and significant at p-value level of .05, indicating that a unit increase in SES was associated with the drop in math score by 8 points. This was unusual when considering the SES normally favorably affects students' academic performance. The initial math scores for boys from poor families ($\beta_{00} = 13.5$) were lower than those for girls of same economic condition ($\beta_{00} = 18.0$). However, the higher initial growth rate of the boys from poor families ($\beta_{10} = 24.9$) compared to the girls ($\beta_{10} = 21.2$), and the higher positive effect of social skills on math achievement for boys of poor families ($\beta_{30} = 5.7$) compared to girls of the same economic condition ($\beta_{30} = 4.1$) was narrowing the gender gap in math for the students of poor families.

The significant random effects at the individual level for the initial status ($\chi^2 = 1771.4$, $p < .01$), the initial growth rate ($\chi^2 = 1245.2$, $p < .01$), and acceleration rate ($\chi^2 = 1009.4$, $p < .01$) of the boys from poor families, and the initial status ($\chi^2 = 13118.3$, $p < .01$), initial growth rate ($\chi^2 = 6618.0$, $p < .01$), and the acceleration rate ($\chi^2 = 5609.7$, $p < .01$) of the boys from non-poor families indicated again that there still remained some variance to be explained.

For the students in poverty, the effect size of social skills, which was calculated for the incremental proportion of variance explained by the inclusion of social skills in

the model was .2 for the level 2 random components of initial status (r_{oi}), and it was .1 for the random components of both initial growth rate (r_{1i}) and rate of acceleration (r_{2i}) in all four HLM models. The effect size for the students in non-poverty, however, was .1 for the random components of initial status (r_{oi}) and less than .01 for the random components of both initial growth rate (r_{1i}) and rate of acceleration (r_{2i}) in all four HLM models. That is, students' social skills appeared to account only for the initial status of their academic performance in the case of children in non-poverty, while they did account for the initial growth and acceleration rate as well as the initial status of academic performance in the case of children in poverty.

Table 4.12. *HLM Growth Models for Boys in Language-Status Groups – Math*

| Fixed Effect | Poverty | | | Non-poverty | | | | |
|--|--------------------|------|----------|-------------|---------------------------|--------|----------|------|
| | β | SE | t | β | SE | t | | |
| Initial status, π_{0i} | | | | | | | | |
| INTERCEPT, β_{00} | 13.5** | 4.16 | 3.24 | 27.5** | 1.30 | 21.25 | | |
| SES gap, β_{01} | -8.2* | 3.57 | -2.30 | 6.5** | 1.72 | 3.76 | | |
| Non-LEP, β_{02} | -6.2 | 5.24 | -1.18 | -5.1 | 4.38 | -1.18 | | |
| LEP-at-K, β_{03} | -1.7 | 5.98 | -.28 | -11.8* | 4.72 | -2.51 | | |
| Initial growth rate, π_{1i} | | | | | | | | |
| INTERCEPT, β_{10} | 24.9** | 1.00 | 24.80 | 26.7** | .31 | 85.82 | | |
| SES gap, β_{11} | 2.1** | .62 | 3.33 | 3.4** | .34 | 9.90 | | |
| Language status gap for non-LEP, β_{12} | -1.2 | 1.77 | -.67 | .3 | 1.04 | .28 | | |
| Language status gap for LEP-at-K, β_{13} | -2.3 | 1.42 | -1.65 | -.7 | 1.08 | -.68 | | |
| Rate of acceleration, π_{2i} | | | | | | | | |
| INTERCEPT, β_{20} | -2.0** | .17 | -11.63 | -2.1** | .05 | -38.20 | | |
| SES gap, β_{21} | -.3* | .10 | -2.60 | -.4** | .06 | -6.56 | | |
| Language status gap for non-LEP, β_{22} | .3 | .28 | 1.19 | .1 | .18 | .37 | | |
| Language status gap for LEP-at-K, β_{23} | .7* | .27 | 2.43 | .2 | .18 | .89 | | |
| Social skills effect, π_{3i} | | | | | | | | |
| INTERCEPT, β_{30} | 5.7** | 1.49 | 3.82 | 2.1** | .40 | 5.24 | | |
| SES gap, β_{31} | 3.3** | 1.21 | 2.73 | -.2 | .50 | -.37 | | |
| Language status gap for non-LEP, β_{32} | 1.3 | 1.98 | .65 | 1.0 | 1.35 | .74 | | |
| Language status gap for LEP-at-K, β_{33} | -.9 | 1.83 | -.48 | 2.7 | 1.58 | 1.69 | | |
| Random Effect | | | | | | | | |
| | Variance Component | df | χ^2 | p | Variance Component | df | χ^2 | p |
| Level 1 | | | | | | | | |
| Temporal variation, e_{it} | 38.53 | | | | 44.20 | | | |
| Level 2 (individual level) | | | | | | | | |
| Initial status, r_{oi} | 54.98 | 634 | 1771.4 | .000 | 93.56 | 3863 | 13118.3 | .000 |
| Initial growth rate, r_{1i} | 48.70 | 634 | 1245.2 | .000 | 32.92 | 3863 | 6618.0 | .000 |
| Rate of acceleration, r_{2i} | 1.20 | 634 | 1009.4 | .000 | .70 | 3863 | 5609.7 | .000 |
| Deviance = 19940.37 df=23 | | | | | Deviance = 114702.8 df=23 | | | |

** p<.01, *p<.05

Chapter Five:

Discussion and Conclusion

The purpose of this study was to identify the significant aspects of social skills in relation to students' academic achievement and to examine the social development of the language minority immigrant students and its effect on their academic performance from kindergarten to fifth grade in comparison with the English-speaking mainstream students. This chapter presents discussion of the results, and conclusion. Recommendation for practice and future study, and contribution of the study are also discussed.

Discussion of the Findings

Importance of the Approaches to Learning for Students' Academic Performance

In this study, the concurrent association of social skills with academic achievement was confirmed through the discriminant analysis, as the five subscales of social skills (*approaches to learning, self-control, interpersonal skills, externalizing problem behavior* and *internalizing problem behavior*) were collectively successful in classifying fifth-grade students into high, middle and low achievement levels. In addition, discriminant function identified *approaches to learning* as the most important aspect among the five subscales of social skills in separating the students into different achievement levels.

Using the profile analysis of GLM, it was verified that students in different achievement level had significantly fluctuating and significantly different developmental patterns in the five subscales of social skills. They also had significantly different levels of skills in all five subscales of social skills, even after the gender, poverty status, and SES were controlled.

The profiles of social skills for achievement groups also revealed that regardless of the difference in developmental changing patterns among the three groups, the low achieving students exhibited consistently lower ratings on the three positive measures of social skills (*approaches to learning, self-control and interpersonal skills*) and consistently higher ratings on the two negative measure of social skills (*externalizing problem behavior and internalizing problem behavior*) than the high achieving students over the six years from kindergarten to fifth grade. Further, the profiles indicated that the students in the three achievement groups showed the largest gap in *approaches to learning*, and the students in the low achieving group displayed more unstable development of *internalizing problem behavior* than students in other groups.

These findings highlight the importance of *approaches to learning* among the various social skills. Through discriminant analysis and profile analysis, *approaches to learning* was evinced to be the most important aspect of social skills in relation to academic achievement. This result confirms the study of McClelland et al. (2000) in which *approaches to learning* was distinguished from other social skills as a significant predictor of students' current and future academic performance, and the study of Lane et al. (2003) in which teachers placed the most importance on *approaches to learning*.

The National Education Goals Panel (NEGP) reported that *approaches to learning* was the most important factor among the school readiness indicators. Further, Fantuzzo, Perry, and McDermott (2004) explained that *approaches to learning* is the ability to engage in learning activities. According to Posner and Rothbart (2000), children's ability to regulate attention develops from age three to the early school years. Although it takes time and effort, inappropriate behaviors related to *approaches to*

learning are amenable to change, and they are sustainable once improved (Pelco & Reed-Victor, 2007). Consequently, intervention for *approaches to learning* is needed in the early school years to effectively improve the academic performance of low-achieving students.

In addition, low achieving students displayed unstable developmental patterns in *internalizing problem behaviors* to a greater extent than middle or high achieving students. Both of the problem behaviors are interconnected with *approaches to learning*, because the disruptive behaviors resulting from externalizing problems, and the anxiety or depression resulting from internalizing problems interfere with students' attentiveness (Rapport et al., 2001). The ability for attention forms a large part of the *approaches to learning* skill. Thus, the large fluctuation over the years in the development of the two problem behaviors for low achievement students also underscores the need for a relevant intervention for this low achieving group which is comprised of a greater number of impoverished children than the other two groups. This also suggests that the educational emphasis during early school years should be placed on long-term goals of forming positive attitudes toward and motivation for learning rather than on short-term performances on standardized tests.

Benefit of Improved Social Skills for Students in Different Language Status

The results of the profile analysis showed significantly different developmental patterns in the five subscales of social skills among the three language-status groups, from kindergarten to fifth-grade, even after controlling for gender, poverty status, and SES. All five subscales of social skills (*approaches to learning*, *self-control*, *interpersonal skills*, *externalizing problem behaviors* and *internalizing problem*

behaviors) significantly fluctuated with totally different development patterns among the three groups during those first six school years, and the level of skills were also significantly different among the three groups, even when accounting for gender, poverty status and SES.

The profiles of social skills of students from impoverished families were strikingly different from those of students from non-impoverished families. The developmental changing patterns of the impoverished students, especially those of *non-LEP* students from impoverished families, were extremely unstable, spanning wide ranges in all five subscales of social skills.

Specifically, *non-LEP* students from impoverished families displayed a large drop in scores in all three prosocial skills (*approaches to learning*, *self-control*, and *interpersonal skills*) and a large rise in both *externalizing* and *internalizing problem behaviors* at third-grade. Overall, they regained these skills and reduced these problems by the time they became fifth-grade, with the exception of the *non-LEP* boys in poverty whose *approaches to learning* remained low in fifth grade. The *non-LEP* girls from impoverished families recovered dramatically, with their skills improving at a greater rate in fifth grade than they had deteriorated in third-grade. Nonetheless, the extreme fluctuations in behavior development presented the need for support and intervention for impoverished *non-LEP* students between first and third-grade, when these students experience a significant decrease in prosocial skills and an increase in problem behaviors.

In the case of the *LEP-at-K* students from impoverished families, the decrease in prosocial skills and the increase in problem behaviors occurred in fifth grade, later than it occurred for the *non-LEP* students from impoverished families, although they scored

higher overall in prosocial skills and lower in problem behaviors than other girls from impoverished families. However, since the validity of the favorable social skills ratings of the *LEP-at-K* group comes into question when considering the contention of Crijnen et al. (2000) that the problems of immigrant students are not properly recognized by teachers of the host country, even small decreases in skills and increases in problem behaviors may reflect the need for attention and support for these *LEP-at-K* students. Given both their language barriers and their family economic situation, these *LEP-at-K* students are the most disadvantaged.

Immigrant students' experience of social hardship due to their different languages and cultures (Ogden et al, 2007) appear to lead to unstable social behaviors with elevated internalizing problem when coupled with the economic hardship. The profiles of the two impoverished immigrant student groups exhibited notably unstable development patterns in both genders, spanning wide ranges in scale, with large fluctuations in all five subscales of social skills.

Such unstable development patterns require attention and intervention. When it comes to problem behaviors, however, students with internalizing problem behaviors tend to be neglected due to the covert nature of the internalizing problems (Siu, 2007). Worse yet, in the case of immigrant students, it is harder for teachers to recognize their internalizing problems due to linguistic and cultural differences (Crijnen et al., 2000). Luckily, on average, *non-LEP* students from impoverished families appear to overcome these problems on their own by the time they become fifth-grade (with the exception of the *approaches to learning* skill in *non-LEP* boys from impoverished families), as indicated in their profiles of social skills. *Non-LEP* students of both genders showed an

increase in the three prosocial behaviors and a decrease in two problem behaviors by fifth grade. However, the decrease in the three prosocial behaviors and the increase in two problem behaviors of *LEP-at-K* students from impoverished families in fifth grade remains a concern along with the non-recovered *approaches to learning* skill of the *non-LEP* boys from impoverished families.

The need for intervention for these immigrant students in the early school years was evidenced in this study. Based on the profiles of their social skills, the timing of support and intervention is critical and should occur between first and third-grade for *non-LEP* students, and between third and fifth-grade for *LEP-at-K* students.

The results of the longitudinal analysis using the HLM growth model showed that the positive longitudinal effect of improved social skills on reading and math performance was significant for all students, regardless of their language status. Depending on their gender and their household-level of poverty, however, the size of the positive effect of the improved social skills on reading and math performance differed among the students according to language status.

Since the students from impoverished families exhibited unstable development of social skills throughout the first six school years, separate HLM analysis for these students from impoverished families was able to specifically depict the effect of social skills on the academic performance of those students and thereby provided detailed information about the achievement growth of *LEP-at-K* students relative to their peers in both economic conditions. The summary of the positive effect of social skills on the score gains in reading and math was presented in Table 5.1.

Table 5.1. *Positive Effect of Social Skills – Score Gains for Reading and Math*

| | | Boys | | Girls | |
|---------|-----------------------|---------|-------------|---------|-------------|
| | | Poverty | Non-poverty | Poverty | Non-poverty |
| Reading | English β_{30} | 5.8** | 4.0** | 5.8** | 3.1** |
| | Non-LEP β_{32} | 5.3* | .2 | -1.2 | 1.8 |
| | LEP-at-K β_{33} | 1.6 | .6 | 2.5 | -.3 |
| Math | English β_{30} | 5.7** | 2.1** | 4.1** | 2.7** |
| | Non-LEP β_{32} | 1.3 | 1.0 | 3.4* | .1 |
| | LEP-at-K β_{33} | -.9 | 2.7 | -.1 | 2.8 |

** indicates $p < .01$,

* indicates $p < .05$

Students from impoverished families were shown to obtain more benefit from the improved social skills in both reading and math than students from non-impoverished families. The reading score gains from the improved social skills were not significantly different among the girls in the same poverty condition; girls in poverty had an average gain of almost six points annually regardless of the language status, and girls in non-poverty condition had an average gain of three points regardless of the language status. However, the reading score gain from the improved social skills were significantly larger for *non-LEP* boys from impoverished families, who had an average score gain of almost 11 points (5.8+5.3) annually, than for the English-speaking mainstream boys in the same economic conditions, who had an annual average score gain of six points. The boys from non-impoverished families had an annual average reading score gain of four points from improved social skills, regardless of language status.

In terms of math performance, the score gains from improved social skills did not vary significantly among boys in the same poverty condition, because boys from

impoverished families had an average gain of almost six points annually, regardless of language status, and boys from non-impoverished families had an average gain of two points, regardless of language status. However, the math score gains from improved social skills were significantly larger for the *non-LEP* girls from impoverished families, who had an average score gain of almost eight points (4.1+3.4) annually, than for English-speaking mainstream girls in the same economic condition, who had an annual average score gain of four points. The girls from non-impoverished families had an annual average reading score gain of almost three points from improved social skills, regardless of language status.

In sum, there was a positive differential effect of social skills on the academic performance of *non-LEP* students from impoverished families; for boys it was in reading, and for girls, it was in math. In addition, the effect of SES gap on the relationship between social skills and academic performance was significant only for the math performance of boys from impoverished families.

These results indicated that students from impoverished families, *non-LEP* students in particular, were in greater need of the social skills intervention than their peers, because the greater benefit in terms of reading performance growth was with *non-LEP* boys in poverty and the greater benefit in terms of math performance growth was with *non-LEP* girls in poverty than their respective counterpart students. In the case of *Non-LEP* boys from impoverished families, the reading score gain was large enough to enable them to match the reading performance of boys from non-impoverished families. These *non-LEP* students from impoverished families were those who displayed the most unstable social development in the profile analysis. Therefore, the significantly positive

effect of social skills on academic performance strongly suggests the need for intervention for students from impoverished families, especially *non-LEP* students.

Recommendation for Practice

This study provides insights into education policies that can benefit mainstream students and language minority students alike. The significant effect of students' improved social skills on their academic performance suggests the need for social skill training and intervention programs particularly focused on *approaches to learning*, as this study identified it as the most critical skill in distinguishing high achievers from low achievers. In addition, the extremely unstable social development of language minority students at the beginning of middle childhood suggests that the appropriate timing for supports and intervention is between first and third grade for *non-LEP* students and between third and fifth grade for *LEP-at-K* students.

As Pelco and Reed-Victor (2007) contended in their study, the learning-related social skills need to be instructed as a part of the school curriculum and need to be provided by teachers who are available to students throughout the school day and have a working knowledge of how make use of opportunities to provide practice as they occur in the classroom. Both emotional and academic support from teachers was shown to be important for lower elementary students, because lower elementary students who were in highly structured classrooms with insufficient emotional support exhibited high levels of internalizing problem behaviors (Belsky et al., 2006). Moreover, for immigrant students, perceived teacher support was particularly important (Vedder et al., 2005), because immigrant students were shown to rely more heavily on their teachers for academic support than on their parents, in contrast to non-immigrant students.

Contribution of the Study

The longitudinal model that estimated and tested the long-term effects of students' improved social skills on their academic performance resulted in a significant positive effect on both reading and math performance. The benefit was even larger for impoverished students. Previous studies that showed the positive causal effect of social skills intervention program on students' reading and math performance through random assignment of experimental design (Miranda et al., 2007, June; Campbell et al., 2005) had a limitation of generalizability due to their narrow geographic coverage and small sample size. By confirming the results of these previous studies through longitudinal analysis using nationally representative data, however, this study, which is limited by the absence of random assignment, provides generalizability and thus establishes a research basis for empirical evidence on the causal effect of improved social skills on academic performance. Therefore, this study contributes to identifying and supporting a remedial program that can potentially boost the academic achievement of students during their early schooling.

In addition, the need for support and appropriate timing for intervention was apparent for the two language minority student groups, as the profiles of their social skills exhibited unstable developmental changing patterns during the different period of the first six school years depending on LEP status. Thus, this study contributes to identifying the critical time period in which students require support and intervention so that they can adjust and work toward their maximum potential both in school and in life.

Directions for Future Studies

The results of this study indicated that *approaches to learning* of students is the most important aspect among the five social skills in relation to their academic performance. Despite the importance of this skill as an indicator of school readiness, which emerges at early age, *approaches to learning* has been neglected in the research (Kagan et al., 1995). Future research utilizing an experimental design is warranted to determine whether improved academic performance can be attributed to students' improved *approaches to learning*.

The *non-LEP* students from impoverished families were shown to experience extremely unstable social development earlier than *LEP-at-K* students in the same economic condition, as the social skill profiles of the *non-LEP* students displayed a huge drop in all three prosocial skills and a large increase in the two problem behaviors in third grade, while the *LEP-at-K* students displayed a drop in all three prosocial skills and an increase in both of problem behaviors in fifth grade. The limitation of the secondary data that restricts the richness in data regarding social factors surrounding this phenomenon does not allow further investigation in this regard. When considering that the onset of puberty begins as early as third grade, while most studies of puberty focus on depression in fifth grade (Angold & Costello, 2006), research on the *internalizing problem behavior* at early puberty age is needed. In particular, a qualitative study of language minority students' experiences at school, conducted by researchers who are familiar with their languages and cultures, may be able to clarify the causes of such decrease in skills in specific periods by investigating the degree and types of students' social hardship depending on their LEP status.

Conclusion

Schools have a great influence on the acculturation and adaptation of immigrant students, as these immigrant students spend the majority of their days at school. However, if their differences in languages and cultures place them at risk of school failure (Ogden et al., 2007) and consequently deprive them of equal opportunities for education, policy may need to intervene, seeking ways to reduce their risk.

According to the social learning theory of Vygotsky (1978), learning first occurs at the social level through interaction with more knowledgeable others, before they internalize the knowledge to make it their own at the individual level. For immigrant students, peers play a major role as the more knowledgeable others in terms of culture and language. Since immigrant students have the task to acquire cultural and linguistic knowledge in addition to academic knowledge simultaneously in the classroom, social skills are important tools that enable them to accomplish this task while interacting with both peers and teachers. Apparently, however, their lack of social skills leads to rejection from their peers (Sundell & Collbiörnsen, 1999, as cited in Ogden et al., 2007) and thus hinders them from accomplishing this task.

The extremely unstable social development trajectories of economically disadvantaged immigrant students, which were shown in the profile analysis, suggest their strong need for social skill support and intervention during the early school years. Moreover, the positive effect of students' improved social skills on their academic performance, which was evidenced in HLM analysis, also suggests that successful intervention can lead these students to achieve both social development and academic success.

The implication of this study extends beyond the information provided about the relationship between social skills and academic performance of children. The study findings illustrate the significant social impact of poverty on children's mental health during the elementary school years through the unstable development trajectory of *internalizing problem behaviors* of low achieving students and language minority immigrant students in poverty. This informs policy with regard to the need for early intervention at macro-level to ameliorate the lifelong damages that poverty can cause to these children in their early school years.

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