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Student Transfer: The Effect of Timing on Academic Achievement

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STUDENT TRANSFER: THE EFFECT OF TIMING ON ACADEMIC ACHIEVEMENT

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An Abstract of the Thesis Presented
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America's population is highly mobile. Some students move between school years, during the summer months, while others transfer after the school year has begun. Classrooms throughout the United States are likely to have students moving-in and transferring-out at any point; mobility occurs before, during, and after the school year begins. Research indicates that mobility has an effect on academic achievement.

The major purpose of this study was to investigate the effect of the timing of student transfer on academic achievement. Students who transferred Early (during the summer) and students who transferred Late (during the school year) were compared to those who did not transfer. Multiple Regression analysis was used to determine if the timing of student mobility significantly effects achievement as measured by the Maine Educational Assessment (MEA). MEA scores of students from a small, rural Maine school system were regressed on gender, socioeconomic status, (SES) transfer status, mobility number, and the timing of transfer.

Results indicated that: transferring, cumulative number of transfers, and the timing of transfer did not have a significant effect on academic achievement. Recommendations for further study included longitudinal study, consideration of personal characteristics of movers, reasons for moving, qualitative studies, the social implications of student mobility and an examination of school district polices and their effectiveness regarding transfer students.

DEDICATION

I dedicate this educational endeavor to three who have passed on yet continue to inspire, encourage, and watch over me from heaven above:

Bessie Jones Small

Kenneth Ivan Wing Jr.

Paulette Mailloux Wing

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1

Introduction

Reports from the United States Census Bureau (2004) confirm that America's population is highly mobile. Research indicates that mobility has an effect on academic achievement (Ascher, 1991; Barton, 2003; Brawner, 1973; Gonzales, 1981; Marchant & Medway, 1987; Plucker & Yecke, 1999; Vail, 2003). The research includes simple relationship studies (Abramson, 1974; Hefner, 1994) and more complex examinations with multiple, confounding, and commonly used variables such as socioeconomic status (SES) and prior achievement (Heinlein & Shinn, 2000; Mao, Whitsett & Mellor, 1997; Rumberger, Larson, Palardy, Ream, & Schleicher, 1998; Texas Education Agency, 1997). The body of evidence relating mobility and achievement is extensive. However, there remains a void. We do not know if there are differences in the academic achievement between students who transfer during the school year and those who transfer during the summer. Little information is available that specifically addresses whether mobility at different points in the school year has different effects on academic achievement. The United States General Accounting Office (1994) expressed the importance of "when" a student transfers by noting that "many new children enter the classroom throughout the year… if they move from one school to another in the middle of the school year, they may have difficulty catching up in all subjects by the end of the school year." (p. 2). Mobility is one of several variables that have an effect on achievement. The research does not address whether there are differences in the achievement of students who transfer from one school to another at different times

throughout the year. It is not currently known if transferring during the summer (Early) has the same effect on achievement as transferring after the school year has begun (Late).

One of the tasks associated with the beginning of every school year is enrolling new students; students who have moved during the summer. However, student mobility is not restricted to the time frame that separates one school year from the next. The registration of new students is an ongoing task; students continue to transfer throughout the school year. Enrollment data from the small, rural, Maine schools that will serve as the population for this study show that during the 2000-2001 school year the seventh grade class started with 48 students in September and ended with 49 in June. During that year 16 new students moved in while 15 students transferred out resulting in a nearly 50% change in the student population. In this study I examined the relationship between mobility and academic achievement within the context of "timing," early or late, that the mobility occurs.

Background

According to the United States Census Bureau (2004), 14% of Americans moved between 2002 and 2003. Of the 40 million people who changed residence that year, 59% moved within the same county, 19% moved to a different county in the same state, another 19% moved to a different state, and 3% were movers from abroad. This report provides a breakdown of the national data by age groupings. Almost 16% of children aged 5 to 9, over 13% of youngsters between ages 10 and 14, and more than 14% of 15 to 19 year olds moved that year. Mobility of this magnitude touches classrooms across the United States.

The United States General Accounting Office (1994) produced a report addressing concerns of the Honorable Marcy Kaptur, House of Representatives. The report used a nationally representative population of 15,000 third grade students. One of Representative Kaptur's questions had to do with how children who moved frequently were succeeding in school compared to students who had not changed schools. The answer was "Children who have changed schools frequently are more likely to be low achievers and repeat a grade" (p. 6).

Mobility has been investigated using a wide range of variables. Some studies used only two variables, mobility and academic achievement. Many included one additional variable such as gender, SES, or previous achievement. Other researchers utilized various combinations of multiple variables.

In some studies the general relationship between mobility and achievement was addressed. Abramson (1974) compared mean Metropolitan Achievement Test (MAT) reading scores of mobile and non-mobile students to the test's grade level norms. He found that non-mobile students demonstrated higher reading achievement and were more likely to be at or above grade level norms. Using the Iowa Test of Basic Skills (ITBS), Hefner (1994) applied a *t* test and found the reading scores of non-mobile fourth graders to be significantly higher than their mobile counterparts.

In other studies an additional variable was included for consideration along with mobility. Ingersoll, Scammon, and Eckerling (1989) used socioeconomic status (SES) as a covariate and stated that mobility had a "disruptive influence on achievement" (p. 148). Jason, Filippelli, Donner, and Bennett (1992) looked at the relationship of mobility and achievement for at-risk students. They found their mobile population to be even more at-

risk. Mabin (1997) considered gender as an additional variable and found no relationship with academic performance.

Researchers have looked at mobility and achievement in conjunction with multiple variables. Socioeconomic status (SES) is a commonly used variable. Mobility was found to have a negative effect on academic achievement when analyzed along with SES and attendance (Applegate, 2003), SES and race (Buerkle, 1997), SES and age (Eckenrode, Rowe, Laird, & Brathwaite, 1995), and SES and limited English proficiency (Horwitch, 2004). Another variable often included in studies with multiple variables was a student's previous achievement. Heinlin and Shinn (2000), Hummel (1987), Manzicopoulus and Knutson (2000), and Mao et al. (1997) found negative effects of mobility when controlling for previous achievement. Variables investigated by Demie (2002) were free lunch, fluency in English, and ethnic background. A study by Fernandez (1987) utilized attendance, behavior, distance of transfer, number of parents, and English as a second language (ESL) as variables. Other variables incorporated into studies included: family structure (Adduci, 1990), graduation rates (Andrews, 2002), gender (Wright, 1999), Intelligence Quotient (IQ) (Whalen & Fried, 1973), parent involvement (Swanson & Schneider, 1999), teacher experience (Sucharski, 2002), mother's education (Alexander, Dauber, & Entwisle, 1996) self-esteem (Simmons, Burgeson, Carlton-Ford, & Blyth, 1987), and teacher education level (Zamudio, 2004). Sewell, Rodriguez, Chandler-Goddard, and Angelettie-Wallace (1982) used 14 variables in their examination of the relationship between mobility and academic achievement.

Researchers have also considered several aspects of mobility. Demie (2002) included an investigation of the causes of mobility, while Adduci (1990) considered the

distance of the move. Kariuki and Nash (1999) used a sample that changed schools but did not change residences. Mantzicopoulos and Knutson's (2000) students all started school in a Head Start program. Other aspects of mobility that have been investigated include: urban students (Paredes, 1993), suburban students (Smith, 1995), military families (Plucker & Yecke, 1999), within district mobility (Kaminski, 1999), within district mobility versus moving in or out of the district (Wright, 1999), and a comparison of family – student – school initiated mobility (Sucharski, 2002).

Transfer rates at the elementary school, middle school, and high school used in this study reflect and in many instances exceed the Census data. The percentage of movers for the 2002 – 2003 school year, as shown in Table 1**,** ranged from a low of 8% of students in grade 11, to a high of 56% of 10th graders. The percentage of school aged children moving at the national, state, and local level is a matter of concern.

The results of current research have incrementally increased the body of knowledge incumbent upon understanding the relationship between mobility and academic achievement. The purpose of this study was to build on that research by investigating and describing the relationship between academic achievement and the timing of students' mobility.

Goals of the Study

In this study I examined the relationship between mobility and academic achievement within the context of "when" the mobility occurs. The main goal of this study was to determine if there are differences in the academic achievement of students who transfer during the school year, and students who transfer prior to the start of the school year compared to students who do not transfer. A second goal of this study was to

determine if the number of school transfers is related to academic achievement. A third goal was to determine if there is a difference in academic achievement between students who remain in one school district and those who have attended more than one district.

Table 1. Middle/High School Student Mobility Rates

	Rates[a] By Grade Level						
Category	6th	7th	8th	9th	10th	11th	12th
Sept 00-01	54	48	37	57	42	45	38
Moves In	7	16	4	11	13	4	5
Moves Out	6	15	14	12	10	7	4
% Change	21	49	44	34	42	22	21
Sept 01-02	58	51	45	32	55	39	39
Moves In	6	8	8	7	16	5	2
Moves Out	9	5	5	10	6	5	1
% Change	23	22	25	44	31	23	7
Sept 02-03	37	55	46	46	36	51	36
Moves In	9	7	7	6	14	2	2
Moves Out	10	9	10	5	14	2	3
% Change	41	26	32	21	56	8	13
Sept 03-04	48	37	58	49	46	38	46
Moves In	10	6	12	8	4	2	2
Moves Out	5	10	10	7	4	1	2
% Change	26	43	31	26	16	8	8
Sept 04-05	47	56	29	53	49	41	40
Moves In	7	11	4	5	6	8	3
Moves Out	5	7	4	7	4	6	1
% Change	22	27	24	21	18	29	9
Sept 05-06	24	45	55	30	51	49	42
Moves In	2	5	5	4	3	3	3
Moves Out	3	8	14	5	2	2	4
% Change	19	26	32	26	9	10	16

[a]Rates from one specific, small, rural, Maine school system.

Rationale for the Study

I was interested in investigating if transferring during the summer has the same effect on achievement as transferring after the school year has begun. The multitude of students moving each year necessitates a closer examination of their achievement in relationship to their mobility. Classrooms around the nation have children transferring with little or no prior notification.

The body of accumulated knowledge as it stands does not inform educators as to whether students who transfer in time to begin the year at a new school achieve at higher, lower, or similar levels as students who transfer at some point after the new school year has commenced. Educators may be able to use the results of this study to address the effects of mobility through changes in policy, practice, and classroom management. The results may inform parents of the benefits of changing residence in concert with school start up schedules. The results of this study may also be used by local, state, and national governments and by private corporations to amend policies and regulations concerning the timing of employee transfer, promotion, and re-assignment.

Research Questions

The research questions of this study were:

1. Is there a difference in academic achievement between students who transfer prior to the start of a school year and those who transfer at some point during the school compared to students who do not transfer at all?
2. What is the relationship between the number of times a student moves and academic achievement. That is, are there differences in academic achievement as the number of transfers increase?

3. What is the relationship between the academic achievement of students who are mobile and those who are not mobile? That is, is there a difference in the academic achievement of students who remain in one school district from Kindergarten through high school graduation and those who have attended more than one school district?

Hypotheses

In order to determine if mobility and, more specifically, the timing of mobility have a significant relationship with academic achievement I proposed the following hypotheses.

1. Transferring has a negative effect on academic achievement.
2. The negative effect of mobility on academic achievement increases as the number of moves increase.
3. The negative effect of late mobility is greater than the negative effect of early mobility when compared to non-movers.
4. Gender interacts in favor of females with mobility number to predict academic achievement.
5. SES interacts in favor of high SES with mobility number to predict academic achievement.

Definitions

1. Early movers: transfer students who enroll in the new school system prior to the start of the school year.
2. Late movers: transfer students who enroll in the school system after having begun the school year in a different school system.

3. Non-movers: students who have been continuously enrolled in the school system from Kindergarten through grade 12.

Summary

Reports from the U. S. Census Bureau confirm that America's population is highly mobile (2004). Class lists at schools across the country are fluid and enrollments are ever changing. Classrooms throughout the United States are likely to have students moving-in and transferring-out at any point; before, during, and after the school year begins. Researchers have studied the relationship between mobility and academic achievement at the national, state, and local level. Numerous variables such as SES, gender, ethnicity, and previous achievement have been analyzed in various combinations with mobility. Numerous aspects of mobility such as the reason for the move, the distance of the move, family characteristics, and type of move have been researched as well. The relationship between academic achievement and the time at which a student moves is one aspect of student mobility that has not been adequately examined by the research community. Data informing students, parents, administrators, and classroom teachers of any differences among students who transfer between school years, those who transfer during the school year, and those who do not transfer are unavailable. In this study I examined those relationships.

CHAPTER 2
Literature Review

Information included in this review of the literature was obtained utilizing the resources available within the Fogler Library at The University of Maine. Those resources included books, journals, and dissertations held in the library's collection as well as print material through interlibrary loan. Additionally, computerized databases were searched: Educational Resources Information Center (ERIC), Academic Search Premier, PsychInfo, and Dissertation Abstracts International. Descriptors utilized in the searches were: mobility, academic achievement, and transfer students.

This review of the literature was divided into four main sections. In the first section, I addressed the complexity of researching the relationship between mobility and academic achievement. In the next section I delineated the findings of mobility's effects on academic achievement into four categories: positive effects, no effect, mixed effects, and negative effects. The third section is where I reviewed the timing of a students' mobility. I concluded with a brief review of the findings.

Mobility's Complexity

Researchers have examined the effect of student mobility on academic achievement in conjunction with numerous variables and have reached a variety of conclusions. A seemingly simple investigation can become a very complicated one. Mobility can be considered from a wide range of viewpoints. The variety of possible combinations of factors—definitions, subject samples, measures of achievement, variables, and statistics—utilized by researchers makes the task of examining mobility problematic.

Definitions

Researchers have many different definitions for mobility. Alexander et al. (1996) labeled their subjects as "exiters" and "stayers." Demie (2002) used the year in which a student joined the school system. Strand (2002) defined stable as any student "who has attended the same school for the whole of the relevant key stage" and mobile as "any pupil that joins the school part way through a key stage" (p. 66). Four categories delineated by Swanson and Schneider (1999) include changing housing but not school as "movers," a change of school but not residence as "changers," a change in both as "leavers," and those who did not have a change in either as "stayers" (p. 55). Wright (1999) divided into two main categories, (a) "location mobility" which is further broken down into "no mobility"-stayed in the same school, "internal mobility"—changed schools but stayed within the district, "external mobility"—moved in or out of the district, and "both"—moved in and changed schools; and (b) "temporal mobility" which has four sub groups according to when students made changes in relation to when the assessment was given, "no mobility," "pre-test mobility," "post-test mobility," and "both" (p. 349). Mobility is defined in several ways in the literature. Mobility can vary from a very broad and general moving of any type to a specifically defined and measured transfer. A number of combinations are possible when a new residence with and/or without a corresponding new school may be either in or out of the same district are considered.

Populations

Today's schools are structured in a variety of grade level configurations. Researchers have examined student populations in numerous geographic locations.

Sample sizes ranged from a few, to many thousands. Alexander et al. (1996) considered 767 first graders from 20 different elementary schools in Baltimore, while Demie's (2002) population consisted of 2,403 eleven-year-olds, 1,479 fourteen-year-olds and 1,225 sixteen-year olds attending school in London. Heinlein and Shinn (2000) considered 764 New York City sixth graders as their study sample while 58,400 Denver students in grades K-12 were analyzed by Ingersoll et al. (1989). Other populations examined in the research: 159 third, fourth, and fifth grade, co-ed parochial school students from Chicago (Jason et al., 1992), 90 mid-western suburban second graders who all began school in a Head Start program (Mantzicopoulos & Knutson, 2000), 447 students who transitioned from sixth to seventh grade in the Milwaukee Public Schools (Simmons et al., 1987), 6,400 seven year old London school children at the completion of Key Stage One (Strand, 2002), 25,000 students from throughout the United States who were each surveyed when they were in 8^{th} , 10^{th} and 12^{th} grades (Swanson & Schneider, 1999), and the 3,102 Kansas third and fourth graders studied by Wright (1999).

Achievement Measures

The use of standardized testing is common and often appropriate; this level of test has norm, reliability, and validity information, which lends support to their being used. A nationally recognized standardized test provides credibility and acceptability. Standardized tests used by researchers to measure achievement included: Peabody Picture Vocabulary Test-Revisited (PPV-T; Manzicopoulos & Knutson, 2000), Woodcock-Johnson Tests of Achievement-Revised (WJ-R; Knutson, 1998), Wide Range Achievement Test-Revised (WRAT-R; Jason et al., 1992), Iowa Test of Basic Skills (ITBS; Evans, 1996; Hefner, 1994; Liechty, 1994; Tunkel, 1999), Tests of Academic

Progress (TAP; Ingersoll et al., 1989), Metropolitan Achievement Test (MAT; Abramson, 1974; Kaminski, 1999; Marchant & Medway, 1987; Wright, 1999), the California Achievement Tests (CAT; Alexander et al., 1996; Buerkle,1997, Heinlin & Shinn, 2000), the Stanford Achievement Test (Mabin, 1997; Zamudio, 2004) and College Board/Educational Testing Service - PSAT, SAT and Advanced Placement exams.

Many states have implemented their own assessment instruments. Maine has mandated the Maine Educational Assessment (MEA). Texas developed the Texas Assessment of Academic Skills (TAAS). The New Jersey High School Proficiency Test (HSPT) is mandated for graduation. Applegate (2003) used the Missouri Assessment Program, Sanderson (2001) the Pennsylvania System of School Assessment, and Smith (1995) the Illinois Goal assessment Program (IGAP).

At the local level there are school records archiving grades, report cards (Brawner, 1973), and grade point averages (Andrews, 2002; Simmons et al., 1987; Smith, 1995; Thomas, 2001). These are part of every student's school experience and may be used as indicators of academic achievement.

Confounding Variables

Some researchers have examined mobility as an entity unto itself. Others have looked at mobility in conjunction with one, two, or numerous other variables. Barton's (2004) essay notes that mobility is only one of 14 factors researchers have tied to student achievement. Besides mobility, Barton emphasizes that the following list may also combine to have an influence on achievement: birth-weight, class size, hunger and nutrition, lead poisoning, parent availability, parent participation, reading to young children, rigor of curriculum, school safety, teacher experience and attendance, teacher

preparation, technology assisted instruction, and television watching. Rothstein (2004) discussed child-rearing practices, health care, and SES in relationship to mobility rates, whilst Vail (2003) centered on the social, emotional, and physical needs of younger mobile students. Analyses by both Demie (2002) and Wright (1999) included mobility, free school lunch status, English fluency, and ethnic background. In their longitudinal study, Heinlein and Shinn (2000) looked at mobility after controlling for previous achievement, school lunch status and gender. Jason et al. (1992) used many of the above factors, their emphasis, an additional variable, was students who are "at-risk". Parents' and teachers' perceptions of the effects of mobility were used to search for correlations with mobility and achievement by Mantzicopoulos and Knutson (2000). In an extensive and layered analysis, Simmons et al. (1987) paired self-esteem, grade-point average, and extracurricular participation with school change, pubertal change, early dating, geographic mobility, and family disruption. Strand's (2002) variables included season of birth, and school attendance; Swanson and Schneider (1999) considered behavioral problems, and dropping out.

The definitions of mobility are varied and numerous. Subject samples are diverse: size, age, grade, gender, and geographic location. Measures of academic achievement are wide-ranging from nationally accepted standardized tests, state mandated tests, local teachers' tests, to individual students' grade point average. Variables considered along with mobility are numerous and have been utilized individually and in a wide range of combinations. Definitions, populations, academic measures, and variables utilized have been, appropriately, hypotheses specific. Researchers have examined mobility using

different definitions, populations, achievement measures, and variables. The relationship between mobility and academic achievement is complex.

Mobility's Effects

Positive Effects

Contrary to the generally held belief, there is research to support the statement that mobility has a positive effect on academic achievement (Brawner, 1973; Marchant & Medway, 1987; Plucker & Yecke, 1999). These studies can be loosely grouped into a "reason for the move" category. If the reason for moving is seen as positive, a promotion or a better assignment versus financial difficulties or loss of employment, the move itself becomes a positive event.

Marchant and Medway (1987), in their study of 40 military families, noted that if the move is undertaken with a positive attitude, that attitude has a direct influence on the move. A positive identification with the military, by the military member and the non-military spouse, creates an optimistic outlook, making the transfer between military bases a positive event ($r = .50$, $p < .01$). The General Well-Being Schedule, Identification with the Military Scale (IMS) and the Social Competence subscale of the Revised Achenbach Child Behavior Checklist were used to obtain self-reported data rather than observed or archival data. The authors also made note that the curriculum at schools on military bases are more consistent than public school curriculums. They suggest that these results may be generalized to corporate transfers "To the extent that families strongly identify with this way of life…" (p. 293).

Plucker and Yecke (1999) concur with Marchant and Medway (1987) that the reason for moving influenced the attitude surrounding the move. In their study involving

military families Plucker and Yecke developed a two part qualitative study that expanded on the work of Marchant and Medway in two specific ways. First, all students had been identified as "gifted," and second, Study One included elementary students attending on-base schools while Study Two included high school students attending off-base public high schools. In this qualitative study, limited to 11 students from five military families, the researchers collected data through in-depth interviews and direct observations over several months.

In a longitudinal study of Mexican American students Brawner (1973) compared the retention and completion rates of students who moved to Racine, Wisconsin to students who remained in Cotulla, Texas. Falling into the reason for the change category, these families, hoping for improved economic opportunities, discovered changes associated with the move after the fact, "Some of these changes are unquestionably positive ones- a move from seasonal to more permanent employment for example" (p. 727). Students also found themselves in positive situations where academics were valued and achievement was emphasized by peers, teachers, and the community. Interviews with over 400 parents provided a value orientation base. School records of nearly 300 students who had moved to Racine and over 500 students who stayed in Cotulla were compared.

No Effect

In a study of 198 tenth graders from a small urban city in New Jersey, Adduci (1990) examined mobility while controlling for family structure, language spoken, and SES. She used three measures of mobility. One measure was the number of consecutive uninterrupted years in the district. Another was the number of times a student moved. And the third was the distance of the move categorized by type of transfer: no transfers,

within district, within the United States, and from outside the United States. The first step in the analyses included only the three non-mobility variables followed by three more steps in which each of the mobility measures were individually included. None of the mobility measures, Number of Transfers ($\Delta R^2 = .017$), Years Enrolled ($\Delta R^2 = .001$), or Distance of Transfer ($\Delta R^2 = .001$) added any significant explanation to the model. Due to the differences in units of measurement of the variables, a beta was used to gauge the relative strength of the relationship of all the independent variables to achievement. Only language spoken was found to have a significant effect.

The 110 sixth graders from the southwest side of Chicago, in a study by Evans (1996), were all of low SES. Forty-seven of the 110 students had attended all six years. The others, decreasing in years of attendance from five to one, numbered: 15, 9, 16, 9, and 7 respectively. The low number of subjects in each of the Years Attended categories resulted in their being sorted into just two groups; *stable*-those in attendance for all six years and *mobile*-those in attendance for less than all six years. The instrument of choice was the Iowa Test of Basic Skills (ITBS). Analyses showed no significance at the $p < .05$ level for reading ($t = .9056$, $df = 58$) or mathematics ($t = .04$, $df = 58$).

The subjects of Andrews' (2002) case study were 98 "at risk" graduates of an alternative high school. Students were sorted into three categories of mobility. One: Movers, had only a residential move. Two: Changers, had only a school move. Three: Leavers, had both a residential and a school move. Inclusion criteria required that all participants had remained within this one specific school system for the entire 12-year period. Changing from elementary school to middle school to high school to alternative high school were all counted as school moves. Accessing archival data, 10th grade

Graduation Qualifying Exam (GQE) scores, cumulative final grade point averages (GPA), mobility category, yearly attendance, and gender were recorded for each student. The multiple linear regression program of the Statistical Package for the Social Sciences (SPSS) was used to analyze the data. Mobility did not significantly explain variance in GPA scores ($b = .130$, $t = .944$, $p < .384$) or GQE scores ($b = .063$, $t = .378$, $p < .707$). Gender and attendance were determined to be important predictors of academic success.

Mixed Effects

Fernandez's (1987) sample consisted of 315 urban New Jersey 10th graders required to take the High School Proficiency Test (HSPT) as a measure of achievement. Simple bi-variate analyses showed significant correlations between number of transfers and reading ($r = 77.6$) and writing ($r = 78.3$) at the $p < .05$ level, but not for math. When school and home factors including attendance, behavior, parents, and ESL, were held constant, mobility had little effect on reading ($\beta = .007$), writing ($\beta = -.086$), or math ($\beta = -.119$).

Whalen and Fried (1973) had a unique distinction to define mobility. In order to be included in the high mobility group, a student had to have attended school in four or more different cities. Low mobility students had to have spent all of their school years in one single suburban California school system. Three variables—mobility, SES, IQ—were dichotomized into high and low sections. Mobility is high and low as noted above. The Hollingshead Occupation List determined SES. Occupations in the first three tiers were rated high SES, while the remaining four tiers were designated low SES. IQ scores from the Iowa Tests of Educational Development (ITED) of 110 and above were high IQ; those below 110 were in the low IQ group. IQ data were collected from student

files whereas mobility and parental occupation data were self-reported; collected from questionnaires students were asked to fill out. Seventy-nine students met the high mobility criteria and had IQ scores, thus 79 low mobility students were randomly chosen from the single school system population. The statistical procedure utilized a three-way analysis of variance with variables of high and low mobility, high and low IQ and high and low SES. Analyses showed a significant interaction between mobility and IQ (F [1, 96] = 8.363, $p < .05$), but not between mobility and SES (F [1, 96] =.818), as measured by General Vocabulary subtest scores. Means and standard deviations indicated that within the high IQ group those with high mobility achieved higher than those with low mobility and that the low IQ group was just the opposite.

Unlike Whalen and Fried's (1973) examination of high school students, Alexander et al. (1996) focused on elementary school students. A cohort of 790 first graders in the Baltimore City Public School System (BCPSS) was randomly selected from 20 different elementary schools and then followed for five years. Indicative of the mobility issue in general, the authors noted that nearly one fourth of the original cohort transferred out of the BCPSS during this five-year span. Measures of achievement were ranking period math and reading grades and California Achievement Test (CAT), reading (CAT-R) and math (CAT-M) sub-tests. All four scores were recorded early in the first grade year and again near the end of the fifth year. Data on ethnicity, SES and mother's education were also recorded. Statistical analyses included ordinary least squares regression, logistic regression, and ordered logistic regression. The effects of mobility on academic achievement are significant when no other variables are controlled (reading, r^2 = -.404, p <.01; math, r^2 = -.233, p <.05), are mixed when prior achievement is

considered (reading, r^2 = -.269, p <.05; math, r^2 = -.065), and become mixed and borderline when background variables are entered (reading, r^2 = -.195, p <.10; math, r^2 = -.081). The authors offer several reflections based on their results: relatively well-to-do students moved out of the district while poor and minority students moved within the districts schools, "…school change may be especially hard on young children" (p.4), and that there is a need to examine the "household side of these dislocations in children's lives" (p. 10) in order to more fully understand the complete effects of mobility on academic achievement.

Wright (1999) and Swanson and Schneider (1999) used relatively large samples in their studies. Wright looked at 3,102 third and fourth graders from 33 elementary schools in a large urban Midwest district. Swanson and Schneider used data from the National Education Longitudinal Study (NELS) which followed some 25,000 students as they progressed from the eighth through the 12th grade. Wright found a significant effect for reading (F [2-1,558] = 7.22, p <.001, R^2 =.009) but less so for math (F [2-1,525] = 2.12, p <.120, R^2 =.003). Swanson and Schneider found that for grades 10 through 12 changing just residence (R^2 = .366, $p < .05$) and changing just school (R^2 = .377, $p < .05$) had a significant effect while changing both residence and school did not. In Contrast, changing residence, school, or both in grades 8 through 10 had no effect on math achievement.

Wright concurred with Alexander et al. (1996) in finding that high SES families were more apt to move to a different school system while low SES students remained and transferred within the school district. The title of Wright's study aptly summarizes the

results of this mixed effects section: “Student Mobility: A Negligible and Confounded Influence on Student Achievement” (p. 347).

Negative Effects

Many researchers agree that mobility is one of several variables that has a negative effect on academic achievement (Ascher, 1991; Barton, 2003; Gonzales, 1981, Vail, 2003). Two variables frequently considered in conjunction with mobility are SES and prior achievement. Poor families are twice as likely to move as those who are not poor (U.S. Census Bureau, 2004), and there is strong relationship between SES and achievement (Appalachian Regional Educational Laboratory, 2005; Rothstein, 2004). Including prior achievement as a variable takes into account initial differences in student learning and competencies (Mantzicopoulos & Knutson, 2000).

A number of studies found that after controlling for SES and prior achievement, mobility still had a significant negative effect on the academic achievement of students (Heinlein & Shinn, 2000; Mao et al., 1997; Rumberger et al., 1998; Texas Education Agency, 1997). Heinlein and Shinn looked at 764 sixth graders in New York City and determined a strong association (math, $b = -6.24$, $p < .001$; reading, $b = -3.00$, $p < .05$) for highly mobile students, those with two or more moves before the third grade. They concluded that transferring early, before the third grade, was a more potent predictor of sixth grade achievement than was transferring after the third grade.

Culling data from the National Education Longitudinal Study of 1988 (NELS) and from the authors own on-going study of Latino students in Los Angeles, Rumberger et al. found that mobility had an even more negative effect on Latino students ($r = .30$, $p < .01$) than on white students ($r = .03$, $p < .01$). At the opposite end of the public school

continuum from Heinleinn and Shinn's study of elementary school students, Rumberger et al., stated that students who remained in the same high school for four years were more likely to graduate than students who changed high schools. Qualitative data from student profiles and in-depth interviews were part of the analyses for the Los Angeles subjects. The Texas Education Agency's (TEA; 1997) study encompassed 3.8 million students, the entire Kindergarten through grade 12 enrollments for the 1994-1995 school year. At all grade levels mobile students scored lower on the Texas Assessment of Academic Skills (TASS) than did their non-mobile peers. Under a different title, Mao et al. (1997) presented the TEA results in a paper to the Annual Meeting of the American Educational Research Association.

Examining a school systems' mobility for all grades, was a common occurrence. In addition to Mao et al. (1997) and TEA (1997) several other researchers considered students from K-12. The office of Comptroller General of the United States (1983) looked at the mobility of students aged 5 to 19 in six different school districts in Texas, California, and Florida. In a study of maltreated children in New York City, Eckenrode et al.'s (1995) subjects were between the ages of 5 and 15. Findings showed mobility mediating the effects of maltreatment on test scores (b = -0.679, $p < .05$), English grades (b = -0.022, $p < .05$), and grade repetition (b = -0.013, $p < .01$). Eckenrode et al. reported that "maltreatment resulted in significantly higher levels of mobility, and higher levels of mobility were associated with lower levels of achievement." (p. 1137). Ingersoll et al. (1989) divided the 45,000 students in the Denver Public Schools into five different groups according to specific mobility definitions. Using the Tests of Academic Progress (TAP) for high school students and the Iowa Test of Basic Skills (ITBS) for elementary

students they determined that "most negative effects of geographic mobility were found at earlier grade levels" (p. 143). Mean composite grade level achievement of students in the first grade produced an *F*-ratio of 40.30 compared to sixth graders $F = 21.66$, and 12th graders $F = 9.82$, all at $p < .001$.

Fifth graders who are mobile do not read as well as their non-mobile peers according to Abramson (1974) and Hefner (1994). While these two researchers came to the same conclusion, their samples were different. Hefner's conclusions were based on 81 students from a single Chicago school, comparatively; Abramson's sample consisted of more than 25,000 New York City students from more than 100 schools in five districts. In the five districts he examined Abramson found differences between mobile and non-mobile students reading at or above grade level norms, ranging from 18% to 30%, were statistically significant at the $p < .01$ level. Hefner's mobile fifth grade Chicago students had significantly lower ITBS reading scores ($t = 4.135$, $p < .05$). Kerbow (1996) also sampled fifth graders from Chicago. Examining the math scores of nearly 3,000 students, mobile students had Illinois Goals Assessment Program (IGAP) scores below state norms resulting in a conclusion that mobile students had lower math achievement.

Mobility, by itself, paired with another variable, or parceled out among several variables, has been found by some researchers to be a factor in the academic achievement of students. Elementary, middle, and high school students are affected by mobility. Mobility touches students in rural communities, suburban neighborhoods, and urban cities. Researchers have found that regardless of age, gender, ethnicity, or SES, students who are mobile are likely to have lower academic achievement than students who are not mobile.

Timing of Mobility

No research was found that specifically stated whether students who transferred before the start of the school year achieved higher, lower, or at the same rate as students who transferred at some point during the school year. In view of the numerous other variables that have been considered in conjunction with mobility the absence of statistical data informing of a relationship with the timing of a students' mobility is an important omission.

Anecdotal evidence and incidental comments regarding timing are not uncommon. Ascher (1991) mentioned that teachers may have a pre-determined negative attitude towards students who enter their classrooms after the start of the school year. Evans (1996) described teachers who found they had to re-teach, assist, and manage due to these untimely transfers and included a discussion of new things to which mid-year transfer students have to adjust: teacher, school, principal, curriculum, and textbooks. The background section of the United States General Accounting Office (1994) report concurred that these transfers present challenges for teachers and students, because "many new children enter the classroom throughout the year, often with no advance notice … if they move from one school to another in the middle of the school year, they may have difficulty catching up in all subjects by the end of the school year" (p. 2).

Alexander et al. (1996) discuss the issues faced by students who transfer during the school year. Such mobility means adjusting to new teachers, new building(s), making new friends, and differences in curriculum. "These differences are heavy burdens for mid-year movers." (p. 3). The authors include a table delineating the number of within-year transfers and between-year (summer) transfers. However, in the statistical analyses

of the data, it is the number of moves rather that the timing of the move that was statistically analyzed. Jason et al. (1992) used grades right after the transfer to compare transfer and non-transfer students but used only first quarter grades which limited the transfer group to summer movers only.

Mao et al. (1997) examined academic achievement by the timing of a student's mobility. Movers were divided into five groups according to which of the six-week terms of the school year their transfer occurred. Each of these five groups was compared to each other and to a non-moving sample. There was not a group of summer movers in the comparisons. The measure of achievement was an achievement test administered to all students in the late spring near the end of the school year. Mao et al. state that the earlier the transfer, the higher the achievement. Thus their recommendation, "By limiting the frequency of moves, and by timing moves to coincide with changes in the school year to the greatest extent possible, parents may be able to mitigate the negative relationship between changing schools and their child's academic performance" (p. 43).

Review of Findings

The majority of researchers found that mobility does have a negative effect on academic achievement. Individually, many researchers offered several answers to more specific questions and narrowly defined situations. Most common among the various answers is that even though mobility has an initially negative effect, that effect diminishes, though is still significant, when other variables, such as previous achievement, school lunch eligibility (SES), and ethnic background are held constant (Alexander et al., 1996; Ingersoll et al., 1989; Mantzicopoulos & Knutson, 2000; Strand, 2002; Wright, 1999). Heinlein and Shinn (2000) found mobility to be initially negative

but found no association when previous achievement was controlled. Contrastingly, Demie (2002) determined that mobility's initial negative effect became even more significant when other variables were regressed. Jason et al. (1992) state that high-risk mobile students perform worse than high-risk, non-transferring students. Mobility does lower GPA according to Simmons et al. (1987). Swanson and Schneider (1999) concluded that whereas changing school in the 11th or 12th grades may be detrimental, transfers in the 8th through 10th grades may produce positive results over the long term.

Other related findings were also purported. Heinlein and Shinn (2000), and Ingersoll et al.(1989) agree that the younger the age at transfer the more negative the effects on achievement. Strand (2002) determined that after controlling for background variables, mobility had a harmful influence on mathematics but no significant effect on either reading or writing. The consensus is that even though mobility does have a harmful influence on academic success, it may be only one of several confounding factors that may work alone or in combination to influence the educational progress of children.

The body of knowledge addressing the relationship between mobility and academic achievement, though extensive, has been relatively absent in research journals over the last few years. However, at the graduate level the relationship remains a timely topic and continues to be addressed. Andrews (2002), Applegate (2003), Horwitch (2004), Norris (2000), Sanderson (2001), Smith (2003), Sucharski (2002), Thomas (2001), and Zamudio (2004) all chose to investigate some aspect of mobility and academic achievement in their doctoral dissertations. Given the existing research, a study focused on investigating the timing of student mobility was warranted. I implemented a study that looked at the timing of transfer in relation to academic achievement.

CHAPTER 3

Method

Introduction

The main purpose of this study was to explore the relationship between the timing of student mobility and academic achievement. Are there differences among the academic achievement of Early Movers, Late Movers, compared to Non-Movers? Socioeconomic status (SES), Gender, Transfer, Mobility#, and the Timing of student mobility were independent or predictor variables and academic achievement was the dependent or criterion variable. Maine Education Assessment (MEA) scores were used as a measure of the dependent variable. Studies have shown that SES, gender, and mobility are predictors of academic achievement (Eckenrode et al., 1995; Heinlein & Shinn, 2000; Lindblad, 1986). Identifying the timing of a school transfer as a variable that also predicts or, as Keith (2006) emphasizes, "explains" student achievement, may influence how schools determine the placement, programming, and services offered to transferring students.

Research Design

The research design for this quantitative study was non-experimental. Archival data were used to examine the relationship between several independent variables - SES, Gender, Transfer, Mobility#, the Timing of mobility, and one dependent variable - Academic Achievement. Achievement was measured using the 4^{th}, 8^{th}, and 11^{th} grade MEA scores of students attending school in a small, rural, town in Maine. Data from students' permanent records were used to seek confirmation of the previously established relationships between the dependent variable -Academic Achievement, and the

independent variables—Gender, SES, Mobility#, and to determine if the Timing of student mobility would also hold status as a statistically significant variable in explaining academic achievement.

Participants

The participants of this study were students who were enrolled and attending one rural Maine high school as seniors from 1997 through 2007. More than 99% of the student body at this high school was Caucasian. Minority students made up less than one percent of the population, therefore race/ethnicity data were not included. Ethnicity was not considered as a variable because anonymity could not be assured. Foreign exchange students were not included due to the uniqueness of their situation; additionally, they are exempt from taking the MEA.

Subjects were from a small rural Maine town with a population of about 3,300. The town's economic base is mostly agriculture and small business. Data from 2004 showed the town's median income was $36,654 (Maine: $37,240), an unemployment rate of 5.5% (Maine: 4.7%) and a poverty rate of 12% (Maine: 11.5%). The State of Maine's average expenditure per pupil for the 2003/2004 school year was $6,879.56. This school's expenditure per pupil was slightly less at $6,747.73. Educational funding for the school system was from 56% state resources, 38% local resources, 4% federal, and 2% other. The school department, with a total enrollment of 598 students, consists of a Pre-Kindergarten to grade 5 school (280 students), a middle school with grades 6 to 8 (132 students), and a high school with grades 9 to 12 (186 students). The middle school and high school are housed in the same building but have different schedules, principals, and core faculty. Some faculty and staff are shared between the two schools such as health,

art, physical education, music, guidance, computer technology, and library media, custodial, and cafeteria.

Data Collection

An overview of this study was presented to the school committee at their June 2006 board meeting. The superintendent of schools recommended, and the school committee approved, access to archived student records. Assurances were made that all levels of confidentiality would be maintained. Data were collected during the summer and fall of 2007. The following data fields were developed for each student: MEA scores, SES, gender, and mobility. MEA scores from 4th, 8th, and 11th grade test administrations were recorded as available. Mobility field codes included: Non-Movers, Early Movers, and Late Movers. Additional data recorded were: year of graduation, grade level at transfer, and cumulative number of transfers.

Dependent Variable

The Maine Educational Assessment (MEA) was selected as the instrument for measuring academic achievement. The MEA, initially introduced as a component of the Educational Reform Act of 1984, was redesigned in 1996 in order to be used as an assessment tool for Maine's Learning Results. Per Legislative statute, the MEA is mandated for all of Maine's 4th, 8th, and 11th grade students annually. Grade levels of mandated testing aligned so that each of the three schools in the school system administered the test; 4th grade MEA in the elementary school, 8th grade MEA in the middle school, and 11th grade MEA in the high school.

Over its history the MEA has been used to assess various subject areas including: Reading, Writing, Mathematics, Science, Social Studies, and Fine Arts. MEA test items

are presented to students in three formats: constructed-response, short answer, and multiple-choice. Reading and Mathematics have been an integral part of every MEA administration and therefore, were selected as the basis for measuring academic achievement for this study.

Reliability is an index of the consistency of a test's results. A reliable test must produce stable and consistent results through repeated administrations. According to the MEA 2004-05 Technical Manual from Measured Progress (Measured Progress, 2005), the test's producer, Cronbach's reliabilities for the 4^{th}, 8^{th}, and 11^{th} grades range from .89 to .91 for Reading and from .88 to .92 for Math. Addressing the concern for variance associated when items are distributed over categories, stratified coefficient α was also calculated at .90 to .93 for Reading and .89 to .93 for Math. Standard Errors of Measurement (SEM) were calculated from raw scores for each grade level and subject area and then used to establish error bands associated with the scaled scores. SEM's ranged from 3.14 to 3.38 for Reading and 3.86 to 4.18 for Math. Cohen's coefficient κ (Kappa) was used to determine the reliability of the consistency of categorizing Performance Levels. The κ values for Reading ranged from .65 to .69 and from .59 to .68 for Math.

Individual student MEA scores in the form of "sticker" were placed in students' permanent records. Those stickers reported results as raw scores from 1999 to the present and as percentile scores before 1999. Measured Progress (2005), the producer of the test, was unable to provide raw score conversion data for the pre-1999 percentile scores. They were able to provide data that allowed raw scores for all testing after 1999 to be converted to percentile scores. Therefore, MEA percentile scores were used in all

statistical analyses. Using Statistical Package for the Social Sciences, all MEA percentile scores were converted to *z* scores where the mean = 0 and the standard deviation = 1. This leveled differences in scores in individual years and allowed for comparisons across the entire population. The MEA variable was coded as ZMEA4R for fourth grade reading scores, ZMEA4M for fourth grade math scores, likewise ZMEA8R and ZMEA8M for eighth grade scores, and ZMEA11R and ZMEA11M for 11th grade scores.

Independent Variables

Gender

Gender (0 = male, 1 = female) was included as a variable in this study for two reasons. First, a number of the researchers reviewed in this study looked at gender in their investigations of the effect of mobility on academic achievement (Eckenrode et al., 1995; Wright, 1999). Including gender allowed for results to be compared to the findings of others, thus lending support to any conclusions. Second, gender is frequently an issue in discussions of education, for example, whether males and females develop and achieve at different ages and rates. Common knowledge dictates that self-esteem and thus the academic achievement of girls is impacted during adolescence (Keith, 2006). Clear differences between girls and boys motivation and academic achievement have been established (Fischer & Lazerson, 1984; Wigfield & Eccles, 2002). The timing of mobility and differences in effect on the academic achievement of males and females was investigated.

Socioeconomic Status

Socioeconomic status (SES) has been established as one of the key factors in academic achievement (Aries, 2001; Fischer & Lazerson, 1984; Woolfolk, 1993).

Including SES in the analyses allowed for comparison with the results of other researchers and thus lent support to conclusions drawn. Conforming to commonly accepted practice, SES was coded by federal free-reduced lunch eligibility status. Students who applied and qualified for free or reduced lunch were coded low (0), all other students were coded high (1).

Mobility

Initially, Mobility was coded as a dichotomous variable: Transfer: No (0), and Yes (1). This Transfer variable combined all movers, early and late, into one group and all non-movers into another. Additionally this variable was determined by the grade level at which the transfer occurred. Only students whose transfer was before the 4th grade would be included in the ZMEA4R and M regressions, and so forth for 8th grade and 11th grade. Transfer expanded to TransferPre4, TransferPre8, and TransferPre11, each with the same No (0), Yes (1) coding. This analysis provided data on the generalized effect of mobility on academic achievement.

Mobility was also analyzed as a continuous variable. Mobility# was determined by the total number of school transfers recorded in a students' cumulative file. Students who attended exclusively in this school system were assigned a mobility value of zero. Again the number of transfers was categorized by how many before the 4th grade, before the 8th grade, and then before the 11th grade creating Mobility#by4, Mobility#by8, and Mobility#by11. Natural grade level progressions within this school system resulting in attendance in a different building were not considered a transfer and did not add to a student's mobility number.

Timing

Timing of mobility was measured in terms of when the transfer occurred in relation to the start of the school year and like the Transfer variable above, the grade level at which transfer occurred – before the 4th, 8th, or 11th grade. Timing was coded on a three-point scale. Students who had no transfers and attended only in this school system were labeled Non Movers (0). Students who transferred into this school system during the summer in time to start the new school year were coded as Early Movers (1). Students who started the school year in a different school system and then transferred in after the beginning of the year were labeled as Late Movers (2). Only students with one transfer were included in these analyses. Those with multiple transfers were not included as they may have had both early and late transfers.

Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) Graduate Pack 16.0 for Mac® (2007) was used for all statistical analyses. Descriptive statistics, Pearson Correlations, and t-tests were run for the dependent and each independent variable. The primary analysis in this study was Multiple Regression (MR). The purpose of MR is to explain the variation in a dependent variable via the variation in multiple independent variables. According to Keith (2006) there are advantages to using MR. Independent variables entered can be either categorical or continuous, or a combination of categorical and continuous. MR can be used for experimental research and perhaps is most appropriate when the research is a non-experimental design where the variables may not be randomly assigned or manipulated. In a series of regressions Gender, SES, transfer status, mobility number, and the timing of transfer—early or late—were examined.

In some instances categorical variables were converted to "dummy variables". As shown in Table 3.1, dummy variables code for membership and non-membership. For example, Timing was initially coded as a three point variable, 0 = no move, 1 = early move, and 2 = late move. Through dummy coding, Timing is converted into two new dichotomous variables. The first new dummy variable, Move_Early, was coded 1 = early move and 0 = all others. The second, Move_Late, was coded 1 = late move and 0 = all others. The first dummy variable (Move_Early) compared students who moved early to those who did not move at all and the second dummy variable (Move_Late) compared students who moved late to those who did not move at all. Multiple regression examines the effect of each variable while others are held constant. Including both dummy variables in a single regression equation made non-movers the reference group for both early and late movers.

Table 3.1. Recoding For Dummy Variables

Group	Initial Timing	Dummy Move_Early	Dummy Move_Late
No Move	0	0	0
Early Move	1	1	0
Late Move	2	0	1

Having converted categorical variables to "dummy" variables, which code for membership and non-membership, MR was also used to determine if there are any significant "interaction" effects between dependent variables. "Interactions are those

instances when the effect of one variable depends on the value of another variable" (Keith, 2006, p.132). The abstract concept of interaction may be more easily understood by a hypothetical reference to experimental research. If a drug company was testing a new diet pill they might find that the effectiveness of the drug depended on gender. For example, males may loose more weight using the diet pill than females. The diet pill had a differential effect depending on the gender of the test subject. In this study, interaction may determine if Mobility had more of an achievement effect on females than on males. Multiplying the centered Mobility# variable by the dummy coded Gender variable, a new interaction variable, MobilityCenterXNewGender, was created and the cross-product term entered into the MR to test for significance. Interpretation of any significant findings for interaction variables further explained the effects of mobility. In this interaction the New_Gender dummy variable coded male = 0 and female = 1. A statistically significant positive coefficient would be interpreted for the cross-product term as meaning that mobility interacted differentially with females than males, resulting in higher MEA scores for females. A negative coefficient would be interpreted that mobility interacted differentially with females than males, resulting in lower MEA scores for females.

Regressions

Regression Analysis #1

This regression determined if transferring had an effect on academic achievement. Results showed the individual net effect of Gender, SES, and Transfer on academic achievement, with the other independent variables held constant.

- Regress ZMEA4R on Gender, SES, TransferPre4
- Regress ZMEA4M on Gender, SES, TransferPre4

- Regress ZMEA8R on Gender, SES, TransferPre8
- Regress ZMEA8M on Gender, SES, TransferPre8
- Regress ZMEA11R on Gender, SES, TransferPre11
- Regress ZMEA11M on Gender, SES, TransferPre11

Regression Analysis #2

This regression examined the effects of mobility on MEA scores in terms of the number of transfers.

- Regress ZMEA4R on Gender, SES, Mobility#by4
- Regress ZMEA4M on Gender, SES, Mobility#by4
- Regress ZMEA8R on Gender, SES, Mobility#by8
- Regress ZMEA8M on Gender, SES, Mobility#by8
- Regress ZMEA11R on Gender, SES, Mobility#11
- Regress ZMEA11M on Gender, SES, Mobility#11

Regression Analysis #3

This regression focused on the essential question of this study - the effect of the timing of student mobility on academic achievement. Using SPSS, two dummy variables were created in order to re-configure the data in the three categories of the Timing variable (See Table 3.1). I used students who did not move as the reference group, comparing them with students who did. The first dummy variable (Move_Early) compared students who moved early to those who did not move at all. The second dummy variable (Move_Late) compared students who moved late to those who did not move at all. This dummy coding changed the three-point mobility scale into two

dichotomous variables, which were then entered into the MR with the other dependent variables Gender and SES.

- Regress ZMEA4R on Gender, SES, Move_Early4, Move_Late4
- Regress ZMEA4M on Gender, SES, Move_Early4, Move_Late4
- Regress ZMEA8R on Gender, SES, Move_Early8, Move_Late8
- Regress ZMEA8M on Gender, SES, Move_Early8, Move_Late8
- Regress ZMEA11R on Gender, SES, Move_Early11, Move_Late11
- Regress ZMEA11M on Gender, SES, Move_Early11, Move_Late11

Regression Analysis #4

This regression tested for interaction between Mobility# (number of moves) and Gender. An interaction is a product variable, in effect multiplying Mobility by Gender and entering it into the regression. Mobility#, a continuous variable, needed to be centered. Using SPSS to compute it, the mean of the variable was subtracted from the variable creating the new MobilityCenter variable with a mean = 0. Gender was re-coded as a dummy variable, NewGender, so that female was coded (1) and male was (0). The MobilityCenterXNewGender product variable, if statistically significant for one of these regressions, meant that the effect of mobility was different for girls than for boys.

- Regress ZMEA4R on Gender, SES, Mobility#by4, MobilityCenterXNewGender
- Regress ZMEA4M on Gender, SES, Mobility#by4, MobilityCenterXNewGender
- Regress ZMEA8R on Gender, SES, Mobility#by8, MobilityCenterXNewGender
- Regress ZMEA8M on Gender, SES, Mobility#by8, MobilityCenterXNewGender

- Regress ZMEA11R on Gender, SES, Mobility#by11, MobilityCenterXNewGender
- Regress ZMEA11M on Gender, SES, Mobility#by11, MobilityCenterXNewGender

Regression Analysis #5

This regression tested for interaction between Mobility and SES. The procedure was the same as in regression analysis # 4. The MobilityCenterXNewSES product variable, if statistically significant for one of these regressions, meant that the effect of mobility was different for low-income students than for high-income students.

- Regress ZMEA4R on Gender, SES, Mobility#by4, MobilityCenterXNewSES
- Regress ZMEA4M on Gender, SES, Mobility#by4, MobilityCenterXNewSES
- Regress ZMEA8R on Gender, SES, Mobility#by8, MobilityCenterXNewSES
- Regress ZMEA8M on Gender, SES, Mobility#by8, MobilityCenterXNewSES
- Regress ZMEA11R on Gender, SES, Mobility#by11, MobilityCenterXNewSES
- Regress ZMEA11M on Gender, SES, Mobility#by11, MobilityCenterXNewSES

Hypotheses

In order to determine if mobility, and more specifically, the timing of mobility has a significant relationship with academic achievement I proposed the following hypotheses.

1. Transferring has a negative effect on academic achievement.
2. The negative effect of mobility on academic achievement increases as the number of moves increases.
3. The negative effect of late mobility is greater than the negative effect of early mobility when compared to non-movers.

4. Gender interacts in favor of females with mobility number to predict academic achievement.
5. SES interacts in favor of high SES with mobility number to predict academic achievement.

Summary

Data from the cumulative records of students in a small rural high school in Maine were used to investigate one specific facet of the relationship between mobility and academic achievement. Existing research indicates that mobility is one of several variables that have an impact on achievement. The focus of this investigation was on the timing of student mobility; those who move during the summer break—Early Movers, compared to those who move during the school year—Late Movers. Multiple Regression analysis was used to determine if the timing of a students' mobility significantly effects, predicts, and explains achievement as measured by the Maine Educational Assessment.

CHAPTER 4

Results

Introduction

The main purpose of this study was to investigate whether the timing (independent variable) of student mobility, Early – transfer during the summer, or Late – transfer during the school year, was related to academic achievement (dependent variable) as measured by Maine Education Assessment (MEA) scores.

Data were collected from the permanent records of students who were listed as members of the senior class at a particular Maine high school from 1997 through 2007. In order to ensure a standard for comparison of the timing of mobility, one of the requirements for inclusion in the timing analysis was that subjects had only one (1) transfer during their K-12 schooling. From the original pool of 431 seniors, 216 had transferred, of those, 122 were found to have a single transfer.

Each of the five main categories of regressions was intended to consider a specific independent variable. Regression Analysis # 1 (RA # 1) considered transfer. Regression Analysis # 2 (RA # 2) considered Mobility as the cumulative number of transfers. Regression Analysis # 3 (RA # 3) considered the timing of a transfer, early and late movers compared to non-movers. Regression Analysis # 4 (RA #4) considered the interaction between Mobility and Gender. Regression # 5 (RA# 5) considered the interaction between Mobility and SES. Each of the five main categories consisted of six individual regressions, one each for: 4^{th} grade Math, 4^{th} grade Reading, 8^{th} grade Math, 8^{th} grade Reading, 11^{th} grade Math and 11^{th} grade, for a total of 30 regressions.

Analysis of the data included descriptive statistics to demonstrate that the data met assumptions of being normally distributed and representative. Further analysis included the use of Multiple Regression (MR) to determine to what extent the variation in the independent variables (SES, Gender, Transfer, Mobility #, Timing) explained the variation in the dependent variable (Academic Achievement). The level of significance used for all analyses was $p \leq .05$. The Statistical Package for the Social Sciences (SPSS) Graduate Pack 16.0 for Mac® (2007) was used for all statistical analyses.

Descriptive Statistics

There were three circumstances that surfaced from examination of the initial subject pool that resulted in excluding cases from analysis. Eight cases were excluded because they had not taken the MEA. Possible explanations for this are that the student was absent during the majority of the testing window or the student qualified for Personalized Alternate Assessment Portfolio (PAAP) an alternative form of testing usually administered by Special Education staff that does not report standard MEA scores. Seven cases were excluded because they were in attendance as foreign exchange students. Exchange students were not required to participate in MEA testing. Additionally, the uniqueness of their mobility status precludes them from consideration. Six students had no record of any MEA testing in their file. MEA stickers for these students may not have been received, been misplaced or misfiled. These exclusions resulted in $N = 410$ cases being included in the data pool.

Gender and SES were included as independent variables in all the regression analyses. There were 202 (49%) males, and 208 (51%) females, 76 (19%) were classified as low SES, and 334 (81%) were high SES.

For RA # 1 cases were sorted according to whether there had been a transfer prior to the three test grades, 4th, 8th, and 11th (See Table 4.1). As a general measure of the effect of transfer, one or more transfers before any of the test grades would code a case for transfer. Timing and the number of transfer were not a factor in this analysis.

Table 4.1. Transfer: Status Prior to MEA Test Grade Levels

	Prior to 4th		Prior to 8th		Prior to 11th	
Transfer	*N*	%	*N*	%	*N*	%
NO	312	76.1	235	57.3	194	47.3
YES	98	23.9	175	42.7	216	52.7
Total	410	100	410	100	410	100

Mobility, indicated by the number of transfers, ranged from zero to 9. In RA # 2 cases were coded by the number of transfers accumulated before reaching each of the three test grades (See Table 4.2). The number of transfers, but not the timing of transfers, was of importance in this analysis.

Only cases with a mobility number of zero or one were used in the analysis of Timing. The cases with a single transfer were further categorized as Early or Late by grade level: before the 4th grade – before the 8th grade – before the 11th grade. Table 4.3 shows the number of cases in each of the categories.

Academic Achievement data, as measured by MEA scores, were recorded for Reading and Math for each of the required 4th, 8th, and 11th grade testing. As shown in Table 4.4 the number of MEA scores available in each of the categories above differs.

This is due in part to students who moved in from another state and did not test in Maine at one or more of the grade levels. Another reason for the differences was that no 11th grade Reading and Math scores were available for two of the graduation years. The Class of 1997 had MEA stickers for their 4th and 8th grade test but none for the 11th grade were found in their files. The Class of 2007 was not required to take the MEA in the 11th grade as the state of Maine switched to the SAT as a means of measuring federally mandated Annual Yearly Progress (AYP).

Table 4.2. Mobility #: Number of Moves Prior to MEA Test Grade Levels

Number of Moves	Prior to 4th		Prior to 8th		Prior to 11th	
	N	%	*N*	%	*N*	%
0	314	76.6	236	57.6	195	47.6
1	70	17.1	106	25.9	125	30.5
2	17	4.1	36	8.8	42	10.2
3	5	1.2	18	4.4	25	6.1
4	4	1.0	9	2.2	7	1.7
5	0	0	4	1.0	7	1.7
6	0	0	0	0	3	0.7
7	0	0	1	0.2	1	0.2
8	0	0	0	0	0	0
9	0	0	0	0	1	0.2

Table 4.3. Timing: Early, Late, or No Move Prior to MEA Test Grade Levels

	Prior to 4th		Prior to 8th		Prior to 11th	
Timing	*N*	%	*N*	%	*N*	%
No Moves	271	66.1	228	55.6	194	47.3
Early Moves	32	7.8	65	15.9	87	21.2
Late Moves	12	2.9	23	5.6	35	8.5

Table 4.4. Availability of MEA Scores

	4th		8th		11th	
Subject	*N*	%	*N*	%	*N*	%
Reading						
Available	332	78	359	87.6	322	78.5
Missing	78	19	51	12.4	88	21.5
Math						
Available	332	78	354	86.3	325	79.3
Missing	78	19	56	13.7	85	20.7

Hypothesis Testing

Six regressions were run to test each hypothesis. One each for: 4th grade Math, 4th grade Reading, 8th grade Math, 8th grade Reading, 11th grade Math and 11th grade Reading.

The following hypotheses were tested in this study:

1. Transferring has a negative effect on academic achievement.
2. The negative effect of mobility on academic achievement increases as the number of moves increases.
3. The negative effect of late mobility is greater than the negative effect of early mobility when compared to non-movers.
4. Gender interacts in favor of females with mobility number to predict academic achievement.
5. SES interacts in favor of high SES with mobility number to predict academic achievement.

Hypothesis #1

It was hypothesized that transferring would have a negative effect on academic achievement. MEA scores were regressed on Gender, SES and Transfer. Data from Table 4.5 shows the six linear regressions resulted in *F* ratios that ranged from 3.501 to 10.749 all at significant levels, from $P < .016$ to .000. R^2 values ranged from .031 to .092 indicating that approximately 3 to 10 percent of the variability in MEA scores can be explained by the combination of all the independent variables, Gender, SES, and Transfer. Only in the 11th grade Math did the independent variable Transfer ($b = -.209$, $\beta = -.105$, $p = .056$) approach significance in explaining MEA score variability (See Table

4.6). The results of this study indicate that transferring had no significant effect on academic achievement.

SES was shown to be a significant predictor ($p < .004$) of academic achievement in both Reading and Math at the 4th, 8th, and 11th grade levels. Gender was significant for 8th and 11th grade Reading ($p < .001$).

Table 4.5. Combined Model Summary / ANOVA for Regression Analysis #1: MEA Scores on Gender, SES, Transfer

MEA	R^2	*df*	*F*	*sig*
4 Math	.031	3, 328	3.501	.016
4 Reading	.042	3, 328	4.769	.003
8 Math	.035	3, 350	4.207	.006
8 Reading	.068	3,355	8.655	.000
11 Math	.047	3, 321	5.262	.001
11 Reading	.092	3,318	10.749	.000

Table 4.6. Summary of Coefficients for Regression Analysis #1: MEA Scores on Gender, SES, Transfer

MEA	Variable	*b*	β	*t*	**sig*
4 Math					
	Gender	-.117	-.059	-1.079	.281
	SES	.407	.156	2.863	.004
	Transfer	-.134	-.057	-1.055	.292
4 Reading					
	Gender	.120	.060	1.107	.269
	SES	.516	.196	3.626	.000
	Transfer	.021	.009	.170	.865
8 Math					
	Gender	-.162	-.081	-1.547	.123
	SES	.400	.155	2.954	.003
	Transfer	-.119	-.059	-1.120	.264
8 Reading					
	Gender	.379	.189	3.694	.000
	SES	.387	.148	2.891	.004
	Transfer	-.188	-.093	-1.809	.071
11 Math					
	Gender	-.201	-.101	-1.843	.066
	SES	.407	.158	2.897	.004
	Transfer	-.209	-.105	-1.921	.056
11 Reading					
	Gender	.479	.240	4.475	.000
	SES	.452	.175	3.272	.001
	Transfer	-.178	-.089	-1.669	.096

* one-tailed

Hypothesis #2

It was hypothesized that mobility had a negative effect on academic achievement and that as the number of moves increased so would the negative effect on achievement. MEA score were regressed on Gender, SES, and Mobility#. The six linear regressions resulted in *F* ratios that ranged from 3.717 to 10.287 all at significant levels, from $p <$ .012 to $p <$ .000. R^2 values ranged from .033 to .088 indicating that approximately 3 to 9 percent of the variability in MEA scores can be explained by the combination of all the independent variables (see Table 4.7). While all the *b*, □, and *t* coefficients for the Mobility# variable were negative, Table 4.8 shows that none reached the $p \leq .05$ level. The results of this study indicate that increasing numbers of moves did not have a significant effect on academic achievement.

SES was shown to be a significant predictor ($p <$ .007) of academic achievement in both Reading and Math at the 4th, 8th, and 11th grade levels. Gender was significant for 8th and 11th grade Reading ($p <$ .001).

Table 4.7. Combined Model Summary / ANOVA for Regression Analysis #2: MEA Scores on Gender, SES, Mobility#

MEA	R^2	*df*	*F*	*sig*
4 Math	.033	3, 328	3.717	.012
4 Reading	.042	3, 328	4.820	.003
8 Math	.035	3, 350	4.193	.006
8 Reading	.065	3, 355	8.263	.000
11 Math	.040	3, 321	4.424	.005
11 Reading	.088	3, 318	10.287	.000

Table 4.8. Summary of Coefficients for Regression Analysis #2: MEA Scores on Gender, SES, Mobility#

MEA	Variable	*b*	*β*	*t*	**sig*
4 Math					
	Gender	-.113	-.056	-1.038	.300
	SES	.389	.149	2.727	.007
	Mobility#	-.098	-.072	-1.319	.188
4 Reading					
	Gender	.119	.059	1.098	.273
	SES	.507	.193	3.540	.000
	Mobility#	-.031	-.023	-.417	.677
8 Math					
	Gender	-.161	-.081	-1.538	.125
	SES	.388	.151	2.844	.005
	Mobility#	-.058	-.058	-1.102	.271
8 Reading					
	Gender	.382	.191	3.718	.000
	SES	.373	.143	2.762	.006
	Mobility#	-.075	-.076	-1.473	.142
11 Math					
	Gender	-.196	-.098	-1.792	.074
	SES	.383	.149	2.696	.007
	Mobility#	-.047	- .062	-1.126	.261
11 Reading					
	Gender	.484	.243	4.521	.000
	SES	.431	.167	3.095	.002
	Mobility#	-.049	-.063	-1.163	.246

* one-tailed

Hypotheses #3

It was hypothesized that the negative effect of mobility would be greater for late movers than for early movers when compared to non-movers. MEA scores were regressed on Gender, SES, Move_Early, and Move_Late variables. The six linear regressions resulted in *F* ratios that ranged from 1.254 to 5.413, only four of them had significant levels, from $p < .036$ to $p < .000$. The two that did not were 4th grade Math with $F(4, 262) = 1.254$, $p = .288$, and 11th grade Math with $F(4, 249) = 2.038$, $p = .090$. R^2 values ranges from .019 to .065 indicating that from nearly 2 to just under 7 percent of the variability in MEA scores can be explained by the combination of all the independent variables (see Table 4.9).

Twelve of the 18 calculated *b*, □, and *t* coefficients for the Move_Early variable were negative, all of the Move_Late coefficients were negative, and every one of the Move_Late coefficients was more negative than the corresponding Move_Early, however only one, Move_Early for 4th grade Reading, reached the $p \leq .05$ level (see Table 4.10). Move_Early for 4th grade Reading held significance at the $p = .046$ level with $b = .369$, □ = .122, and $t = 2.002$. The results of this study indicate that (a) except for 4th grade Reading, there are no significant differences between not moving at all and moving early, and (b) there are no significant differences between not moving at all and moving late.

SES was shown to be a significant predictor ($p < .05$) of Academic Achievement in Reading at the 8th grade level and just missed significance ($p = .051$) at the 4th grade level. SES reached significance in Math at both the 4th and 8th grade levels, but for neither Reading nor Math at the 11th. Gender was significant for 8th and 11th grade Reading ($p < .002$).

Table 4.9. Combined Model Summary / ANOVA for Regression Analysis #3: MEA Scores on Gender, SES, Move_Early, Move_Late

MEA	R^2	*df*	*F*	*sig*
4 Math	.019	4, 262	1.254	.288
4 Reading	.038	4, 262	2.610	.036
8 Math	.044	4, 281	3.238	.013
8 Reading	.049	4, 282	4.705	.001
11 Math	.031	4, 251	2.038	.090
11 Reading	.065	4, 249	5.413	.000

Table 4.10. Summary of Coefficients for Regression Analysis #3: MEA Scores on Gender, SES, Move_Early, Move_Late

MEA	Variable	*b*	*β*	*t*	**sig*
4 Math					
	Gender	-.087	-.043	-.704	.482
	SES	.352	.128	2.069	.040
	Early	-.032	-.010	-.166	.868
	Late	-.106	-.021	-.340	.743
4 Reading					
	Gender	.107	.055	.897	.371
	SES	.362	.120	1.963	.051
	Early	.369	.122	2.002	.046
	Late	-.239	-.049	-.796	.427
8 Math					
	Gender	-.152	-.075	-1.281	.201
	SES	.369	.138	2.289	.023
	Early	.116	.047	.790	.430
	Late	-.328	-.088	-1.464	.144
8 Reading					
	Gender	.372	.184	3.185	.002
	SES	.359	.133	2.232	.026
	Early	-.027	-.011	-.186	.852
	Late	-.359	-.097	-1.623	.106
11 Math					
	Gender	-.179	-.091	-1.460	.146
	SES	.304	.118	1.865	.063
	Early	-.095	-.044	-.685	.494
	Late	-.261	-.083	-1.291	.198
11 Reading					
	Gender	.501	.250	4.102	.000
	SES	.240	.092	1.484	.139
	Early	-.092	-.042	-.663	.508
	Late	-.319	-.100	-1.589	.113

*one-tailed

Hypothesis #4

It was hypothesized that Gender would interact, in favor of females, with mobility number to predict academic achievement. The six linear regressions resulted in *F* ratios that ranged from 2.817 to 8.204 all at significant levels from $p < .000$ to $p < .025$. R^2 values ranged from .033 to .082 indicating that approximately 3 to 8 percent of the variability in MEA scores can be explained by the combination of all the independent variables, Gender, SES, Mobility#, MobilityCenterXNewGender (see Table 4.11). None of the coefficients for the interaction variables, from Table 4.12, approached significance. The results of this study indicate that there was no differential effect of mobility for girls than for boys.

SES was shown to be a significant predictor ($p < .008$) of academic achievement in both Reading and Math at the 4th, 8th, and 11th grade levels. Gender was significant for 8th and 11th grade Reading ($p < .001$).

Table 4.11. Combined Model Summary / ANOVA for Regression Analysis #4: MEA Scores on Gender, SES, Mobility#, Interaction Variable – MobilityXGender

MEA	R^2	*df*	*F*	*sig*
4 Math	.033	4, 327	2.817	.025
4 Reading	.050	4, 327	4.259	.002
8 Math	.035	4, 349	3.166	.014
8 Reading	.068	4, 354	6.449	.000
11 Math	.041	4, 320	3.434	.009
11 Reading	.082	4, 317	8.204	.000

Table 4.12. Summary of Coefficients for Regression Analysis #4: MEA Scores on Gender, SES, Mobility#, Interaction Variable – MobilityXGender

MEA	Variable	*b*	β	*t*	**sig*
4 Math					
	Gender	-.116	-.058	-1.061	.290
	SES	.386	.148	2.693	.007
	Mobility#	-.080	-.059	-.902	.368
	MobilityXGen	-.024	-.025	-.384	.701
4 Reading					
	Gender	.107	.053	.990	.323
	SES	.494	.188	3.450	.001
	Mobility#	.044	.032	.500	.617
	MobilityXGen	-.098	-.102	-1.584	.114
8 Math					
	Gender	-.166	-.083	-1.564	.119
	SES	.390	.151	2.851	.005
	Mobility#	-.043	-.043	-.629	.530
	MobilityXGen	-.027	-.023	-.340	.734
8 Reading					
	Gender	.371	.186	3.596	.000
	SES	.379	.145	2.804	.005
	Mobility#	-.032	-.032	-.469	.639
	MobilityXGen	-.078	-.068	-1.002	.317
11 Math					
	Gender	-.197	-.099	-1.797	.073
	SES	.379	.147	2.657	.008
	Mobility#	-.014	-.019	-.222	.824
	MobilityXGen	-.057	-.058	-.698	.486
11 Reading					
	Gender	.480	.241	4.489	.000
	SES	.414	.161	2.969	.003
	Mobility#	.025	.032	.370	.712
	MobilityXGen	-.119	-.122	-1.426	.155

* one-tailed

Hypothesis #5

It was hypothesized that SES would interact, in favor of high SES, with mobility number to predict academic achievement. The six linear regressions resulted in *F* ratios that ranged from 2.875 to 7.930 all at significant levels from $p < .000$ to $p < .023$. R^2 values ranged from .034 to .058 indicating that approximately 3 to 6 percent of the variability in MEA scores can be explained by the combination of all the independent variables, Gender, SES, Mobility#, MobilityCenterXNewSES (see Table 4.13). None of the coefficients for the interaction variable approached significance (see Table 4.14). The results of this study indicate that there was no differential effect for mobility for low SES than for high SES.

SES was shown to be a significant predictor ($p < .009$) of academic achievement in both Reading and Math at the 4th, 8th, and 11th grade levels. Gender was significant for 8th and 11th grade Reading ($p < .001$).

Table 4.13. Combined Model Summary / ANOVA for Regression Analysis #5: MEA Scores on Gender, SES, Mobility#, Interaction Variable – MobilityXSES

MEA	R^2	*df*	*F*	*sig*
4 Math	.034	4, 327	2.875	.023
4 Reading	.043	4, 327	3.689	.006
8 Math	.039	4, 349	3.519	.008
8 Reading	.058	4, 354	6.477	.000
11 Math	.040	4,320	3.352	.010
11 Reading	.091	4, 317	7.930	.000

Table 4.14. Summary of Coefficients for Regression Analysis # 5: MEA Scores on Gender, SES, Mobility#, Interaction Variable – MobilityXSES

MEA	Variable	*b*	β	*t*	**sig*
4 Math					
	Gender	-.111	-.056	-1.024	.307
	SES	.386	.148	2.697	.007
	Mobility#	-.073	-.053	-.847	.398
	MobilityXSES	-.037	-.038	-.609	.543
4 Reading					
	Gender	.120	.060	1.108	.269
	SES	.505	.192	3.517	.000
	Mobility#	-.007	-.005	-.079	.937
	MobilityXSES	-.035	-.036	-.572	.568
8 Math					
	Gender	-.156	-.078	-1.486	.138
	SES	.389	.151	2.854	.005
	Mobility#	.015	.015	.184	.854
	MobilityXSES	-.100	-.097	-1.217	.225
8 Reading					
	Gender	.386	.193	3.755	.000
	SES	.376	.144	2.787	.006
	Mobility#	-.013	-.013	-.169	.866
	MobilityXSES	-.084	-.083	-1.054	.293
11 Math					
	Gender	-.194	-.097	-1.773	.077
	SES	.378	.147	2.643	.009
	Mobility#	-.067	-.089	-1.045	.297
	MobilityXSES	.034	.035	.412	.680
11 Reading					
	Gender	.491	.246	4.577	.000
	SES	.421	.163	3.018	.003
	Mobility#	-.102	-.131	-1.521	.129
	MobilityXSES	.086	.087	1.017	.310

* one-tailed

Summary

This chapter presented the results of the analyses of the data used in the study. The descriptive statistics provided information on the number and percentage of cases in each of the several variable categories. Hypotheses testing were performed using MR for each of the five hypotheses. Using the $p < .05$ level of significance, the results of this study indicate that there are no significant differences in the academic achievement of: (RA # 1) students who transfer and those who do not, (RA # 2) students with multiple transfers, (RA # 3) students who move during the summer, except for lone finding of significance for 4th grade Reading Early, and those who move during the school year, compared to students who did not move. Also, examining for interactions, there was no differential effect of mobility for girls than for boys (RA # 4) and there was no differential effect for mobility for low SES than for high SES (RA # 5). Additionally, SES had a significant effect on Academic Achievement in 28 of the 30 regression, and Gender reached significance in 10 of the 30 calculated results.

CHAPTER 5

Discussion

Introduction

Data from the U.S. Census Bureau (2004) demonstrates the extent to which the population has been on the move. Research indicates that mobility has an effect on academic achievement (Ascher, 1991; Barton, 2003; Brawner, 1973; Gonzales, 1981; Marchant & Medway, 1987; Plucker & Yecke, 1999; Vail, 2003). The main purpose of this study was to investigate the effect of the timing of a student's mobility on academic achievement. Specifically, are there differences between the achievement of students who transfer during the summer and those who transfer at some point during the school year compared to those who do not transfer at all? Five hypotheses were put forth. 1) Transferring has a negative effect on academic achievement. 2) The negative effect of mobility on academic achievement increases as the number of moves increase. 3) The negative effect of late mobility is greater than the negative effect of early mobility when compared to non-movers. 4) Gender interacts in favor of females with mobility number to predict academic achievement. 5) SES interacts in favor of high SES with mobility number to predict academic achievement.

Data from the permanent records of seniors attending a small, rural, high school in Maine from 1997 through 2007 were collected. Data fields included MEA scores, Gender, SES, and several aspects of mobility, namely if, how many times, and when, a student transferred. Multiple regressions were run using the Statistical Package for the Social Sciences (SPSS) Graduate Pack 16.0 for Mac® (2007) to regress the dependent

variable Academic Achievement, as measured by MEA scores, on the independent variables SES, Gender, Transfer, Mobility #, and Timing.

Summary of Results

The results of this study indicate that there are no significant differences in the academic achievement of: students who transfer and those who do not; students with multiple transfers; students who move early – during the summer, except for 4th grade Reading , and those who move late - during the school year, when compared to students who did not move. Additionally, there was no differential effect of mobility for girls than for boys and there was no differential effect for mobility for low SES than for high SES. The results also show that SES had a significant effect on Academic Achievement in nearly 95 % of the outcomes, while Gender reached significance 33 % of the time.

Discussion of Descriptive Statistics

Gender and SES

A nearly equal number of males and females were found in the subject pool. Of the 410 cases in the study 49% (202) were male, and 51% (208) were female. Percentages for low and high SES were not similar to those of gender. Low SES was recorded at 19% (76) compared to 81% (334) high SES. Inclusion in the low SES category meant that families had completed applications for federal Free and Reduced Lunch eligibility; all others were automatically placed in high SES. It is likely that some eligible families did not do the paperwork which resulted in students being coded for high SES status when if fact they were low SES.

Transfer Status

Mobility was initially considered in terms of whether a student had transferred or not. By the fourth grade nearly one quarter of the $N = 410$ students had transferred, a little less than half by the eighth grade, and just over half had transferred by the eleventh grade. This seems to be a reasonable progression through the grade levels; 98 had moved in their first five years, another 77 over the next four years, and 41 more three years later. A total of 216 students or 52.7% of the pool were coded as transfer (See Table 4.1).

Mobility #

As shown in Table 4.2, the number of times a student moved ranged from zero to nine, although no student had eight moves. The highest number of moves by the fourth grade was four, a high of seven by the eighth, and nine moves was the highest for the 11th grade. Although more than half of the subject pool had transferred, only about 10% had three or more moves. As might be expected, the percentage of cases with multiple moves was inversely related to the number of moves.

Timing of Mobility

Inclusion in the analysis of the timing of mobility was limited to students with only one move before each of the three MEA test grades. It is not known if multiple early or late moves or a combination of early and late moves might have a compounding effect that might be different from a single move, therefore as a means of equalizing potential effects of mobility, only cases with a single move were considered. Nearly one quarter of the transfer cohort had more than one transfer and was thus eliminated from consideration for the effects of timing by this threshold. From Table 4.3, the analysis of timing at the 4th grade was comprised of only12 Late movers and 32 Early movers, by the

8th grade those numbers had just about doubled to 23 Late and 65 Early, and then increased to 35 Late and 87 Early that were included in the 11th grade analysis. These are relatively small sample sizes.

MEA Scores

Converting MEA percentiles scores to *z* scores - where the mean is zero and the standard deviation is one - allowed for inclusion of all available MEA data across the graduation years 1997 to 2007. The highest number of scores, 88% of Reading and 86% of Math, were available for the 8th grade test. Just over three quarters of Reading and Math scores were found for both the 4th and 11th grade tests. This variation in available scores illustrates the extent of mobility across grade levels. Students transferred before and/or after MEA tests. A student might have been in the district for only one test - perhaps in the 8th grade, two test sessions - 8th and 11th, or all three, resulting in an unequal number of cases of MEA scores across the test grades.

Discussion of Multiple Regressions

Regression Analysis #1

The first hypothesis stated: transferring has a negative effect on academic achievement. In this first analysis, only 11th grade Math approached a significant negative effect on achievement (b = -.209, β = -.105, p = .056). This near missing of significance is most likely an isolated finding and cannot be given serious consideration. No indication or basis presents itself for concluding that the relationship between Transfer and 11th grade Math is any different than the effect (not significant) found for Reading and Math at the other grade levels. RA # 1 also showed SES, and to a lesser degree Gender as predictors of academic achievement.

Regression Analysis #2

It was hypothesized that the negative effect of mobility on academic achievement would increase as the number of moves increased. Considering the findings in RA # 1, that transferring, as found in this study, did not have a significant negative effect on academic achievement, it follows that multiple moves might also not have a compounding effect. Logic would dictate that multiple moves would result in gaps in educational curriculum, and missed sections of subject area scope and sequence which would culminate in a negative effect on academic achievement. Perhaps those effects are real but of short duration so as to effect ranking period grades but have no long term effect on standardized test scores.

Regression Analysis #3

This third regression investigated the hypothesis that the negative effect of late mobility is greater than the negative effect of early mobility when compared to non-mobile students. Fourth grade Reading ($p = .456$) was the lone exception to the no significant effect pattern established in RA # 1 and RA # 2. It seems important to note that the vast majority of *b*, β, and *t* coefficients for the Move_Early and Move_Late variables bore a negative sign. While only one, 4^{th} grade Reading Early, which had positive coefficients, reached significance at $p < .05$, the preponderance of negative signs intimates careful consideration and reflection. This significant result is suspect for several reasons. First and foremost, it's singularity. This was the lone one of the 48 possibilities of mobility significances calculated in this entire study that reached significance and even then, it was barely below ($p < .046$) the lowest of the traditionally accepted $p < .05$ thresholds. Additionally, while 83% of the *b*, β, and *t* coefficients were negative, this one

had positive coefficients. This finding cannot be ignored. It is possible, though extremely unlikely, that there is something about the 4th grade and/or reading that separates it from the others. A more plausible explanation might be data entry error on the part of this researcher or simply the random chance exception to statistical non-significance.

Regression Analyses # 4

The fourth hypotheses stated that Gender interacts in favor of females with mobility number to predict academic achievement. This regression investigated the possible interaction between Mobility # and Gender. Interactions consider whether the effect of one variable depends on the value of another variable. In this study I found that the effect of mobility did not depend on whether the student was male or female. There were no differential effects for Gender.

Regression Analyses # 5

The fifth hypotheses stated that SES interacts in favor high SES with mobility number to predict academic achievement. This regression investigated the possible interaction between Mobility # and SES. Interactions consider whether the effect of one variable depends on the value of another variable. In this study I found that the effect of mobility did not depend on whether the student held high or low SES status. There were no differential effects for SES.

Gender

Results for the independent variable Gender were consistently mixed over the various regressions. Gender did have a statistically significant ($p < .05$) effect on 8th and 11th grade Reading in all five regression analyses, but Gender did not reach significance for 4th grade Reading, nor for 4th, 8th, or 11th grade Math in any of the regressions. Gender

had significant regression coefficients in 10 of the 30 individual regressions (refer to Tables 4.5 – 4.14).

SES

Socioeconomic status had a statistically significant ($p < .05$) effect in 28 of the 30 individual regressions run in this study. As shown in tables 4.5 – 4.14 computed MR results support the status of SES as a predictor of academic achievement. The two non-significant findings were both in RA #3, the investigation of timing, and then, only in the 11th grade. The consistency of these findings begs the question, what is there about grade 11 that sets it apart from all the other results. I would offer, as one possible explanation, that for juniors in high school there may be a perceived, or perhaps a real, social stigma associated with standing in line to get a tray for free and reduced lunch. How many 11th graders in this study might not have turned the paperwork to qualify for free lunch and were "miss-coded" as high SES?

Findings Related to the Literature

The literature review in this study was divided into four categories of effects: positive, no effect, mixed, and negative. Those with positive effects were mostly limited to studies of military families (Marchant & Medway, 1987; Plucker & Yecke, 1999). While there may have been a limited number of students from military families in this study, there was no hint or any indication in the findings that transferring, the number of transfers, nor the timing of transfer had any positive effects on academic achievement.

The findings of this study most closely agree with Adduci (1990) who considered number of moves and distance of the move, Evans (1996) whose only consideration was mobile versus stable, and Andrews (2002) whose three classifications of mobility were

(a) change residence, (b) change school, and (c) change both residence and school. These studies concluded that mobility did not have any effect on academic achievement. The results of this study support the conclusion that the various aspects of mobility under investigation - mobility, mobility number, and timing of mobility—had no effect on the academic achievement of the students who were the subjects of this examination. These findings regarding the specific aspect of the Timing of mobility (having no effect) are new and unique to the extent of the literature reviewed in Chapter 2 and have yet to be either supported or contradicted.

Several researchers found mixed results. Fernandez (1987) found significant correlations for reading and writing but not for math. Analyses by Whalen and Fried (1973) showed a significant interaction between mobility and IQ (F [1, 96] = 8.363, $p <$ .05), but not between mobility and SES (F [1, 96] =.818). Alexander et al. (1996) also had mixed results, changing as different variables were held constant. While various coefficients for mobility from the results of this study fluctuated and both positive and negative signs attached, none reached significance and cannot be concluded to support the mixed effects of mobility on academic achievement found by other researchers.

The preponderance of studies, 15 or more, included in my review of the literature found that mobility, in one or more of its aspects, had a negative effect on academic achievement. Even though there was support in the literature for all four categories of effects—positive, none, mixed and negative— the majority of findings reported negative effects, thus my analyses were all one-tailed. My findings could have fit into any of the categories; I anticipated that I would find a negative effect. I did not. This study does not support nor confirm the findings of others, of a negative effect of mobility on academic

achievement. More specifically, based on the findings of this study, it seems unlikely that the timing of transfer has a negative effect on academic achievement.

Implications and Further Research

The practical rationale for this study was that an investigation into the effects of the timing of student transfer could inform me, school administrators, and other counselors and educators as to whether there might be differences in the achievement of students who transfer during the summer and those who transfer at some point after the school year has begun when compared to students who do not transfer at all. Educators would then be able to address any effects through changes in policy, practice, and classroom management. No effects were found, the implication being that perhaps no new policy, practice, or strategy need be changed, developed, or implemented for mobile students in this school district. It may be important to note that the most recent research finding no effect (Andrews, 2002) was published more than six years ago. Am I more sensitive to mobility issues and has that influenced the way I work with students who have transferred thus minimizing the effects of transfer? Has the school counseling profession in general become so aware of the negative effects of mobility that the issue is already being appropriately addressed?

What is it about this specific school district that eliminates the negative effects of transferring found in so many others? This is a small, close-knit community. Transfer families are quickly recognized and known by name at school and in the community. When new students register they and their parents are welcomed by the guidance counselor, and introduced to administrators, faculty, and staff. After course schedules have been made, a tour of the building with an emphasis on student specific classrooms is

conducted. Transfer students are escorted to their newly assigned lockers and helped with the combination lock. A "buddy" is assigned to help the new transfer student through their first two school days. Parents and teachers have likely met and engage in on-going contact - direct, telephone, or email - regarding student progress. Longevity of staff is high, the majority having been in the district for 15 years or more. Class sizes are small; many less than 20, most less than 15, a few with 10 or less. One-on-one after school help sessions for students is a common occurrence. Participation in extracurricular activities is the norm. At the middle school there is a no-cut policy for athletics and at the high school "B" level teams are included if numbers allow. The school buildings serve as the hub of activity hosting school and community sponsored events on a daily basis. Might other schools, of any size and geographic location, with similar student oriented characteristics also find no significant effects of transfer on academic achievement for their mobile students?

The finding, no effect, only applies regarding long-term academic achievement of mobile students as measured by the MEA. An examination of transfer in closer proximity to the MEA test date might yield different results. For instance, what if only students who transferred in the same year as the test administration were included in the subject pool, rather than those transferring two, three, four, or more years prior to the test as was the case in this study.

In my experience there is substantial anecdotal evidence that the MEA is often not taken seriously by students. This may be partly due to there being no consequence or ramifications for individual students who do poorly due to lack of effort. MEA scores are not tied to graduation or grade level promotion. The lengthy duration of the test disrupts

the school schedule for several days at a time and offers little or no incentive for students to do their best. Additionally, I am aware that this school district followed to a high degree the state mandate that "all" students complete the MEA testing. Only a very few students qualified to be exempted from testing in this district. Though unsubstantiated, it is reported that some schools found ways to not include low performing and low functioning students in the testing, perhaps skewing state scores in the aggregate. Did the instrument of choice, the MEA, contribute in some way to the finding of no effect?

Does sample size have some unrecognized influence on finding no effect of mobility on academic achievement? Three of the researchers cited in this study found no effect and had relatively small sample numbers: Adduci (1990) $N = 198$, Andrews (2002) $N = 98$, and Evans (1996) $N = 30$. In my study the $N = 410$, however, $n = 98$ pre-4th grade, $n = 175$ pre-8th grade, and $n = 216$ pre-11th grade cases were coded as Transfer; Mobility # cases ranged from $n = 1$ to $n = 125$; and Early/Late cases from a low of $n = 12$ to a high of $n = 87$.

The vast majority of researchers, from all four effects categories – positive, no effect, mixed, and negative - cited in Chapter two, pulled their samples from metropolitan areas such as New York City, Chicago, Austin, and Denver or referred to the location as a large urban Midwestern center. What role does geography play? Is there something about Maine or this small rural school in particular that insulates it from the negative effects of transfer so commonly found by other researchers? Perhaps, as the saying goes, it does take a village to raise a child.

There are four categories of findings of the effect of mobility on academic achievement – positive, no effect, mixed, and negative. Based on the number of studies

with negative effects and my own experience I hypothesized that I would find negative effects too, and elected to run one-tailed tests. In hindsight, that decision may have been inappropriate. What differences in significant results might the same data have produced if I had not predetermined a direction and ran the analyses with two-tailed tests?

In light of the extent to which we have become a mobile society, I encourage continued investigation into the effects of student mobility. Might short-term effects be more important? If reliability and validity issues could be addressed, a study looking at differences between ranking period grades before and after transferring might provide insight into mobility. A qualitative study comprised of observations, surveys, and in-depth interviews with students at various intervals after transferring might yield informative personal, social, and academic insights. This study only considered students who moved into this specific school district, perhaps a study tracking those who transferred out would yield significant results. Is there a resilience to change, perhaps differing across the age span, that exposes students in the short term but insulates them in the long term? What possible interactions are there among personality, self-esteem, and academic achievement in mobile students compared to non-mobile students that could be sorted out via qualitative analysis? What are the social effects of mobility and how do social implications impact achievement? This school district may already have policies in place that address student mobility in such a way that the negative effects of transferring become insignificant. The finding of no significant effect of transfer does not mean mobile students do not merit attention. I would recommend a thorough examination of the policies, practices and characteristics of these three schools and an investigation of how and why they effectively address student mobility.

Previous achievement, a significant variable in other studies (Heinlin & Shinn, 2000; Hummel, 1987; Manzicopoulus & Knutson, 2000; Mao, et al., 1997) was not incorporated into this study. Might these data return different results if comparisons were made when controlling for previous achievement? Are there differences in MEA scores of students who moved between 4th and 8th, 8th and 11th, and/or 4th and 11th grades?

Limitations

Mobility in this study only included students who transferred into this one specific school system. Tracking students who transferred out of this school system to another school system was beyond the scope of this work. Only students with a total of one transfer were included in the analysis of Timing. All data recording and input are subject to the accuracy of this researcher. Data were from a single, small, rural, white, low/middle class, Maine, school system. The school district in this study welcomed transfer students and their parents individually. The schools maintain veteran faculty and staff, offer small class sizes, individual attention, and boast high participation in extracurricular and athletic activities. The schools are an integral component of the fabric of the community. Generalizability is limited to school systems with similar characteristics.

Summary

None of the hypotheses put forth in this study were proven. This study does lend support to the findings of other researchers who found that student mobility has no significant effect on academic achievement (Adduci, 1990; Andrews, 2002; Evans, 1996).This study supports the findings of researchers who determined both SES and, to a lesser degree in this study, Gender, have a significant effect on academic achievement

(Applegate, 2003; Buerkle, 1997; Eckenrode et al., 1995; Horwitch, 2004). Suggestions for further research included longitudinal studies, personal characteristics of movers, reasons for moving, qualitative studies, and the social implications of student mobility. Additionally, an examination of the policies, practices, and characteristics of this particular school system (and any others that show no effect of transfer on academic achievement) was strongly recommended. Classrooms around the nation continue to have children transferring in and out throughout the summer and during the school year. Researching the effects of mobility must continue as well.

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