THE EFFECT OF SCHOOL MOBILITY AND CONCURRENT CHANGES ON STUDENTSô ACADEMIC PERFORMANCE

by
Bess A. Rose

A dissertation submitted to Johns Hopkins University in conformity with the requirements for the degree of Doctor of Education

Baltimore, Maryland

May 2016

Abstract

Changes in school environments are sources of instability and stress for children. The social, educational, residential, and familial changes that usually accompany school changes are likely to exacerbate this stress and negatively impact academic performance. The full range of these changes that occur with school changes, and their relative effects on performance, have not been studied. Using administrative records documenting the educational histories of a representative sample of public school students, this study estimated the effect of mobility on academic grade point average, and the variation in this effect among different types of concurrent changes in childrenôs social, educational, residential, and familial environments, controlling for studentsôprior achievement, personal characteristics, chronic absence from school, and school membership. Multilevel growth curve modeling was used to account for the nesting of annual measures within students and students within schools; cross-classification and multiple membership were used to account for all of the schools that students attended since beginning first grade. Overall each school change that a student experienced was associated with a deficit of 0.02 GPA points in the year of the change compared to similar students who had not changed schools. The study found greater declines in academic performance when students experienced changes in social, residential, and familial environments concurrent with school changes. Relatively stable school changes in which students moved with groups of peers, not triggered by changes in residence or specifically targeting individual students, had neutral effects on academic performance. Solo transfers, on the other hand, triggered by residential transfers with family structure change or financial issues, were negatively associated with academic performance; this negative effect was likely due to

the loss of neighborhood and family stability in addition to the disruption of school-based social ties and academic routines. Further investigation is warranted into strategies to support students who are experiencing stress from changes that trigger school transfers, particularly those involving family structure changes or financial issues.

Dissertation Committee

Marc Stein, Ph.D., Associate Professor, Johns Hopkins University

Martha Abele Mac Iver, Ph.D., Associate Professor, Johns Hopkins University

Julia Burdick-Will, Ph.D., Assistant Professor, Johns Hopkins University

Tasha Beretvas, Ph.D., Associate Dean for Research and Graduate Studies, College of Education, The University of Texas at Austin (external reviewer)

Acknowledgements

I would like to thank Dr. Larry Rogers and the Maryland State Department of Education for conducting the *Study of Student Mobility in Maryland* (Rogers, 2004), which was the source of the administrative data analyzed here, and The Annie E. Casey Foundation for funding it. They are not responsible for any mistakes made here. Funding for the current study was provided by a grant from the U.S. Department of Educationôs Institute of Education Sciences (IES) to Johns Hopkins Universityôs interdisciplinary pre-doctoral research training program (R305B080020).

Dedicated to

Laurie Fogleman

and

Dr. Edward F. Pajak (1947ï 2014)

Table of Contents

List of Tables

List of Figures

CHAPTER ONE

INTRODUCTION

A common understanding of how children progress through the educational system is that they attend one elementary, one middle, and one high school over the course of their academic careers. However, these students are the exception rather than the rule in U.S. public schools today. Most students change schools at least once during their K-12 school careers, not including normative school changes such as those from elementary to middle school (Rumberger, 2002). Prior research has attempted to estimate the effect of school transfers on academic achievement and other outcomes for children. Findings have not been consistent, ranging from some evidence of negative effects, to evidence of some positive effects.

The preponderance of evidence from recent summaries and meta-analyses indicates that overall, school mobility has a negative effect on academic performance (U.S. Government Accountability Office, 2010; Reynolds, Chen & Herbers, 2009). The effect of a single school change has been estimated to be a loss of about one month of schooling or one-tenth of a standard deviation in reading and math performance (Reynolds et al., 2009), about the same amount lost by children over summer vacation (Cooper, Nye, Charlton, Lindsay, & Greathouse, 1996). Changing school three or more times has been estimated to result in a loss of about one-third of a standard deviation in reading and math, or the equivalent of three months of school (Reynolds et al., 2009).

However, other research has found neutral or even positive effects of mobility on achievement. Swanson and Schneider (1999) found that school transfers between eighth and tenth grade had a positive effect on academic gains in the last two years of high

school. Hanushek, Kain, and Rivkin (2004) attempted to explain the variation in mobility effects by distinguishing intra-district transfers from inter-district and inter-region transfers, and short term effects from longer-term effects. They found that when all types of moves were analyzed together, the overall effect of mobility appeared to be negative and only on short-term outcomes, but analyzing different effects among types of moves showed that moving to a new district in the same region had positive longer-term effects but neutral short-term effects, while within-district moves had negative short-term effects but neutral longer-term effects. Pribesh and Downey (1999) found that the co-occurrence of stressful events affecting childrenôs home and family environments accounted for much of the effect of mobility.

Although a substantial amount of research has already been conducted on the impact of changing schools on student achievement, the vast majority of this research has not accounted for the fact that when students change schools, it is not only the school environment that is changing: it is also studentsô peer groups, neighborhoods, or family situations, depending on the reason for the transfer. ñWhat accounts for the generally negative impact of mobility on achievement and why, in some cases, does mobility not impact achievement or even improve it? The answer depends, in part, on the reasons students change schools.ò (Rumberger, 2002, p. 2382) Students change schools for a variety of reasons: in some cases individual students change schools, while in others, entire schools are closed or their boundaries are redrawn. Individual changes can be transfers intended (by either the parent or the school) to place the student in a more appropriate or supportive educational environment (private school, special education setting), or transfers resulting from family residential moves (with or without additional

family changes due to remarriage or financial stress). Each of these types of school changes may or may not involve changes in other major arenas of studentsô lives: peer groups, residence, family. How these concurrent environmental changes affect childrenôs academic performance has not previously been tested, but some types of changes may have negative impacts while others have no effect or even a positive influence. Many researchers have pointed out the need for research that takes these concurrent changes into account (Alexander, Entwisle, & Dauber, 1996; Burkam, Lee, & Dwyer, 2009; Fantuzzo, LeBoeuf, Chen, Rouse, & Culhane, 2012; Hanushek, Kain, & Rivkin, 2004; Kerbow, 1996; Langenkamp, 2011; Mehana & Reynolds, 2004; Reynolds et al., 2009; Rumberger, 2002; South, Haynie, & Bose, 2007); however, the field has left these issues largely unaddressed. The purpose of this study was to investigate, using a representative sample of public school students in a mid-Atlantic state, the relationship between student mobility and academic achievement as measured by grade point average in core academic classes (reading/language arts, mathematics, science, and social studies), and to examine whether there is significant variation in this relationship among different types of concurrent changes in childrenôs social, educational, residential, and familial environments.

Thus, the overarching research question was: How does the relationship between school changes and academic performance vary among different types of concurrent changes in childrenôs academic, social, residential, and familial environments? The study posed a series of research questions to assess this relationship:

1: What is the range and scope of documented reasons that students change schools?

2: a) What are the characteristics of students who change schools? b) How do student characteristics vary by documented reason for changing schools?

3: What is the relationship between changing schools and academic performance in the year of the school change?

4: How does the relationship between changing schools and academic performance in the year of the school change vary among different types of concurrent changes in childrenôs social, educational, residential, and familial environments?

In order to answer these research questions, this observational retrospective longitudinal study examined academic performance, as measured by academic grade point average, using multilevel growth curve modeling to account for the nesting of annual measures within students and students within schools. Cross-classification and multiple membership models were used to account for all of the schools that students attended over the course of the study. Covariates were included to account for the observed differences between students based on race/ethnicity, gender, free or reduced-price lunch status, special education status, and limited English proficiency, as well as chronic absence from school. Thus, the study estimated the effects of mobility and the variation in these effects due to transfer reason, controlling for studentsô prior achievement, personal characteristics, and school membership.

This study contributes to the research literature on student mobility in a number of ways. It examines the variety of reasons for mobility and whether or not some types of moves are less harmful than others, or are potentially beneficial. In addition, it takes into account the contribution of school effects for mobile students (using cross-classified

multiple membership growth curve modeling) to examine the relationship of student mobility with academic achievement.

More clearly understanding mobility will allow policy makers to understand the source of its negative impact on achievement and thus provide guidance for the development and enactment of policies that could better support mobile students. This is vitally important, as ñthere is currently no legislation and subsequent education policy and funding structures to support children who are experiencing school mobility without homelessnessé . At present, mobile students represent an óinvisible populationô that is not formally being acknowledged in the education systemò (Fantuzzo et al., 2012, p. 400). If school transfers have a negative effect even when other environmental factors remain relatively stable, then policy makers could consider limiting transfers to end-of-year or end-of-semester transfer windows and limiting the number of times students could transfer. It may be that school transfers only have a negative effect when coupled with other family changes; in this situation, policy makers may wish to allow students to remain enrolled in the same school (to the extent feasible) while these external changes are going on.

In addition, understanding the source of stress for students (school changes alone, or school changes in combination with family changes) is likely key to providing insights on potential academic, social, and emotional supports that could be beneficial for students and families during stressful times and transitions. If school transfers in and of themselves are harmful, the implication would be that schools need to do more to limit these transfers or mitigate their effects. Prior research has detailed the school-based strategies that can be used to ease transitions for students, such as faster transfer of

records and clearer communication about studentsô educational needs (to address curricular gaps and academic performance), orientation meetings and buddy systems (to address studentsô acclimations to the new school environment and social groups), and one-on-one counseling to support studentsô emotional needs (Cornille, Bayer, & Smyth, 1983; Jason et al., 1992).

On the other hand, if school transfers are only harmful when coupled with changes external to the school setting, then resources will need to be focused instead on supporting students and their families during these transitional times. These supports will likely need to come from outside the school setting, although school staff may be able to connect families and students with community resources that can provide counseling or other supports as needed. Families also may benefit by understanding the impact of their transitions on their childrenôs educational performance and thereby make decisions with the goal of minimizing this negative impact.

CHAPTER TWO

LITERATURE REVIEW

Overview

This study examined the relationship between changing schools and academic achievement and the variation in this relationship among different types of concurrent changes in childrenôs social, educational, residential, and familial environments. This chapter first explores the psychological and sociological theories that help explain why changing schools might be difficult for children, and the importance of examining other environmental changes that occur at the same time as school changes. Next, it builds from these theories a conceptual framework for understanding these concurrent changes in light of the events that ñtriggerò school transfers. It then discusses findings from the research literature according to this conceptual framework and shows that we might expect childrenôs academic and other outcomes to worsen as the degree of instability due to concurrent changes increases.

In summary, this chapter argues that given childrenôs need for stability, school transfers must be evaluated within the context of stability in the other arenas of childrenôs lives as well. While children can normally adjust to the new relationships and expectations that accompany school changes, too many concurrent changes in other arenas along with school changes can overwhelm childrenôs adjustment skills and slow their academic learning. While researchers have studied the effects of school changes and residential moves on childrenôs academic performance, the full range of social, educational, residential, and familial changes that occur with school changes, and their relative effects on performance, have not been studied.

Stability and Change in Children's Development

Children's development is influenced by multiple environments, such as schools, peer groups, neighborhoods, and families (Bronfenbrenner, 1986, 1994). Stability in these environments is very important for children's development. Children rely on the "secure base" (Ainsworth, Blehar, Waters, & Wall, 1978/2014) provided by parents, teachers, and other important adults as they learn how to cope with the constant change that is part of normal development as they grow physically, cognitively, and emotionally. Predictable and familiar "arenas of comfort" (Simmons, Burgeson, Carlton-Ford, & Blyth, 1987) such as home and school can provide children places in which they can feel safe and take time to process changes. Changes in school environments, as well as the changes in social groups, family structure, residential setting, or educational placements that usually accompany school changes, are sources of instability and stress for children (Blom, Cheney, & Snoddy, 1986; Coddington, 1972; Yamamoto, 1979). These changes challenge children to maintain a cohesive sense of self, deal with losses of relationships with peers and adults and form new ones, and adjust to inconsistent academic standards and expectations (American Academy of Child and Adolescent Psychiatry, 2011; Blom et al., 1986; Hendershott, 1989; Rumberger, Larson, Ream, & Palardy, 1999; Youell, 2006). Too much change at any one time can be too much for children to handle. When these environments are marked by multiple sources of instability, such as when parents divorce, move to a new home, and transfer children to a new school, children's normal development may be hindered (American Academy of Child and Adolescent Psychiatry, 2011; Blom et al., 1986; Filippelli & Jason, 1992; Jason et al., 1992; Pribesh & Downey, 1999; Simmons et al., 1987; Warren-Sohlberg, Jason, Orosan-Weine, Lantz, & Reyes,

1998). Academic performance is one marker of this development and is likely to reflect harm. The conceptual framework for my study is based on the idea that instability and change in childrenôs school environments may result in stress as children attempt to maintain continuity of self, deal with losses of relationships, make new friends and relate to new teachers, and adjust to new expectations in their new educational environments. These school changes are likely to be exacerbated by concurrent changes in other environmental factors such as social group, residence, and family.

Childrenôs sense of security can be thought of in terms of relationships with attachment figures as well as familiarity with important developmental environments. The stability of these relationships and environments has been theorized using various metaphors such as ñsecure baseò (Ainsworth et al., 1978/2014), ñarenas of comfortò (Simmons et al., 1987), and ñhomeò (Adam & Chase-Lansdale, 2002). The concept of children having a ñsecure baseò comes from psychological attachment theory and the study of infants and their mothers (Ainsworth et al., 1978/2014). As young children explore and learn from the environments around them, they look back to their mothers to ensure a sense of safety and protection (Ainsworth et al., 1978/2014; Kobak & Madsen, 2008). This concept has been expanded to children in extra-familial learning environments such as school and can be considered a key aspect of teacher-student relationships (Riley, 2011). Childrenôs relationships with teachers mirror their relationships with their mothers in the sense that teachers can provide a similar secure base from which children feel safe in exploring new things.

This concept of security in terms of relationships was broadened to include stability in terms of environments by Simmons and colleagues (1987), who used the term

ñarena of comfortò to reflect the broader setting beyond a single relationship as a ñsecure baseò:

> Individuals do better both in terms of self-esteem and behavioral coping if there is some *arena of comfort* in their livesé . If the child is comfortable in some environments, life arenas, and role relationships, then discomfort in another arena should be able to be tolerated and masteredé . There needs to be some arena of life or some set of role relationships with which the individual can feel relaxed and comfortable, to which he or she can withdraw and become reinvigorated. (Simmons et al., 1987, pp. 1231-1232)

Simmons et al. (1987) suggested that as long as children have a single safe and familiar environment, they should be able to withstand changes in another environment, such as school. This hypothesis has not been explicitly tested in the research literature. It is also possible that as children experience changes in more environments and thus have more and more ñarenas of *dis*comfort,ò they have fewer opportunities to retreat and recharge and thus a greater likelihood of negative academic outcomes.

Why Is Changing Schools Difficult for Children?

When children are faced with the loss of security and stability provided by adults and school settings, they often demonstrate negative emotional and behavioral responses; these can be internalized (e.g., withdrawing, being overly anxious) or externalized (e.g., hitting or teasing other children) (Blom et al., 1986). Childrenôs behavioral responses to change essentially depend on two things: how they respond to the stressful event, and how well they adjust to the new setting.

Responding to Stressful Events

For many years psychologists and school staff understood childrenôs responses to major changes such as school transfers in terms of ñstress.ò The ñstressò of a particular event includes not only the event itself (the ñstressorò) but also the individualôs response

to that stressor (Blom et al., 1986; Compas, 1987). Individual responses vary due to perceiving an event as positive, negative, or neutral (Tolan, Miller, & Thomas, 1988), individual physiology (Mattarella-Micke & Beilock, 2013), and personal characteristics (American Academy of Child and Adolescent Psychiatry, 2011; Barber & Olsen, 2004; Jason et al., 1992; Medway, 2002).

Perceptions of events. Stressors are not necessarily purely negative; events that most people consider positive (such as a job promotion) can be stressful as well (Blom et al., 1986). ñEntering a new schoolò and ñmoving to a new school districtò are commonly included on scales for assessing individualsô stressful experiences (Blom et al., 1986; Coddington, 1972; Sandler & Block, 1979; Yamamoto, 1979). Childrenôs perceptions as to whether events are positive or negative have been found to vary in part based on how predictable or usual those events are. Normal developmental transitions, such as starting high school, are rated positively by adolescents, whereas transferring schools at non-normative times is rated negatively (Tolan et al., 1988).

Physiological responses. Stressful events, however, are not simply a matter of psychological perceptions; they also manifest in physical responses. Our current understanding of the physical processes underlying these responses is that stressful events prompt the adrenal cortex to release glucocorticoids, which in turn are believed to affect limbic structures and the frontal cortex, thereby impairing cognitive functioning (e.g., memory, learning) (Sauro, Jorgensen, & Pedlow, 2003). There is evidence that there are significant relationships between stressful occurrences, levels of glucocorticoids (e.g., cortisol), and impaired cognitive functioning (Sauro et al., 2003), although it also appears

that the individual must respond emotionally in order for the ñstress hormonesò to affect cognition (Mattarella-Micke & Beilock, 2013).

Personal characteristics. Childrenôs specific emotional, mental, behavioral, and physical responses to stressful life events like moving to a new school are likely to vary depending on their personal characteristics such as gender and special education status (Barber & Olsen, 2004; Jason et al., 1992). Girls are more prone to react with internalizing responses such as depression and anxiety, whereas boys are more likely to react externally (Attar et al., 1994). Students receiving special education services are likely to have worse responses to transitions like school transfers (Jason et al., 1992; Medway, 2002). Students who are experiencing academic or behavioral problems are likely to have more trouble with school transfers, since they particularly need structure and consistency in their environments (Medway, 2002).

Children may also respond to school changes differently as they age (Medway, 2002). Moves in a childôs first year of school are considered especially challenging because they are still adjusting to being apart from their parents (American Academy of Child and Adolescent Psychiatry, 2011); the added insecurity of changing school may cause them to feel too insecure to confidently form new relationships or learn new things. Among elementary school children, students experiencing major transitions like school, family, or residential changes may respond by clinging to the teacher, hitting classmates, teasing other children, competing for their parentsô attention, withdrawing and not relating to peers (Blom et al., 1986); aggressive responses are more likely around the time of the transition, but not later (Attar, Guerra, & Tolan, 1994). Adolescents may also have more difficulty when changing schools, because peer groups are highly important at this

age (American Academy of Child and Adolescent Psychiatry, 2011) and because they may feel an increased sense of lack of control over these changes along with the physical and emotional changes they are experiencing (Hendershott, 1989). Adolescent students who experienced major negative life events were significantly more likely to later have lower grade-point averages and higher rates of depression or anxiety (Dubois, Felner, Brand, Adan, & Evans, 1992).

Adjusting to New Settings

In addition to dealing with the stress of life events like changing schools, children must find ways to adjust to their new settings. These responses are a series of ñtasksò that children perform: maintaining a sense of self, making new friends, forming relationships with new teachers, and learning new academic expectations. These tasks require continual adjustment and responses on the part of the individual (Compas, 1987).

Maintaining sense of self. It may be difficult for children to feel a sense of continuity of their own identity as they experience the changes in relationships and environments that accompany school transfers. Children may experience anxiety as they struggle to cope with this perceived threat to self; school changes and other disrupting events ñchallenge the individualôs capacity to hold on to a sense of continuityò (Youell, 2006, p. 81). Because childrenôs identities are formed and maintained via their social relationships, in new settings with new relationships, children have to develop new roles and identities. This can be a challenging process for mobile students (Blom et al., 1986) as they find themselves in social contexts with children and adults who lack any prior familiarity with them.

Adolescents may particularly have difficulty in this regard. Mobility, at least in the year following a move, negatively impacts adolescentsô feeling of mastery over their environment, an important aspect of childrenôs sense of self (Hendershott, 1989). However, studies have not found clear evidence that adolescents experience declines in self-image due to transfers alone (Tolan et al., 1988; Warren-Sohlberg & Jason, 1992). Thus, while there is some evidence that adolescents struggle to maintain consistent identities when they change schools, there are likely additional factors that impact their ability to adjust and succeed in new environments

Relationships with peers and teachers. Childrenôs relationships with peers of their own age as well as teachers and other school-based adults are important aspects of their personal and social well-being. Transferring students lose connections to friends and teachers at their old schools and must form new relationships at their new schools. These transitions are accompanied by a myriad set of emotional, social, and psychological implications. However, the degree to which their new teachers and peers accept and support new students can make a difference in transitioning studentsô success.

Students who change schools experience a loss of relationships with peers at their old schools and are faced with the task of forming new relationships with peers at their new schools (Blom et al., 1986). One student in California who changed schools once during middle school and twice during high school illustrates the emotional impact of these losses: ñI minded [changing schools] because I started having good friends and it was hard losing themò (Rumberger et al., 1999, p. 38).

In addition to dealing with the loss of relationships, transferring students also have to adapt to new social groups (American Academy of Child and Adolescent

Psychiatry, 2011; Gruman et al., 2008; South & Haynie, 2004) and ñfind a niche among strangersò (Blom et al., 1986, p. 138). Mobile students are faced with the challenges of making new friends, which takes time; some students choose ñto get out of [school] as quickly as possible and go on to something elseò and thus do not form new friendships at all in the new school (Rumberger et al., 1999, p. 38).

As mobile students work to adjust to these losses and social challenges, their engagement with peers at school can suffer (Fantuzzo, LeBoeuf, Chen, Rouse, & Culhane, 2012; Gruman et al., 2008; Rumberger & Larson, 1998). Typically, compared to non-mobile students, mobile students have fewer friends (Langenkamp, 2011; South, Haynie, & Bose, 2007) and friends with relatively low academic performance (South et al., 2007), are less centrally located in peer networks (South et al., 2007), and participate less in extracurricular activities (Langenkamp, 2011); these factors may help explain why mobile students are more likely to drop out of school (South et al., 2007) and have lower grade point averages (Langenkamp, 2011).

Positive relationships with teachers, which are important for all students, can be difficult to form for mobile students. Building these relationships takes time (Pianta, 1999), and a student who changes school frequently may not form supportive relationships with any school-based adults. This is likely why mobile students have lower levels of bonding with their teachers (Langenkamp, 2011). It is possible that students who transfer schools due to administrative decisions (e.g., placement in special education or alternative schools) may be apt to view adults in the new school with suspicion and distrust.

It is also important to note that behavioral norms and expectations can differ greatly between schools (Bradshaw, Sudhinaraset, Mmari, & Blum, 2010; Jason et al., 1992; Lareau, 2011). School norms are important aspects of how schools function (Schneider, 2000); if they are not communicated clearly, new students may lose time in trying to understand how to fit in and this could distract them from their school work. The effect of childrenôs transitions varies based on how well ñthe balance between challenge and supportò in the two settings is appropriate for the child considering his or her developmental needs (Bronfenbrenner, 1979, p. 288). School factors, such as teacher support and peer acceptance, can play a protective role in moderating the effects of mobility on engagement and achievement (Blom et al., 1986; Gruman et al., 2008; Medway, 2002; Osher et al., 2003).

Adjusting to new academic expectations. Along with these social-emotional issues with sense of self and relations with others, mobile children have cognitive challenges related to school transfers. Changing schools often entails gaps or repetitions in coursework and curricula (American Academy of Child and Adolescent Psychiatry, 2011; Bradshaw et al., 2010; Rogers, 2004). Varying academic standards and expectations, or what Rumberger et al. (1999) called ñcurricular incoherence,ò can pose challenges for mobile students when they are expected to repeat material they have already mastered or when it is assumed they have already mastered material upon which new learning is being scaffolded (Jason et al., 1992). There is some evidence that mobile students have difficulty engaging with academic tasks at school (Rumberger et al., 1999; Fantuzzo et al., 2012). These are likely due not only to the social-emotional challenges that accompany any transition but also to the lack of coordination among schools and

adults in childrenôs academic lives when receiving schools fail to attend to curricular changes or the individual needs of new students.

In summary, the process of moving to a new school entails a number of specific challenges for students. First they must deal with their own psychological and physiological responses to the stress of the transition. Then they must adjust to their new settings by maintaining a stable identity in the midst of new environments, and they must deal emotionally with the loss of old teachers and friends and at the same time form new relationships with adults and peers at the new school. On top of these personal issues, children are usually expected to adjust to different academic expectations and structures.

Children who are experiencing a change in schools but stability in other areas can normally deal with all of these adjustment tasks because they have the emotional support of caretaking adults in the home arena, which provides comfort and familiarity to balance the changing environment of school. The stable aspects of family and neighborhood, important environments for children in addition to school, give children places where they can continue to feel like themselves and have familiar relationships. All of these settings and relationships are part of childrenôs ñhomesò that nurture childrenôs development (Adam & Chase-Lansdale, 2002). However, as will be discussed in the next section, children experience additional challenges when these other ñarenas of comfortò are also arenas of change.

Types of School Changes

Students change schools for a variety of reasons. Such transfers can involve concurrent changes in one or more other arenas: peer group (e.g., moves by an individual student, not the entire group), educational setting (e.g., from public to private school),

residence (e.g., family moves to a new home), family structure (e.g., divorce), or family circumstances (e.g., financial hardship).

Non-promotional transfers can be expected to be more stressful for children than promotional transfers, because the changes in childrenôs ñarenas of comfortò that occur along with school changes are likely to exacerbate childrenôs stress and difficulties adjusting to the new school setting (Adam & Chase-Lansdale, 2002; American Academy of Child and Adolescent Psychiatry, 2011; Blom et al., 1986; Filippelli & Jason, 1992; Jason et al., 1992; Pribesh & Downey, 1999; Simmons et al., 1987; Warren-Sohlberg et al., 1998). ñIf change é occurs in too many areas of life at once, then individuals may experience considerable discomfort é with self and discomfort with the world. Such children may not feel at one with themselves or at home in their social environmentsò (Simmons et al., 1987, p. 1231). When children lose the stable base of key relationships and the comforting arenas where they can safely conduct the necessary adjustment tasks, their ability to successfully deal with school changes is likely to suffer.

Prior research on childrenôs psychological, social-emotional and academic adjustment to school changes has not examined the full range of concurrent changes that occur with these school transfers. Much of the existing research on mobility has treated school changes as isolated events, ignoring the changes in other arenas that usually accompany a transfer. ñRecognizing these various types of moves as distinct is important, as they may have different ramifications for studentsô social ties and hence their educational performanceò (Pribesh & Downey, 1999, p. 522).

Understanding the full range of school changes requires understanding the school processes that prompt them. All school transfers are brought about by a ñtriggerò event:

some kind of occurrence or decision made by the studentôs family, school administrators, district leaders, or possibly the student him- or herself. The most common event for school changes is the promotion of students from one grade level to the next. Some group transfers are due to district-level decisions about zoning boundaries or school closures. The trigger event for individual moves most often is a change in the residence of the studentôs family such that the family moves from one school attendance zone to another. Behind residential moves lie additional trigger events or reasons for the familyôs move. In some moves, the household composition remains intact and studentsô attachment figures remain in the home; this is often the case when the family is moving to what they perceive as a more suitable location or better school district. However, other moves are due to family changes due to death, divorce, or remarriage; in these moves the child has to adjust not only to a new neighborhood but also the emotions and relationships surrounding the family structure changes. Still other moves may be due to family financial issues such as parental job loss, financial strain, or eviction.

A substantial number of school moves are triggered not by residential changes but by some kind of decision about the studentôs educational setting, such as the parentsô choice to move the student from private to public school, or an administrative decision to place the student in a special program (e.g., special education or alternative setting). Sometimes, families and students are offered ñschool choiceò which enables them to enroll in any school in the district (often with an application and approval process).

Grouping all these trigger events together using the monolithic concept of ñmobilityò or simply dividing them into residential and non-residential transfers masks distinct processes and events. Promotional transfers and transfers that are due to school

closures or attendance zone boundary changes are not directed at a particular student and in fact in these situations all other environmental factors remain relatively stable. On the other end of the scale are school transfers that are concurrent with residential changes, changes in family structure or changes in the familyôs economic well-being. Thus, all school transfers can be conceptualized in reference to the extent of changes happening in other arenas of the studentôs life. Figure 1 displays this conceptual framework for school transfers. The next section discusses each of these types of school changes in more detail.

No social group change		Social group change				
		No change in residence		Change in residence		
No other change (closure/ rezoning)	Change in school level/ organization (promotion)	Change in educational setting (parent-initiated)	Change in educational setting (school-initiated)	No family change	Family structure change	Family financial stress
Type 1 (0 arenas change)	Type 2 (1 arena change)	Type 3 (2 arenas change)	Type 4 (2 arenas change)	Type 5 (2 arenas change)	Type 6 (3 arenas change)	Type 7 (3 arenas change)

Figure 1. Conceptual framework for school changes with changes in social, educational, residential, and familial environments.

The Varying Effects of School Changes on Academic Performance

School transfers can be categorized according to the underlying changes occurring in the studentôs life that trigger the transfer. The degree to which additional changes are occurring indicates the degree of stability or instability in these childrenôs lives at the time of the school changes. As the degree of instability increases, children have fewer ñsecure basesò or ñarenas of comfortò to help them process and cope with school and other changes.

Types 1 and 2 occur without any change in the childôs social group; the remaining types occur when the child transfers alone and thus does experience change in social group. Types 3 and 4 occur without any change in the childôs residential environment but with changes in the type of educational setting; Types 5, 6, and 7 occur with changes in the childôs residential environment.

The categorization of transfers into residential and non-residential transfers was used by Rumberger and Larson (1998), Swanson and Schneider (1999), and Pribesh and Downey (1999). My typology goes further in breaking down non-residential transfers into those that occur without any other change (Type 1), those that occur with change in school organization (Type 2), and those that occur with change in educational setting (Types 3 and 4), and residential transfers into those that occur without a major change in family setting (Type 5) and those that occur with major changes in the family setting (Types 6 and 7). Next I discuss each type of change in more detail.

School Changes with No Change in Social Group

Type 1: School changes with no social, educational, residential, or familial changes. Type 1 school changes are due to district-initiated changes in school assignment (e.g., rezoning, school closure). Type 1 changes include the non-normative transfers that occur due to district-level decisions about school assignments. School systems re-assign school boundaries and sometimes close schools or build new schools due to changes in population. In the years since implementation of the No Child Left Behind Act of 2002, school systems have also increasingly closed schools due to low performance.

These district-initiated changes occur without any other changes specific to a child or his or her family, and generally occur with entire groups of students at the same

time. The social and peer support provided by moving with the collective may afford some protection that more solitary moves do not (Bronfenbrenner, 1979; Langenkamp, 2011). The child retains ñarenas of comfortò within which he or she can safely process the stress of changing schools. Thus, these can be considered highly stable transfers.

The school openings and closings that result from changes in population have not been studied in terms of their effects on studentsô performance. Closures that result from low performance under NCLB school accountability systems, however, have drawn increasing levels of community interest and involvement, thus prompting some researchers to investigate the effects of closures on student outcomes. Findings on the impact of these accountability-based school closures on students are mixed. In a study of 44 school closings across the Chicago public school district from 2001 to 2009, de la Torre and Gwynne (2009) found that while students experienced some immediate losses (i.e. decreases in reading and math performance within the year that the school closing was announced, decreased likelihood of attending summer school the summer immediately following), studentsô performance after moving to other schools returned to their expected trajectories one year afterwards. This ñreturn to normalò persisted two and three years after the moves. However, another study of a single urban high school in a western state had different results, finding that the schoolôs closure in 2006 resulted in significant losses in reading, writing and math performance as well as increased dropout rates and decreased graduation rates (Kirshner, Gaertner, & Pozzoboni, 2010). Interviews with students revealed struggles with social connections and lack of support in receiving schools (Kirshner et al., 2010). Because each school closure entails unique circumstances, there are likely differences in how school staff, families, and students

perceive and react to these changes. Warren-Sohlberg and Jason (1992) hypothesized that schools in the process of closing are able to prepare their students for the transition and thus ñbufferò them from negative effects. It is also possible that transferring as a group provides children continuity with peers and ongoing social supports that students experiencing other types of transfers alone do not have (Warren-Sohlberg & Jason, 1992).

In summary, Type 1 changes are relatively stable; the only change is the change involved in moving from one school to another. Usually they involve children moving together as a group to a new school. Although children must adjust to new teachers and potentially different academic expectations, they retain relationships with peers and still have other ñarenas of comfortò providing stability and security. There is no clear indication that these transfers are harmful in terms of academic outcomes.

Type 2: School changes with changes in school organization (promotional transfers). When students are promoted from one grade span grouping to another (e.g., from elementary to middle school), the school environment and organization change, but their peers, residence, and family remain the same. These promotional transfers are therefore a relatively stable type of school change. Normative transfers from elementary to middle and middle to high school are designed to occur when children are developmentally ready for larger and more impersonal school environments and increased content specialization by subject (Youell, 2006). Such changes ñare seen as moving on to the next stage of lifeò (Youell, 2006, p. 74), a positive developmental benchmark (Tolan et al., 1988).

Although they rate these transitions positively, students demonstrate general declines around these times, in such markers as school grades, interest in school, intrinsic motivation, self image, and self confidence (Wigfield, Eccles, & Pintrich, 1996). While these declines are often attributed to the developmental challenges students face during adolescence, other evidence suggests that they are due to school environments that are a poor fit for childrenôs developmental needs (Eccles et al., 1993; Wigfield et al., 1996; Seidman, Aber, Allen, & French, 1996). It is also possible that the negative transition experiences are no different from regular grade-to-grade transitions within the same school. Research on the effect of normative school transitions has largely focused only on the years just prior and just after the transitions, neglecting to compare studentsô transition experiences to their experiences at other grade-level transitions where school changes are not involved. Barber and Olsen (2004) did include such comparisons and found that declines in academic performance as well as personal and interpersonal domains persisted at each grade-level transition after entry to middle school, not just at the school transitions.

Studentsô experiences with normative school transitions vary based on their background and other experiences at these times. There is some evidence that family problems such as parents divorcing, changing residence, or financial stress exacerbate the transition to middle school (Barber & Olsen, 2004). Transition experiences also can be better or worse depending on studentsô race and gender; for example, girls may be able to better navigate the transition to middle school due to stronger feelings of connectedness to school, but this pattern reverses at the transition to high school (Akos & Galassi, 2004). Minority students in one study also reported higher levels of helpfulness of school

counselors compared to white students at both transition times (Akos & Galassi, 2004), which may help ease transition problems.

Overall, these findings suggest that while it is commonly believed that the changes to middle and high school are problematic for students, it is likely not the transitions *per se* that cause observed declines; rather, there is a general pattern of decreasing academic performance that is also affected by specific school environments and student characteristics.

School Changes with Change in Social Group but No Residential or Family Change

In contrast to the school changes that entire groups of students experience together, individual changes involve changes in social group as well as school environment. Some of these ñsoloò changes involve a change in the type of educational setting, such as when children transfer from the private sector to public school, or from a regular education setting to a specialized program or school. Other solo changes are due to changes in the studentôs residence. Residential changes can further involve other family-based changes.

A substantial portion of school changes are due to either parent- or school-initiated placement decisions. Parent-initiated transfers occur when families remain at the same residence but send their child to a new school (e.g., private school or public magnet or charter school). School-initiated transfers occur when school administrators place children in a different educational setting (e.g., special education placement). Both types of transfers involve a child-specific decision that is based on changing (and ostensibly improving) the educational setting for the child. While these children retain the security

and familiarity of the home and neighborhood environments, there is a distinct qualitative difference in educational setting.

Type 3: School changes with parent-initiated change in educational setting. Parents can choose to transfer their children from public to private school (or vice versa) or, where local district and state policies allow, to magnet, charter, or other public schools. Further, under NCLB, parents of children at low-performing Title I schools were provided the option to transfer to district-designated higher-performing schools (Vernez, Naftel, Ross, Le Floch, Beighley, & Gill, 2009). The available evidence suggests that there may not be any effect on achievement for students participating in Title I choice (Zimmer, Gill, Razquin, Booker, & Lockwood, 2007); however, there has not been a great deal of research on the impact of these kinds of transfers on student achievement. Another kind of choice-based mobility occurs when secondary students (or their parents) aim to make a ñfresh startò by switching to a different high school. These moves are likely to be unsuccessful during the junior or senior year of high school, but are likely to pay off in improved graduation rates if made in 10th grade or sooner, as long as the student weathers the short-term stress of changing schools (Swanson & Schneider, 1999). Thus the effect of parent-initiated transfers may be neutral or positive, depending on the circumstances.

Type 4: School changes with school-initiated change in educational setting. In addition to parent-initiated decisions, school staff can make the decision to transfer a student who is not being successful. Kerbow (1996) raised the point that ñsome students who are having difficulty either academically or behaviorally may be ócounseledô out of a schoolò (Kerbow, 1996, p. 10). Students with emotional and behavioral disorders are

more likely to experience school mobility due to these administrative transfers (Osher et al., 2003). Transferring students to special education or alternative schools is done in order to place students in educational settings that provide for their special needs. These placements are sometimes made to alleviate burdens in traditional schools that are unable or unwilling to provide the necessary supports.

In both parent- and school-initiated transfers in educational setting, it is likely that children were experiencing difficulties in the original setting that prompted parents or school staff to feel that a move was necessary. Regardless of the motives of school staff or parents, if studentsô new schools do indeed provide supports, programming and instructional strategies that are better suited to these studentsô needs, then the net impact may be a positive one. ñTo the extent that teacher or classroom changes enhance the ability of the child to benefit from the academic program and establish positive relationships, these forms of mobility may enhance the school adjustment of students with learning and behavior challengesò (Osher et al., 2003, p. 87). However, these transfers could also result in negative impacts, exacerbated by the problems that these students may have in adjusting to new settings as well as the stigma they may face in being identified as students with special needs or as behavior ñproblems.ò

In summary, Type 3 and 4 transfers are done on behalf of the student with the implied or explicit goal of improving the childôs educational environment or providing a better ñfit.ò The goal for these types of transfers is to place the child in a school that is markedly different from the childôs old school, whether in terms of perceived quality or social or academic appropriateness for the child. ñAlthough disruptive, a change of schools can afford an important opportunity to improve the quality of a studentôs

education. In particular, a different school may provide a new learning environment that conforms more closely to a familyôs educational values and expectations or better accommodates the academic needs of a specific studentò (Swanson & Schneider, 1999, p. 56). Thus, the children experiencing these kinds of transfers can be understood as experiencing a more drastic change than that involved in Type 1 transfers. In addition, these students are not transferring with a group and thus lose relationships not only with teachers but also peers. The academic structures and expectations in the new school are likely more different than those in Type 1. Thus, adjusting to these new settings can be expected to be more difficult.

School Changes with Change in Social Group and Residence

In contrast to school changes in which no residential change occurs, Type 5, 6, and 7 changes are triggered by a studentôs residential move. Most school changes (about 60 percent) are due to such changes in the studentôs familyôs residence (Kerbow, 1996; Rumberger & Larson, 1998). However, within the category of residential school transfers, researchers to date have had limited access to detailed records and thus there has been very little research making the distinction between relatively stable moves, in which the household composition remains the same and family circumstances are relatively stable, and more unstable residential moves, which are triggered by family structure changes or negative family situations such as job loss or eviction.

Type 5: School changes with change in residence but no family changes. As previously discussed, any residential move, whether or not it entails a school change, can be stressful and disruptive for children (Adam & Chase-Lansdale, 2002). When school transfers are triggered by residential change, students are moving in isolation and do not

have the protective buffer of moving with the group as seen in Types 1 and 2. In these solo residential transfers, children must deal not only with transferring to a new school environment but also a new residential setting. These children must deal with maintaining a cohesive sense of self, the loss of relationships and formation of new ones, and adjusting to new social settings and expectations not only in school but also in the neighborhood setting. In situations where students change schools and residences at the same time, students experience changes in two of the most influential contexts simultaneously, causing significant disruption for students. This disruption can be understood in reference to childrenôs need for continuity and stability, both in terms of their sense of self (Rumberger et al., 1999) and their social relationships (Pribesh & Downey, 1999). One student who changed schools and residences four times during the course of middle and high school characterized these transitions as having ñóreally shattered my personalityôò (Rumberger et al., 1999, pp. 37-38). Investigations into the combined effect of school and residence changes show that this combined instability can be damaging for children. Students who move and transfer are more likely to drop out of school (Rumberger & Larson, 1998; South et al., 2007), fail to complete high school (Rumberger & Larson, 1998) and have lower math performance (Pribesh & Downey, 1999).

Type 5 school changes occur when a student transfers schools because of a family move to a new residence, but there are no other major changes in the childôs family environment that would be expected to have a significant impact on the student (such as change in family structure or financial strain). Simply moving to a new home is not in itself considered a positive or negative change (Tolan et al., 1988). These moves may be

due to significant changes in the family, such as birth of a new child or parents getting a new job (Pribesh & Downey, 1999), but do not involve changes that children perceive negatively (Tolan et al., 1988). In these moves, although children must adjust to new school and residential settings simultaneously, they do have the stability of family to provide an arena of comfort.

Some Type 5 changes are viewed as ñstrategicò for the improvement of the childôs educational setting (Anderson, Leventhal, & Dupéré, 2014). Families with young children and those that are more advantaged are more likely to move in order to send their children to better schools (Anderson et al., 2014). There is some evidence that these strategic moves may lead to improved academic outcomes (Swanson & Schneider, 1999). Moves to new districts, not just new school attendance areas, appear to be linked to improvements, but this effect is not consistent for all racial groups (Hanushek, Kain & Rivkin, 2004; Mehana & Reynolds, 2004; Xu, Hannaway, & DôSouza, 2009); African-American students do not appear to move to higher quality schools as often as white students do (Hanushek et al., 2004; Xu et al., 2009).

A number of individual factors help determine how children respond to residential moves. The subjective experience of moving varies among children; those experiencing a single residential change may not have the negative emotional responses that characterize ñstress.ò It is possible that children whose families express positive feelings about the residential move have no negative effects, whereas ñif the family attitude toward moving or toward this particular move is negative, then it is likely that the childôs attitude will be negativeò (Medway, 2002, pp. 1464-1465). There is also some evidence that childrenôs personalities in terms of introversion influence their response to moving. One study

found a negative correlation between residential moves experienced as children, and well-being as adults; this relationship was mediated by introversion and a relative lack of close social relationships (Oishi & Schimmack, 2010). Introverts who had moved frequently as children were more likely to have died during the 10-year follow-up (Oishi & Schimmack, 2010).

As children age, their responses to residential mobility are due more directly to their own involvement with neighborhood peers rather than indirectly via their parentsô responses to moving. In adolescence, mobile children may exhibit higher rates of externalizing behaviors (acting out and aggression) and internalizing behaviors (anxiety and depression); these relationships do not appear to be explained by what is going on at home and rather may be ñbecause moving may compound the challenges of other transitions including pubertal development, school changes, and shifting peer groupsò (Anderson et al., 2014, p. 77) or because ñyouth who move may affiliate with delinquent peers or experience peer rejection and victimizationò (Anderson et al., 2014, p. 77).

Childrenôs adjustment to residential changes may also be impacted by processes going on at home. Children who moved and were living with both biological parents did not appear to have significantly poorer school performance (except those with 8 or more moves); children who did not live with both biological parents and who moved more than once had significantly greater likelihood of poor school performance (Tucker, Marx, & Long, 1998). Family contexts may be especially influential for younger children. There is evidence that in early childhood, mobile children have significantly lower quality family processes, which are in turn related to significantly lower math and reading achievement and greater rates of externalizing behaviors; this family process effect may have been due

to added strain of dealing with small children or ñcoping with shifting parenting demands that are somewhat less relevant in later periodsò (Anderson et al., 2014, p. 76).

In summary, Type 5 moves are characterized by residential change which triggers a school transfer. These changes entail significant changes for children as they must deal with losing relationships with peers and teachers and forming new ones. They must maintain a stable sense of self in both a new school setting and a new neighborhood setting. School processes and expectations may also be different in the new school, although not to the degree that occurs when children move to a new sector or school type, as in Type 3 and 4 moves. These students undergo significant changes but do still have stability in terms of their larger family context.

Types 6 and 7: School changes with change in residence and family changes. The greatest amount of instability for mobile students occurs with school moves that are triggered by family events involving not only a residential change for the student but changes in other important areas as well. The most common of these is when a student moves due to changes in family structure (Type 6). Other school changes are based on family changes including eviction, parentôs job loss, or parent incarceration (Type 7). With these family changes and stressors on top of residential and school changes, children have lost all of the primary arenas of comfort and secure bases that could have provided stable, reassuring places and people to help them deal with such changes.

Type 6 school changes are triggered by residential moves that are due to parents divorcing, remarrying, moving out of or into a partnerôs home, or moving in with other family members. When a child loses a member of the household to whom he or she has formed a close attachment, and the child perceives that communication with this

attachment figure is threatened, the child can respond with responses of fear, anger, or sadness (Kobak & Madsen, 2008). The changes in studentsô and familiesô social networks that occur when parents break up are likely to erode the social relations and thus the social capital necessary for childrenôs development (Coleman, 1988; Pribesh & Downey, 1999). There is some evidence that multiple changes in family structure are themselves harmful for children (Adam & Chase-Lansdale, 2002; Fomby & Cherlin, 2007).

However, there is also evidence that family disruption does not directly impact childrenôs outcomes, at least for adolescents (South et al., 2007). Langenkamp (2011) found that family structure change did not affect middle and high schoolersô cumulative GPA, although it did have a negative effect on high school math course attainment for middle school students. Some argue that the negative effects of family structure changes are due not to the changes themselves but characteristics of these parents that exist prior to the changes (Adam & Chase-Lansdale, 2002; Fomby & Cherlin, 2007).

Aside from moves due to changes in family composition, residential moves that are accompanied by other negative family events such as job loss or eviction (Type 7) can be especially problematic for children (Coleman, 1988; Pribesh & Downey, 1999; Warren-Sohlberg & Jason, 1992; Wood, Halfon, Scarlata, Newacheck, & Nessim, 1993). Families experiencing financial strain are more likely to move more frequently. Although researchers define ñfrequentò moves differently (e.g., 3 or more moves; 5 or more moves), these high levels of residential mobility have been found to significantly relate to negative outcomes for children: students who moved 3 or more times are at twice the risk for repeating a grade as children who had never moved (Simpson & Fowler, 1994); children who moved 5 or more times are 35% more likely to be retained in grade and

77% more likely to have a higher number of behavior problems (Wood et al., 1993). Students who experience multiple transitions do not gain an ñinoculation effectò by which they become desensitized to repeated stressors over time (Crockett, Petersen, Graber, Schulenberg, & Ebata, 1989, cited in Jason et al., 1992), contrary to conventional wisdom (Blom et al., 1986).

With these frequent Type 7 moves, childrenôs homes ñare chaotic enough to affect their academic performanceò (Warren-Sohlberg & Jason, 1992, p. 83). Such chaotic environments may be becoming more common; there appears to be ñgrowing chaos in the lives of families, in child care settings, schools, peer groups, youth programs, neighborhoods, workplaces, and other everyday environments in which human beings live their lives. Such chaos interrupts and undermines the formation and stability of relationships and activities that are essential for psychological growthò (Bronfenbrenner & Morris, 2006, p. 824).

Students from low socioeconomic status (SES) families are more likely than higher-SES students to experience school changes overall as well as school changes that are combined with family changes (Hanushek et al., 2004; Rumberger & Larson, 1998). Reasons for residential moves show clear delineations by socioeconomic status. More highly educated and higher-income families are more apt to maintain family and financial stability (i.e. Type 5 moves); more disadvantaged families tend to move for family-related reasons (i.e. Type 6 and 7 moves) (Schacter, 2001). Poorer students are also more vulnerable to the negative effects of mobility (DuBois, Felner, Meares, & Krier, 1994) and may experience greater declines, at least in the year immediately following a move (Hanushek et al., 2004). Alexander, Entwisle, and Dauber (1996) hypothesized that ñthe

family side of moves is what is important ï changes of residence, changes of guardianship, temporary relocations, and the likeé . Such dislocations é must be hard on children and would be expected to interfere with their academic routineò (Alexander et al., 1996, p. 10).

In summary, Type 6 and 7 school changes are accompanied by the greatest degree of change in the childrenôs lives. They lose the relationships with peers and adults not only from their old school but also from their old neighborhood. They are likely losing connections with significant adults in their homes as well. Maintaining a coherent identity across all of these new settings likely poses a significant challenge for children and adolescents. The different social and organizational expectations of the new schools, neighborhoods, and family settings pose multiple, simultaneous challenges. With all of the concurrent changes, there is a marked lack of any stable, safe place for children to experience the stability necessary for processing these adjustment tasks. It is likely that these changes would produce the most precipitous declines in academic performance.

Understanding these disparate types of school changes according to the degree of change taking place in childrenôs social, educational, residential, and familial environments is key to understanding what children experience when they transfer schools and, thus, to accurately estimating the effects of school mobility on academic performance. It is precisely this ñdegree of change or discontinuity in [childrenôs] environmentsò that has been identified as deserving the attention of researchers (Adam & Chase-Lansdale, 2002, p. 803). School changes where the social, educational, residential, and familial environments are stable (Type 1) are likely to have neutral effects. In contrast, children undergoing change in more of these arenas have fewer safe places for

processing change and successfully completing the tasks required for healthy coping (maintaining personal identity, forming relationships, adjusting to new expectations). Thus it is likely that school changes further along the spectrum of this typology will result in greater declines in academic performance.

Summary

School mobility is a complex phenomenon that researchers, hampered by limited data, do not yet fully understand. Changing schools, once thought of as one among many stressful events that occur in childrenôs lives, entails unique adjustment processes for mobile students. These children must maintain a continuous sense of identity as they move from one setting to another, deal with the loss of relationships and form new ones, and become accustomed to new educational processes and expectations. Having one or more ñarenas of comfortò in stable environments such as home and family provides mobile children with safe places to conduct these adjustment tasks. A typology that categorizes school transfers according to the degree of change in other environments may be useful in disentangling the effects of mobility on academic achievement.

CHAPTER THREE

METHODS

The conceptual framework outlined in Chapter 2 posits school changes in terms of whether they are accompanied by changes in social group, changes in educational setting, or residential change with or without additional family changes. School changes can be categorized into seven types depending on which of these environmental changes occurred along with the school change. The aim of the present study was to investigate the relationship between changing schools and academic achievement in the year of the school change, and the variation in this relationship among these different types of concurrent changes in children's social, educational, residential, and familial environments. This chapter discusses the sample, measures, and analytic methods used.

Data Set and Sample

This study used a pre-existing de-identified data set that was created from a retrospective study of student mobility in Maryland that took place in 2001 to 2003 using administrative data from student administrative records (Rogers, 2004). The original study used proportional stratified sampling based on district and grade-level (elementary, middle, and high) enrollment to randomly select 315 schools (117 elementary, 110 middle and 88 high schools) from all 24 school districts in the state.[1] Thus the school sample is representative of the population of public schools in Maryland in 2001.

Teams of data collectors, including myself, traveled to each school in the sample to review student records. At each school, the roster of one fifth-, eighth-, or twelfth-

[1] Special schools (e.g., alternative or special education) were excluded from the sample frame.

grade classroom was selected for student record review.[2] Data were collected from the cumulative hard-copy records of 7,803 students. At no time were the students themselves contacted or involved in the study. Demographics (gender, race/ethnicity, free- and reduced-price meals) of the student sample were not statistically significantly different from overall student demographics in the state (Rogers, 2004).

We sampled students who were in fifth, eighth, or twelfth grade in the 2001-2002 or 2002-2003 school years. These students could have been retained once or multiple times along the course of their schooling since first grade. Thus, the students were not all enrolled in the same grades at the same time. The advantage of this design is that it minimizes the historical effects that may be unique to a specific school year. For example, as seen in Table 1, students in the sample could have been enrolled in Grade 1 any time between the 1987-88 school year and the 1998-99 school year. A twelfth-grade student who was sampled in 2000-01 and had never been retained in grade would have been in eighth grade in 1996-97, fifth grade in 1993-94, and first grade in 1989-90. Due to incomplete school histories, the dataset does not include records going all the way back to first grade for all students.

[2] At the selected elementary school in Kent County, a fourth-grade classroom was selected, because at the time the highest grade in all Kent County elementary schools was grade 4.

Table 1

Number of Records by Selected Grades and School Year (Full Sample)

School Year	Grade 1	Grade 5	Grade 8	Grade 12
1987-88	10	0	0	0
1988-89	129	0	0	0
1989-90	1,352	0	0	0
1990-91	132	0	0	0
1991-92	4	10	0	0
1992-93	49	64	0	0
1993-94	557	1,493	0	0
1994-95	1,660	142	9	0
1995-96	58	3	61	0
1996-97	845	28	1,618	0
1997-98	1,900	519	150	0
1998-99	30	1,870	0	2
1999-00	0	4	5	20
2000-01	0	699	503	1,786
2001-02	0	2,192	2,031	149
Total	6,726	7,024	4,377	1,957

Note. The total number of records for a particular grade includes multiple records for students who repeated that grade.

Measures

Dependent Variable: GPA

Student academic grade point average was the outcome of interest for this study. The original data set included annual report card grades, in points based on the original grading scale, for any classes in the four core academic subject areas (English/ reading/language arts, math, science, and social studies) as well as the grading scale used.[3] These were converted into a four-point grade point average (GPA) for each year,

[3] Maryland public schools are required to maintain student records (Code of Maryland Regulations 13A.08.02), using minimum standards established by the Maryland State Department of Education (MSDE, 2008). These standards include records of studentsô annual performance. For grades 1 through 5, the record must include each subject and the year-end summary of performance; for grades 6 through 8, each subject and the cumulative mark earned (this may represent a one-semester or a two-semester course); for grades 9 through 12, courses and the cumulative mark earned and number of credits earned toward graduation (MSDE, 2008).

using the formula GPA = (4 x total points earned) / (number of classes x number of points on grading scale). For example, a student who took 5 classes in the core academic subject areas and received a ñ2ò on a 3-point scale in each class would have a GPA for that year of (4 x 10) / (5 x 3) = 2.67 on a 4-point scale.

It is important to note that the outcome of interest for this study was general performance in school, not only the degree of mastery of academic content as would ostensibly be measured by a standardized assessment. Report card marks cannot be considered objective assessments, because grading policies and procedures vary among teachers, schools, districts, and states. Further, grades are often assigned based on not only mastery of academic content but also behavior and socio-emotional learning. Report card grades are based on teachersô appraisals of studentsô success, and are good all-around measures of how well children are doing in school (Alexander, Entwisle, & Dauber, 2003). Mobile students may be likely to experience gaps in curricula due to the school change, and teachers may be more likely to grade new students poorly due to their lack of familiarity with the student and based on mobile studentsô challenges with adjusting to the new environment. Academic GPA is also an important educational outcome because it determines whether students will be eligible to graduate from high school, predicts whether students will drop out of school, and is a key predictor of college attendance (Battin-Pearson et al., 2000; Mac Iver & Messel, 2013). High school seniors in 2015 with higher grade point averages had higher mean SAT scores (College Board, 2015). Furthermore, report card grades matter to students and their families in ways that scores on standardized assessments do not (Alexander et al., 2003). It is likely that measures of school-related domains such as GPA are sensitive to changes in school and

other environments (Seidman et al., 1996; Simmons et al., 1987), making GPA a good candidate for discerning mobilityôs effects on students.

Independent Variable: School Changes

Data collectors recorded as complete a school history as possible for each student, working backwards in time from the year of data collection and going back to the year the student entered school in first grade.[4] Each Maryland public school was identified using its two-digit local education agency (LEA) code and four-digit school code. Records from private and out-of-state schools were also included in this school history; codes were created for these schools using ñ00ò for LEA and a sequence of codes starting with ñ0001ò for school (the codes for non-Maryland public schools thus do not correspond to actual school identification numbers).[5] At any point in the school history, when a transfer was indicated, the coder indicated a ñ1ò in the withdrawal field,[6] and searched the documentation in the cumulative folder to determine the ñtriggerò or reason for the transfer. Reasons were able to be determined for some, not all, of the transfer

[4] School histories were examined back to first grade, not kindergarten, since mandatory all-day kindergarten was not implemented in the state until the 2007-2008 school year (the Bridge to Excellence in Public Schools Act of 2002) and thus was not yet in effect when the sample students entered school.

[5] One benefit of the study dataset was that it included school records from studentsô entire educational histories across multiple schools, districts, states, and sectors, not just the administrative data to which researchers typically have access. Administrative achievement data typically include only report card grades or test scores that were administered in the administrative unit (e.g., school, district, or state), and are missing grades or scores from other units (e.g., private schools, out-of-district and out-of-state schools) (McCaffrey & Lockwood, 2011).

[6] In the existing data set, an annual mobility variable indicated the number of school *withdrawals* experienced by each student each year. For example, if a student transferred over the summer at the end of first grade, a withdrawal was indicated in the mobility variables for the first-grade year. However, this inaccurately indicated that mobility occurred prior to the end of the first-grade year, and growth modeling would incorrectly attribute first-grade performance to this summer transfer. In the original study, the number of withdrawals was totaled for each student over their entire school history and regression analyses were used to estimate the effect of withdrawals on the studentsô academic achievement in the final year (the year of data collection in 5th, 8th, or 12th grade). Growth curve modelling was not used, so the more precise alignment of entry into a new school in a specific year with performance in that year was not needed. In contrast, the current study used growth curve modelling to estimate the year-by-year relationship between performance and mobility. Thus, I created new variables so that an end-of-year withdrawal flags the student for mobility not in the school year prior to the withdrawal but in the school year following the withdrawal.

events. Each transfer event for which a reason could be identified was coded indicating the transfer reason or ñtriggerò in the event that a reason could be identified.[7]

Student mobility was measured by the total number of new schools attended each year as well as the number of new schools attended each year for a given reason type according to the conceptual framework (i.e., Type 1: group changes due to rezoning or school closure; Type 2: group changes due to promotional transfers; Type 3: solo changes involving a parent-initiated change in educational setting, such as from public to private school; Type 4: solo changes involving a school-initiated change in educational setting; Type 5: solo changes triggered by change in residence with no other family change; Type 6: solo residential changes accompanied by change in family structure; and Type 7: solo residential changes accompanied by family stress). Transfers for which a reason could not be determined were coded as Type 9; these missing transfer codes are discussed in more detail below.[8]

---

[7] These transfer reason codes were included in the original data set but never analyzed in the original study.
[8] The existing dataset did not contain information on all occurrences of change in the studentsô lives, only those that took place in relation to school transfers. Ideally, we would be able to observe all changes that occur in childrenôs educational, residential, and family environments ï including those that occur without a school change ï in order to ascertain the relative impact of all of these changes, alone and in combination. This would enable a comparison of achievement effects of the combinations of the various types of changes in childrenôs lives. The present study explicitly operationalized changes that occurred along with school changes. This study could not distinguish true stability from other situations where school change did not occur. Thus this study compared the performance of students with school changes that occurred with and without other changes to the performance of students with no school changes who may or may not have experienced other. The implication of this research design is that the comparison group of non-mobile students is confounded by unobserved variables (other social, educational, residential, and familial changes that are not concurrent with school changes). As a result, the effect of mobility may be underestimated, because the comparison group is not completely different from the group of mobile students.

Covariates

Panel variables. Annual variables indicating school year, school level, and whether a student is repeating the grade were included to account for the studyôs unbalanced panel design.

Student demographics. Certain student characteristics are related to achievement or differ among mobile and non-mobile student populations and were included as statistical controls in the models described below. Poverty status was measured by a dummy variable indicating whether a student received free- or reduced-price lunch (FRPL).[9] Special education and English learner (limited English proficiency) status and gender were also indicated by dummy variables, with non-special education, non-LEP, and male being the comparison categories, respectively. Race/ethnicity was collected as required by federal reporting prior to 2006 whereby students were coded as belonging to a single race from among five categories; it was indicated by dummy variables for American Indian/Alaska Native, Asian/Pacific Islander, Black/African American, and Hispanic, with White as the reference category. These student characteristics are related to mobility and achievement and were included in the models estimating the relationship between mobility and achievement so that this estimation would not be confounded by these correlated variables.

[9] The FRPL indicator is only a proxy measure of poverty; it reflects only household income and not parental educational attainment or occupational status (Cowan et al., 2012), and reflects only families that chose to apply. However, it is a commonly used measure for educational data because it is usually the only measure available. Recent changes to the National School Lunch Program have expanded eligibility so that many students receive free meals at school regardless of household income, making FRPL data since 2012 particularly inaccurate (USDE, 2012); however, at the time of data collection, these changes had not yet taken place, and student eligibility was determined only by individual household income. Students were eligible for free meals if their household income was at or below 130 percent of the federal poverty level; students were eligible for reduced-price meals if their household income was between 130 and 185 percent of the federal poverty level (Ralston, Newman, Clauson, Guthrie, & Buzby, 2008).

Chronic absence. A dummy variable indicating whether a student was frequently absent (annual attendance rate below 90 percent) was included as a time-varying control. In a study of ninth graders in Baltimore City public schools, chronic absence (attendance rates below 90 percent) was a key indicator of course failure (Mac Iver & Mac Iver, 2010). Recent research using administrative data in New York City public schools found that 18 percent of elementary students with no mid-year school transfers were chronically absent, compared to 34 percent among those with one or more transfer and 56 percent among those with two or more transfers (Institute for Children, Poverty & Homelessness, 2015). Prior studies in Philadelphia and Worcester, Massachusetts, found that absenteeism did not appear to mediate the effect of mobility on achievement for homeless students (Fantuzzo et al., 2012; Buckner et al., 2001). Buckner et al. (2001) attributed this to the successful implementation of the McKinney-Vento act which protects the educational rights of homeless children. It is possible that for mobile students in general, who lack such protections, the relationship of mobility with achievement is partially mediated by school attendance.

Missing Data

There were two types of missing data in the dataset: records where analytic variables are missing for every year, and records with missing data for some years. Both of these types of missing data could affect the inferences drawn from the studyôs findings. Students with missing analytic variable data for all years are dropped from the analyses, potentially resulting in a sample of students that no longer represents the population of inference (i.e., all public school students in Maryland), and records with missing data for some years, although retained in the analyses, may bias the estimates of

the relationship of mobility and other factors with GPA. The analytic variables for which data were missing for some students on one or more occasions were GPA, mobility status, and attendance. This section addresses both of these issues in more detail.

Deleted Students: Missing Analytic Variables for Every Year

Of the 7,803 students in the dataset, 463 students (5.9 percent) were missing report card records for every year and were dropped from the analytic sample for the present study. An additional 16 students (0.2 percent) were dropped who had only one year of data and their mobility status for this year was missing (i.e. it was unknown whether they were new or continuing students). Finally, another 57 students (0.7 percent) were dropped who were missing attendance data for every year. Thus, the analytic sample consisted of 7,267 students. Initial analyses using *t* tests were conducted to check whether the 536 dropped students (6.9 percent of the full sample) differed in terms of demographics and mobility from those who were not dropped.

Table 2

Comparison of Students in Analytic Sample with Students Who Were Dropped

Characteristic	Analytic sample *M* (*SD*)	Dropped *M* (*SD*)	*t* (df)	*p*
Total number of school changes	2.01 (1.83)	2.65 (1.96)	-7.24 (605.31)[a]	<.001
Ever changed schools	.81 (.39)	.99 (.11)	-26.10 (1777.86)[a]	<.001
Free or reduced-price lunch	.27 (.44)	.35 (.48)	-3.79 (605.33)[a]	<.001
Special education	.10 (.30)	.10 (.29)	-0.17 (7801)	.864
Limited English proficient	.01 (.11)	.04 (.20)	-3.49 (557.91)[a]	<.001
American Indian	.00 (.06)	.01 (.07)	-0.53 (590.60)[a]	.598
Asian	.04 (.19)	.04 (.20)	-0.24 (7801)	.809
Black	.38 (.49)	.43 (.50)	-2.24 (7801)	.025
White	.53 (.50)	.48 (.50)	2.40 (7801)	.017
Hispanic	.04 (.20)	.04 (.20)	-0.10 (7801)	.917
Female	.50 (.50)	.49 (.50)	0.45 (7801)	.650

[a]A variance ratio test rejected the null hypothesis that variances of the two groups were equal ($p < .05$), so a *t* test with unequal variances was used and Satterthwaiteôs degrees of freedom are reported.

Students who were dropped from the analyses were more likely to be mobile, receiving free- or reduced-price lunch, limited English proficient, and/or black (Table 2). Implications of these differences between the two groups will be discussed in Chapter 5.

The remaining students were included in the analyses regardless of whether they had incomplete school enrollment histories or any missing GPA data for two reasons: so that the estimates of student growth and the relationship of mobility to growth could be informed as much as possible from the available data, and so that the analytic sample would not be limited to a subset of less-mobile students. If the analyses included only students who had GPA and school membership data for all years, estimates of the effects of mobility would likely be underestimated and the inferences based on these estimates would be biased. Including students with incomplete histories in the analyses enables generalizations to the broader set of mobile and non-mobile students.

Deleted Records: Missing Analytic Variable Data for Some Years

After students described in the previous section were dropped, the outcome measure, GPA, was still missing on one or more occasions for 2,807 of the 7,267 students in the analytic sample (38.6 percent of students), mobility status was missing on one or more occasions for 323 students (4.4 percent), and attendance was missing on one or more occasions for 937 students (12.9 percent). Closer examination of this missingness revealed that of the 55,620 student-by-year observations for these students, GPA was missing for 21,375 (38.4 percent of occasions), mobility status was missing for 2,103 (3.8 percent), and attendance was missing for 7,920 (14.2 percent). A total of 9,394 annual records (16.9 percent) were missing one or more of these analytic variables; all of these occasions were dropped. Thus, the final analytic sample consisted of a total of 46,226

observations for 7,267 students. The degree to which an individual student informs the estimates for the model parameters varies based on the number of observations for that student; students with fewer complete observations are down-weighted in the analyses (Burchinal et al., 2006; Raudenbush & Bryk, 2002; Singer & Willett, 2003).

Despite this down-weighting, the missing records might bias the sample of observed records if they are not randomly but systematically missing due to an unobserved variable. The statistical analyses used in this study assume that data are ñmissing at randomò or MAR; this assumption would be violated if GPA data were missing systematically in a way that is not accounted for by the covariates in the analytic models, and the reason for missingness is not otherwise related to GPA (Burchinal, Nelson, & Poe, 2006; Rubin, 1976; Singer & Willett, 2003). Violating this assumption would result in biased estimates of the effect of mobility on GPA; in other words, characteristics of students or schools that are not included in the models might account for a negative relationship between mobility and GPA. If these unobserved characteristics tend to occur in mobile populations, the ñmobility effectò might be erroneously inflated (i.e. some of the variation in GPA that is due to this unobserved variable would be mis-attributed to mobility). Thus, it is important to consider the possible mechanisms driving the observed missingness.

Although state regulations require maintenance of report card data, school membership, and attendance data in studentsô cumulative record folders (MSDE, 2008), there are several reasons that these data might be missing: records from previous schools were not transferred with a student who changed schools; an entire group of students did not receive any report card grades, as is sometimes the case in the primary grades;

individual students did not receive report card grades; human filing error; loss of records due to floods, fire, and the like; or school-wide or district-wide failure to maintain data records properly.

Record review and conversations with administrative staff at the time of data collection did not reveal any systematic incidents such as natural disasters that would cause records to be missing. Human filing error is presumed to occur randomly and thus would not violate the MAR assumption. There are, however, systematic patterns of school and LEA grading policies such that some students are not given report card grades. Since school and LEA membership is accounted for in the analytic models, and these grading policies should have no relationship with student performance or student mobility, the MAR assumption still holds. Individual students might not receive report card grades when their attendance was extremely low; attendance is included as a covariate in the analyses. Student mobility is also included in the analyses.

Despite the state regulations requiring record maintenance, it is likely that some schools, particularly those with chaotic environments, high staff turnover, frequent student mobility, and poor administration, systematically fail to maintain complete student records. These school characteristics are not accounted for in the analyses and thus may provide a situation where the data are missing not at random.

The other type of missing data affecting this study occurred when a student changed schools but the reason for the change was unknown. This occurred only when there was a solo change but the coder was unable to determine whether residential and/or family changes occurred at the same time as the school change. These school transfer reasons were coded as Type 9. The series of analytic models attempted to distill the effect

of these Type 9 transfers. As will be seen in Chapter 4, there were 1,642 transfers coded as Type 9 (15 percent of all transfers). Some of these transfers were in fact non-residential (either parent- or school-initiated), some were residential (with or without additional family changes). Thus, the estimates for these other types of solo school changes are under-powered (due to depressed cell sizes) and their standard errors artificially increased, subjecting them to increased likelihood of Type II error in which there is an effect but it goes undetected.

Data Analysis Strategy

The aim of this study was to estimate the relationship between changing schools and academic performance (GPA) in the year of the school change, and the variation in this relationship among different types of concurrent changes in children's social, educational, residential, and familial environments. To achieve this aim, descriptive and inferential statistical analyses were used. First, a series of descriptive analyses (e.g., means, distributions, cross-tabulations) examined the range and scope of documented reasons that students change schools (RQ1), the characteristics of students who change schools (RQ2a), and how these student characteristics vary by documented reason for changing schools (RQ2b). Then, growth curve modeling was used to estimate the relationship between changing schools and academic performance (GPA) in the year of the school change (RQ3), and how this relationship varies among different types of concurrent changes in children's social, educational, residential, and familial environments (RQ4). This section explains the advantages of using this modeling approach and provides details about the models used.

The longitudinal structure of the dataset allowed the examination of the relationship between transfers and subsequent achievement, controlling for prior achievement. This provided a comparative advantage over cross-sectional studies that find a relationship between mobility and achievement without the temporal relationship that is necessary (although not sufficient) to establish causality (Shadish, Cook & Campbell, 2002). Longitudinal data also allows children to serve as their own controls, in a sense; studentsô performance in first grade establishes their baseline performance and controls for pre-existing differences between mobile and non-mobile students. Using annual data may detect fluctuations in achievement with better sensitivity to when moves occur than datasets or analyses that aggregate the number of moves over a five-year period (e.g., Alexander et al., 1996), because annual data allow us to observe how students perform academically in the years when they change schools and how it compares to their performance in the years when they remain in the same school.

Since childrenôs development occurs within multilayered concentric circles of systems, including time, educational settings, neighborhoods, and families (Bronfenbrenner, 1986, 1994), multilevel modeling allows for the accurate estimation of distinct effects from these various systems (Raudenbush & Bryk, 2002). This study used three-level growth curve models to compare the initial (first grade) GPAs and annual GPA change of mobile and non-mobile students while accounting for their membership in multiple schools over time, and among the mobile students to compare these trajectories among types of mobility.

Repeated measure or growth curve modeling is based on the idea of estimating studentsô initial outcomes (e.g., in the first year of study) and their estimated growth for

each increment of time (e.g., year) (Raudenbush & Bryk, 2002; Singer & Willett, 2003). Using multilevel modeling for growth curve analyses has several advantages over alternate methods: estimating the impact of time-varying predictors on outcome overall as well as on change in the outcome over time (growth), improving causal inferences, and including cases with some missing data (Duckworth, Tsukayama, & May, 2010; Raudenbush & Bryk, 2002; Singer & Willett, 2003).

A few studies have used growth curve modeling to examine the effect of mobility on academic achievement. ObradoviĹ et al. (2009) and Cutuli et al. (2013) demonstrated the use of growth curve modeling in estimating the initial status and growth of homeless and highly mobile students relative to their peers. Herbers et al. (2012) examined the protective effects of early achievement on later outcomes for homeless and highly mobile students. Gruman et al. (2008) used growth curve modeling to examine the impact of mobility on academic success and to explore factors that might moderate this impact. Similarly, in this study, repeated measures (Level 1) were nested within student (Level 2). However, none of the prior studies of mobility using growth curve modeling accounted for school membership; their models only nested time points within students, not students within schools.

Schools account for a significant amount of the variation in studentsô academic performance (Konstantopoulos & Borman, 2011); in other words, some of the variation in GPA is shared or ñclusteredò among the schools that students attend. Multilevel modeling can be used to account for these cluster effects of school membership on student outcomes (Raudenbush & Bryk, 2002). However, most research on academic performance and student and school effects on that performance has not accounted for

student mobility, even though it is an important factor that affects all educational research and statistical analysis involving students and schools (Goldstein, Burgess, & McConnell, 2007). Part of the reason for this is that students who belong to more than one school over the course of a study add a significant amount of complexity to multilevel models. In traditional hierarchical modeling, individuals (e.g. students) are understood as ñnestedò or belonging to higher level units (e.g. schools). These strictly hierarchical models do not allow for students to belong to more than one higher level unit (school). Thus, researchers frequently ñsolveò the problem of mobile students either by deleting mobile students from the analysis or by assigning them to a single school (Goldstein et al., 2007; Chung, 2009; Chung & Beretvas, 2012). A more appropriate solution is to include all of the schools that mobile students by using cross-classified structures (Goldstein et al., 2007; Chung, 2009; Chung & Beretvas, 2012).

A handful of researchers (Goldstein et al., 2007; Chung, 2009; Chung & Beretvas, 2012) have compared the results produced by these two solutions and have demonstrated the impact not using the cross-classified solution. Some of this work has used two-level models where students are nested in schools; Goldstein and colleagues (2007) analyzed student achievement and school accountability data in England using cross-classification and multiple membership and showed that ignoring the non-hierarchical structure resulted in an underestimation of Level 2 (between-school) variance by 18%.[10] Others (Grady & Beretvas, 2010; Luo & Kwok, 2012) have examined the differences in these solutions using multilevel growth curve analyses where measurement occasions are nested within students who are then nested in schools. In this approach, students are

[10] Goldstein et al. (2007) treated mobility as a student-level, not time-varying, variable, counting the number of schools the student had attended during the three-year period prior to the tested year.

cross-classified by first school and subsequent school, and students are allowed to be members of multiple subsequent schools; thus it is referred to as cross-classified multiple membership (CCMM) modeling (Grady & Beretvas, 2010; Luo & Kwok, 2012). Grady and Beretvas (2010) analyzed ECLS-K data to determine the effect of ignoring mobility on parameter, standard error, and model fit estimates, comparing the CCMM approach to two other approaches, deleting the record and using the first school of attendance. They confirmed that ignoring multiple membership and cross-classification structures resulted in underestimating between-school variance and overestimating between-student variance, as Goldstein et al. (2007) did. Further, they found that estimates of the effect of student and school factors on math achievement growth were altered; using the wrong approach resulted in overly small standard errors for student-level predictors and overly large standard errors for school-level predictors. In this situation, student-level factors may be incorrectly found to have a significant effect on achievement (Type I error) and school-level factors may be incorrectly found to have no significant effect (Type II error).

Luo and Kwok (2012) extended this prior work on accounting for mobile students by conducting two Monte Carlo simulations, one based on a scenario where an entire group of students is mobile, such as happens in structural mobility when a cohort completes a grade or program, and another based on non-systematic or non-structural individual mobility, as when students change residences. They constructed fictional three-level datasets depicting time nested within students nested within schools. They found for both types of mobility that in the mis-specified model, part of the school variance was misattributed to other levels (student level in structural mobility, student and time levels in non-structural mobility). Noting that ñsome researchers have the

misconception that including a covariate of school-switching status would be a remedy for not considering the cross-classified structure of the dataò (Luo & Kwok, 2012, pp. 52-53), they conducted a supplementary simulation in which they compared the cross-classified model to a model with such a student ñschool-switchingò covariate; they found similar biases as in their earlier analysis. Furthermore, the standard error of the covariate was overestimated, resulting in reduced power to detect its impact (Luo & Kwok, 2012).

Despite the fact that the importance of using CCMM models has been demonstrated in a number of studies, only a few have investigated the effect of student mobility on academic achievement (e.g., Goldstein et al., 2007). Therefore, this study used cross-classified multiple membership growth curve models to allow students to belong to multiple schools over time. Since students in the dataset could belong to multiple schools over time as well as multiple schools each year, models used cross-classification and multiple membership structures; students were cross-classified by first-grade school(s) (Level 3) and subsequent school(s) (Level 3). Their school membership was constructed in this way so that school influence on initial outcomes could be disentangled from school influence on growth after the first year; in this way, first grade achievement (studentsô starting points, or model intercepts) could be correctly modeled as functions of first grade school(s) only, not subsequent schools (Grady & Beretvas, 2010).[11]

[11] A key difference from the work of Grady and Beretvas (2010) in the present studyôs data is that students could belong not only to multiple schools across years, but also to multiple schools within each school year. Thus, initial status (first grade GPA) was modeled as a function of not just the first school attended (as in Grady & Beretvas, 2010) but the *set* of schools attended during the first year of school (first grade). Change trajectories were modeled as a function of the set of first-year schools as well as the set of schools attended subsequently, just as in Grady and Beretvas (2010).

School changes and GPA

First a series of models, summarized in Table 3, examined the relationship between school changes and GPA. The first model was an unconditional growth model that included only the intercept and growth parameters (growth is indexed by *Time*, starting at *Time* = 0 for the first time the student was in grade 1 and increasing by 1 each school year, regardless of studentôs grade in school). Thus, in the unconditional model, at Level 1, the GPA in school year *t* for student *i* was modeled as the mean GPA for student *i* (intercept) plus the mean annual change in GPA for student *i* (slope) and the residual associated with time *t* for student *i*. This residual is assumed normally distributed with a mean of zero, $e_{ti} \sim N(0, \sigma^2_e)$. The Level 1 intercept (first-grade GPA, π_{0i}) was modeled at Level 2 (student) as a function of the mean GPA across students and student *i*ôs deviation from that mean. In Model 1a, β_{00} represents the mean first-grade GPA. Studentsô changes in GPA over time (π_{1i}) were modeled at Level 2 as a function of mean change for all students and the random variation in change rates across students. β_{10} is the mean annual growth across all students. The parameters r_{0i} and r_{1i} are the conditional residuals for the intercept and slope, respectively, for student *i* and are assumed normally distributed with means of zero and a covariance structure thus:

$$\text{cov}\begin{bmatrix} r_{0i} \\ r_{1i} \end{bmatrix} = \begin{bmatrix} \tau_{00} & \tau_{01} \\ \tau_{10} & \tau_{11} \end{bmatrix}.$$

Next in Model 1b a mobility variable was added at Level 1 indicating the number of new schools attended in the current year. This variable was set as fixed at Level 2, so that the effect of mobility was constrained to not vary across students.

Table 3

Taxonomy of Models for Examining the Effects of School Changes on GPA

Label	Level 1 model	Level 2 models
1a Unconditional	$GPA_{ti(j)\{k\}} = \pi_{0i(j)\{k\}} + \pi_{1i(j)\{k\}}Time_{ti(j)\{k\}} + e_{ti(j)\{k\}}$	$\pi_{0i(j)\{k\}} = \beta_{00(j)\{k\}} + r_{0i(j)\{k\}}$ $\pi_{1i(j)\{k\}} = \beta_{10(j)\{k\}} + r_{1i(j)\{k\}}$
1b Mobility	$GPA_{ti(j)\{k\}} = \pi_{0i(j)\{k\}} + \pi_{1i(j)\{k\}}Time_{ti(j)\{k\}} + \pi_{2i(j)\{k\}}Newschs_{ti(j)\{k\}} + e_{ti(j)\{k\}}$	$\pi_{0i(j)\{k\}} = \beta_{00(j)\{k\}} + r_{0i(j)\{k\}}$ $\pi_{1i(j)\{k\}} = \beta_{10(j)\{k\}} + r_{1i(j)\{k\}}$ $\pi_{2i(j)\{k\}} = \beta_{20(j)\{k\}}$
1c Panel	$GPA_{ti(j)\{k\}} = \pi_{0i(j)\{k\}} + \pi_{1i(j)\{k\}}Time_{ti(j)\{k\}} + \pi_{2i(j)\{k\}}Newschs_{ti(j)\{k\}} + \pi_{3i(j)\{k\}}(SchYr\text{-}1997)_{ti(j)\{k\}} + \pi_{4i(j)\{k\}}Repgrade_{ti(j)\{k\}} + \pi_{5i(j)\{k\}}Span\_m_{ti(j)\{k\}} + \pi_{6i(j)\{k\}}Span\_h_{ti(j)\{k\}} + e_{ti(j)\{k\}}$	$\pi_{0i(j)\{k\}} = \beta_{00(j)\{k\}} + r_{0i(j)\{k\}}$ $\pi_{1i(j)\{k\}} = \beta_{10(j)\{k\}} + r_{1i(j)\{k\}}$ For q=2 or more, $\pi_{qi(j)\{k\}} = \beta_{q0(j)\{k\}}$
1d Student characteristics	$GPA_{ti(j)\{k\}} = \pi_{0i(j)\{k\}} + \pi_{1i(j)\{k\}}Time_{ti(j)\{k\}} + \pi_{2i(j)\{k\}}Newschs_{ti(j)\{k\}} + \pi_{3i(j)\{k\}}(SchYr\text{-}1997)_{ti(j)\{k\}} + \pi_{4i(j)\{k\}}Repgrade_{ti(j)\{k\}} + \pi_{5i(j)\{k\}}Span\_m_{ti(j)\{k\}} + \pi_{6i(j)\{k\}}Span\_h_{ti(j)\{k\}} + \pi_{7i(j)\{k\}}FRPLxTime_{ti(j)\{k\}} + \pi_{8i(j)\{k\}}SpecEdxTime_{ti(j)\{k\}} + \pi_{9i(j)\{k\}}LEPxTime_{ti(j)\{k\}} + \pi_{10i(j)\{k\}}AmindxTime_{ti(j)\{k\}} + \pi_{11i(j)\{k\}}AsianxTime_{ti(j)\{k\}} + \pi_{12i(j)\{k\}}BlackxTime_{ti(j)\{k\}} + \pi_{13i(j)\{k\}}HispxTime_{ti(j)\{k\}} + \pi_{14i(j)\{k\}}FemalexTime_{ti(j)\{k\}} + e_{ti(j)\{k\}}$	$\pi_{0i(j)\{k\}} = \beta_{00(j)\{k\}} + \beta_{01(j)\{k\}}FRPL_{i(j)\{k\}} + \beta_{02(j)\{k\}}SpecEd_{i(j)\{k\}} + \beta_{03(j)\{k\}}LEP_{i(j)\{k\}} + \beta_{04(j)\{k\}}Amind_{i(j)\{k\}} + \beta_{05(j)\{k\}}Asian_{i(j)\{k\}} + \beta_{06(j)\{k\}}Black_{i(j)\{k\}} + \beta_{07(j)\{k\}}Hisp_{i(j)\{k\}} + \beta_{08(j)\{k\}}Female_{i(j)\{k\}} + r_{0i(j)\{k\}}$ $\pi_{1i} = \beta_{10(j)\{k\}} + \beta_{11(j)\{k\}}FRPL_{i(j)\{k\}} + \beta_{12(j)\{k\}}SpecEd_{i(j)\{k\}} + \beta_{13(j)\{k\}}LEP_{i(j)\{k\}} + \beta_{14(j)\{k\}}Amind_{i(j)\{k\}} + \beta_{15(j)\{k\}}Asian_{i(j)\{k\}} + \beta_{16(j)\{k\}}Black_{i(j)\{k\}} + \beta_{17(j)\{k\}}Hisp_{i(j)\{k\}} + \beta_{18(j)\{k\}}Female_{i(j)\{k\}} + r_{1i(j)\{k\}}$ For q=2 or more, $\pi_{qi(j)\{k\}} = \beta_{q0(j)\{k\}}$
1e Chronic absence	$GPA_{ti(j)\{k\}} = \pi_{0i(j)\{k\}} + \pi_{1i(j)\{k\}}Time_{ti(j)\{k\}} + \pi_{2i(j)\{k\}}Newschs_{ti(j)\{k\}} + \pi_{3i(j)\{k\}}(SchYr\text{-}1997)_{ti(j)\{k\}} + \pi_{4i(j)\{k\}}Repgrade_{ti(j)\{k\}} + \pi_{5i(j)\{k\}}Span\_m_{ti(j)\{k\}} + \pi_{6i(j)\{k\}}Span\_h_{ti(j)\{k\}} + \pi_{7i(j)\{k\}}FRPLxTime_{ti(j)\{k\}} + \pi_{8i(j)\{k\}}SpecEdxTime_{ti(j)\{k\}} + \pi_{9i(j)\{k\}}LEPxTime_{ti(j)\{k\}} + \pi_{10i(j)\{k\}}AmindxTime_{ti(j)\{k\}} + \pi_{11i(j)\{k\}}AsianxTime_{ti(j)\{k\}} + \pi_{12i(j)\{k\}}BlackxTime_{ti(j)\{k\}} + \pi_{13i(j)\{k\}}HispxTime_{ti(j)\{k\}} + \pi_{14i(j)\{k\}}FemalexTime_{ti(j)\{k\}} + \pi_{15i(j)\{k\}}Chronabs_{ti} + e_{ti(j)\{k\}}$	$\pi_{0i(j)\{k\}} = \beta_{00(j)\{k\}} + \beta_{01(j)\{k\}}FRPL_{i(j)\{k\}} + \beta_{02(j)\{k\}}SpecEd_{i(j)\{k\}} + \beta_{03(j)\{k\}}LEP_{i(j)\{k\}} + \beta_{04(j)\{k\}}Amind_{i(j)\{k\}} + \beta_{05(j)\{k\}}Asian_{i(j)\{k\}} + \beta_{06(j)\{k\}}Black_{i(j)\{k\}} + \beta_{07(j)\{k\}}Hisp_{i(j)\{k\}} + \beta_{08(j)\{k\}}Female_{i(j)\{k\}} + r_{0i(j)\{k\}}$ $\pi_{1i} = \beta_{10(j)\{k\}} + \beta_{11(j)\{k\}}FRPL_{i(j)\{k\}} + \beta_{12(j)\{k\}}SpecEd_{i(j)\{k\}} + \beta_{13(j)\{k\}}LEP_{i(j)\{k\}} + \beta_{14(j)\{k\}}Amind_{i(j)\{k\}} + \beta_{15(j)\{k\}}Asian_{i(j)\{k\}} + \beta_{16(j)\{k\}}Black_{i(j)\{k\}} + \beta_{17(j)\{k\}}Hisp_{i(j)\{k\}} + \beta_{18(j)\{k\}}Female_{i(j)\{k\}} + r_{1i(j)\{k\}}$ For q=2 or more, $\pi_{qi(j)\{k\}} = \beta_{q0(j)\{k\}}$

Based on the theoretical framework, it was expected that GPAs would vary from grade to grade (due to changing expectations in higher grades) and across time (e.g., due to historically changing grading practices or ñgrade inflationò). Thus, in Model 1c controls for grade span (dummy variables for middle school and high school, with elementary the referent), and period (school year) were included in the model. Also included was an indicator for whether the student was retained in the prior year (i.e. was repeating the grade).

Next, in model 1d, student covariates, free- or reduced-price lunch status, special education status, Limited English Proficient status, race/ethnicity (with white as the referent group), and gender (with male as the referent) were added at Level 2 and interacted with time at Level 1 to estimate the degree to which the annual change associated with student characteristics varies as children age. These variables were treated as non-time-varying in the original study and were measured at the time of data collection. Finally, in model 1e a dummy variable indicating chronic absence was included as a time-varying covariate to examine the degree to which this would explain mobility effects.

Distilling among types of school changes

The initial models estimate the overall effects of mobility. They do not estimate the distinct effects of various types of school changes. Another series of models used the variables for school change types, as described in the conceptual framework, in place of the overall mobility variable (*Newschs*) used in the first series of models. The aim of this set of models, summarized in Table 4, was to estimate the effects of the different types of mobility as outlined in the conceptual framework.

Table 4

Taxonomy of Models for Examining the Effects of School Changes and Concurrent Changes on GPA

Label	Level 1 model
Group vs. solo (Model 2a)	$GPA_{ti\{j\}\{k\}} = \acute{}_{0i\{j\}\{k\}} + \acute{}_{1i\{j\}\{k\}}Time_{ti\{j\}\{k\}} + \boldsymbol{\pi_{2i\{j\}\{k\}}Group_{ti\{j\}\{k\}}} + \boldsymbol{\pi_{3i\{j\}\{k\}}Solo_{ti\{j\}\{k\}}} + \acute{}_{4i\{j\}\{k\}}(SchYr\text{-}1997)_{ti\{j\}\{k\}} + \acute{}_{5i\{j\}\{k\}}Repgrade_{ti\{j\}\{k\}} + \acute{}_{6i\{j\}\{k\}}Span\_m_{ti\{j\}\{k\}} + \acute{}_{7i\{j\}\{k\}}Span\_h_{ti\{j\}\{k\}} + \acute{}_{8i\{j\}\{k\}}FRPLxTime_{ti\{j\}\{k\}} + \acute{}_{9i\{j\}\{k\}}SpecEdxTime_{ti\{j\}\{k\}} + \acute{}_{10i\{j\}\{k\}}LEPxTime_{ti\{j\}\{k\}} + \acute{}_{11i\{j\}\{k\}}AmindxTime_{ti\{j\}\{k\}} + \acute{}_{12i\{j\}\{k\}}AsianxTime_{ti\{j\}\{k\}} + \acute{}_{13i\{j\}\{k\}}BlackxTime_{ti\{j\}\{k\}} + \acute{}_{14i\{j\}\{k\}}HispxTime_{ti\{j\}\{k\}} + \acute{}_{15i\{j\}\{k\}}FemalexTime_{ti\{j\}\{k\}} + \acute{}_{16i\{j\}\{k\}}Chronabs_{ti} + e_{ti\{j\}\{k\}}$
Group: closure/ rezoning vs. promotion (Model 2b)	$GPA_{ti\{j\}\{k\}} = \acute{}_{0i\{j\}\{k\}} + \acute{}_{1i\{j\}\{k\}}Time_{ti\{j\}\{k\}} + \boldsymbol{\pi_{2i\{j\}\{k\}}Closure_{ti\{j\}\{k\}}} + \boldsymbol{\pi_{3i\{j\}\{k\}}Promotion_{ti\{j\}\{k\}}} + \acute{}_{4i\{j\}\{k\}}Solo_{ti\{j\}\{k\}} + \acute{}_{5i\{j\}\{k\}}(SchYr\text{-}1997)_{ti\{j\}\{k\}} + \acute{}_{6i\{j\}\{k\}}Repgrade_{ti\{j\}\{k\}} + \acute{}_{7i\{j\}\{k\}}Span\_m_{ti\{j\}\{k\}} + \acute{}_{8i\{j\}\{k\}}Span\_h_{ti\{j\}\{k\}} + \acute{}_{9i\{j\}\{k\}}FRPLxTime_{ti\{j\}\{k\}} + \acute{}_{10i\{j\}\{k\}}SpecEdxTime_{ti\{j\}\{k\}} + \acute{}_{11i\{j\}\{k\}}LEPxTime_{ti\{j\}\{k\}} + \acute{}_{12i\{j\}\{k\}}AmindxTime_{ti\{j\}\{k\}} + \acute{}_{13i\{j\}\{k\}}AsianxTime_{ti\{j\}\{k\}} + \acute{}_{14i\{j\}\{k\}}BlackxTime_{ti\{j\}\{k\}} + \acute{}_{15i\{j\}\{k\}}HispxTime_{ti\{j\}\{k\}} + \acute{}_{16i\{j\}\{k\}}FemalexTime_{ti\{j\}\{k\}} + \acute{}_{17i\{j\}\{k\}}Chronabs_{ti} + e_{ti\{j\}\{k\}}$
Solo: Non-residential vs. residential (Model 2c)	$GPA_{ti\{j\}\{k\}} = \acute{}_{0i\{j\}\{k\}} + \acute{}_{1i\{j\}\{k\}}Time_{ti\{j\}\{k\}} + \acute{}_{2i\{j\}\{k\}}Closure_{ti\{j\}\{k\}} + \acute{}_{3i\{j\}\{k\}}Promotion_{ti\{j\}\{k\}} + \boldsymbol{\pi_{4i\{j\}\{k\}}Nonres_{ti\{j\}\{k\}}} + \boldsymbol{\pi_{5i\{j\}\{k\}}Res_{ti\{j\}\{k\}}} + \boldsymbol{\pi_{6i\{j\}\{k\}}Type9_{ti\{j\}\{k\}}} + \acute{}_{7i\{j\}\{k\}}(SchYr\text{-}1997)_{ti\{j\}\{k\}} + \acute{}_{8i\{j\}\{k\}}Repgrade_{ti\{j\}\{k\}} + \acute{}_{9i\{j\}\{k\}}Span\_m_{ti\{j\}\{k\}} + \acute{}_{10i\{j\}\{k\}}Span\_h_{ti\{j\}\{k\}} + \acute{}_{11i\{j\}\{k\}}FRPLxTime_{ti\{j\}\{k\}} + \acute{}_{12i\{j\}\{k\}}SpecEdxTime_{ti\{j\}\{k\}} + \acute{}_{13i\{j\}\{k\}}LEPxTime_{ti\{j\}\{k\}} + \acute{}_{14i\{j\}\{k\}}AmindxTime_{ti\{j\}\{k\}} + \acute{}_{15i\{j\}\{k\}}AsianxTime_{ti\{j\}\{k\}} + \acute{}_{16i\{j\}\{k\}}BlackxTime_{ti\{j\}\{k\}} + \acute{}_{17i\{j\}\{k\}}HispxTime_{ti\{j\}\{k\}} + \acute{}_{18i\{j\}\{k\}}FemalexTime_{ti\{j\}\{k\}} + \acute{}_{19i\{j\}\{k\}}Chronabs_{ti} + e_{ti\{j\}\{k\}}$
Non-residential: parent- vs. school-initiated (Model 2d)	$GPA_{ti\{j\}\{k\}} = \acute{}_{0i\{j\}\{k\}} + \acute{}_{1i\{j\}\{k\}}Time_{ti\{j\}\{k\}} + \acute{}_{2i\{j\}\{k\}}Closure_{ti\{j\}\{k\}} + \acute{}_{3i\{j\}\{k\}}Promotion_{ti\{j\}\{k\}} + \boldsymbol{\pi_{4i\{j\}\{k\}}Parent_{ti\{j\}\{k\}}} + \boldsymbol{\pi_{5i\{j\}\{k\}}School_{ti\{j\}\{k\}}} + \acute{}_{6i\{j\}\{k\}}Res_{ti\{j\}\{k\}} + \acute{}_{7i\{j\}\{k\}}Type9_{ti\{j\}\{k\}} + \acute{}_{8i\{j\}\{k\}}(SchYr\text{-}1997)_{ti\{j\}\{k\}} + \acute{}_{9i\{j\}\{k\}}Repgrade_{ti\{j\}\{k\}} + \acute{}_{10i\{j\}\{k\}}Span\_m_{ti\{j\}\{k\}} + \acute{}_{11i\{j\}\{k\}}Span\_h_{ti\{j\}\{k\}} + \acute{}_{12i\{j\}\{k\}}FRPLxTime_{ti\{j\}\{k\}} + \acute{}_{13i\{j\}\{k\}}SpecEdxTime_{ti\{j\}\{k\}} + \acute{}_{14i\{j\}\{k\}}LEPxTime_{ti\{j\}\{k\}} + \acute{}_{15i\{j\}\{k\}}AmindxTime_{ti\{j\}\{k\}} + \acute{}_{16i\{j\}\{k\}}AsianxTime_{ti\{j\}\{k\}} + \acute{}_{17i\{j\}\{k\}}BlackxTime_{ti\{j\}\{k\}} + \acute{}_{18i\{j\}\{k\}}HispxTime_{ti\{j\}\{k\}} + \acute{}_{19i\{j\}\{k\}}FemalexTime_{ti\{j\}\{k\}} + \acute{}_{20i\{j\}\{k\}}Chronabs_{ti} + e_{ti\{j\}\{k\}}$
Residential: No family changes vs. family changes (Model 2e)	$GPA_{ti\{j\}\{k\}} = \acute{}_{0i\{j\}\{k\}} + \acute{}_{1i\{j\}\{k\}}Time_{ti\{j\}\{k\}} + \acute{}_{2i\{j\}\{k\}}Closure_{ti\{j\}\{k\}} + \acute{}_{3i\{j\}\{k\}}Promotion_{ti\{j\}\{k\}} + \acute{}_{4i\{j\}\{k\}}Parent_{ti\{j\}\{k\}} + \acute{}_{5i\{j\}\{k\}}School_{ti\{j\}\{k\}} + \boldsymbol{\pi_{6i\{j\}\{k\}}Nofamchg_{ti\{j\}\{k\}}} + \boldsymbol{\pi_{7i\{j\}\{k\}}Famchg_{ti\{j\}\{k\}}} + \acute{}_{8i\{j\}\{k\}}Type9_{ti\{j\}\{k\}} + \acute{}_{9i\{j\}\{k\}}(SchYr\text{-}1997)_{ti\{j\}\{k\}} + \acute{}_{10i\{j\}\{k\}}Repgrade_{ti\{j\}\{k\}} + \acute{}_{11i\{j\}\{k\}}Span\_m_{ti\{j\}\{k\}} + \acute{}_{12i\{j\}\{k\}}Span\_h_{ti\{j\}\{k\}} + \acute{}_{13i\{j\}\{k\}}FRPLxTime_{ti\{j\}\{k\}} + \acute{}_{14i\{j\}\{k\}}SpecEdxTime_{ti\{j\}\{k\}} + \acute{}_{15i\{j\}\{k\}}LEPxTime_{ti\{j\}\{k\}} + \acute{}_{16i\{j\}\{k\}}AmindxTime_{ti\{j\}\{k\}} + \acute{}_{17i\{j\}\{k\}}AsianxTime_{ti\{j\}\{k\}} + \acute{}_{18i\{j\}\{k\}}BlackxTime_{ti\{j\}\{k\}} + \acute{}_{19i\{j\}\{k\}}HispxTime_{ti\{j\}\{k\}} + \acute{}_{20i\{j\}\{k\}}FemalexTime_{ti\{j\}\{k\}} + \acute{}_{21i\{j\}\{k\}}Chronabs_{ti} + e_{ti\{j\}\{k\}}$
Family changes: Structure vs. financial (Model 2f)	$GPA_{ti\{j\}\{k\}} = \acute{}_{0i\{j\}\{k\}} + \acute{}_{1i\{j\}\{k\}}Time_{ti\{j\}\{k\}} + \acute{}_{2i\{j\}\{k\}}Closure_{ti\{j\}\{k\}} + \acute{}_{3i\{j\}\{k\}}Promotion_{ti\{j\}\{k\}} + \acute{}_{4i\{j\}\{k\}}Parent_{ti\{j\}\{k\}} + \acute{}_{5i\{j\}\{k\}}School_{ti\{j\}\{k\}} + \acute{}_{6i\{j\}\{k\}}Nofamchg_{ti\{j\}\{k\}} + \boldsymbol{\pi_{7i\{j\}\{k\}}Struct_{ti\{j\}\{k\}}} + \boldsymbol{\pi_{8i\{j\}\{k\}}Finan_{ti\{j\}\{k\}}} + \acute{}_{8i\{j\}\{k\}}Type9_{ti\{j\}\{k\}} + \acute{}_{9i\{j\}\{k\}}(SchYr\text{-}1997)_{ti\{j\}\{k\}} + \acute{}_{10i\{j\}\{k\}}Repgrade_{ti\{j\}\{k\}} + \acute{}_{11i\{j\}\{k\}}Span\_m_{ti\{j\}\{k\}} + \acute{}_{12i\{j\}\{k\}}Span\_h_{ti\{j\}\{k\}} + \acute{}_{13i\{j\}\{k\}}FRPLxTime_{ti\{j\}\{k\}} + \acute{}_{14i\{j\}\{k\}}SpecEdxTime_{ti\{j\}\{k\}} + \acute{}_{15i\{j\}\{k\}}LEPxTime_{ti\{j\}\{k\}} + \acute{}_{16i\{j\}\{k\}}AmindxTime_{ti\{j\}\{k\}} + \acute{}_{17i\{j\}\{k\}}AsianxTime_{ti\{j\}\{k\}} + \acute{}_{18i\{j\}\{k\}}BlackxTime_{ti\{j\}\{k\}} + \acute{}_{19i\{j\}\{k\}}HispxTime_{ti\{j\}\{k\}} + \acute{}_{20i\{j\}\{k\}}FemalexTime_{ti\{j\}\{k\}} + \acute{}_{21i\{j\}\{k\}}Chronabs_{ti} + e_{ti\{j\}\{k\}}$

Note. As in Table 3, in all models, the Level 1 intercept and slope are set to random at Level 2; all other parameters are fixed at Level 2.

In Model 2a, the variables *Group* and *Solo* are substituted for the *Newschs* variable that had been used previously to estimate the effect of attending new schools. Now, the effect of making school changes as part of a group and the effect of school changes that are made by individual students can be estimated as distinct effects.

In Model 2b, the group transfers are distilled so that the effect of attending new schools due to school closure and the effect of attending new schools due to promotional transfers can be estimated separately. The other variables remain the same as in Model 2a.

Next, in Model 2c, the effects of solo school changes are separated into distinct effects of non-residential transfers, residential transfers, and solo changes for which reason could not be determined. Model 2d includes separate effects for the non-residential transfers (parent- or school-initiated changes in educational setting), and Model 2e includes separate effects for the residential transfers (indicating whether family changes were also involved). Finally, Model 2f breaks residential transfers involving family changes into those with family structure changes and those with financial issues.

In all models, at Level 3, mean GPAs in the set of first-grade schools $\{j\}$ ($b_{00\{j\}}$) were modeled simply as a function of the overall mean first-grade GPA in all schools, γ_{0000}, plus the random variation attributed to the set of first-grade schools $\{j\}$ (Equation 1). This estimate for mean GPA in first-grade schools takes first-grade schools $\{j\}$ into account but not schools attended subsequent to the first grade $\{k\}$ (see Grady & Beretvas, 2010). Equation 1 reflects the potential of multiple membership in first-grade schools. Since students can belong to more than one school in first grade, the residuals for these

schools are weighted such that the weights sum to 1; for example, for a student attending 2 schools in first grade, each schoolôs residual is weighted .5.

$$\beta_{00\{j\}} = \gamma_{000} + \sum_{h\in\{j\}} w_{tih} u_{00h} \quad (1)$$[12]

The mean annual change in GPA for students in the sets of first-grade schools $\{j\}$ and subsequent schools $\{k\}$ ($\beta_{10\{j\}\{k\}}$, the Level 2 intercept) is modeled as a function of the grand mean of annual change in GPA, γ_{1000} (Equation 2). Change in GPA takes into account not only studentsô first-grade schools $\{j\}$ but also schools they attended after their first year $\{k\}$ (see Grady & Beretvas, 2010). The random performance above or below this mean due to the residual effects of first-grade schools and subsequent schools can be weighted due to multiple membership (as in Equation 1):

$$\beta_{10\{j\}\{k\}} = \gamma_{100} + \sum_{h\in\{j\}} w_{tih} u_{10h} + \sum_{h\in\{k\}} w_{tih} u_{10h} \quad (2)$$

Level 3 residuals associated with schools j and k are assumed normally distributed with means of zero and a covariance structure thus:

$$\text{cov}\begin{bmatrix} u_{00\{j\}} \\ u_{10\{k\}} \end{bmatrix} = \begin{bmatrix} \Omega_{u_{00}} & \Omega_{u_{00}u_{10}} \\ \Omega_{u_{00}u_{10}} & \Omega_{u_{10}} \end{bmatrix} \text{and } \text{cov}(u_{10k}) = \Omega_{u_k 11}.$$

All other parameters were modeled as fixed at level 3: $\beta_{q00\{j\}\{k\}} = \gamma_{q000}$.

All models were conducted using MCMC estimation in MLwiN (version 2.35), using the *runmlwin* add-on for Stata SE (version 11.2) (Leckie & Charlton, 2013; Rasbash, Browne, Healy, Cameron, & Charlton, 2014; see also Browne, 2014; Goldstein, 2003; Grady & Beretvas, 2010).

[12] In the school-level equations (Equations 1 and 2), no school covariates are included. Although school demographic and mobility information would be valuable, the dataset was limited in that it did not include specific school identifiers for non-public or non-Maryland schools (these schools were included in the dataset but dummy identifiers were created that do not match to other sources). Thus, links to other data sources (e.g., CCD, state mobility data) would only be possible for public Maryland schools, reducing the generalizability of the findings.

CHAPTER FOUR

RESULTS

The purpose of this study was to examine the relationship between school changes and academic performance as measured by GPA, in the year of the school change and in the years following the school change, controlling for prior academic performance, student characteristics, and school membership; and to examine the extent to which this relationship varies among different types of concurrent changes in childrenôs social, educational, residential, and familial environments.

Why Students Change Schools

The first research question for this study asked, what is the range and scope of documented reasons that students change schools? As discussed in Chapter 2, there are a number of characteristics of school changes that are likely to contribute to the disruption and stress that transferring students experience. The types of school changes and their frequency in the analytic dataset are summarized in Figure 2.

<table>
<tr><td colspan="2">Group
n = 5,643
50%</td><td colspan="5">Solo
n = 5,579
50%</td></tr>
<tr><td rowspan="3">Type 1
No other change (closure/ rezoning)
n = 216
2%</td><td rowspan="3">Type 2
Change in school level (promo-tion)
n = 5,427
48%</td><td colspan="2">No change in residence
n = 783
7%</td><td colspan="3">Change in residence
n = 3,154
28%</td><td rowspan="3">Type 9
Solo transfer, reason unknown
n = 1,642
15%</td></tr>
<tr><td rowspan="2">Type 3
Change in educa-tional setting (parent-initiated)
n = 617
5%</td><td rowspan="2">Type 4
Change in educa-tional setting (school-initiated)
n = 166
1%</td><td rowspan="2">Type 5
No family change
n = 1,698
15%</td><td colspan="2">Family change
n = 1,456
13%</td></tr>
<tr><td>Type 6
Family structure change
n = 760
7%</td><td>Type 7
Family financial issues
n = 696
6%</td></tr>
</table>

Figure 2. Distribution of types of school changes according to conceptual framework (n = 11,222).

In the analytic dataset of 7,267 students for whom there were a total of 46,226 annual observations, there were a total of 11,222 school transfers, each of which was

coded in accordance with the conceptual framework. About half of the school changes were solo transfers where students changed schools alone (50 percent) and half were group moves (50 percent). Most of these group transfers were promotional transfers, with a small number due to school closures or attendance boundary changes (2 percent of the total). Most of the solo transfers were residential transfers which accounted for 28 percent of all school changes; non-residential transfers accounted for 7 percent of the total. The non-residential transfers were primarily initiated by parents or students; these accounted for 5 percent of all transfers, while school-initiated transfers comprised just 1 percent of all transfers. Residential moves were about split in terms of additional family changes: moves in which no family change took place comprised 15 percent of all transfers, while residential moves with additional family changes (13 percent of the total) were about evenly divided between those with changes in family structure (7 percent of the total) and those with family financial issues (6 percent). For 15 percent of the transfers it could not be determined whether students changed residence or educational setting (usually due to a lack of records from previous schools); these were all solo transfers.

The Characteristics of Students Who Change Schools

The second research question for this study asked, what are the characteristics of students who change schools, and how do these characteristics vary by documented reason for changing schools? The characteristics of students in the analytic sample are displayed in Table 5 for the sample overall and by mobility level. Comparing the composition of the sample overall with the composition of each mobility group shows the relative differences in mobility levels among these student groups. While overall, 27.2 percent of the sample were students who received free or reduced-price lunch (FRPL)

(similar to the population of public school students in the state), they were over-represented among mobile students: FRPL children accounted for 32.4 percent of those with 4 transfers, and 43.2 percent of those with 5 or more. Similarly, while black students comprise 38.4 percent of the overall sample, they form a majority among the higher-mobility students (51.3 percent of those with 4 transfers, and 55.4 percent of those with 5 or more).

Table 5

Student Characteristics, Overall and by Total Number of School Changes (n = 7,267)

	Overall	Total number of school changes					
		0	1	2	3	4	5+
Free or reduced-price lunch	27.2	23.5	26.4	23.3	28.1	32.4	43.2
Special education	9.7	11.3	9.4	9.6	7.3	11.3	10.4
Limited English proficient	1.2	0.2	2.3	1.2	1.2	0.8	0.3
American Indian	0.4	0.4	0.3	0.4	0.4	0.4	0.5
Asian	3.9	4.3	4.4	4.3	3.1	4.0	1.3
Black	38.4	25.2	36.1	36.8	46.2	51.3	55.4
White	53.1	67.7	54.2	54.7	45.6	39.5	37.0
Hispanic	4.2	2.4	4.9	3.8	4.7	4.8	5.9
Female	50.3	50.9	49.5	49.4	51.0	52.1	51.1

These student characteristics vary based not only on the frequency of school changes but also the reasons for those changes. Against the backdrop of the composition of the overall sample, the distribution of student characteristics for each type of school change shows relatively equitable distributions for some types of change (i.e. distributions that mirror that of the overall sample) and less so for other types. Table 6 displays the characteristics of students in the analytic sample, grouped by whether or not they ever experienced a particular type of school change. The composition of students who have not experienced a type of school change, in the column labelled *0*, can be compared to the composition of students who have experienced one or more of those type of school change, in the column labelled *1+*.

For example, looking just at the comparison for closure/rezoning transfers (Type 1), the table shows that of the students who never experienced closure/rezoning transfers 27.3 percent were FRPL, whereas 24.4 percent of those who did experience closure/rezoning transfers were FRPL.

Types of transfers where differences appear to be sizeable are parent-initiated and school-initiated transfers (Types 3 and 4) and residential transfers with and without other family changes (Types 5, 6, and 7). FRPL students were less likely to have changed schools due to parent-initiated transfers, reflecting the fact that many of these transfers were to and from private schools. Special education students comprised 22.1 percent of students who experienced school-initiated transfers; these were likely due to placements related to their special education status. Students receiving FRPL and black students were overly represented in the group of students experiencing residential changes, particularly those with concurrent family financial issues. This pattern aligns with published findings (Rumberger, 2002; U.S. Government Accountability Office, 2010).

Table 6

Characteristics of Students Who Have and Have Not Experienced School Changes, by Documented Reasons for Changing Schools

	Group school changes				Solo school changes											
					No residential change				Residential change							
											Family changes					
	Closure/ rezoning (Type 1)		Promotional (Type 2)		Parent-initiated (Type 3)		School-initiated (Type 4)		No family change (Type 5)		Family structure change (Type 6)		Family financial issues (Type 7)		Solo changes, unknown reason (Type 9)	
	0	1+	0	1+	0	1+	0	1+	0	1+	0	1+	0	1+	0	1+
FRPL	27.3	24.4	34.2	21.8	28.0	19.5	26.8	42.9	25.7	31.7	25.8	40.5	24.9	61.1	24.4	36.3
Special ed.	9.8	6.9	11.1	8.7	9.9	8.1	9.5	22.1	9.9	9.2	9.7	10.5	9.6	11.7	9.6	10.3
LEP	1.2	0.0	2.1	0.5	1.3	0.6	1.2	0.0	0.4	3.6	1.2	0.9	1.2	1.1	1.1	1.5
Amer. Ind.	0.4	0.9	0.5	0.3	0.3	0.9	0.4	0.0	0.3	0.7	0.4	0.3	0.4	0.0	0.4	0.4
Asian	3.9	2.3	5.1	2.9	4.0	2.7	4.0	1.2	3.2	6.1	4.1	2.2	4.1	0.7	3.8	4.1
Black	38.3	42.4	38.9	38.0	38.3	39.2	38.1	51.5	36.4	44.5	36.9	53.0	36.2	71.7	34.7	50.7
White	53.2	50.7	50.9	54.8	53.1	53.3	53.4	42.3	57.0	40.9	54.4	40.5	55.1	23.8	57.2	39.7
Hispanic	4.2	3.7	4.6	3.9	4.2	3.9	4.2	4.9	3.0	7.8	4.2	4.0	4.2	3.8	3.9	5.2
Female	50.2	51.2	49.7	50.7	50.1	51.6	50.6	35.6	50.7	48.9	50.0	53.2	49.9	55.2	50.3	50.1

Note. FRPL = Free or reduced-price lunch. Special ed. = Special education. LEP = Limited English proficient. Amer. Ind. = American Indian.
Table reads: Among students who never experienced group school changes due to closure/rezoning, 27.3 percent were FRPL; among students who experienced one or more of these school changes, 24.4 percent were FRPL.

The Relationship Between Changing Schools and Academic Performance

The third research question for this study asked, what is the relationship between changing schools and academic performance in the year of the school change and in the years following the school change? This section provides descriptive data for studentsô GPAs and school changes, followed by the results of three-level cross-classified multiple membership growth models which estimate the relationship between GPA and changing schools, controlling for student characteristics and other factors.

Descriptive Analyses

The outcome of interest in this study was academic performance as measured by annual grade point average for core academic courses (reading/language arts, mathematics, science, and social studies). In general, GPAs declined as students progressed through school (Table 7). In first grade, the mean GPA was 3.16 on a four-point scale. The mean declines 0.35 points to 2.81 by fifth grade, another 0.32 points from fifth to eighth grade, and an additional 0.22 points by 12th grade.

Table 7

Number of Records and Mean and Standard Deviation of GPA, by Grade

Grade	*n*	*M*	*SD*
Total	46226	2.76	0.87
1	5168	3.16	0.68
2	5303	3.18	0.70
3	5515	2.93	0.74
4	5766	2.85	0.78
5	6076	2.81	0.78
6	3734	2.67	0.89
7	3886	2.51	0.92
8	3534	2.49	0.93
9	1825	2.26	0.90
10	1840	2.19	0.88
11	1780	2.18	0.89
12	1799	2.27	0.92

As can be seen in Table 8, GPAs tended to be lower for students who have experienced school changes. The table shows, by grade, the number of students, mean GPA and standard deviation in GPA by the number of school changes the student has experienced up to and including that grade (no school changes, one school change, two school changes, etc.). The relationship of GPA with mobility can be seen as early as first grade. At the end of first grade, students who had not experienced any school changes during first grade had a mean first grade GPA of 3.17, while students who had changed schools once during first grade had a mean GPA of 2.98.

The gap between mobile and non-mobile students appears to widen as students progress through school. In fifth grade, the mean GPA for students who had never changed schools was 2.97, while for students who had changed schools once (any time before or during fifth grade) the mean was 2.79, and for students who had changed schools five or more times, the mean was 2.13. By eighth grade, due to normative transitions from elementary to middle school, the number of students who had never changed schools was relatively small (the analytic dataset has only 56 eighth-grade records for students in this category). For the students who had changed schools once, the mean eighth grade GPA was 2.65, while for those who had changed schools 5 or more times, the mean was 2.01.

Table 8

Number of Records and Mean and Standard Deviation of GPA, by Grade and Cumulative Number of School Changes

	0 school changes			1 school change			2 school changes			3 school changes			4 school changes			5 school changes		
Grade	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
All	18974	3.08	0.72	11727	2.77	0.83	8000	2.48	0.89	4023	2.33	0.90	1827	2.17	0.90	1675	1.99	0.87
1	**4892**	**3.17**	**0.68**	240	2.98	0.74	35	2.92	0.61	1	2.60	N/A	0	N/A	N/A	0	N/A	N/A
2	**4076**	**3.22**	**0.68**	1000	3.08	0.73	181	2.86	0.84	33	2.84	0.72	10	2.78	0.66	3	2.44	0.38
3	**3492**	**3.02**	**0.72**	1458	2.83	0.73	403	2.62	0.79	110	2.50	0.72	27	2.45	0.69	25	2.36	0.74
4	**3100**	**2.98**	**0.74**	1741	2.80	0.78	591	2.60	0.78	209	2.51	0.80	75	2.01	0.88	50	2.24	0.77
5	**2918**	**2.97**	**0.72**	1900	2.79	0.77	724	2.58	0.81	313	2.51	0.79	108	2.22	0.84	113	2.13	0.80
6	329	2.70	0.84	**1773**	**2.78**	**0.87**	959	2.68	0.88	385	2.44	0.89	168	2.36	0.97	120	2.01	0.91
7	84	2.62	0.92	**1700**	**2.68**	**0.86**	1157	2.51	0.93	480	2.30	0.93	256	2.17	0.88	209	1.93	0.93
8	56	2.63	0.89	**1510**	**2.65**	**0.89**	1022	2.54	0.88	485	2.26	0.93	239	2.11	0.99	222	2.01	0.92
9	2	3.00	0.71	83	2.15	0.91	**806**	**2.35**	**0.92**	505	2.31	0.86	220	2.14	0.88	209	1.97	0.86
10	14	2.33	0.94	101	2.29	0.86	**756**	**2.26**	**0.86**	514	2.19	0.90	242	2.16	0.85	213	1.91	0.86
11	7	1.96	1.19	108	2.37	0.89	**696**	**2.24**	**0.87**	501	2.23	0.91	237	2.06	0.90	231	1.95	0.83
12	4	1.52	1.03	113	2.37	0.94	**670**	**2.34**	**0.91**	487	2.33	0.97	245	2.24	0.86	280	1.97	0.84

Note. Normative pattern in bold.

Three-level Cross-classified Multiple Membership Growth Models

Three-level cross-classified multiple membership growth models were used to estimate effects of transfers while accounting for studentsô membership in first-grade and subsequent schools, allowing for multiple schools each year and over time. Each model in the series adds a set of variables, reading the table from left to right, culminating in the full model in the last column. Results are displayed in Table 9.

The series of three-level CCMM models adds variables in sequence, and model fit improves each time, as indicated by the progressively smaller Bayesian Deviance Information Criterion. First, the unconditional model, Model 1a, estimated the GPAs of all students without taking mobility or any student characteristics into account. Average first-grade GPAs (the model intercept), without controlling for other factors, were estimated to be 3.19, with declines after first grade of 0.12 points per year.

The bottom panel of Table 9 shows the partitioning of the random variance among Level 1 (repeated measures), Level 2 (students), and Level 3 (school), which includes schools that students attended in first grade (Level 3: firstsch) and schools they attended subsequent to first grade (Level 3: subsch). The Level 1 random parameter for the first model indicates that the largest part of the variation among GPAs was due to intra-student variation, that is, the deviation of observed values from an individualôs change trajectory. The Level 2 and Level 3 variance parameters show between-student and between-school variation in first-grade GPAs and rates of change. Most of the variation in first-grade GPAs is due to differences between students, with some due to differences between (first grade) schools. Differences between students and between

(subsequent) schools account for a small amount of variation in rates of change. There is significant unexplained variance in both initial status and rates of change at all levels.

Table 9

Explaining Mobility as Predictor of GPA

	Unconditional (Model 1a)	Mobility (Model 1b)	Panel/context (Model 1c)	Student Demographics (Model 1d)	Chronic Absence (Model 1d)
Fixed effects					
Level 1 (annual observations)					
Intercept (initial status)	3.19*** (.01)	3.21*** (.01)	3.22*** (.02)	3.43*** (.02)	3.45*** (.02)
Time (rate of change)	-0.12*** (.00)	-0.12*** (.00)	-0.11*** (.01)	-0.13*** (.01)	-0.13*** (.01)
New schools		-0.04*** (.01)	-0.02*** (.01)	-0.02** (.01)	-0.02*** (.01)
School year[a]			0.02*** (.00)	0.03*** (.00)	0.03*** (.00)
Repeating grade			0.19*** (.02)	0.20*** (.02)	0.20*** (.02)
Middle school			-0.11*** (.01)	-0.12*** (.01)	-0.11*** (.01)
High school			-0.34*** (.02)	-0.33*** (.02)	-0.31*** (.02)
FRPL x Time				-0.01* (.00)	-0.01* (.00)
Special education x Time				0.04*** (.01)	0.04*** (.01)
Limited English proficient x Time				0.05* (.02)	0.05* (.02)
American Indian x Time				-0.02 (.02)	-0.03 (.02)
Asian x Time				0.03** (.01)	0.02** (.01)
Black x Time				-0.02*** (.00)	-0.02*** (.00)
Hispanic x Time				-0.00 (.01)	-0.00 (.01)
Female x Time				0.03*** (.00)	0.03*** (.00)
Chronically absent					-0.21*** (.01)
Level 2 (student)					
FRPL				-0.24*** (.02)	-0.23*** (.02)
Special education				-0.48*** (.03)	-0.47*** (.02)
Limited English proficient				-0.45*** (.11)	-0.45*** (.11)
American Indian				0.08 (.11)	0.06 (.11)
Asian				0.03 (.04)	0.02 (.04)
Black				-0.20*** (.02)	-0.20*** (.02)
Hispanic				-0.17*** (.04)	-0.17*** (.04)
Female				0.07*** (.01)	0.08*** (.01)
Random parameters					
Level 3: firstsch					
Variance(initial status)	0.09*** (.01)	0.09*** (.01)	0.09*** (.01)	0.06*** (.01)	0.06*** (.01)
Covariance(initial status/change)	-0.01*** (.00)	-0.01*** (.00)	-0.01*** (.00)	-0.01*** (.00)	-0.01*** (.00)
Variance(growth)	0.00*** (.00)	0.00*** (.00)	0.00*** (.00)	0.00*** (.00)	0.00*** (.00)
Level 3: subsch					
Variance(growth)	0.01*** (.00)	0.01*** (.00)	0.01*** (.00)	0.01*** (.00)	0.01*** (.00)
Level 2					
Variance(initial status)	0.21*** (.01)	0.21*** (.01)	0.22*** (.01)	0.18*** (.01)	0.17*** (.01)
Covariance(initial status/change)	-0.01*** (.00)	-0.01*** (.00)	-0.01*** (.00)	-0.01*** (.00)	-0.01*** (.00)
Variance(growth)	0.01*** (.00)	0.01*** (.00)	0.01*** (.00)	0.01*** (.00)	0.01*** (.00)
Level 1					
Within-person	0.25*** (.00)	0.25*** (.00)	0.24*** (.00)	0.24*** (.00)	0.24*** (.00)
Effective number of parameters	8476.0	8469.0	8581.4	8319.8	8240.8
Bayesian deviance information criterion	74975.8	74961.7	74216.9	73917.0	73651.3

Note. Standard deviations are in parentheses. FRPL = Free or reduced-price lunch.
[a]School year was grand-mean centered on 1997-98.
* $p < .05$; ** $p < .01$; *** $p < .001$.

Adding mobility as a time-varying factor at Level 1 (Model 1b) improves model fit slightly, but it does not alter the within-student variance component. The Level 1 intercept, 3.21, now represents the mean GPA in first grade for students who did not change schools in first grade. The slope parameter, unchanged at -0.12, now represents the conditional rate of change, controlling for the effects of school changes. Each school change was associated with a drop in GPA of 0.04 points, about 5 percent of a standard deviation.

The effects of school year, grade retention, and school level are added to the model next as time-varying covariates (Model 1c). Once these are accounted for, the effect of school changes drops to -0.02. GPAs appear to increase gradually over the course of the study (1988 to 2001). Students who are repeating the grade perform better than their non-repeating peers. GPAs in the middle school grades (6 through 8) are 0.11 points lower on average than those in elementary school; GPAs in grades 9 through 12 are 0.34 points lower.

Student demographic variables at Level 2 as well as interacted with time at Level 1 were added in order to examine their effects on first grade GPAs as well as on rates of change over time (Model 1d). Adding student demographics to the model accounts for some of the variation in first-grade GPAs, as seen in the Level 2 and Level 3 random parameters. Variation in first-grade GPAs due to differences between students drops 18 percent, and variation in first-grade GPAs due to differences between schools drops 33 percent. The referent student (i.e. where all student demographic variables are 0) is a white male student who is not receiving any special services (free or reduced-price lunch or FRPL, special education or limited English proficient). The average first-grade GPA

for a non-mobile referent student in 3.43. Students with FRPL status have first-grade GPAs 0.24 points lower than those not eligible for FRPL, and their GPAs decline by an additional 0.01 points annually. For special education students, first-grade GPAs are 0.48 points lower, but their decline in performance is less steep over time by 0.04 points. Similarly, LEP students have first-grade GPAs that are 0.45 points lower than their non-LEP peers, but their declines are also less steep over time by 0.05 points. Black students have first-grade GPAs that are 0.20 points lower than their white peers and rates of change over time that are 0.02 points steeper. Female students have higher grades at the outset of schooling by 0.07 points on average, and experience less steep declines over time.

Finally, in Model 1d chronic absence is added as a time-varying covariate. This again improves model fit and adjusts the estimates somewhat. Students who are chronically absent in a given year demonstrate worse performance than those who attend regularly, by 0.21 points. The estimated -0.02 mobility effect, however, is unchanged, indicating that chronic absence is not a mechanism for the effect of school changes on academic performance.

Variation in the Relationship Between Changing Schools and Academic Performance with Concurrent Environmental Changes

The fourth research question for this study asked, how do the relationships between changing schools and academic performance in the year of the school change and in the years following the change vary among different types of concurrent changes in childrenôs social, educational, residential, and familial environments? This section provides results of three-level cross-classified multiple membership growth models that

estimate these relationships. Results are displayed in Table 10. First, Model 2a distinguishes between group and solo moves. In group moves, the student who is changing schools is doing so as a member of a larger group of students who are all changing schools together, for example in promotional transfers, when an entire class leaves elementary school to move to one or more middle schools, or in redistricting transfers, when school attendance boundaries are redrawn or schools are closed. In these situations, children who are changing schools do not lose all of their larger group of schoolmates. In solo moves, by contrast, including those intended to improve studentsô educational settings and those made as a result of family residential changes, children are changing schools in isolation and thus experience the loss not only of a familiar school environment but also of the entire set of schoolmates.

Examining the coefficients for the *group* and *solo* variables shows that students experiencing school changes in groups have, on average, GPAs in the year of the change that are no different from those of students continuing in the same school. By contrast, students experiencing school changes individually have, on average, GPAs 0.03 points lower in the year of the change compared to students continuing in the same school. Adding this distinction to the model improved model fit, as indicated by the smaller model fit statistic, the Bayesian deviance information criterion, compared to the statistic for the full mobility-only model (Model 1d). This suggests that making this distinction between group and solo moves provides a better model for explaining the variation in GPA due to changing schools than treating mobility as a monolithic variable.

Table 10

Effects of Different Types of School Changes on GPA

	Group vs. solo (Model 2a)	Group: closure vs. promotion (Model 2b)	Solo: Non-residential vs. residential (Model 2c)	Non-residential: parent- vs. school-initiated (Model 2d)	Residential: No family changes vs. family changes (Model 2e)	Family changes: Structure vs. financial (Model 2f)
Fixed effects						
Level 1 (annual observations)						
Intercept (initial status)	3.45*** (.02)	3.45*** (.02)	3.45*** (.02)	3.45*** (.02)	3.44*** (.02)	3.45*** (.02)
Time (rate of change)	-0.13*** (.01)	-0.13*** (.01)	-0.13*** (.01)	-0.13*** (.01)	-0.13*** (.01)	-0.13*** (.01)
New schools						
Group	0.00 (.01)					
Closure/rezoning (Type 1)		0.00 (.04)	0.00 (.04)	0.00 (.04)	0.01 (.04)	0.00 (.04)
Promotion (Type 2)		0.00 (.01)	0.00 (.01)	0.00 (.01)	0.00 (.01)	0.00 (.01)
Solo	-0.03*** (.01)	-0.03*** (.01)				
Non-residential transfers			0.01 (.02)			
Parent-initiated (Type 3)				0.03 (.02)	0.02 (.02)	0.03 (.02)
School-initiated (Type 4)				-0.02 (.03)	-0.02 (.04)	-0.02 (.03)
Residential transfers			-0.03*** (.01)	-0.03*** (.01)		
No family changes (Type 5)					-0.02 (.01)	-0.02 (.01)
Family changes					-0.05*** (.01)	
Family structure change (Type 6)						-0.04* (.02)
Family financial change (Type 7)						-0.06** (.02)
Solo transfer, unknown reason (Type 9)			-0.06*** (.01)	-0.06*** (.01)	-0.06*** (.01)	-0.06*** (.01)
School year[a]	0.03*** (.00)	0.03*** (.00)	0.03*** (.00)	0.03*** (.00)	0.03*** (.00)	0.03*** (.00)
Repeating grade	0.20*** (.02)	0.20*** (.02)	0.20*** (.02)	0.20*** (.02)	0.20*** (.02)	0.20*** (.02)
Middle school	-0.12*** (.01)	-0.12*** (.01)	-0.12*** (.01)	-0.12*** (.01)	-0.12*** (.01)	-0.12*** (.01)
High school	-0.33*** (.02)	-0.33*** (.02)	-0.34*** (.02)	-0.33*** (.02)	-0.33*** (.02)	-0.33*** (.02)
FRPL x Time	-0.01* (.00)	-0.01* (.00)	-0.01* (.00)	-0.01* (.00)	-0.01* (.00)	-0.01* (.00)
Special education x Time	0.04*** (.01)	0.04*** (.01)	0.04*** (.01)	0.04*** (.01)	0.04*** (.01)	0.04*** (.01)
Limited English proficient x Time	0.05* (.02)	0.05* (.02)	0.05* (.02)	0.05* (.02)	0.05* (.02)	0.05* (.02)
American Indian x Time	-0.03 (.02)	-0.03 (.02)	-0.02 (.02)	-0.03 (.02)	-0.03 (.02)	-0.03 (.02)
Asian x Time	0.02** (.01)	0.02** (.01)	0.02** (.01)	0.02* (.01)	0.02** (.01)	0.02** (.01)
Black x Time	-0.02*** (.00)	-0.02*** (.00)	-0.02*** (.00)	-0.02*** (.00)	-0.02*** (.00)	-0.02*** (.00)
Hispanic x Time	-0.00 (.01)	-0.01 (.01)	-0.00 (.01)	-0.00 (.01)	-0.00 (.01)	-0.00 (.01)
Female x Time	0.03*** (.00)	0.03*** (.00)	0.03*** (.00)	0.03*** (.00)	0.03*** (.00)	0.03*** (.00)
Chronically absent	-0.21*** (.01)	-0.21*** (.01)	-0.21*** (.01)	-0.21*** (.01)	-0.21*** (.01)	-0.21*** (.01)

	Group vs. solo (Model 2a)	Group: closure vs. promotion (Model 2b)	Solo: Non-residential vs. residential (Model 2c)	Non-residential: parent- vs. school-initiated (Model 2d)	Residential: No family changes vs. family changes (Model 2e)	Family changes: Structure vs. financial (Model 2f)
Level 2 (student)						
FRPL	-0.23*** (.02)	-0.23*** (.02)	-0.23*** (.02)	-0.23*** (.02)	-0.23*** (.02)	-0.23*** (.02)
Special education	-0.47*** (.02)	-0.47*** (.02)	-0.47*** (.02)	-0.47*** (.03)	-0.47*** (.02)	-0.47*** (.02)
Limited English proficient	-0.43*** (.11)	-0.43*** (.11)	-0.44*** (.11)	-0.44*** (.11)	-0.44*** (.11)	-0.44*** (.11)
American Indian	0.07 (.10)	0.07 (.11)	0.07 (.11)	0.07 (.11)	0.07 (.11)	0.07 (.11)
Asian	0.02 (.04)	0.02 (.04)	0.03 (.04)	0.03 (.04)	0.03 (.04)	0.02 (.04)
Black	-0.20*** (.02)	-0.20*** (.02)	-0.20*** (.02)	-0.20*** (.02)	-0.20*** (.02)	-0.20*** (.02)
Hispanic	-0.17*** (.04)	-0.17*** (.04)	-0.17*** (.04)	-0.17*** (.04)	-0.17*** (.04)	-0.17*** (.04)
Female	0.08*** (.01)	0.08*** (.01)	0.08*** (.01)	0.08*** (.01)	0.08*** (.01)	0.08*** (.01)
Random parameters						
Level 3: firstsch						
Variance(initial status)	0.06*** (.01)	0.06*** (.01)	0.06*** (.01)	0.06*** (.01)	0.06*** (.01)	0.06*** (.01)
Covariance(initial status/change)	-0.01*** (.00)	-0.01*** (.00)	-0.01*** (.00)	-0.01*** (.00)	-0.01*** (.00)	-0.01*** (.00)
Variance(growth)	0.00*** (.00)	0.00*** (.00)	0.00*** (.00)	0.00*** (.00)	0.00*** (.00)	0.00*** (.00)
Level 3: subsch						
Variance(growth)	0.01*** (.00)	0.01*** (.00)	0.01*** (.00)	0.01*** (.00)	0.01*** (.00)	0.01*** (.00)
Level 2						
Variance(initial status)	0.17*** (.01)	0.17*** (.01)	0.17*** (.01)	0.17*** (.01)	0.17*** (.01)	0.17*** (.01)
Covariance(initial status/change)	-0.01*** (.00)	-0.01*** (.00)	-0.01*** (.00)	-0.01*** (.00)	-0.01*** (.00)	-0.01*** (.00)
Variance(growth)	0.01*** (.00)	0.01*** (.00)	0.01*** (.00)	0.01*** (.00)	0.01*** (.00)	0.01*** (.00)
Level 1						
Within-person	0.24*** (.00)	0.24*** (.00)	0.24*** (.00)	0.24*** (.00)	0.24*** (.00)	0.24*** (.00)
Effective number of parameters	8239.3	8246.5	8242.4	8243.6	8243.7	8240.9
Bayesian deviance information criterion	73634.7	73641.6	73636.0	73639.0	73638.3	73642.5

Note. Standard deviations are in parentheses. FRPL = Free or reduced-price lunch.

[a]School year was grand-mean centered on 1997-98.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Closer examination of the group changes (Model 2b) does not reveal any distinction between the two types of groups changes: promotional transfers and redistricting or closure transfers. The model fit statistic for Model 2b is slightly worse than the previous model.

Next, the solo moves were more closely examined by distinguishing among non-residential transfers, residential transfers, and solo moves for which the reason was unknown (Model 2c).[13] In the previous model these solo transfers, taken together, were estimated to have an average effect of a loss of 0.03 GPA points. Distinguishing among them improved model fit and showed that the GPAs of students experiencing non-residential transfers were statistically equivalent to those of students continuing in the same school. These students, while changing to new schools that are likely to have substantially different expectations and climate, were continuing in the same household and thus had some semblance of continuity and stability in their lives. Residential transfers, however, where students not only changed schools but moved to a new address, thereby experiencing significant changes in their school and home environments, were associated with a drop in GPA by 0.03 points. Solo transfers for which the reason was unknown were associated with even larger drops in GPA, by 0.06 points. It is possible that these transfers, where the required transfer of student records did not take place, involve schools with low staff capacity, frequent transfers, or organizational problems that are concomitant with poor instructional environments that explain the added drop in GPA.

[13] Transfers for which reason was coded as unknown were examined and determined to be solo transfers, i.e. no patterns of groups of students transferring simultaneously were detected.

Next, Model 2d drilled down into the non-residential transfers based on who was making the decision to transfer ï parents/guardians or school staff. Although this model fit the data slightly worse than the previous one and coefficients were not statistically significant, the directions of the coefficients suggest that parental choices were associated with positive increases in GPA, while school-initiated transfers were associated with negative decreases in GPA. These results suggest that transfers made by choice, such as those into or out of private, charter, or magnet schools, may result in an educational environment that is a better fit for the student where the student thrives, or that parents and guardians make the right judgments about school quality. Conversely, school-initiated transfers into or out of special education or alternative settings may, at least in the short term, result in students not performing at their best or school settings that are not as instructionally effective. The data for both types of transfers is hampered by the fact that there is no distinction in the direction of the move, whether the move is from a traditional public school to a private, magnet, or charter school, or vice versa, or out of a zoned school to a special setting, or returning from the special school to the zoned school. It is possible that, if we were able to make this distinction, that other patterns would emerge that would indicate which settings are associated with improvements for which children.

Next, residential transfers were examined more closely by distinguishing, first, transfers in which the student changed residence but experienced no other family changes from transfers in which the student not only changed residence but also experienced other family changes. This comparison (Model 2e) revealed that those who transferred schools due to residential changes without family changes had GPAs that were not significantly

different from students who did not change schools, while those who experienced changes in residence with other family changes had GPAs that were 0.05 points lower than non-transferring students. Model fit improved slightly. This distinction tells a much different story from the earlier finding (Model 2c) that implied that residential transfers were uniformly negative. Here, we see that although students change schools and residence at the same time, having a stable, consistent family structure and relatively secure family finances enables students to weather the stress of having simultaneous changes in school and neighborhood settings. It is the residential changes accompanied by additional family changes that account for the negative association of residential transfers with school performance.

The residential moves with additional family changes were examined in more detail in the next model (Model 2f). Residential transfers that occurred with changes in family structure (Type 6) were slightly less harmful than the effects of residential school transfers that occurred with family financial strain (e.g., homelessness) (Type 7). Model fit, however, worsened slightly.

Finally, the coefficients in this full model were compared using joint and separate chi-squared tests. A joint test comparing effects among all types failed to reject the null hypothesis that the effects are all equal: χ^2 (28 df) = 26.232, p = 0.56. Separate tests comparing each possible coefficient pair (Type 1 vs. Type 2, Type 1 vs. Type 3, etc.) found significant differences between the neutral effect of Type 2 transfers (promotional, fixed effect = 0.00) and Type 6 (residential moves with family structure change, -0.04) (χ^2 = 4.696, 1 df, p = .03), Type 2 and Type 7 (residential moves with family financial issues, -0.06) (χ^2 = 8.353, 1 df, p = .004), and Type 2 and Type 9 (solo moves, reason

unknown, -0.06) (G^2 = 15.991, 1 df, p = .000). These results indicate that though the size of the difference in these estimates appears small, they are statistically significant. Separate tests also revealed that the coefficient for Type 3 (parent-initiated) transfers, which was +0.03 though statistically non-significant, was also statistically significantly different from the negative coefficients for Type 6 (G^2 = 6.187, 1 df, p = .013), Type 7 (G^2 = 8.963, 1 df, p = .003), and Type 9 transfers (G^2 = 11.968, 1 df, p = .001). Overall, these results indicate that the reasons for school transfers do indeed matter when assessing the effect on school performance. Implications of these findings are discussed in Chapter 5.

CHAPTER FIVE

DISCUSSION

Summary and Implications of Findings

The purpose of this study was to examine the reasons that students change schools and how the relationship of mobility with academic performance varies among them. It described the relative prevalence of reasons for school changes and characteristics of students who change schools. It then examined the relationship between school mobility and academic performance, as measured by GPA, controlling for studentsô first-grade achievement and their achievement trajectories prior to changing schools, as well as their demographic characteristics, chronic absence, and school membership over their educational histories. Finally, it compared the relative effects on performance of school changes with and without concurrent changes in social, educational, residential, and familial environments.

This study found evidence for a small overall mobility effect, net these other factors. Overall each school change that a student experienced was associated with a deficit of 0.02 GPA points in the year of the change compared to similar students who had not changed schools. While statistically significant, the size of this effect is relatively small; it is about two percent of a standard deviation, one-sixth of the observed annual decline in GPA as students progressed through school, and about one-tenth of the size of the observed gaps in GPAs between African American and white students and between low-income and non-FRPL students. The size of the effect of school changes estimated in this study is somewhat smaller than the comparable mean effect presented in the meta-analysis by Reynolds et al. (2009), which was -0.03 for reading and -0.06 for math

among studies that controlled for prior achievement, family socioeconomic status, and other covariates. The present study, however, included promotional transfers, which were found to have neutral effects and thus likely dampened the estimated effect of overall mobility. The findings reflect the fact that school changes of any type require children to make new relationships with students and teachers and adjust to new social norms (American Academy of Child and Adolescent Psychiatry, 2011; Blom et al., 1986; Compas, 1987; Fantuzzo et al., 2012; Gruman et al., 2008; Hendershott, 1989; Langenkamp, 2011; South & Haynie, 2004; Pianta, 1999; Rumberger & Larson, 1998).

At the outset of the study it was theorized that students would demonstrate greater declines in academic performance when they experienced more changes in social, residential, and familial environments concurrent with school changes. This study did find evidence supporting this theoretical framework. Relatively stable school changes in which students moved with groups of peers, not triggered by changes in residence or specifically targeting individual students, were found to have neutral effects on academic performance. This aligns with the understanding that students can adjust to new school environments when their other social, residential, and familial environments remain relatively consistent, providing them a secure base of relationships amidst the change in one arena. However, the number of transfers due to school closure or rezoning in this study was relatively small (n = 216) and accounted for only 2 percent of all transfers, so the power to detect effects was relatively weak. The finding that promotional transfers were also neutral may be explained not only by the relative stability in adolescentsô lives but by the positive opinion that adolescents have of such normal developmental transitions (Tolan et al., 1988).

Solo transfers, on the other hand, generally had negative effects on school performance, likely because students in these situations were losing ties with their established school-based social group. Among these transfers, those that involved only a change in educational setting, not a change in residence, had no impact on student performance in school. Although the effects were statistically neutral, results suggest that parent-initiated transfers may tend to have positive effects, while school-initiated transfers may be associated with negative effects. It is possible that school-initiated transfers did involve better educational placements for these students but that the positive effects of more appropriate fit were cancelled out by the stress and psychological adjustment imposed on the transferring student.

Unfortunately the data used in this study did not assess whether these new environments were well-suited to the child, whether chosen by parents or school staff. Both of these kinds of transfers point to the importance of assessing the fit of school environments with studentsô social, emotional, and academic needs, whether they are a function of childrenôs developmental stages (Eccles et al., 1993) or individualsô unique circumstances. The distinct effects of these transfers from other kinds of school changes demonstrates the need for researchers to attend to the fact that part of the problem of mobility is actually a problem with inappropriate school settings. Kerbowôs (1996) study of mobility in Chicago public schools revealed that ñfrom the perspective of students, school transfer is clearly an exit phenomenon. They are escaping either unsafe or inadequate school environments,ò characterized by trouble with other students, problems with former teachers, or academic difficulties in the classroom (Kerbow, 1996, p. 10). A child changing from one environment to another may experience net benefits if the new

environment is more developmentally appropriate and better meets the needs of that child. The current study did not take these factors into account.

Residential transfers, where students lose neighborhood-based as well as school-based social ties, were overall negatively associated with academic performance, further bolstering the idea that the stress of transferring schools is amplified by the stress of additional losses at the same time. Among these, those involving yet another arena of instability, due to family structure change or financial issues, had the most harmful effects.

Limitations and Implications for Further Research

This study faced a number of limitations that are discussed in this section, along with recommendations for future research. The main limitations were missing data, the number of years that have elapsed since data collection, the analysis of only short-term effects of mobility, and the lack of information about potential mediators of mobilityôs effects.

Missing Data

One limitation of this study is the exclusion from the analytic dataset of annual records that were missing GPA, chronic absence, or mobility data. This resulted in the exclusion of 536 students (6.9 percent of the full sample). As seen in Table 2, students who were dropped from the analyses were more likely to be mobile, receiving free- or reduced-price lunch, limited English proficient, and/or black. Most of the characteristics of the remaining analytic sample mirror the demographics of the state as a whole at the time of data collection, although the proportion of students receiving free or reduced-price lunch in the state was 33.8 percent (Rogers, 2004), while in the analytic sample it

was 27.2 percent. As discussed in Chapter 2, students from low-income families are more likely than other students to experience school changes overall as well as school changes that are combined with family changes (Hanushek et al., 2004; Rumberger & Larson, 1998; Schacter, 2001). The negative effects of mobility may be even greater for poorer students due to their increased vulnerability (DuBois et al., 1994). Thus, this studyôs findings may have underestimated the effects of mobility overall.

Future research must continue to grapple with the issue of incomplete administrative records for mobile students, particularly those attending schools that may lack the resources or capacity to track down and obtain complete records when new students enter. In order to test the sensitivity of estimates to violation of the MAR assumption, a ñbest caseò and ñworst caseò treatment effect approach could be taken in order to estimate the upper and lower bounds for the direct effect of mobility on GPA (Horowitz & Manski, 2000; IES, 2009). Specifically, the lower bound for the estimated mobility effect (i.e. the smallest possible impact) could be estimated by substituting values of 0 for missing GPAs for non-mobile students and values of 4 for missing GPAs for mobile students. Likewise, the upper bound for the estimated mobility effect (i.e. the largest possible impact) could be estimated by substituting values of 4 for missing GPAs for non-mobile students and values of 0 for missing GPAs for mobile students.

Time Period

Another aspect of the study is the time period for the data that were used. These studentsô educational histories ranged from 1988 to 2002, just prior to implementation of the *No Child Left Behind Act* (NCLB). The fairly stable educational policy context in Maryland during this period provides a stable backdrop for investigating changes in GPA

over time. It is likely that this state context was similar to the accountability policies in all states under NCLB. At the time covered in this study, Maryland had school accountability policies and a standardized state test for children in grades three, five, and eight (Maryland School Performance Assessment Program), and assessments that were required for graduation (Maryland Functional Tests) (Cidbulka & Derlin, 1998; Michaels & Ferrar, 1999). Under NCLB, states were uniformly required to establish school accountability systems with the goal of all children achieving proficiency in reading and math by 2014. Thus the findings of the present study are likely fairly representative of the national picture of mobilityôs effects under NCLB (from 2002 until recently).

It is unclear to what extent the same findings would be obtained from a similar study today. It is possible that the Common Core, if fully implemented, would establish consistent educational standards and expectations across states, which would ameliorate the effects of mobility, at least insofar as those effects are caused by dissimilar curricula and performance standards. The recent withdrawal of several states from the Common Core and the re-assertion of statesô decision making authority in the recent passage of the *Elementary and Secondary Success Act*, however, suggest that educational standards will likely continue to be inconsistent from state to state. Thus understanding the effects of school mobility and designing policies and interventions to ameliorate those effects will continue to be important objectives for researchers and policy makers.

Modeling Mobility's Effects

It is important to examine the short term and long-term effects of mobility more closely. This study estimated the relationship between school changes and academic performance in the year of the school change only. Changes in school and other settings

may also affect childrenôs academic performance in the long term, but modeling the persistence of factors like mobility that affect educational outcomes is ñone of the most challenging aspects of modeling longitudinal achievement dataò (Mariano, McCaffrey, & Lockwood, 2010, p. 254). Estimating the duration of educational effects has been receiving growing attention with efforts to model teachersô ñvalue addedò (Broatch & Lohr, 2012; Mariano et al., 2010; see also Sass, Semykina & Harris, 2014, for a thorough discussion). Future research should examine short-term as well as long-term patterns to disentangle the immediate and lasting impacts of mobility. It is important to measure outcomes not just immediately following the transition but even years later (Bronfenbrenner, 1979). Effects of school transfers on childrenôs performance are likely to be greatest within a year of the transition (Gruman et al., 2008; Hanushek et al., 2004; Medway, 2002), but it is unknown whether student performance in later years is affected. The persistence of this potential effect on later years may be steady or declining; Hanushek et al. (2004) found distinct differences in the effects between moves in the school year immediately prior to the current year and moves in school years 2 years or more in the past for some types of moves. Significant persistent effects would suggest that children never fill the gaps in curricula and foundational skills that occur when they transfer from school to school (American Academy of Child and Adolescent Psychiatry, 2011; Bradshaw et al., 2010; Jason et al., 1992; Rogers, 2004; Rumberger et al., 1999).

Mediators and Moderators of Mobility's Effect on Academic Performance

Although this study provides evidence for the effect of school mobility on academic performance, the mechanisms for this effect remain unknown. The significant effects of mobility over and above studentsô chronic absence from school indicate that the

impact on performance is not due simply to the poor attendance that can occur due to school transitions and social withdrawal. Having friends in school and bonding with teachers are likely important moderators of mobilityôs negative effects on achievement, as Langenkamp (2011) found. The current study did not assess these factors.

Positive engagement with school might also provide moderating effects, although research suggests that the relationship between engagement and academic outcomes is complicated. Some evidence suggests the possibility of an ñengagement-achievement paradoxò in that engagement has positive effects on academic performance only for white students ï black students are more engaged in school but have lower GPAs, and the relationship between engagement and achievement is positive for whites but negative for blacks (Shernoff & Schmidt, 2008). If black students tend to be more mobile than white students, improving their ñengagementò in school will likely not be sufficient to close the black-white achievement gap. The present study did not examine the potential variation in mobility effects among subgroups (i.e. interaction between mobility and race) or measure student engagement other than chronic absence.

The studyôs findings about the substantial amount of variation in GPA that is due to variation between schools points to the importance of studying school-level effects of mobility on individual students. Although student membership in the schools the students attended over the course of their educational histories was able to be appropriately modeled, the current study lacked data about these schools. Actual school identification numbers were tracked only for Maryland public schools. School contextual variables were not included in the analyses in order to include as many students and schools as possible. Including school context data might help explain some of the school-level

variation in GPAs (which accounted for about a third of the overall variation). School-level mobility rates would be particularly valuable, since it is likely that staff in low-mobility schools would have better capacity to attend to the individual needs of new students, while in high-mobility schools keeping up with the constant churn of incoming and outgoing students would be a challenge. Mobility can be a challenge for schools and teachers, not only in meeting the instructional and social-emotional needs of incoming students, but also in establishing and maintaining stable relationships and processes (Bryk, Sebring, Allensworth, Luppescu, & Easton, 2010; Lash & Kirkpatrick, 1990; U.S. GAO, 2010). Prior research has found that school-level mobility related to dropout after controlling for other factors, largely due to the fact that high-mobility schools have lower levels of involvement and lower academic performance (South et al., 2007).

This study did not examine whether there is variation in mobility effects among schools. The race and SES achievement gaps have been found to be widely variable among schools (Konstantopoulos & Borman, 2011), and it is likely that such variability exists in terms of the negative effects of mobility on achievement. Further research is needed into the variation in mobility effects due to contextual and strategic differences among schools. Preliminary research using a subset of the present studyôs dataset (Rose, 2013) suggests mobility gaps were especially large in schools with higher overall levels of achievement. Analyses of the grade 6 CTBS reading scores of 1504 students attending 215 schools in grade 6 and 640 schools prior to grade 6 showed that the relationship between mobility and reading scores was neutral on average, but varied significantly among schools. Mobility gaps were especially large in schools with higher overall levels of achievement. It is possible that schools with greater academic press are not as good at

attending to individual studentsô academic deficits and social-emotional needs. Schools that provide structured and explicit support in these areas, for example using school-wide supports such as positive behavioral interventions and supports (PBIS), may narrow or close mobility gaps, as demonstrated by preliminary research using data from a randomized control trial of PBIS (Rose, 2010). In schools randomly assigned to non-PBIS mobile students performed significantly lower on the Maryland School Assessment in reading compared to non-mobile students, but that mobile and non-mobile students performed equally in schools randomly assigned to PBIS. When a student transfers into a new school where behavioral expectations are inconsistent and not explicit, cognitive function may be impaired due to the studentôs unsuccessful attempts to understand and assimilate into the new culture. The consistent and explicit communication of behavioral expectations in PBIS schools may eliminate this cognitive confusion, opening the mental door for learning.

At the district level, policy makers may be able to address these effects by ensuring greater consistency in curricula and standards and by training staff to identify students who have recently experienced school changes, assess their gaps in curriculum and essential skills and knowledge, and provide appropriate and timely remediation. One teacher interviewed for the original study stated that she intentionally did not examine studentsô cumulative folders and school histories so that she would have a ñclean slateò upon which to judge their performance. Although well-intended, this approach, later confirmed through focus groups to be widespread, is likely to operate to the detriment of mobile children.

Overall this study demonstrated the importance of paying attention to the changes that occur in childrenôs lives along with school changes, and taking into account student and school factors in examining the relationship of these school changes with achievement. It underscores the need for school staff to be trained to understand and provide appropriate supports for this different types of school changes and the curricular gaps that can occur.

References

Adam, E. K., & Chase-Lansdale, P. L. (2002). Home sweet home(s): Parental separations, residential moves, and adjustment problems in low-income adolescent girls. *Developmental Psychology, 38*, 792ï 805.

Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978; Reprint 2014). *Patterns of attachment: A psychological study of the strange situation*. New York: Psychology Press.

Alexander, K. L., Entwisle, D. R., & Dauber, S. L. (1996). Children in motion: School transfers and elementary school performance. *Journal of Educational Research, 90*, 3-12.

Alexander, K. L., Entwisle, D. R., & Dauber, S. L. (2003). *On the success of failure: A reassessment of the effects of retention in the primary school grades* (2nd ed.). New York: Cambridge University Press.

Alexander, K. L., Entwisle, D. R., & Olson, L. S. (2001). Schools, achievement, and inequality: A seasonal perspective. *Educational Evaluation and Policy Analysis, 23*, 171-191.

American Academy of Child and Adolescent Psychiatry. (2011, March). *Facts for families: Children and family moves*. Retrieved from http://www.aacap.org/App_Themes/AACAP/docs/facts_for_families/14_children_and_family_moves.pdf

Anderson, S., Leventhal, T., & Dupéré, V. (2014). Residential mobility and the family context: A developmental approach. *Journal of Applied Developmental Psychology, 35*, 70-78.

Attar, B. K., Guerra, N. G., & Tolan, P. H. (1994). Neighborhood disadvantage, stressful life events, and adjustment in urban elementary-school children. *Journal of Clinical Child Psychology, 23*, 391-400.

Barber, B. K., & Olsen, J. A. (2004). Assessing the transitions to middle and high school. *Journal of Adolescent Research, 19*, 3-30.

Battin-Pearson, S., Newcomb, M. D., Abbott, R. D., Hill, K. G., Catalano, R. F., & Hawkins, J. D. (2000). Predictors of early high school dropout: A test of five theories. *Journal of Educational Psychology, 92*, 568-582.

Blom, G. E., Cheney, B. D., & Snoddy, J. E. (1986). *Stress in childhood: An intervention model for teachers and other professionals*. New York: Teachers College Press.

Bradshaw, C. P., Sudhinaraset, M., Mmari, K., & Blum, R. W. (2010). School transitions among military adolescents: A qualitative study of stress and coping. *School Psychology Review, 39*, 84-105.

Broatch, J., & Lohr, S. (2012). Multidimensional assessment of value added by teachers to real-world outcomes. *Journal of Educational and Behavioral Statistics, 37*, 256-277.

Bronfenbrenner, U. (1979). Contexts of child rearing: Problems and prospects. *American Psychologist, 34*, 844-850.

Bronfenbrenner, U. (1986). Ecology of the family as a context for human development: Research perspectives. *Developmental Psychology, 22*, 723-742.

Bronfenbrenner, U. (1994). Ecological models of human development. In *International Encyclopedia of Education, Vol. 3, 2nd Ed*. Oxford: Elsevier. Reprinted in: M.

Gauvain & M. Cole (Eds.), *Readings on the development of children, 2nd Ed*. (1993, pp. 37-43). New York: Freeman.

Bronfenbrenner, U., & Morris, P. A. (2006). The bioecological model of human development. In *Handbook of Child Psychology* (pp. 793-828).

Browne, W. J. (2014). MCMC estimation in MLwiN version 2.31. Centre for Multilevel Modelling, University of Bristol. http://www.bristol.ac.uk/cmm/software/mlwin/download/manuals.html

Bryk, A. S., Sebring, P. B., Allensworth, E., Luppescu, S., Easton, J. Q. (2010). Organizing schools for improvement: Lessons from Chicago. Chicago: The University of Chicago Press.

Burchinal, M., Nelson, L., & Poe, M. (2006). Growth curve analysis: An introduction to various methods for analyzing longitudinal data. In K. McCartney, M. Burchinal, & K. Bub (Eds.), *Best practices in quantitative methods for developmentalists*. *Monographs of the Society for Research in Child Development, 71*(3), 65-87.

Burkam, D. T., Lee, V. E., & Dwyer, J. (2009). School Mobility in the Early Elementary Grades: Frequency and Impact From Nationally-Representative Data. Workshop on the Impact of Mobility and Change on the Lives of Young Children, Schools, and Neighborhoods. Retrieved from https://www.researchgate.net/profile/David_Burkam

Chin, T., & Phillips, M. (2004). Social reproduction and child-rearing practices: Social class, children's agency, and the summer activity gap. *Sociology of Education, 77*, 185-210.

Chung, H. (2009). *The impact of ignoring multiple-membership data structures* (Doctoral dissertation). Retrieved from UT Electronic Theses and Dissertations, http://repositories.lib.utexas.edu/handle/2152/11672

Chung, H., & Beretvas, N. (2012). The impact of ignoring multiple membership data structures in multilevel models. *British Journal of Mathematical and Statistical Psychology, 65*, 185-200.

Cidbulka, J. G., & Derlin, R. L. (1998). Authentic education accountability policies: Implementation of state initiatives in Colorado and Maryland. *Educational Policy, 12*, 84-97.

Coddington, R. D. (1972). The significance of life events as etiologic factors in the diseases of children ï II: A study of a normal population. *Journal of Psychosomatic Research, 16*, 205-213.

Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology, 94(Supplement)*, S95-S120.

College Board. (2015). 2015 College-Bound Seniors: Total Group Profile Report. Retrieved from http://research.collegeboard.org/programs/sat/data/cb-seniors-2015

Compas, B. E. (1987). Stress and life events during childhood and adolescence. *Clinical Psychology Review, 7*, 275-302.

Cooper, H., Nye, B., Charlton, K., Lindsay, J., & Greathouse, S. (1996). The effects of summer vacation on achievement test scores: A narrative and meta-analytic review. *Review of Educational Research, 66*, 227-268.

Cornille, T. A., Bayer, A. E., & Smyth, C. K. (1983). Schools and newcomers: A national survey of innovative programs. *The Personnel and Guidance Journal, 62*, 229-236.

Cowan, C. D., Hauser, R. M., Kominski, R. A., Levin, H. M., Lucas, S. R., Morgan, S. L., ... & Chapman, C. (2012). Improving the measurement of socioeconomic status for the National Assessment of Educational Progress: A theoretical foundation (Recommendations for the National Center for Education Statistics). Washington, DC: National Center for Education Statistics. Retrieved from http://nces.ed.gov/nationsreportcard/pdf/researchcenter/Socioeconomic_Factors.pdf

Cutuli, J. J., Desjardins, C. D., Herbers, J. E., Long, J. D., Heistad, D., Chan, C.-K., Hinz, E., & Masten, A. S. (2013). Academic achievement trajectories of homeless and highly mobile students: Resilience in the context of chronic and acute risk. *Child Development, 84*, 841-857.

de la Torre, M., & Gwynne, J. (2009). *When schools close: Effects on displaced students in Chicago Public Schools*. Retrieved from http://ccsr.uchicago.edu/publications/when-schools-close-effects-displaced-students-chicago-public-schools

DuBois, D. L., Felner, R. D., Brand, S., Adan, A. M., & Evans, E. G. (1992). A prospective study of life stress, social support, and adaptation in early adolescence. *Child Development, 63*, 542-557.

DuBois, D. L., Felner, R. D., Meares, H., & Krier, M. (1994). Prospective investigation of the effects of socioeconomic disadvantage, life stress, and social support on early adolescent adjustment. *Journal of Abnormal Psychology, 103*, 511-522.

Duckworth, A. L., Tsukayama, E., & May, H. (2010). Establishing causality using longitudinal hierarchical linear modeling: An illustration predicting achievement from self-control. *Social Psychological and Personality Science, 1*, 311-317.

Eccles, J. S., Midgley, C., Wigfield, A., Buchanan, C. M., Reuman, D., Flanagan, C., & Mac Iver, D. (1993). Development during adolescence: The impact of stage-environment fit on young adolescentsô experiences in schools and in families. *American Psychologist, 48*, 90-101.

Fantuzzo, J., LeBoeuf, W. A., Chen, C.-C., Rouse, H. L., & Culhane, D. P. (2012). The unique and combined effects of homelessness and school mobility on the educational outcomes of young children. *Educational Researcher, 41*, 393-402.

Filippelli, L. A., & Jason, L. A. (1992). How life events affect adjustment and self-concept of transfer children. *Journal of Instructional Psychology, 19*, 61-65.

Fomby, P., & Cherlin, A. J. (2007). Family instability and child well-being. *American Sociology Review, 72*, 181-204.

Goldstein, H. (2003). *Multilevel Statistical Models*, 3rd ed. London: Arnold.

Goldstein, H., Burgess, S., & McConnell, B. (2007). Modelling the effect of pupil mobility on school differences in educational achievement. *Journal of the Royal Statistical Society, 170*, 941-954.

Grady, M. W., & Beretvas, S. N. (2010). Incorporating student mobility in achievement growth modeling: A cross-classified multiple membership growth curve model. *Multivariate Behavioral Research, 45*, 393-419.

Gruman, D. H., Harachi, T. W., Abbott, R. D., Catalano, R. F., & Fleming, C. B. (2008). Longitudinal effects of student mobility on three dimensions of elementary school engagement. *Child Development, 79*, 1833-1852.

Hanushek, E. A., Kain, J. F., & Rivkin, S. G. (2004). Disruption versus Tiebout improvement: The costs and benefits of switching schools. *Journal of Public Economics, 88*, 1721ï 1746.

Hendershott, A. B. (1989). Residential mobility, social support and adolescent self-concept. *Adolescence, 24*, 217-232.

Herbers, J. E., Cutuli, J. J., Supkoff, L. M., Heistad, D., Chan, C., Hinz, E., & Masten, A. S. (2012). Early reading skills and academic achievement trajectories of students facing poverty, homelessness, and high residential mobility. *Educational Researcher, 41*, 366-374.

Horowitz, J. L., & Manski, C. F. (2000). Nonparametric analysis of randomized experiments with missing covariate and outcome data. *Journal of the American Statistical Association, 95*, 77-84.

Institute for Children, Poverty & Homelessness. (2015). Empty seats: The epidemic of absenteeism among homeless elementary students. Retrieved from http://www.icphusa.org/index.asp?page=16&report=132

Jason, L. A., Weine, A. M., Johnson, J. H., Warren-Sohlberg, L., Filippelli, L. A., Turner, E. Y., & Lardon, C. (1992). *Helping transfer students: Strategies for educational and social readjustment*. San Francisco: Jossey-Bass.

Kerbow, D. (1996). Patterns of urban student mobility and local school reform. *Journal of Education for Students Placed at Risk, 1*, 147ï 169.

Kirshner, B., Gaertner, M., & Pozzoboni, K. (2010). Tracing transitions: The effect of high school closure on displaced students. *Educational Evaluation and Policy Analysis, 32*, 407-429.

Kobak, R., & Madsen, S. (2008). Disruptions in attachment bonds: Implications for theory, research, and clinical intervention. In J. Cassidy and P. R. Shaver (Eds.), *Handbook of Attachment: Theory, Research, and Clinical Applications, 2nd edition* (pp. 23-47). New York: Guilford.

Konstantopoulos, S., & Borman, G. D. (2011). Family background and school effects on student achievement: A multilevel analysis of the Coleman data. *Teachers College Record, 113*, 97-132.

Langenkamp, A. G. (2011). Effects of educational transitions on studentsô academic trajectory: A life course perspective. *Sociological Perspectives, 54*, 497-520.

Lareau, A. (2011). *Unequal childhoods: Class, race, and family life* (2nd ed.). Berkeley: University of California Press.

Lash, A. A., & Kirkpatrick, S. L. (1990). A classroom perspective on student mobility. *Elementary School Journal, 91*, 171-191.

Leckie, G., & Charlton, C. (2013). runmlwin ï a program to run the MLwiN multilevel modelling software from within Stata. *Journal of Statistical Software, 52*(11), 1-40.

Luo, W., & Kwok, O. (2012). The consequences of ignoring individuals' mobility in multilevel growth models: A Monte Carlo study. *Journal of Educational and Behavioral Statistics, 37*, 31-56.

Mac Iver, M. A., & Mac Iver, D. J. (2010). Keeping on track in ninth grade and beyond: Baltimoreôs ninth graders in 2007-08. A research report by the Baltimore Education Research Consortium. Retrieved from http://baltimore-berc.org/keeping-on-track/

Mac Iver, M. A., & Messel, M. (2013). The ABCs of keeping on track to graduation: Research findings from Baltimore. *Journal of Education for Students Placed At Risk (JESPAR)*, 18, 50-67.

Mariano, L. T., McCaffrey, D. F., & Lockwood, J. R. (2010). A model for teacher effects from longitudinal data without assuming vertical scaling. *Journal of Educational and Behavioral Statistics, 35*, 253-279.

Maryland State Department of Education (MSDE). (2008). Maryland student records manual. Baltimore, MD: Author.

Mattarella-Micke, A., & Beilock, S. L. (2013). The integration of emotion and cognitive control. In T. P. Alloway and R. G. Alloway (Eds.), *Working memory: The connected intelligence* (pp. 239-260). New York: Psychology Press.

McCaffrey, D. F., & Lockwood, J. R. (2011). Missing data in value-added modeling of teacher effects. *The Annals of Applied Statistics, 5*, 773-797.

Medway, F. J. (2002). Best practices in assisting relocating families. In A. Thomas and J. Grimes (Eds.), *Best Practices in School Psychology IV* (pp. 1461-1471). Bethesda, MD: National Association of School Psychologists.

Mehana, M., & Reynolds, A. J. (2004). School mobility and achievement: A meta-analysis. *Children and Youth Services Review, 26*(1), 93ï 119.

Michaels, H. R., & Ferrara, S. (1999). Evolution of educational reform in Maryland: Using data to drive state policy and local reform. In G. J. Cizek (ed.), *Handbook of Educational Policy* (pp. 101-127). San Diego: Academic Press.

Obradoviĺ, J., Long, J. D., Cutuli, J. J., Chan, C.-K., Hinz, E., Heistad, D., & Masten, A. S. (2009). Academic achievement of homeless and highly mobile children in an urban school district: Longitudinal evidence on risk, growth, and resilience. *Development and Psychopathology, 21*, 493-518.

Oishi, S., & Schimmack, U. (2010). Residential mobility, well-being, and mortality. *Journal of Personality and Social Psychology, 98*, 980-994.

Osher, D., Morrison, G., & Bailey, W. (2003). Exploring the relationship between student mobility and dropout among students with emotional and behavioral disorders. *The Journal of Negro Education, 72*, 79-96.

Pianta, R. C. (1999). *Enhancing relationships between children and teachers*. Washington, DC: American Psychological Association.

Pribesh, S., & Downey, D. B. (1999). Why are residential and school moves associated with poor school performance? *Demography, 36*, 521-534.

Ralston, K., Newman, C., Clauson, A., Guthrie, J., & Buzby, J. (2008). *The National School Lunch Program: Background, trends, and issues* (Economic Research

Report No. 61). Washington, DC: U.S. Department of Agriculture. Retrieved from http://files.eric.ed.gov/fulltext/ED502404.pdf

Rasbash, J., Browne, W. J., Healy, M., Cameron, B., & Charlton, C. (2014). *MLwiN Version 2.31*. Centre for Multilevel Modelling, University of Bristol. Retrieved from http://www.bristol.ac.uk/cmm/software/mlwin/download/

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Thousand Oaks, CA: SAGE.

Reynolds, A. J., Chen, C.-C., & Herbers, J. E. (2009, June). *School mobility and educational success: A research synthesis and evidence on prevention*. Paper presented at the Workshop on the Impact of Mobility and Change on the Lives of Young Children, Schools, and Neighborhoods, National Research Council, Washington, DC. Retrieved from http://www.iom.edu/~/media/Files/Activity%20Files/Children/ChildMobility/Reynolds%20Chen%20and%20Herbers.pdf

Riley, P. (2011). *Attachment theory and the teacher-student relationship*. New York: Routledge.

Rogers, L. (2004). *Student mobility in Maryland: A report to The Annie E. Casey Foundation*. Baltimore, MD: Maryland State Department of Education.

Rose, B. A. (2010). The attenuating effects of school-wide PBIS on the negative impact of student mobility. Unpublished manuscript, Department of Teacher Development and Leadership, The Johns Hopkins University School of Education, Baltimore, Maryland.

Rose, B. A. (2013, September). Examining variation in effects of student mobility using cross-classified, multiple membership modeling. Presented at the fall conference of the Society for Research on Educational Effectiveness, Washington, D. C.

Rumberger, R. W. (2002). Student mobility. In *Encyclopedia of Education* (2nd ed., Vol. 7, pp. 2381-2385). New York: Macmillan Reference USA.

Rumberger, R. W., & Larson, K. A. (1998). Student mobility and the increased risk of high school dropout. *American Journal of Education, 107*, 1-35.

Rumberger, R. W., Larson, K. A., Ream, R. K., & Palardy, G. J. (1999). *The educational consequences of mobility for California students and schools*. University of California, Berkeley and Stanford University: Policy Analysis for California Education Research Series 99-2. Retrieved from https://gse.soe.berkeley.edu/research/PACE/reports/Conseq_of_mobility_for_CA_schools.pdf

Sandler, I. N., & Block, M. (1979). Life stress and maladaptation of children. *American Journal of Community Psychology, 7*, 425-440.

Sass, T. R., Semykina, A., & Harris, D. N. (2014). Value-added models and the measurement of teacher productivity. *Economics of Education Review, 38*, 9-23.

Sauro, M. D., Jorgensen, R. S., & Pedlow, C. T. (2003). Stress, glucocorticoids, and memory: A meta-analytic review. *Stress, 6*, 235-245.

Schacter, J. (2001). Why people move: Exploring the March 2000 current population series. Current Population Reports. Washington, DC: U.S. Census Bureau. Retrieved from http://www.census.gov/prod/2001pubs/p23-204.pdf

Schneider, B. (2000). Social systems and norms: A Coleman approach. In M. T. Hallinan (Ed.), *Handbook of the Sociology of Education* (pp. 365-385). New York: Kluwer Academic/Plenum Publishers.

Seidman, E., Aber, J. L., Allen, L., & French, S. E. (1996). The impact of the transition to high school on the self-system and perceived social context of poor urban youth. *American Journal of Community Psychology, 24*, 489-515.

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Boston: Houghton Mifflin.

Shernoff, D. J., & Schmidt, J. A. (2008). Further evidence of an engagement-achievement paradox among U. S. high school students. *Journal of Youth and Adolescence, 37*, 564-580.

Simmons, R. G., Burgeson, R., Carlton-Ford, S., & Blyth, D. A. (1987). The impact of cumulative change in early adolescence. *Child Development, 58*, 1220-1234.

Simpson, G. A., & Fowler, M. G. (1994). Geographic mobility and children's emotional/behavioral adjustment and school functioning. *Pediatrics, 93*, 303-309.

Singer, J. D., & Willett, J. B. (2003). *Applied longitudinal data analysis: Modeling change and event occurrence*. New York: Oxford University.

South, S. J., & Haynie, D. L. (2004). Friendship networks of mobile adolescents. *Social Forces, 83*(1), 315-350.

South, S. J., Haynie, D. L., & Bose, S. (2007). Student mobility and school dropout. *Social Science Research, 36*, 68-94.

Swanson, C. B., & Schneider, B. (1999). Students on the move: Residential and educational mobility in Americaôs schools. *Sociology of Education, 72*, 54-67.

Tolan, P., Miller, L., & Thomas, P. (1988). Perception and experience of types of social stress and self-image among adolescents. *Journal of Youth and Adolescence, 17*, 147-163.

Tucker, C. J., Marx, J., & Long, L. (1998). ñMoving onò: Residential mobility and childrenôs school lives. *Sociology of Education, 71*, 111-129.

U.S. Department of Education, Office of Planning, Evaluation and Policy Development, Performance Information Management Service. (2012). *Free and Reduced-Price Lunch Eligibility Data in ED*Facts*: A White Paper on Current Status and Potential Changes*. Washington, D.C.: Author. Retrieved from www2.ed.gov/about/inits/ed/edfacts/free-lunch-white-paper.doc

U.S. Government Accountability Office (GAO). (2010, November). *Many Challenges Arise in Educating Students Who Change Schools Frequently*, GAO-11-40 (Washington, DC: Author). Retrieved from http://www.gao.gov/products/GAO-11-40

Vernez, G., Naftel, S., Ross, K., Le Floch, K. C., Beighley, C., & Gill, B. (2009). State and Local Implementation of the No Child Left Behind Act, Volume VIIð Title I School Choice and Supplemental Educational Services: Final Report. Washington, D.C.: U.S. Department of Education, Office of Planning, Evaluation and Policy Development, Policy and Program Studies Service. Retrieved from http://www.rand.org/content/dam/rand/pubs/reprints/2009/RAND_RP1383.pdf

Voight, A., Shinn, M., & Nation, M. (2012). The longitudinal effects of residential mobility on the academic achievement of urban elementary and middle school students. *Educational Researcher, 41*, 385-392.

Warren-Sohlberg, L., & Jason, L. A. (1992). How the reason for a school move relates to school adjustment. *Psychology in the Schools, 29*, 78-84.

Warren-Sohlberg, L., Jason, L. A., Orosan-Weine, A. M., Lantz, G. D., & Reyes, O. (1998). Implementing and evaluating preventive programs for high-risk transfer students. *Journal of Educational and Psychological Consultation, 9*, 309-324.

Wigfield, A., Eccles, J. S., & Pintrich, P. R. (1996). Development between the ages of 11 and 25. In D. C. Berliner & R. C. Calfee (eds.), *Handbook of Educational Psychology* (pp. 148-185). Mahwah, NJ: Lawrence Erlbaum Associates.

Wood, D., Halfon, N., Scarlata, D., Newacheck, P., & Nessim, S. (1993). Impact of family relocation on childrenôs growth, development, school function, and behavior. *Journal of the American Medical Association, 270*, 1334-1338.

Xu, Z., Hannaway, J., & DôSouza, S. (2009). Student transience in North Carolina: The effect of school mobility on student outcomes using longitudinal data. National Center for Analysis of Longitudinal Data in Education Research (CALDER) Working Paper no. 22, March 2009. Retrieved from http://www.caldercenter.org/upload/1001256_student_transience.pdf

Yamamoto, K. (1979). Children's ratings of the stressfulness of experiences. *Developmental Psychology, 15*, 581-582.

Youell, B. (2006). *The learning relationship: Psychoanalytic thinking in education*. London: Karnac Books.

Zimmer, R., Gill, B., Razquin, P., Booker, K., & Lockwood, J. R. (2007). State and Local Implementation of the No Child Left Behind Act, Volume Ið Title I School Choice, Supplemental Educational Services, and Student Achievement.

Washington, D.C.: U.S. Department of Education, Office of Planning, Evaluation and Policy Development, Policy and Program Studies Service. Retrieved from http://www.rand.org/pubs/reprints/RP1265.html