PATHWAYS TO STUDENT SUCCESS:

AN EXAMINATION OF GRADUATION MODELS

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ABSTRACT: National high school graduation rates have been relatively stagnant, hovering around 80% for the past decade according to the National Center for Education Statistics. However, the U.S. falls short of the U.S. Department of Education's goal of a 90% high school graduation rate and ranks in the bottom among other developed countries. Because of this, it becomes imperative to examine potential models in which students are at-risk of not graduating. Using data from the Pathways to Student Success Study (a population based sample using all 7th graders in a large school district in a South Central U.S. city ; N = 1,832), two distinct models were tested, both using the binary outcome of graduated vs. dropped out.

The first analysis tested both the favorability and accuracy of 7th grade teacher's predictions of student graduation. This model was then tested with three moderators- student's/mother's/father's attitudes towards the importance of education. Results showed that 7th grade teacher's predictions were significantly related to the future graduation of their students. Findings highlight that teachers were more favorable in their predictions of female and White students (separately), while minority teachers and teachers with more teaching experience were more favorable with respect to all students. With regard to accuracy, teachers were more accurate with female students, minority teachers were more accurate only with White students, and teachers with less experience were more accurate than teachers with more experience (all statistically significant associations). Father's importance of education was found to moderate the relationship as a possible risk factor for students predicted to graduate but dropped out.

The second model used a structural equation model to test the longitudinal effects that school mobility has on graduation. The model used two levels of mediators, with the first consisting of student work ethic, parent-child closeness, and delinquent peer selection, and the second consisting of GPA and attendance rates. Without the mediators, school mobility significantly predicted dropout; however, the model fully mediated the relationship such that the original association is non-significant, and is only significant through both levels of mediators.

Findings from the present research add to the body of work examining student graduation/dropout rates by investigating predictors from middle school as opposed to the more voluminously researched high school indicators. Results generally suggest that middle school predictors are highly indicative of high school trajectories of graduation or dropout. Implications include increased indicators for at-risk students by middle school teachers, school initiatives that help with school transition, as well as caution for parents seeking to opt for school choice in early adolescence.

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INTRODUCTION

Problem Statement

High school graduation rates in the U.S. have been relatively stable, hovering around

80% nationwide for the past decade (National Center for Education Statistics, 2015). This rate

falls short of the national goal of a 90% high school graduation rate (U.S. Dept. of Education,

2017) and ranks the U.S. in the bottom among other developed countries (OECD, 2017). With

regards to state specific data, Oklahoma recently ranked 46th for high school dropout rate (1st

having the lowest dropout rate and 51st having the highest dropout rate) and 41st in overall

educational quality (1st being the best and 51st being the worst; National and State Data Profiles,

2014); both indicators are therefore well below the national average. Furthermore, Oklahoma's

graduation rates steadily declined in the past decade, while the majority of states saw an increase

during this same time period (Oklahoma Public School Graduation rates of 2015, 2016). Of

particular concern, the inability to graduate high school has been linked with health disparities

such as obesity, substance abuse, depressive disorders, cigarette smoking, and decreased physical

activity, thus failure to graduate high school is labeled as a public health issue by some

researchers (e.g., Freudenberg & Ruglis, 2007). Individuals who do not complete high school are

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significantly more at-risk for incarceration (Baker & Lang, 2013), and have significantly less career options, lower wages, and higher rates of unemployment (Murnane, Willett, & Tyler, 2000). Due to the deleterious sequelae of dropping out, graduating high school is at the forefront of the U.S. Department of Education's goals (U.S. Dept. of Education, 2015).

Purpose and Importance

The purpose of the present research is to examine how contexts and characteristics of early adolescents (7th grade) affect 12th grade graduation rates. Research on high school graduation and dropout prevention programs has largely been focused on high school students (Soland, 2013). Studies that are limited to high school variables may be problematic, however, due to the average dropout timing coming around 10th grade (National Center for Education Statistics, 2015), which makes examining high school variables less germane to graduation, as some adolescents will have already dropped out. Although high school variables can predict graduation rates, these variables may come too late for interventions to help students complete high school. There is an essential need for up-to-date research regarding the pathways towards high school graduation earlier than high school so that school boards, administrators, and teachers can provide the best possible chance for students to graduate. To explore these pathways, this dissertation is organized to include the following:

- An introductory chapter outlining the problem statement, purpose, importance, and summary research questions/hypotheses.

- A manuscript testing the model of middle school teacher's predictions of high school graduation.

- A second manuscript testing a school mobility model on 7th grader's chances of graduating.

- A concluding chapter summarizing major findings and future recommendations (to be determined).

Sample

Data for this investigation are from the Pathways to Student Success project (PaSS); a population-based sample of 7th graders and their first period/homeroom teachers in an urban school district in the South Central U.S in 2009. Parents were notified in advance of the survey, and students who omitted if themselves or their parents declined to participate. Students who were present on the day of data collection were given the opportunity to participate with participation rate of 98%. Students were given the option to be surveyed in either English or Spanish using a self-report standardized assessment during their homeroom class period in the Spring semester. Due to differing levels of literacy, questions were read aloud to avoid confusion. Students with learning disabilities severe enough to be exempt from annual end of instruction exams were excluded from the current study. The survey took approximately 35 minutes to complete. The survey received institution review board (IRB) approval, and all personal data was restricted by assigning identification numbers to each student, which could not be traced to any student profiles by the research team.

Following the 2009 survey, the school district sent administrative follow-up data (i.e. grade point average, attendance rates, suspensions/expulsions) each semester until 2014. The district also provided "exit codes," for each student, which details why a student would leave the school system (i.e. graduated, dropped out, transferred out of district, expelled, homeschooled, sent to juvenile detention, hospitalized and did not return, died, etc…). For the purpose of this study, graduation data was cleaned by categorizing exit codes into groups: graduated, dropped out (which includes exit codes of dropped out, did not register with no transfer, expelled, and

transferred to penal system) and other (transferred out of district/state, or missing exit code). For most analyses, the 3rd category was excluded from the study. The variables were then added to the dataset that contained the original 7th grade variables, thus making this investigation longitudinal in nature.

CHAPTER II

MANUSCRIPT 1

Middle School Teacher Predictions of High School Graduation: Are They Accurate?

The ability to accurately identify key factors that impact graduation rates among adolescents has been the subject of study for decades, with more schools using this data to implement warning systems as early as possible in order to tackle the ongoing problem of high school attrition and dropout occurrences (Soland, 2013). Some researchers even termed school dropout as a public health issue, citing well-studied links between education and health (Freudenberg & Ruglis, 2007). Further, with recent Federal regulations such as the Every Student Succeed Act of 2015 (ESSA) which monitors individual high school graduation rates, the need to implement new methods to detect at-risk students who may not graduate becomes paramount.

In examining specific predictors, high school teacher predictions of student graduation are a highly accurate predictor of high school graduation (Soland, 2013). Nevertheless, research has shown that the average dropout period occurs around 10th grade, around age 16 (National

Center for Education Statistics, 2015), which may make studies of high schoolers less germane to improving graduation rates because some students drop out before making the transition to high school. Because examining warning signs of at-risk students already enrolled in high school may prove too late an indicator, studies have increasingly been dedicated to middle school predictors to forecast graduation and dropout instances; especially as adolescence has shown to be a critical developmental determinant when predicting high school graduation (Kieffer, Marinell, & Neugebauer, 2014; Kurlaender & Jackson, 2012). Yet studies that look specifically at middle school predictors have been solely focused on student-centered, administrative variables such as attendance, standardized assessment scores, specific course regimens, course failures, and behavioral citations (Kieffer, Marinell, & Neugebauer, 2014; Kurlaender & Jackson, 2012; Lassen, Steele, & Sailor, 2006). While these indicators have merit, research supports the notion that teachers have predictive information not revealed in administrative data by drawing parallels between student behaviors, such as academic preparedness and academic vigilance (Dweck, Walton, & Cohen, 2014). Although both high school teacher predictions and middle school administrative characteristics have shown statistical associations to high school graduation, each method carries its own limitations; and thus far, no study has combined the two elements to investigate the predictive nature that middle school teachers may have on predicting high school graduation and/or dropout.

In addition to using teacher predictions to determine high school graduation, research has found that the role of parents is pivotal when investigating student success. More specifically, the importance of academics to parents may affect parental involvement at home, parental involvement at school, and parental warmth; all of which have been linked to student performance and graduation (Dietrich & Salmela-Aro, 2013; Mcnair & Johnson, 2009). Thus,

this paper investigates the role that parents' attitudes towards the importance of education plays as a moderator in the link between teacher prediction and high school graduation in middle school.

Theoretical Foundation

This paper draws upon two theories, with the first providing a framework for a teachers' abilities to predict the graduation of their students, and the second providing a foundation for the role that parents play in the academic success of their offspring. Regarding the first theoretical foundation, an individual's ability to make accurate predictions about future situations based on certain traits within a specific niche can be explained by the Ecological Approach to Person Perception Theory, developed by McArthur and Baron (1983). This theory is based upon specific "attunements" that individuals in specific domains acquire. For example, a skilled mechanic may possess the ability to not only identify a problem, but recognize the precise cause and location of a malfunction simply by hearing an engine motor – a situation that non-mechanics would be oblivious to because of their lack of attunement to engines. Along with specific "attunements," this theory posits that the individuals for which the predictions are made must make "affordances," which are stimuli that can be detected by an individual with an attunement specific to that stimuli; i.e. the engine must first make a sound (affordance) for a mechanic to identify the problem (attunement). Thus, because teachers have specific training and experience in dealing with students and academic success, they possess an attunement for predicting the eventual success of students above and beyond others who are not teachers. However, their predictions are only valid to the students they instruct (as opposed to other students in different classes/schools) due to the key affordances that their own students portray.

With regards to how parental beliefs may affect student academic success, the Parental Beliefs and Socialization Model (Murphey, 1992) posits that parental beliefs shape the behavior, and ultimately, the achievements of their children. More specifically, Murphey described a direct link between the attitudes of parents and the outcomes of their children. He defines "beliefs" broadly as attitudes/values concerning children within a specific realm, but emphasizes his theory has a particular focus on the nature of the child and the developmental process. For example, if parents believe that the government is inherently insidious, their children may intrinsically adopt this belief by not voting as adults. When applied using an educational lens, Murphey's model suggests that parent's attitudes towards education may be manifested by their offspring- either to their benefit or detriment. Thus, parents' attitudes towards education can play an important role in the future academic achievement (i.e. graduation) of their children.

Teacher's Predictions of Academic Success

Among the numerous ways to use teacher variables to predict graduation, the most direct way is to simply ask teachers to predict student graduation. Soland (2013) looked at 10th grade teacher predictions of student graduation using a large national data set collected in 1990. Students at this time identified as 10th graders, and additional data was collected in 1992 and 1994 to capture graduation data. Teachers were extremely accurate, with 88% correctly predicting student graduation. Teachers were less accurate and less favorable when predicting whether or not a minority student would graduate (African American students made up 14% of the total sample, while Hispanics made up 11%); and teachers with more teaching experience (total years teaching) were more accurate in predicting student graduation. Teacher breakdown was 47% female, 89% white, 5% African American, 2% Hispanic, and 4% other. To date, Soland's study is the only peer-reviewed investigation that examined teacher predictions using

graduation as an outcome; however, others have used teacher predictions in a more subject-specific way by using markers of subject-grade point average or literacy as an outcome. When investigating different subjects individually, teacher predictions of student academic success were highly accurate in the areas of science, math, and reading (Hanna, Bligh, Lenke, & Orleans, 1969; Lightman & Sadler, 1993; Royer & Schumer, 1976). Daun (1995) notes however, that although teacher predictions were fairly accurate in his study of West African pupils, this could largely be due in part to the self-fulfilling prophecies of the teacher and student achievement in the same year. This highlights the importance of using long-term, longitudinal data to examine the association between teacher predictions and subsequent student academic outcomes.

Parental Attitudes Toward Education and Academic Success

Parent's attitudes towards education has shown to affect student success in a variety of ways. Morgan, Sinatra, and Eschenauer (2015) found that 12th graders commonly reported that parental involvement not only advanced their skill sets, but gave them greater confidence and self-esteem. Parental expectations may also be a factor in the academic success of high school students. Several studies examined the impact of parental expectations and found a positive and significant relationship with student achievement (Battin-Pearson et al., 2000; Seyfried & Chung, 2002), with higher parental expectations yielding better student academic success. This relationship may be curvilinear, however, as excessive expectations from parents may lead to student burn-out and lower academic motivation (Sorkkila, Aunola, & Ryba, 2017).

Less studied in the literature however, is the specific idea of parental attitudes towards the importance of education. In a qualitative investigation of Korean parents and children, Yang and Shin (2008) identified that parental beliefs about the importance of education affects the well-being of children and their perceptions of their potential. Similarly, Melnick and Fiene

(1990) found a positive link between parents' attitudes towards the importance of education and the educational achievement of their children; more specifically, homes that stressed the importance of education directly affected a child's motivation towards school. In identifying gender differences, another study found that parental attitudes towards the importance of education for females affected the quality of education given to girls in India. That is, the more parents valued the education of their daughters, the greater academic success those females generally had (Purewal & Hashmi, 2015).

The demographics of parents may also be a determinant of high school graduation. Using data from the National Longitudinal Survey of Youth (1985) researchers found that single-parent households yielded significantly lower graduation rates than two-parent households (Sandefur, McLanahan, & Wojtkiewics, 1992). With single-parent families on the rise, Ziol-Guest, Duncan and Kalil (2015) revealed using more recent data that students from single-parent households had lower academic achievement and were overall more disadvantaged when measuring academic outcomes. The study also suggested that single-parent households may have less time to devote to students' academic career.

Student Attitudes Towards the Importance of Education and Academic Success

Limitations of using student administrative data give merit to examining various sociological, non-cognitive student traits (Lassen, Steele, & Sailor, 2006). Testing positive attitudes towards education, for instance, have predictive associations with high school graduation. Laursen (2015) argues, for example, that academic grit (i.e. perseverance to achieve one's goals) is a better predictor of high school success than intelligence quotient (IQ) or grade point average (GPA). Mirroring these findings in private high school students, Ivcevic and Brackett's 2014 study revealed that attitudes towards finishing school significantly predicted the

academic successes (i.e. GPA, behavioral citations, academic honors) of that student. The notion that these attitudes ultimately disclose how much a student values his/her educational abilities was examined by Ludden (2012), who found that students who valued the importance of school was predictive of group membership in the "high achieving" student category. Other studies have found similar significant links between student attitudes towards education and academic success, IQ and conscientiousness (Duckworth, Peterson, Matthews, & Kelly, 2007).

Current Study

Although teacher predictions have shown to be a significant predictor of student achievement, it has solely been used within a high school contextual sphere. This may be problematic, however, as according to the National Center for Education Statistics (2015), the average age for dropping out of high school was between 15 and 16 years old (around 10th grade). Thus, while accurate, high school teacher predictions may serve as too late an indicator to identify at-risk students. The current study, however, uses middle-school teacher predictions of 7th grade students' chances of graduation against future graduation data for those students in a population based sample. Further, because research has shown the importance that attitudes towards education play in determining educational outcomes, this study will use several moderators to determine if the relationship between teacher predictions and graduation is attenuated under certain conditions (see Figure 1). In other words, do students'/mothers'/fathers' attitudes towards the importance of education act as a risk factor for students who were predicted to graduate but dropped out, or separately, a protective factor for students who were predicted to drop out but graduated? Using Murphey's Parental Beliefs and Socialization Model, the moderators chosen for this study are composite variables that asses the importance of school to the student, mother, and father (all student report). Goodman and Gregg (2010) define parental

attitudes towards education as a mother's or father's beliefs or attitudes about the future of his/her child's education, which this paper will use as a foundation for operationalizing the variables.

Research Questions and Hypotheses

Research question #1: Are there differences in the favorability and accuracy of teacher predictions based on student race/ethnicity and gender, and teacher race/ethnicity, gender, and experience?

> *Hypothesis #1a*: Teachers will have less favorable predictions of minority students, and no difference by gender.

> *Hypothesis #1b.* Teachers will have less accurate predictions of minority students, and no difference by gender.

> *Hypothesis #1c*: Minority teachers will have more accurate predictions than white teachers.

> *Hypothesis #1d*: Teachers with more experience will have more accurate predictions than teachers with less experience.

Research question #2: Can middle school teacher's predictions significantly predict student graduation?

> *Hypothesis #2*: There is a significant link between middle school teacher's predictions and graduation rates.

Research question #3: Do mother's, father's and student's attitudes towards the importance of education moderate the relationship between teacher prediction and graduation?

> *Hypothesis #3*: All moderators will be significant in attenuating the link between teacher predictions and actual graduation.

Research Question #4: Are parent's and student's attitudes towards education a risk factor for students who were predicted to graduate but dropped out, or a protective factor for students who were predicted to drop out but graduate?

> *Hypothesis #4*: Low levels of parent's and student's attitudes will be a risk factor for students predicted to graduate but dropped out, and high levels of parent's and student's attitudes will be a protective factor for students who were predicted to drop out but graduated.

Figure 1.
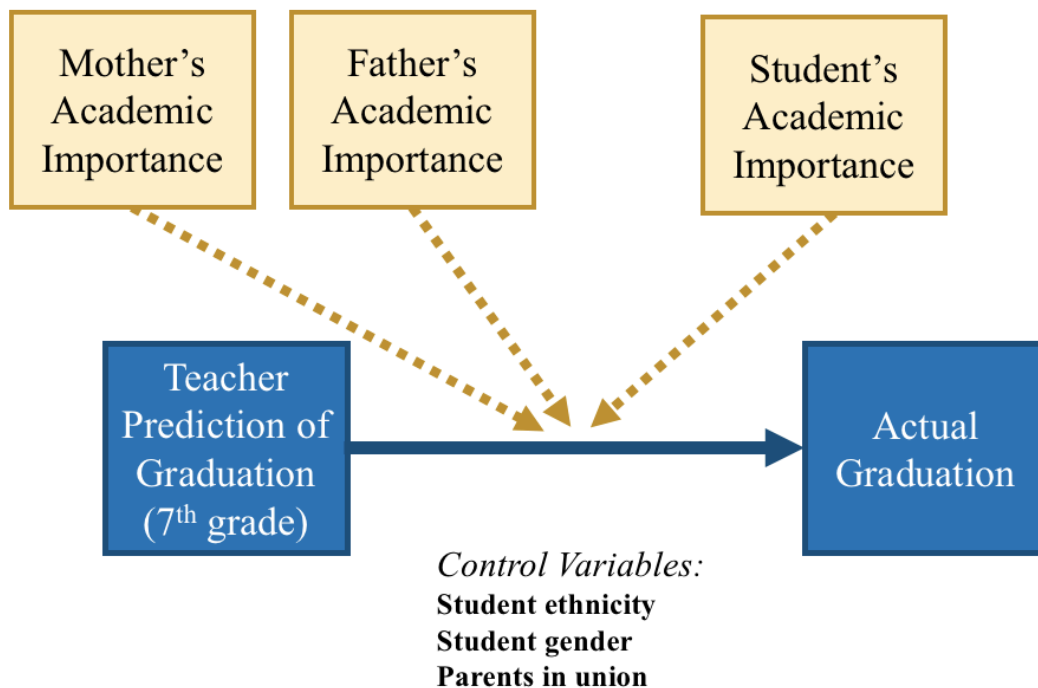
Method

Sample

The current study uses teacher-student dyadic data from the Pathways to Student Success project (PSS), a district-wide survey collection in a medium-sized south central U.S. city starting in 2009. The complete population of 7th grade students in attendance the day of data collection

who gave assent to participate and whose parents did not object (response rate = 98%; $N =$ 1,832) was surveyed in either English or Spanish using a self-report standardized instrument. Due to differences in literacy rates, the questions were read aloud to prevent misunderstanding. Teachers were also surveyed, filling out paper-and-pencil surveys for each individual student. Subsequently, administrative data (i.e. GPA, attendance, and "exit codes" which explains why a student left school such as graduation/expulsion/dropout/transfer) was provided by the district for the students each additional semester until 2014. For the purpose of this study, graduation data was cleaned by organizing exit codes into groups: graduated, dropped out (which includes exit codes of dropped out, did not register with no transfer, expelled, and transferred to penal system) and other (transferred out of district/state, or missing exit code). These variables were then added to the original dataset that contained the 7th grade variables and teacher predictions, thus making this investigation longitudinal in nature.

Table 1 presents descriptive statistics. Teacher prediction data was available for 1,467 students in the sample. After excluding students who had missing graduation information and/or teacher prediction data the final sample size was 817 students (50% female; 18% White, 25% Black, 45% Latino, 5% Asian, 4% Native American, and 3% Other; mean age = 13.1 at the 7th grade wave, ranging from 11 to 15). Teacher breakdown was 52% female, 57% White, 42% Black, and 1% Latino ($N = 83$). Teaching experience was as follows: 32.8% had 0 to 5 years, 24.2% had 6 to 15 years, and 43.0% had 16 or more years teaching experience. Teachers identified as homeroom or 1st period teachers.

Table 1.

Sample Descriptive Statistics for Study Variables

	Full Sample			Graduated			Did Not Graduate			*p*-Value for *t*
	M	SD	%	M	SD	%	M	SD	%	
Female			50.2%			78.9%			21.1%	
Male			49.8%			66.7%			33.3%	
White			18.3%			82.6%			17.4%	
Latino			44.8%			70.5%			29.5%	
Black			24.8%			69.2%			30.8%	
Asian/Pac. Islander			5.0%			94.9%			5.1%	
Native American			4.1%			59.4%			40.6%	
Other Race/Ethnicity			3.0%			73.9%			26.1%	
Parents in Union			49.3%			78.3%			21.7%	
Teacher Predictions	3.23	.81		3.39	.74		2.81	.85		**.000**
Mother's Attitudes	3.79	.43		3.80	.41		3.73	.49		**.038**
Father's Attitudes	3.67	.61		3.70	.58		3.59	.69		.054
Student's Attitudes	3.70	.47		3.74	.44		3.59	.53		**.000**

Note: N = 871 for full sample. Bold = statistically significant.

Measures

Perceived parental attitudes towards the importance of education. Both mother's and father's perceived importance of education was a composite of two variables per parent asking the student how much they agree with the following statements of "Finishing high school is important to my mother/mother figure," "Finishing high school is important to my father/father figure," "Going to college is important to my mother/mother figure," and "Going to college is important to my father/father figure" using a Likert scale from 1 ("strongly disagree") to 4 ("strongly agree"). The questions were then averaged into one variable for each parent. Total scores per parent ranged from 1 through 4, with higher scores indicating a higher perceived importance of education. The Cronbach's Alpha was .73 and .88 for the mothers and fathers, respectively.

Student attitudes towards the importance of education. Similar to the parental importance question above, students were asked how much they agree with the statements of "Finishing high school is important to me" and "Going to college is important to me" using a Likert scale from 1 ("strongly disagree") to 4 ("strongly agree"). The questions were then averaged with a total score ranging from 1 to 4 (higher scores indicate a higher level of importance towards education), with a Cronbach's Alpha of .71.

Teacher prediction of student graduation. Seventh grade first period or homeroom teachers were asked to rate each individual student's chances of graduating high school ("What are the chances of this student graduating high school?") with responses of "very unlikely," "unlikely," "likely," and "very likely." For the regression analyses the variable were left continuous. For the favorability and accuracy of teacher predictions the variable was dichotomized and coded as "0" for not likely to graduate, and "1" for likely to graduate.

Student high school graduation. Graduation data was provided by the school district for the students who were in the original 7th grade cohort. Whenever a student exits school, they are given an "exit code." Students were then coded into two categories: "0" for graduated (graduation exit code), and "1" for dropped out (did not re-enroll, dropped out, expelled, transferred to penal system exit codes).

Gender. Student gender was assessed by a single question asking the student "What is your gender?" with responses coded "male" (0) or "female" (1).

Race/ethnicity. Students were asked to identify their race/ethnicity by a single question asking "With which race/ethnicity do you most closely identify?" with options of "White," "African American/Black," "Hispanic/Latino," "Asian/Pacific Islander," "Native American," or

"Other." White, Black, and Latino responses were then dummy coded to be used as control variables in the model (i.e. 1 = White/Black/Latino, 0 = otherwise).

Parents in union. Students were asked about their current living situation at home by the question of "Who do you live with most of the time?" Responses were coded as 1 if they identified as living with both biological parents and 0 for all other living arrangements.

Teaching experience. Teaching experienced was measured by the question of "How many years of teaching experience do you have?" with an open numerical response.

Analytic Strategy

To answer the first research question, descriptive statistics and Chi-Square tests were used to compare the predictions by student groupings and the accuracy of predictions for each subgroup (i.e. male teachers vs. female teachers). To answer the second and third research questions, a moderated logistic regression was conducted with teacher predictions as an independent variable, graduation as a dichotomous dependent variable, and three interaction variables as moderators. Moderation was conducted by using techniques specified by Hayes (2013). First, the three variables of student, mother, and father's attitudes towards the importance of education were added to the model. Next, the three variables as well as the independent variable of teacher predictions were centered (i.e. the mean was subtracted from all individual values of that variable) and multiplied by the centered independent variable and included in the model as an interaction to test for significance. Lastly, to answer the fourth research question, *t*-tests were utilized to test protective and risk factors measuring mother/father/student levels of importance towards education for students who were predicted to drop out but graduated, and students who were predicted to graduate but dropped out.

Results

Teacher Prediction Favorability

For the first research question, descriptive statistics and Chi-Squares tests were conducted to assess both teacher prediction favorability and accuracy. Table 2 present teacher predictions by four categories: full sample, sample by student/teacher gender, sample by student/teacher ethnicity, and the sample by teaching experience. It should be noted that this table does not take into consideration actual student graduation, but merely dissects the predictions by subgroups regardless of graduation outcome. Overall, all teachers predicted an 80.1% graduation rate for all students. When viewing teacher predictions by gender, several Chi-Square tests were run to assess differences of how well the observed distribution of data fits with the distribution that is expected if the variables are independent (i.e. categorical IV of student gender and categorical DV of predicted to graduate or not, categorical IV of teacher gender and categorical DV of predicted to graduate or not). The sole significant finding revealed that all teachers were likely to predict female students to graduate more favorably than male students (84.3% to 75.8%, p <.000). No other gender differences were significant.

In examining the sample by race/ethnicity, several significant associations were discovered. Teachers predicted minority students less favorably than White students (78.7% to 84.9%, p <.05), White teachers had less favorable graduation predictions of all students, regardless of race/ethnicity, than minority teachers (78.1% to 82.5%, p < .049), and lastly, White teachers predicted less favorable outcomes of minority students than that of minority teachers (76.7% to 81.6%, p <.05). No differences existed between White and minority teacher's predictions for white students.

Table 2.

Teacher Predictions of Student Graduation and Chi-Square Tests

	% Predicted to Graduate Descriptives	$\chi2$ p - value for Predictions
Full Sample		
A. All Teachers & All Students	80.1%	
Sample by Gender		
B. All Teachers & Male Students	**75.8%**	**.000**
C. All Teachers & Female Students	**84.3%**	**.000**
D. Male Teachers & All Students	79.5%	.138
E. Female Teachers & All Students	81.2%	.138
F. Male Teachers & Male Students	75.5%	.305
H. Female Teachers & Male Students	77.8%	.305
I. Female Teachers & Female Students	85.0%	.295
J. Male Teachers & Female Students	83.2%	.295
Sample by Minority Race/Ethnicity		
K. All Teachers & White Students	**84.9%**	**.016**
L. All Teachers & Minority Students	**78.7%**	**.016**
M. White Teachers & All Students	**78.1%**	**.049**
N. Minority Teachers & All Students	**82.5%**	**.049**
O. White Teachers & White Students	85.0%	.911
P. Minority Teachers & White Students	84.4%	.911
Q. White Teachers & Minority Students	**76.7%**	**.036**
R. Minority Teachers & Minority Students	**81.6%**	**.036**
Sample by Teacher Experience		
S. 0 to 5 Years Experience & All Students	87.6%	.226
T. 6 to 15 Years Experience & All Students	85.3%	.226
U. 0 to 5 Years Experience & All Students	**87.6%**	**.000**
V. 16+ Years Experience & All Students	**77.6%**	**.000**
W. 6 to 15 Years Experience & All Students	**85.3%**	**.009**
X. 16+ Years Experience & All Students	**77.6%**	**.009**

Note: N = 1,467 for the full sample, statistical significance is bolded

With regards to teaching experience, three groups were compared (0 to 5 years, 6 to 15 years, and 16+ years) dichotomously to one another, resulting in three Chi-Square tests (i.e. 0 to 5 against 6 to 15, 0 to 5 against 16+ years, and 6 to 15 against 16+ years). Although no statistically significance difference was found in comparing the 0 to 5 with the 6 to 15 group, the

next two groups yielded significant findings: teachers with 0 to 5 years had more favorable predictions than teachers with 16+ years' experience (87.6% to 77.6%, $p < .000$), and teachers with 6 to 15 years had more favorable predictions than teachers with 16+ years' experience (85.3% to 77.6%, $p < .009$).

Teacher Prediction Accuracy

Table 3 presents how accurate teachers were in predicting student graduation. In general, all teachers were 73.2% accurate in predicting student graduation. In examining the sample by gender breakdown, teachers were more accurate in predicting female students than male students (78.9% to 67.3%, $p < .001$). No other gender differences were significant.

In investigating differences by ethnicity, minority teachers were more accurate than White teachers in their predictions of all students (84.7% to 71.9%), although at a level of approaching significance ($p = .053$). No other differences in ethnicity were significant.

In investigating teaching experience, teachers with 0 to 5 years' experience were more accurate than teachers with 16+ years' experience (80.1% to 68.3%, $p < .002$). Teachers with 0 to 5 years also had more accurate predictions than teachers with 6 to 15 years' experiences, albeit at a level approaching significance (80.2% to 72.3%, $p = .061$).

Table 3.

Accuracy of Teacher Predictions with Chi-Square Tests

	% Accurate Descriptives	$\chi 2\ p$ - value for Prediction Accuracy
Full Sample		
A. All Teachers & All Students	73.2%	
Sample by Gender		
B. All Teachers & Male Students	**67.3%**	**.001**
C. All Teachers & Female Students	**78.9%**	**.001**
D. Male Teachers & All Students	75.5%	.404
E. Female Teachers & All Students	71.2%	.404
F. Male Teachers & Male Students	68.3%	.604
H. Female Teachers & Male Students	67.0%	.604
I. Female Teachers & Female Students	77.2%	.239
J. Male Teachers & Female Students	80.9%	.239
Sample by Minority Race/Ethnicity		
K. All Teachers & White Students	79.4%	.073
L. All Teachers & Minority Students	72.0%	.073
M. White Teachers & All Students	71.5%	.129
N. Minority Teachers & All Students	75.3%	.129
O. White Teachers & White Students	71.9%	.053
P. Minority Teachers & White Students	84.7%	.053
Q. White Teachers & Minority Students	72.1%	.705
R. Minority Teachers & Minority Students	71.8%	.705
Sample by Teacher Experience		
S. 0 to 5 Years Experience & All Students	**80.2%**	**.061**
T. 6 to 15 Years Experience & All Students	**72.3%**	**.061**
U. 0 to 5 Years Experience & All Students	**80.2%**	**.002**
V. 16+ Years Experience & All Students	**68.3%**	**.002**
W. 6 to 15 Years Experience & All Students	72.3%	.332
X. 16+ Years Experience & All Students	68.3%	.332

Note: $N = 817$ for the full sample, statistical significance is bolded

Teacher Prediction Models

For the second and third research questions, binary logistic regressions were run on three

models to first assess if there is a significant link between middle teacher's predictions and

student graduation, and second to assess whether or not this link is moderated by

student's/mother's/father's attitudes towards graduation. The first regression Model 1 uses the

independent variable of interest only (teacher predictions to graduate, which was coded as 1 for

"not very likely to graduate," to 4 for "very likely to graduate") and the dependent variable of

student dropout (0 for "graduated" and 1 for "dropped out"). Model 2 includes several control

variables (dummy coded ethnicities, parents in union, and student gender); and Model 3 includes

the addition of three moderators run simultaneously (student/father/mother's attitudes towards

the importance of education- all student reported; see Table 4).

Table 4.

Logistic Regression Moderation Models Examining Teacher Predictions and Student Dropout

	Model 1			Model 2			Model 3		
	B	Exp(B)	Sig	B	Exp(B)	Sig	B	Exp(B)	Sig
Teacher Prediction	**-.87**	**0.419**	**.000**	**-.75**	**0.472**	**.000**	**-.79**	**0.445**	**.000**
White				**-.64**	**0.529**	**.031**	-.60	0.551	.099
Latino				.43	1.540	.112	-.14	0.869	.645
Black				**.64**	**1.891**	**.031**	.05	1.053	.871
Asian/Pac. Islander				-.95	0.388	.227	-.86	0.420	.272
Native American				**1.30**	**3.676**	**.004**	**1.38**	**3.981**	**.002**
Other Race/Ethnicity				.49	1.629	.380	.53	1.704	.342
Female				**-.58**	**0.559**	**.001**	**-.53**	**0.588**	**.004**
Parents in Union				**-.50**	**0.608**	**.009**	**-.51**	**0.598**	**.007**
Mother's Attitudes Towards Education				.17	1.185	.471	.22	1.241	.419
Father's Attitudes Towards Education				-.01	0.991	.953	-.09	0.910	.545
Student's Attitudes Towards Education				**-.50**	**0.606**	**.013**	**-.52**	**0.592**	**.017**
Mother's Attitudes Moderator							.08	1.079	.385
Father's Attitudes Moderator							**-.19**	**0.826**	**.048**
Student's Attitudes Moderator							-.01	0.989	.898
Nagelkerke R^2		0.13			0.19			0.20	
Model $\chi 2$		$\chi 2 = 78.612$***			$\chi 2 = 108.123$***			$\chi 2 = 112.305$***	

Note: ***$p < .001$, statistically significant variables bolded. Graduation coded as 0 = graduated, 1 = dropped out.

Model 1 was significant ($R^2 = .13$, $\chi 2 = 78.612$, $p = .000$) with teacher predictions also being

significant ($B = -.87$, Exp(B)$= .419$, $p = .000$). Said differently, a one unit increase in 7th grade

teacher's prediction to graduate equated to a 58% decrease in the likelihood of dropping out.

Model 2 was significant (R^2= .19, χ^2= 108.123, p= .000) along with the teacher prediction

variable (B= -.75, Exp(B)= .472, p= .000), being white (B= -.64, Exp(B)= .529, p= .031), being

Black (B= .64, Exp(B)= 1.891, p= .031), being Native American (B= 1.30, Exp(B)= 3.676, p=

.004), being female (B= -.58, Exp(B)= .559, p= .001), parents in union (B= -.50, Exp(B)= .608,

p= .009), and student's attitudes towards the importance of education (B= -.50, Exp(B)= 0.606,

p= .013). Model 3 was also significant (R^2= .20, χ^2= 112.305, p= .000), with the same seven

variables remaining significant in Model 2 (teachers prediction, White, Black, Native American,

parents in union, female, and student's attitude towards the importance of education).

Additionally, of the three moderators, father's attitudes towards the importance to education

(student report) was significant (B= -.19, Exp(B)= .826, p= .048). It should be noted that Model

3 had an increased r-square of .01 (from .19 to .20). This marginal increase may be due to two

reasons. The first is that the significant moderator could have replaced variance from another

variable it was correlated with. The second rationale is that the moderator was significant for the

upper and lower ends of the spectrum, thus, only affecting a smaller subset of the population, and

not additive of the variance of the entire population.

Risk and Protective Factors

To answer the fourth research question of risk and protective factors, a series t-tests were

utilized to examine group differences. Each t-test compared levels of student's/mother's/father's

attitudes towards the importance of education between two student subgroups: students who

were predicted to drop out, and students who were predicted to graduate (see Table 5). No

significant differences were found in students who were predicted to drop out. There were,

however, two group differences in students who were predicted to graduate. The first was that

students who were predicted to graduate but then dropped out had significantly lower attitudes towards education compared to the students who did graduate (3.63 vs 3.76, $p <.01$), as well as father's attitudes towards education (3.58 vs 3.73, $p <.05$). No differences were found between the two groups of students who were predicted to graduate and mother's attitudes.

Table 5.

T-tests Comparing Student/Mother/Father's Attitudes Towards Education by Student Sub-Groups

		Student's Att. Towards Edu	Mother's Att. Towards Edu	Father's Att. Towards Edu
Predicted to Drop out				
Actual Outcome	Graduated	3.59	3.62	3.48
	Dropped Out	3.50	3.66	3.62
Predicted to Graduate				
Actual Outcome	Graduated	**3.76****	3.83	**3.73***
	Dropped Out	**3.63****	3.77	**3.58***

Note: *p < .05, **p <.01. Statistical significance is bolded.

Discussion

Teacher Prediction Favorability

In examining teacher prediction favorability, Chi-Square tests were run in three sub-groups: 1. Groups by teacher/student gender, 2. Groups by teacher/student ethnicity, and 3. Groups by teacher experience. With regards to gender, results from this study show that teachers significantly favor female students over male students (84.3% to 75.8%). Though past research has been scant on teacher predictions, other research has shown that adolescent males have higher rates of aggression, substance use, and risky sexual activity compared to females (Chun & Mobley, 2010). That said, these behavioral characteristics may be embedded in middle school teacher's predictions of males being less apt to graduate than females. Other results showed no difference in teacher gender, or teacher gender matched with student gender (i.e. male teachers

were not any more or less favorable to male students compared to female teachers). This non-significant results suggests that male and female teachers may be impacted to the same degree when taking into consideration the naturally occurring higher levels of risky behaviors that males have, which in-turn lead to generally lower predictions of graduation for that group.

Unlike gender, ethnic breakdowns of teachers/students with regards to teacher predictions yielded several significant results. As predicted, all teachers regardless of ethnicity were significantly less favorable to minority students compared to white students (78.7% to 84.9%). This falls in line with previous research that teachers may use subjective bias when assessing students of color (van Ewijk, 2011). Nonetheless, minority adolescents often score lower in academics than their majority counterparts (Patel, Barrera, Strambler, Munoz, & Erynn, 2016), and thus, teachers may not necessarily be biased but may be using academic scores as a foundation in order to predict future academic success. Said differently, the distinction between teacher implicit bias and unbiased reasoning is unclear. Another significant difference comes in examining teacher race/ethnicity. Minority teachers were significantly more favorable than White teachers with regards to all students regardless of ethnicity (82.5% to 78.1%), and as predicted, were more favorable towards minority students (81.6% to 76.7%). In a study of minority teachers, Magaldi and Conway (2016) highlight that teachers of color often find themselves in more activist roles for students, especially pertaining to students of color. This may explain why minority teachers have more favorable predictions of minority students, which also may spill over to non-minority students as well.

The third category in investigating teacher prediction favorability was in examining teacher experience. Generally speaking, teachers with less experience had more favorable predictions than teachers with more teaching experience. This was significantly true for two

levels of teaching experience levels- teachers with 0 to 5 years compared to 16+ years (87.6% to 77.6%) and teachers with 5 to 15 years compared to teachers with 16+ years (85.3% to 77.6%). Although research has not explored favorability differences by teaching experience, the disparities in favorability may lie in newer teachers remaining more optimistic about student outcomes, and/or being somewhat immune to the detrimental "burnout" effects that plague teachers with more teaching experience (Grayson & Alvarez, 2008).

Teacher Prediction Accuracy

Teacher accuracy was first measured by descriptive statistics and accompanied with a Chi-Square test in the same way teacher favorability was measured. Overall, teachers were 73.2% accurate in predicting the future graduation of their students. It should be noted that teacher predictions were dichotomized so that "not very likely" and "not likely" were combined, and "likely" and "very likely" were combined (see methods section for details). However, when only looking at the "not very likely" and "very likely" categorical predictions, teacher accuracy jumped to 85.6%. Using the same method as this study, Soland (2013) found that 10th grade teachers were 88% accurate using only "not very likely" and "very likely" responses, and 82% accurate when including the "not likely" and "likely" responses.

In exploring gender differences, teachers (regardless of gender) were significantly more accurate in predicting female students than male students (78.9% to 67.3%). This may be due to the actual graduation rate of females being higher than males (78.9% for females and 66.7% for males), coupled with the initial predictions of females being more favorable than males (84.3% for females and 75.8% for males). There were no differences between male and female teacher accuracies across all student subgroups (full sample, male sample, female sample).

The single significant finding in terms of ethnicity was that minority teachers were more accurate than White teachers in their predictions of White students. No differences were found when examining on minority students. This conflicts with Soland's (2013) study which found that minority teachers were more accurate in predicting the graduation of minority students. It should be noted, however, that the smallest subgroup of students were White (18.3%) with the smallest subgroup of teachers identifying as a minority (41.7%), meaning that this examination of teacher by student accuracy had the smallest number of participating pairs. Soland's study had a majority of White students, which may have accounted for differing results in this category.

Most surprisingly, and contrary to this study's hypothesis, teachers with less experience were generally more accurate than teachers with more experience. The difference was significant in comparing the 0 to 5 years group to the 6 to 15 year group and 16+ years group (although no significant difference between the latter two groups). Since Soland collected baseline data in 1990, this contrast in results could be due in part to cultural or generational aspects of younger versus older teachers. Since high school graduation rates are higher in 2009 than in 1990, it may be that older teachers are still operating on an older paradigm of predicting student graduation. Thus, because teachers with less experience had overall more favorable predictions than teachers with more experience, and because graduation rates have generally increased, teachers with less experience may have been more accurate in this study. Another factor influencing this result could come in the form of the students themselves being of a different generation than the previous Soland study ("Generation X" students in 1990 vs "Xennial/Millennial" students in 2009), although more research on this is needed.

In discussing the regression models, teacher predictions in 7th grade significantly predicted high school graduation. Much like Soland (2013), results gives evidentiary support for teachers being highly accurate in significantly predicting whether or not their students would achieve graduation, however at the 7th grade level for both teachers and students (recall that Soland's teacher predictions were 10th grade teachers predicting 10th grade students). This also helps validate the Ecological Approach to Person Perception Theory with regards to teachers having specific "attunements" that may drive their predictions. Additionally, the model was moderated by father's attitudes towards the importance of education (student report). This suggests that under certain conditions, a father's attitudes towards education can potentially change the academic trajectory of the student (for better or for worse) that would normally be dictated by the teacher prediction model. This would seem to mimic the idea that students tend to value and/or adopt their parents' beliefs about education even more than their own inherent values of education (Melnick & Fiene, 1990). This also reinforces the concept that parents play a vital role in the academic achievement of their offspring (Seyfried & Chung, 2002).

Protective and Risk Factors

The last result of this study came in examining students who were predicted to drop out but graduated, and students who were predicted to graduate but dropped out. Although there were no significant links in the former, the latter yielded two important risk factors. Results showed significant differences in the students who were predicted to graduate and graduated, and students who were predicted to graduate but dropped out when looking at levels of students' and fathers' attitudes towards the importance of education. Although it is unclear why these were not significant in the dropout group, or why mother's attitudes towards education was not statistically significant in either group (although the graduated students did have higher levels), it

nonetheless suggests that if a student is on track to graduate in middle school, a significant risk factor is having lower levels of student or father attitudes towards the importance of education which may change the graduation trajectory of that student. It is possible that mother's attitudes towards the importance of education play either a mediating or indirect role in bolstering either the father's or student's own attitudes, which should be considered in a future study. It is also possible that many families culturally consider the father as a "head of household" role, and thus, father's attitudes towards education becomes the more important influential factor. Regardless, these results highlight that when a father is present in a household, it is important that he exhibit positive cues towards the importance of education. These results also suggests the need for sustaining beliefs in the importance of education at both the student level and parent level throughout middle and high school in order to avoid this risk factor.

Implications

The ongoing problem of student graduation rates in the United States has forged pathways for many intervention programs, such as alternative high schools, school counseling programs, GPA/other academic warning systems and teacher predictions (Lever, et al., 2004). While some of these programs have shown promise, they are all geared towards interventions at the high school level, thus rendering students who choose early dropout in high school impervious to these efforts. For example, of the ones listed, high school teacher predictions have shown to be particularly accurate and effective for students when teacher's identify a student as at-risk of potentially not graduating (Soland, 2013). What this does not capture are students who have already dropped out before being identified by these high school teachers. This study gives evidentiary support for the continued use of this measure, expanding its use to the middle school level, as results from this study show that middle school teachers can significantly predict the

graduation of their students much like their high school colleagues. By identifying students already at risk of dropping out in middle school, intervention programs can be implemented earlier, and thus, capture students who may drop out before most high school interventions start. One example of the collaborations between middle and high schools comes in the private school sector. While private schools have greater financial resources (which in-turn manifest in better facilities, more tutors, etc.), an often overlooked competitive advantage is that most private schools are either kindergarten through 12th or 7th through 12th (The Condition of Education, 2016). The advantage of having elementary and middle schools under the same system as the high school may create opportunities for better early warning indicators as identified by the faculty, as opposed to most public 9th through 12th schools, which are disconnected from their district's multiple middle schools.

Another implication of this study comes in the result of the significant moderators and protective/risk factors for students. As schools often focus on academic indicators (i.e. increasing GPA and standardized test scores), additional emphasis should be placed on more macro level elements that fortify the idea that education is important. For example, the academic think tank "Schools That Can" organizes a middle and high school event titled "Career Day: With a Twist," which partners students with local professionals from a diverse range of fields including technology, film/entertainment, law, entrepreneurship and government (www.schoolsthatcan.org). Small groups of students are paired with a professional to problem-solve a challenge in that professional's field. Through this activity, students are introduced to real world challenges and experience a vocation side-by-side with a professional. Students and their professional mentors then design a customized solution and present their findings, with various awards given to innovative groups. Results indicate higher levels of student interest,

reports of student meaning-making for potential careers, and a greater desire to continue academic pathways towards a career path of their choice. Additionally, professionals from this event often reported remaining in contact with their students groups.

This study revealed insights into teacher predictions and attitudes towards the importance of education, however, this study also lays the foundation for several other research pathways. The first is examining how early can teacher predictions be made and remain accurate? For example, can elementary school teacher predictions have statistical associations with high school graduation? Next, it is unclear what the motivation are for middle school teachers making the predictions they did. For example, were they more influenced by the social aspects of the student, work ethic, school connectedness or other grade specific data? Lastly, more research needs to be investigated on the importance of mothers on a child's academic success. Although this study showed no statistical correlation, we do know that mothers play an integral role in the development of their children, and thus, more study is needed to see how this interfaces with a child's future academic success.

Strengths, Limitations and Conclusions

Though this study provides insightful merits on teacher predictions, it comes with several limitations. The first is that data collected for this study was collected by a single teacher for each student and in an urban area. Being able to capture multiple teacher prediction data points per student would enhance the reliability of these results. Further, an urban setting presents generalizability issues for areas not in a highly ethnic sample, as evidenced by several findings contrary to Soland's (2013) study. Though these limitations exist, this study has numerous strengths. The study is longitudinal and used a population based sample with 1,467 teacher predictions and graduation data for 817 students. Next are the unique variables used, particularly

the parenting variables. While most studies ask parents about their attitudes on education (a high potential for self-implicit bias), our study gauges parents' attitudes from the perspective of the student. However, it could be argued that students' perceptions of their parents' attitudes may be at least as important as the parents' stated perceptions. Lastly, this study employs a wide array of statistical techniques to test the proposed hypotheses; chi-square, moderated logistic regression, and t-tests were utilized in order to assess the importance of teacher predictions and parenting variables.

By examining the accuracy of teacher predictions moderated by students' and parents' attitudes towards the importance of education, this study highlighted the potential for implementing early warning indicators by middle school teachers. Results also highlight the impact that both student's and parent's attitudes towards education can have, particularly as a risk factor for students who were predicted to graduate. Future studies should focus on implementing and evaluating programs that use a mix of both academic indicators and teacher intuition to capture a wider group of potentially at-risk students in an effort to tackle the problem of high school dropout.

CHAPTER II

MANUSCRIPT 2

School Mobility and Graduation: A Structural Equation Model Testing Two Levels of

Student-Centered Variables

Recent Federal regulations such as the Every Student Succeed Act of 2015 (ESSA) are

increasing the accountability of schools by specifically monitoring graduation rates. In

amplifying the pressure on schools to increase the number of graduating students, the U.S.

Department of Education has endorsed a 90% national graduation rate goal by 2020 (U.S. Dept.

of Education, 2015). As schools seek to increase their graduation rates to meet these new

standards, they are faced with several barriers to graduation, such as school mobility (i.e. the

number of times a student changes schools). Links between the number of times a student

changes schools and decreased student success are clearly documented (Clemens, Lalonde, &

Sheesley, 2016; Ross, 2016). Adding to this problem is that school mobility is steadily increasing

(Fowler-Finn, 2001), with current estimates reporting one-third of all children moving at least

once between 4th and 7th grade (Hanushek, Kain, & Rivkin, 2004). Changes in policy have

potentially magnified the problem, as the department of education touted "school choice" as a means for greater academic success (U.S. Department of Education, 2017), equating to possible increases in school mobility.

Although research acknowledges the link between school mobility and poor academic success, less consideration is given to the specific pathways linking these two variables (Malmgren & Gagnon, 2005), with even fewer studies examining these pathways with a longitudinal outcome of graduation; a key statistic schools are aiming to increase to meet national standards (South, Haynie & Bose, 2005). Because 1 in 9 families move per year (U.S. Census, 2013), and because school mobility has been linked to dropping out of school, understanding the specific pathways between school mobility to graduating/dropping out becomes essential in the efforts to thwart the deleterious effects caused by school mobility.

Current Study

South, Haynie and Bose (2005) explored school mobility and dropping out through several mediating characteristics (explained in more detail in the "theoretical foundations" section following this section). Their study laid the foundation for future studies to expand upon this topic. This study uses school mobility as the independent variable, two levels of mediators (the first comprised of student work ethic, parent-child closeness and peer relationships, and the second comprised of 8th/9th grade GPA and 8th/9th grade attendance) in a path analysis (see Figure 1). This study not only assesses the pathways from school mobility to graduation, but also investigates the interplay amongst the variables.

Figure 1. Proposed Structural Equation Model

Level 2 Mediators

Level 1 Mediators
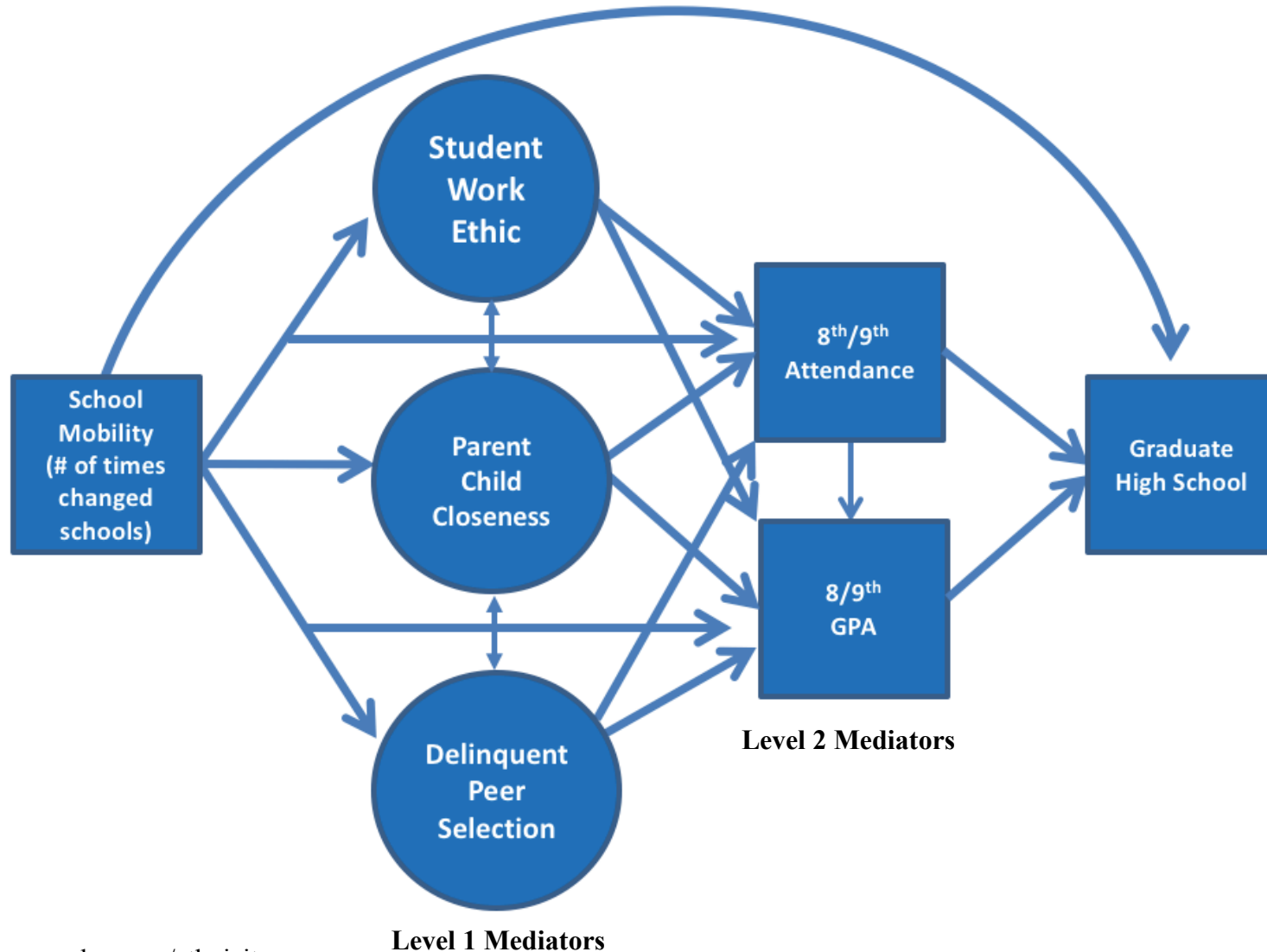
Control Variables: gender, race/ethnicity

Student Work Ethic: completes work (T), pays attention (T), eager to learn (T), CA=.85

Delinquent Peer Selection: hangs with wrong crowd (T), friends stole/damaged, friends skip school, friends belong to gang, friends drop out, friends trouble w/ police, CA=.74

Parent-Child Closeness: parents talk about drugs/alcohol, often have fights with family (reverse coded), feel important to parents , CA = .60

Note: T=Teacher Report.

Although this investigation uses the same theoretical concept and accompanying variables as South, Haynie and Bose (2005), the current study distinctively expands upon South et al.'s study in several ways. First, this study uses updated data (1994 vs 2009). This is important for several reasons: 1. generationally, students are contextually different ("Generation X" vs "Xennials/Millennials"), 2. there has been multiple changes in the Department of Education's platform to change student learning (i.e. "No Child Left Behind Act of 2002"), and 3. dropout rates have decreased from 1990 to 2009 (The Condition of Education, 2016). The next difference between the studies is that the selection criteria utilized by South et al. included students in various grades from 7th through 11th using 2 waves of data, whereas this study follows a single cohort of 7th graders using multiple time points (7th grade student characteristics, 8th/9th combined administrative data, and 12th grade graduation data). Lastly and most importantly, is the analytic strategy to which these variables are examined. South et al. used a multi-level model with logistic regression, while this study uses a structural equation model (SEM); both of which have binary outcomes of graduation. The reasons for why this study used an SEM model is explained in more detail in the analytic strategy section of this paper.

Theoretical Foundation

South et al. (2005) developed a meta-theory that links school mobility and dropout/graduation. Their school mobility theory, which to-date is the only expansive theoretical explanation concerning school mobility and graduation, focuses on four student-centered variables as intermediaries between school mobility and graduation: parent-child relationship characteristics, peer social networks, psychological well-being (i.e. self-esteem/motivation), and academic performance/school engagement. The theory postulates that school mobility detrimentally affects these four student-centered variables, and thus, leads to poor graduation

rates. The current study aims to test this theory using the same four student-centered variables. It should be noted that studies often use different academic outcomes other than graduation (i.e. grade point average [GPA], standardized test scores) as graduation rates may be difficult to acquire. Thus, the subsequent literature review will include studies that use various measures of student achievement other than graduation (i.e. Miliotis, Sesma, & Masten, 1999).

School Mobility, Student Work Ethic, Parent-Child Closeness and Delinquent Peer Selection

School mobility and parent-child relationships. Although research examining the link between school mobility and parent-child relationships is somewhat sparse (Gillespie, 2015), there is enough evidentiary data to support the link between the two. In a study of 132 high schools comprised of 8,038 students using the data from the National Longitudinal Study of Adolescent Health, Haynie and South (2005) found that changes in schools or residences affected parents' abilities to monitor their child's behavior as effectively as before the move (parent report). As such, they found that increases in mobility were significantly associated with increased violent behavior in adolescents, which may strain dyadic relationships. Similar results were also found by Gillespie (2015), who highlighted that changes in residential mobility (which often comes with a change in schools) caused shifting variations in parenting styles in both mothers and fathers. Further, Gillespie emphasizes that even a temporary change in parenting styles due to the stresses of mobility can have detrimental effects on the parent-child relationship, adolescent development and the child's psychological well-being.

School mobility and peer social networks. The study of student mobility on peer-social networks revealed an array of wide-ranging effects, as deviant peer relationships have been linked to a panoply of negative adolescent behaviors. South et al. (2005) found that adolescents

who recently moved are 33% more likely to engage in sexual intercourse compared to their non-mobile counterparts, as adolescents who are more mobile may often choose to associate with more sexually promiscuous peers. Other studies found that more mobile adolescents experience higher levels of victimization (i.e. being physically attacked) and isolation from peers (Haynie & South, 2005). This same study noted that the school peers of adolescents who recently moved were significantly more deviant than adolescents who had not recently moved (measured by outcomes of substance use, skipping school, and frequency of physical fights). These results were mirrored by Dupere, Archambault, Leventhal, Dion, and Anderson (2015), as their study linked elementary-aged students who changed schools to the selection of maladaptive peers. In terms of peer network size, Langenkamp (2016) discovered that students who transfer schools have less numerical friendships than non-movers. This could possibly explain why transfer students report stronger ties to their teachers, as Langenkamp explains students with no social networks often look towards gatekeepers in an effort to help them rebuild social solidarity. It should be noted, however, that competing research has shown that school mobility can, at specific times be beneficial for students who were previously victimized at their former school (as measured by decreased rates of physical and verbal abuse; Carson, Esbensen, Finn-Aage, & Taylor, 2013).

School mobility and student work ethic. Students who are mobile not only feel the effects of losing close interpersonal relationships (i.e. family, friends, neighbors), but can also be affected by the loss of tangible objects involved in everyday institutions students are involved with (i.e. playgrounds, familiarity of physical objects of the previous home/school/church; Fisher, 1988), which may limit adolescent engagement in those institutions. With regards to educational institutions, Raviv, Keinan, Abazon, and Raviv (1990) found that 8 of the top 15 life

stressors from moving had to do with school variables (analyzed from a sample of 150 adolescents who recently moved); more specifically, forming social relationships. Because forming new social ties requires a great deal of energy, Raviv and colleagues (1990) examined how school mobility can deplete student work ethic. Their study found that changing schools decreases a student's academic motivation while increasing depressive symptoms over time (Herbers, Reynolds, & Chen, 2013). Rumberger et al. (1999) also suggest that changing schools results in less motivation to be involved in that school due to fewer social relationships that usually catalyze student engagement.

Student Mobility, GPA and Attendance

School mobility and GPA/attendance. Conducting a meta-analysis on the association between school mobility and academic achievement, Mehana and Reynolds (2004) found a strong link between the number of times a student changes school and academic successes in both reading and math scores. They do note, however, that exceptions were made in cases of military families. Individual studies have found that students who move at least once are more likely to perform poorly and ultimately, are more at-risk for dropping out of school (Astone & McLanahan, 1994). Further, research has suggested that the negative effects of school mobility on academics is more pronounced in families with lower parental involvement (Hagan, MacMillan, & Wheaton, 1996). Student mobility however, can also affect attendance, a critical determinant of high school graduation (Kieffer, Marinell, & Neugebauer, 2014). Hinz, Kapp, and Snapp (2003) evaluated groups of high school students' attendance rates in conjunction with Minneapolis' 95% attendance rate goals. Their assessment revealed that students who were either highly mobile in a single district, or moved to a new school district altogether, were more at-risk for absenteeism. They also noted a bidirectional relationship between school attendance

and grades, such that lower school attendance affected grades, and the frustration of lower grades caused greater absenteeism.

Student Work Ethic, Parent-Child Closeness, Delinquent Peer Selection, GPA and Attendance

Parent child relationships and academic performance. More voluminously studied is the link between parent-child relationships and academic performance. In a review of literature, Ramsdal, Bergvik, and Wynn (2015) theorized a strong positive relationship between parent-child attachment and graduation, and a negative relationship to dropout rates. Similar to this was Miliotis, Sesma, and Masten's (1999) study which found that good parenting (i.e. parental involvement) was a protective factor for student achievement (measured by school records and behavioral citations) in a group of highly mobile, homeless, African-American parent-child dyads. Other studies concluded that not only the nature, but the frequency of parent-child bonding is linked to academic outcomes. Crosnoe (2004) for instance, found that emotionally distant relationships with parents were associated with reduced academic achievement (i.e. science, mathematics, english, and social studies GPA over 2 years of school) as reported by both student and parents.

Peer social networks and academic performance. The acquisition of friends is of paramount concern to adolescents, as this helps fortify the seemingly tumultuous environment that pre-teens and teens experience (Danby, Thompson, Theobald, & Thorpe, 2012). Peer selection, however, can both help and hurt a student's chances of graduating. Dobbie and Fryer (2014) in investigating students with high-achieving peer networks, found that students who surround themselves with more successful peers (measured by test scores) received significantly higher scores on 8th grade standardized tests then students with lower achieving peers. Testing

the theory of positive peer relationships, Johnson, Simon, and Mun (2013) evaluated the impact of 12th grade mentors on incoming 9th grade students. Students who participated in the peer mentorship program were significantly more likely to graduate compared to the control group (81% to 63%). Not all peer relationships positively impact chances of graduating, however. In one of the most longitudinally comprehensive studies, Veronneau, Vitaro, Pedersen, and Tremblay (2008) followed a cohort of male kindergartners (age 6) through age 23 to investigate the effects that peer relationships have on student success. Their study found that students who selected more aggressive and disruptive friends during pre-adolescence (ages 11 and 12) were significantly more likely to drop out of high school.

Student work ethic and academic performance. A student's work ethic can impact (for better or worse) a student's academic performance. Martin, Galentino, and Townsend (2014), for instance, found that students with higher academic motivation (i.e. the drive a student has to graduate) were more likely to graduate from community college than those with lower academic motivation. Academic grit, a term used intermittently with student work ethic (as defined as sustained interest and efforts towards future goals), was significantly associated with increased academic success, such as GPA (Duckworth, Peterson, & Matthews, 2007). Nevertheless, it can also detrimentally impact student success. In a large sample of nearly 5,000 students, depressive symptoms (which decreased a student's work ethic) were significantly linked to lower student academic engagement, academic efficacy, and GPA (Jaycox et al., 2009).

GPA, Attendance and High School Graduation

Academic performance and high school graduation. Given the above studies it seems academic performance would have natural links to high school graduation rates. Numerous studies have linked both GPA and standardized tests scores to graduation rates (Ackerman,

Kanfer, & Calderwood, 2013; Soland, 2013). When examining attendance, Allensworth and Easton (2005) noted that students who attended school more regularly not only had higher rates of graduation, but also had a higher likelihood of graduating on-time compared to students with low attendance rates.

Research Questions and Hypotheses

Research Question #1: Does school mobility in middle school predict high school graduation?

> *Hypothesis 1:* Students who report a higher number of moves will be less likely to graduate high school compared to students who not do not report changing schools.

Research Question #2: Do the first and second levels of mediators (student work ethic, peer relationships, and parent-child closeness, and $8^{th}/9^{th}$ grade GPA/attendance, respectively) fully or partially mediate the relationship between school mobility and graduation?

> *Hypothesis 2a:* This study expects that due to the mediating factors between the independent and dependent variables, the relationship will be fully mediated.
>
> *Hypothesis 2b:* This study expects that school mobility will be negatively and significantly related to student work ethic and parent-child closeness, and positively and significantly related to delinquent peer behavior.
>
> *Hypothesis 2c:* Student work ethic and parent-child closeness will have a positive relationship to attendance and GPA, and delinquent peer behavior will have a negative relationship to attendance and GPA, both at significant levels.

Hypothesis 2d: This study expects to find that both GPA and attendance will have a

positive and significant relationship to graduating high school.

Method

Sample

Participants for this investigation come from the Pathways to Student Success project, in which the entire population of 7th graders in medium sized south central U.S. city were surveyed in 2009 (after assenting and without parental objection; a 98% response rate). Questions were read aloud, and surveys were provided in Spanish when requested. The full sample included 1,832 students. The final sample included 1,202 students, which included students with data on study variables and graduation data. Students were evenly split by gender (50.3% female), with an average age of 13 at time 1 in 7th grade. The majority of students identified as Latino (44.8%), with other ethnicities of Black (24.8%), White (18.3%), Asian/Pacific Islander (5.0%), Native American (4.1%), and Other (2.9%). Along with the students, teachers were also surveyed and gave individual data for each student in 7th grade. Subsequently, other administrative data (i.e. attendance, GPA and "exit codes" which explains the reason why a student left school such as graduation/expulsion/dropout/transfer) was provided by the school district each semester until 2014. For the purpose of this study, graduation data was cleaned by categorizing exit codes into groups: graduated, dropped out (which includes exit codes of dropped out, did not register with no transfer, expelled, and transferred to penal system) and other (transferred out of district/state, or missing exit code). The variables were then added to the dataset that contained the original 7th grade variables, thus making this investigation longitudinal in nature.

Measures

School mobility. School mobility was assessed by a single question, "How many times have you changed schools within the past year?" with responses coded as 0="never," 1="1," 2="2-3," 3="4-5," or 4="more than 5." The average response was 1.68, with 61.0% having never changed, 18.8% changing once, 13.8% changing two to three times, 3.8% changing four or five times, and 2.5% changing more than five times.

Student work ethic. Student work ethic was a composite of three teacher-reported variables, including: "How often does the student complete work?", "How often does the student pay attention?", and "How often is the student eager to learn?" Responses ranged from 0="never," 1="sometimes," 2="often," and 3="always." The variables were average, ranging from 0 to 3 (higher scores equating to higher levels of work ethic) and had a Cronbach's alpha of .85.

Delinquent peer selection. This was a composite of one teacher report item and five student reported items. The teacher reported question asked, "How often does this student hang with the wrong crowd?" with responses of 0="never," 1="sometimes," 2="often," and 3="always." Student reported questions asked, "In the past year, have your friends… stole or damaged property? Skipped school? Belonged to a gang? Dropped out? Been in trouble with the police?" with responses of 0 "no" and 1 "yes." The teacher variable was recoded as dichotomous, then averaged with the five other dichotomous student variables (ranging from 0 to 1). The Cronbach's alpha for delinquent peer selection was .68.

Parent-child closeness. Parent-child closeness was a composite of three student reported questions that asked how much they agree with the following statements, "Parents know how I

think or feel," "I often have fights with my family (reverse coded)", and "I feel important to my parents," with responses coded as 0="strongly disagree," 1="disagree," 2="agree," and 3="strongly agree." The questions were averaged (ranging from 0 to 3) and had a Cronbach's alpha of .60.

GPA. GPA was provided by the school district on a semester basis. Semesters were averaged across 8th and 9th grades to create the GPA variable.

School attendance. Attendance was provided by the school district on a yearly basis (as a percentage of possible attendance for the school year) of 8th and 9th grades. Yearly attendance was averaged to create the attendance variable.

Dropout from high school. Graduation information was provided by the school district for the students who comprised the original 7th grade cohort. When students exit the school district, they are assigned an "exit code." Students were then coded into two categories: "0" for graduated, or "1" for dropped out (i.e. did not re-enroll, expelled, dropped out, transferred to penal system exit codes).

Gender. Gender was measured by a single question asking "What is your gender?" Responses were coded as 0 for male and 1 for female.

Race/ethnicity. Students were asked to identify their race/ethnicity by a single question asking "With which race/ethnicity do you most closely identify?" with options of "White," "African American/Black," "Hispanic/Latino," "Asian/Pacific Islander," "Native American," or "Other." White, Black, and Latino responses were then dummy coded to be used as control variables in the model (i.e. 1 = White/Black/Latino, 0 = otherwise).

Analytic Strategy

To answer the first research question, a logistic regression was conducted between school mobility and graduation (see Figure 1). The second and third research questions should take into account the South at al.'s (2005) study, which provides the theoretical foundation for this investigation. Although South and colleagues revealed several important results, using a logistic regression comes with its own set of limitations. In order to not only test their theory but further expand upon their findings, a structural equation model (SEM) was necessary. This is appropriate for three distinct reasons, as suggested by Schumacker and Lomax (2016). First, while independent variables can each show statistical relevance to the dependent variable, it is not sufficient for examining the relationship between the independent variables themselves. In contrast, SEM permits relationships among multiple variables to be modeled and statistically tested (an explicit suggestion/limitation of the South, Haynie and Bose study); hence the reason why SEM is the preferred method of analysis when testing theories of models.

Second, measurement error is a major concern, especially when using quantitative analyses, and is usually ignored with most traditional forms of analysis. SEM techniques explicitly take measurement error into account when generating global fit statistics. Third, SEM modeling techniques have the ability to not only test various models against each other (i.e. models of different gender, race/ethnicity), but can also test interactions (i.e. moderation) in the same model should further analysis need to be considered. Because of these reasons, this study will utilize SEM as the main quantitative method to answer the second research question (see Figure 1). Prior to conducting the model, bivariate correlations were examined on study variables.

It should be noted that standard procedure for evaluating SEM model fit statistics includes the reporting of Chi-square (χ^2), the root mean square error of approximation (RMSEA)

estimate and confidence interval, the standardized root mean square residual (SRMR), and the CFI/TLI. Measurement and structural models are deemed to fit the data (global fit) when the Chi-square p-value is above .05 (non-significant), RMSEA estimate is less than .05, the RMSEA probability is above .05, the SRMR is below .08, and CFI/TLI reports are above .95 (Klein, 2016). Mplus, the statistical package used to run the model, provides these statistics when running the model. All analyses control for gender and race/ethnicity.

Results

Table 1 presents descriptive statistics for the sample. In order to test the first research question, a binary logistic regression was conducted to test the association between school mobility and student graduation (see Table 2 and Figure 2). School mobility was found to be a significant predictor of graduation (B= .22, p< .01, OR= 1.25), such that every increase in the school mobility variable resulted in a 25% increase in the likelihood of not graduating.

Table 1.

Sample Descriptive Statistics for Study Variables

	Full Sample			Graduated			Did Not Graduate			p-Value for t
	M	SD	%	M	SD	%	M	SD	%	
Female			50.2%			78.9%			21.1%	
Male			49.8%			66.7%			33.3%	
White			18.3%			82.6%			17.4%	
Latino			44.8%			70.5%			29.5%	
Black			24.8%			69.2%			30.8%	
Student Work Ethic	2.87	.47		3.06	.64		2.55	.67		**.000**
Parent-Child Closeness	2.92	.47		2.92	.46		2.96	.44		.250
Delinquent Peer Selection	0.34	.31		0.28	.28		0.45	.31		**.000**
$8^{th}/9^{th}$ GPA	2.80	.71		3.07	.61		2.35	.66		**.000**
8th/9th Attendance	91.27	7.83		93.85	4.67		87.48	9.17		**.000**
School Mobility	0.68	1.01		0.49	.87		0.70	1.04		**.005**

Note: N = 1,202 for full sample. Bold = statistically significant.

Table 2.

Logistic Regression Examining School Mobility and Graduation

	B	SE	Sig.	Exp(B)
School Mobility to Did Not Graduate	**0.22****	.08	.006	1.251

Note: **$p<.01$. Graduation coded as 0= Graduated, 1= Did not graduate. Statistical significance is bolded.

In preparation for the second research question, bivariate correlations were examined on study variables (see Table 3). All key variables (excluding the control variables) were significantly correlated to one another with the exception of parent-child closeness with school mobility, graduation, and attendance (all $p > .05$). When examining the control variables, being White was significantly and negatively associated with school mobility ($r = .17$, $p < .000$), while being African American had a positive and significant association ($r = .12$, $p < .000$). Being Latino was not correlated with school mobility.

Figure 2. Binary Logistic Regression Between Main Independent and Dependent Variables

Table 3

Bivariate Correlations

Variables	1	2	3	4	5	6	7	8	9	10	11
IV and DV											
1. School Mobility	-										
2. Graduate	**.10****	-									
Level 1 Mediators											
3. Student Work Ethic	**-.07***	**-.33*****	-								
4. Parent Child Closeness	-.45	-.05	**.07***	-							
5. Delinquent Peer Selection	**.10*****	**.28*****	**-.24*****	**-.25*****	-						
Level 2 Mediators											
6. 8th/9th Attendance	**-.08***	**-.41*****	**.19*****	.03	**-.17*****	-					
7. 8th/9th GPA	**-.19*****	**-.45*****	**.46*****	**.10****	**-.25*****	**.48*****	-				
Control Variables											
8. Female	-.11	**-.14*****	**.19*****	**-.11*****	**-.06***	-.04	**.15*****	-	-	-	-
9. Black	**.12*****	.05	**-.10*****	**.08****	-.01	-.01	**-.08***	-	-	-	-
10. White	**-.17*****	**-.10****	.02	-.03	**-.15*****	-.04	**.09****	-	-	-	-
11. Latino	.35	.06	.03	-.04	**.15*****	-.01	**-.11*****	-	-	-	-

Note: *p < .05, **p <.01, ***p < .001. Statistical significance is bolded. Graduation is coded as 0= Graduated, 1= Did not Graduate.

Table 4 presents the measurement model results for the SEM model. As provided, global fit statistics indicated good fit for the measurement model ($\chi^2 = 9.878$, $p = .079$, $df = 5$; CFI = .995, TLI = .953; RMSEA = .03, 90% C.I. = .000, .055, Probability RMSEA= .91, SRMR = .01). It should also be noted that standardized residuals were adequate as no single residual was outside the range of -1.96 to 1.96.

Table 4.
Global Fit Statistics

Chi Square Test of Model Fit		
Value	9.878	
Degrees of Freedom	5	
p-value	.079	
RMSEA		
Estimate	0.028	
90% C.I.	0.000	0.055
Probability RMSEA	0.906	
CFI/TLI		
CFI	0.995	
TLI	0.953	
SRMR	0.011	

School Mobility, Student Work Ethic, Parent-Child Closeness, Delinquent Peer Selection, GPA and Attendance

Table 5 denotes the individual pathways for the SEM model in Figure 3. School mobility had negative significant pathways to student work ethic and parent-child closeness (b = -.08, $p <$ .05 and b = -.06, $p < .05$) and a positive significant pathway to delinquent peer selection (b = .08, $p < .05$). In exploring results within the level 1 mediators, parent-child closeness was positively associated with student work ethic and negatively associated with delinquent peer selection, both as significant levels (b = .10, $p < .01$, b = -.26, $p < .000$, respectively). Bidirectional pathways between the level 1 mediators are considered correlations. School mobility also had significant

negative relationships to both level 2 mediators of 8th/9th GPA and 8th/9th Attendance ($b = -.13$, $p < .000$, $b = -.08$, $p < .05$, respectively).

Table 5

Structural Equation Model Pathways

Direct Pathways	b	S.E.	Sig.
School Mobility to Level 1 and Level 2 Mediators			
School Mobility to Student Work Ethic	**-.08**	**.03**	**.017**
School Mobility to Parent-Child Closeness	**-.06**	**.03**	**.049**
School Mobility to Delinquent Peer Selection	**.08**	**.03**	**.023**
School Mobility to 8th/9th Attendance	**-.08**	**.04**	**.018**
School Mobility to 8th/9th GPA	**-.13**	**.03**	**.000**
Level 1 Mediators[1]			
Parent-Child Closeness with Student Work Ethic	**.10**	**.03**	**.002**
Parent-Child Closeness with Delinquent Peer Selection	**-.26**	**.03**	**.000**
Level 1 Mediators to Level 2 Mediators			
Student Work Ethic to 8th/9th Attendance	**.15**	**.04**	**.000**
Student Work Ethic to 8th/9th GPA	**.34**	**.03**	**.000**
Parent-Child Closeness to 8th/9th Attendance	.00	.04	.797
Parent-Child Closeness to 8th/9th GPA	.05	.03	.050[1]
Delinquent Peer Selection to 8th/9th Attendance	**-.25**	**.04**	**.000**
Delinquent Peer Selection to 8th/9th GPA	**-.07**	**.03**	**.044**
Level 2 Mediators			
8th/9th Attendance to 8th/9th GPA	**.40**	**.03**	**.000**
Level 2 Mediators to Graduation			
8th/9th Attendance to Graduation	**-.24**	**.04**	**.000**
8th/9th GPA to Graduation	**-.27**	**.04**	**.000**
IV to DV			
School Mobility to Graduation	.00	.04	.834
Select Indirect Pathways			
Mobility -> Delinquent Peers -> Attendance -> Did Not Graduate	**.01**	**.00**	**.043**
Mobility -> Work Ethic -> GPA -> Did Not Graduate	**.01**	**.00**	**.030**

Note: Statistical significant pathways are bolded. [1] = Approaching significance. All results are standardized. Model controls for gender, ethnicity (AA, Latino, White), and depressive symptoms. [1] = bidirectional pathways (correlation). Did Not Graduate is coded as 0= Graduation, 1= Did not graduate.

Figure 3. Structural Equation Model Results
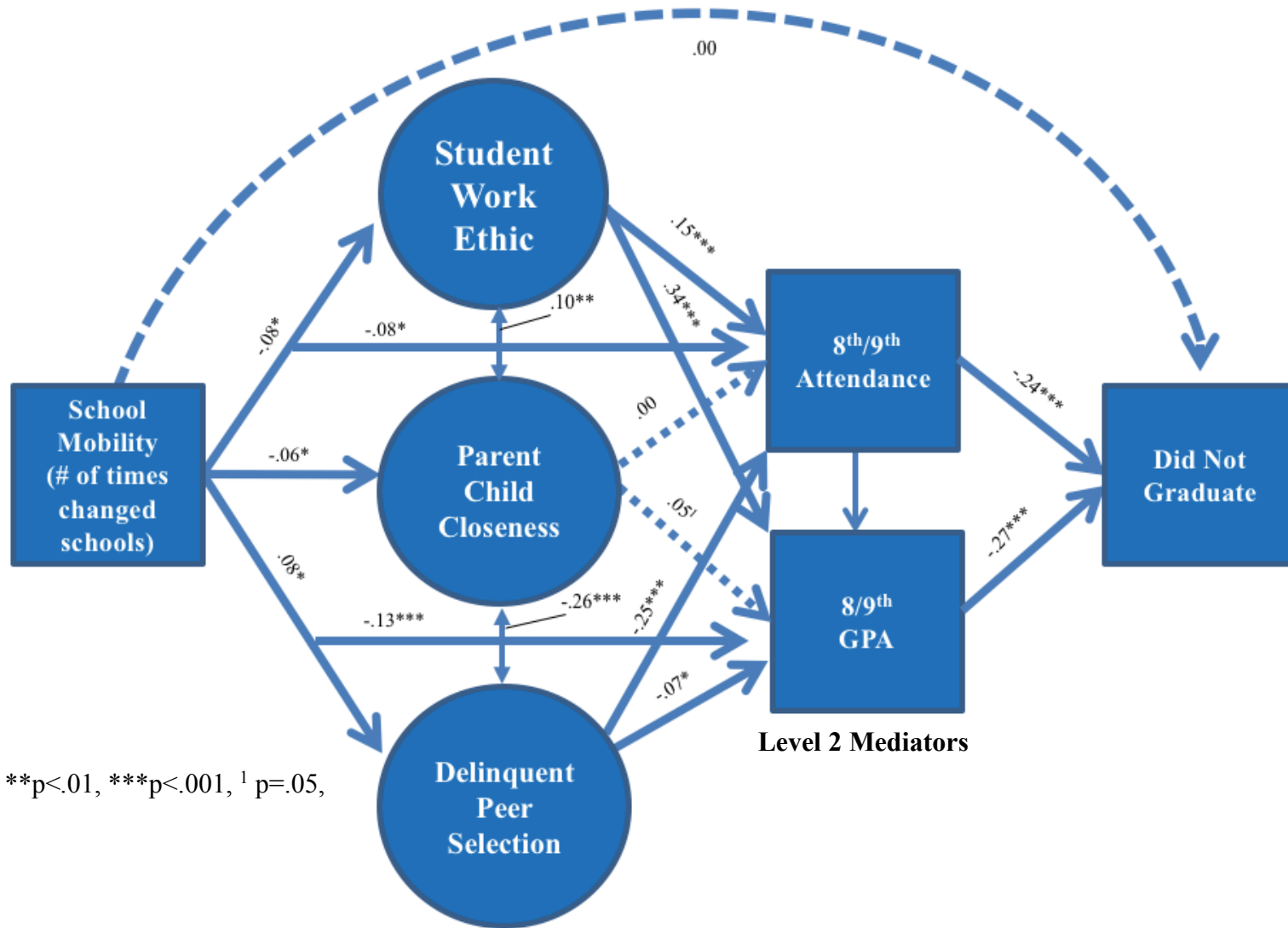
Control Variables: gender, race/ethnicity   **Level 1 Mediators**

Student Work Ethic: completes work (T), pays attention (T), eager to learn (T), CA=.85

Delinquent Peer Selection: hangs with wrong crowd (T), friends stole/damaged, friends skip school, friends belong to gang, friends drop out, friends trouble w/ police, CA=.74

Parent-Child Closeness: parents talk about drugs/alcohol, often have fights with family (reverse coded), feel important to parents , CA = .60

T=Teacher Report

Student Work Ethic, Parent-Child Closeness, Delinquent Peer Selection, GPA and Attendance

All but one of the level 1 mediators had a significant relationship to both level 2 mediators (parent-child closeness was not significantly associated to 8th/9th attendance, and approaching significance to 8th/9th grade GPA). Student work ethic had positive and significant pathways to 8th/9th attendance ($b = .15, p < .000$) and 8th/9th GPA ($b = .34, p < .000$). Parent-child closeness was approaching significance to 8th/9th GPA ($b = .05, p = .05$), but as previously stated, had no statistical relationship to 8th/9th attendance ($b = .05, p = .797$). The last level 1 mediator, delinquent peer selection, negatively predicted both 8th/9th GPA ($b = -.07, p < .05$) and 8th/9th attendance ($b = -.25, p < .000$), however at different significance levels. When looking only within level 2 mediators, 8th/9th attendance significantly predicted 8th/9th GPA ($b = .40, p < .000$; also correlations).

GPA and Attendance

There was a negative and significant pathway from 8th/9th attendance to graduation ($b = -.24, p < .000$) as well as 8th/9th GPA to graduation ($b = -.27, p < .000$). Note that the original logistic regression investigating school mobility to graduation was significant; however, when examining the relationship between school mobility directly to graduation in the model, the pathway was not significant, meaning that the original relationship was fully mediated by the path analysis.

Indirect Pathways

Due to the large number of possible indirect pathways, only significant indirect pathways were highlighted. Of the two that were significant, the first is the pathway of school mobility to

delinquent peer selection, then to 8th/9th attendance, and ending at graduation ($b = .01$, $p < .04$).

The other significant indirect pathway was school mobility to work ethic, then to 8th/9th GPA,

and ending in graduation ($b = .01$ $p < .03$). Lastly, as standard procedure, and in order to

replicate the model, the covariance matrix is presented in Table 6. This matrix presents the

covariances (i.e. the unstandardized correlation values) of the study variables.

Table 6
Covariance Matrix for Structural Equation Model Variables

	1	2	3	4	5	6	7	8	9	10	11
1 School Mobility	*0.983*										
2 Graduation	0.618	*0.625*									
3 Attendance	0.663	0.527	*0.677*								
4 GPA	0.677	0.533	0.647	*0.691*							
5 Student Work Ethic	0.770	0.615	0.549	0.557	*0.779*						
6 Parent Child Closeness	0.750	0.598	0.535	0.543	0.755	*0.758*					
7 Delinquent Peer Selection	0.961	0.612	0.657	0.671	0.763	0.744	*0.974*				
8 Female	0.983	0.625	0.677	0.691	0.779	0.758	0.974	*1.000*			
9 Black	0.983	0.625	0.677	0.691	0.779	0.758	0.974	1.000	*1.000*		
10 Latino	0.983	0.625	0.677	0.691	0.779	0.758	0.974	1.000	1.000	*1.000*	
11 White	0.983	0.625	0.677	0.691	0.779	0.758	0.974	1.000	1.000	1.000	*1.000*

Note: Variances are italicized, covariances are in non-italics.

Discussion

School Mobility and Graduation

With regard to the relationship between school mobility and graduation, results broadly

show that changing schools ultimately leads to a detrimental effect on a student's chances of

graduation. The examination of school mobility on graduation in a logistic regression (i.e. no

other variables) explained 3% of the variance of graduation. However, when examined through

the lens of the path analysis, the model explained 31% of the variance in whether the student

graduated from high school, and changed the direct relationship from school mobility to graduation from significant to a non-significant finding, thus showing evidence of a fully mediated model. This finding suggests that school mobility may actually have no direct effect on graduation, but rather only through several mediating factors does it play a significant role. This would align with previous research that examines how school mobility interplays (both directly and indirectly) with academic success (South et al., 2005). It should be noted that this study only asked about changing schools within the past year, and thus, these results may be more conservative than if the school mobility variable was expanded to include several years previous to 7th grade.

In discussing school mobility's relationships to the level 1 mediators, each of the three pathways from school mobility represented significant associations to student work ethic, parent-child closeness and delinquent peer selection. Fisher (1988) highlights the need for stability and structure during adolescence, and that changing the environment may have a detrimental effect on an otherwise stable and/or structured setting. Results from this study would solidify that claim based on the detrimental effect that school mobility has on all level 1 mediators. For example, friendship has been shown to be a priority for children entering adolescence (Lafontana & Cillessen, 2010), and given that changing schools essentially forces an adolescent to acquire a new inventory of relationships, an adolescent may be less selective in terms of the quality of those friendship for the sole purpose of accumulating any peer acceptance/membership that is readily available- a possible explanation for this study's delinquent peer selection finding. Fisher's adolescent need for structure/stability theory may very well explain the detrimental result that changing schools has on student work ethic in this study. If a student is accustomed to specific school strategies, times, or environments to which he/she completes work, a disruption

in those typical patterns may result in decreased concentration, effort, or willingness to complete assignments, especially if a student is maladaptive to changing environments. Lastly, with respect to school mobility and parent-child closeness, school mobility has been shown to escalate family stress (Gruman, Harachi, Abbott, Catalano, & Fleming, 2008), which would naturally lead to lower levels of parent-child closeness- a finding mirrored in this study. It should be noted that stress in this instance, may come bi-directionally from both parent and child from the switching of schools, although the parent-child variable is strictly student report. It may also be the case that the unfavorable consequences of school mobility on peer selection and/or student work ethic may have a spillover effect that strains the relationship between parent and child, as parent-child closeness was significantly correlated to both delinquent peer selection and student work ethic.

With the exception of parent-child closeness not having a significant association to 8th/9th attendance, all three level 1 mediators were significantly linked to both level 2 mediators. As expected, student work ethic predicted both 8th/9th grade attendance and GPA. Students who show a decline in the caliber of their work may inherently do worse on school assignments (thus, lower GPA rates) which in turn may lead to decreased motivation to attend school. Students who make more delinquent peer choices may also be tied to that group's academic standing and attendance rates, as also noted by Danby and colleagues (2012) who found that peer group membership predicted academic test scores either positively or negatively, depending on that group's academic standing. Parent-child closeness, although not related to attendance, was significantly linked to 8th/9th grade GPA. Two possible rationales exist in explaining this result. The first is student centered, in that parent-child strain from moving schools causes the student to rebel against the parent's push for better academic success (i.e. students don't study when told).

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The second is a possible lack of parental focus on academic success. For example, Gillespie (2015) found that a shift in family environment can have an effect of fluctuating parenting styles. Parents who were previously used to helping with school work, checking homework, and/or being active in other school related activities may find themselves either too busy, focused on other areas of development (i.e. trying to mitigate adolescent antisocial behavior), or unwilling to attempt to get closer to their child for fear of backlash (i.e. giving their child space/detaching).

In any of the above results, none seem to have been more voluminously studied than the relationship between attendance/GPA and graduation (Ackerman, Kanfer, & Calderwood, 2013; Allensworth & Easton, 2005; Soland, 2013). Nonetheless, many studies examine either GPA or attendance from the latter periods of high school, whereas this study found a significant link between late middle school and early high school as predictors of 12th grade graduation. This suggests that the effects of a lower attendance rate and/or GPA are more potent when habitually demonstrated at a younger age, especially in students who have higher rates of school mobility.

Implications

There are two notable implications for this study in the realms of schools and parents; both of which affect the students themselves. In the constant struggle to attain higher graduation rates, this study provides evidentiary support for school-based programs to place an emphasis on students who change schools, particularly those who have a history of changing schools more than once. While some schools may make the transition more seamless, others may have no such program in place, thus rendering the student on his/her own to forge the necessary relationships that typically come with adolescents at school. By adopting a more rigorous program which introduces the student to several peer social groups, the odds are increased that delinquent peer selection out of necessity would be chosen. Further, targeted counseling programs would be

beneficial in efforts to increase the student's work ethic. Past research has shown that effective school counselors can increase student motivation (Barna & Brott, 2012), and thus, a greater and more targeted focus on students who have recently transferred would aid in the difficult transition process.

A second implication is centered around parents' initial decisions to change schools. While some relocations are inevitable, some are purely voluntary. "School choice" is a buzzword of the 2016 Department of Education that encourages families to switch schools to their liking. While the idea of switching to another school may sound promising, student success may not come to fruition. Further, as of March 2018, the Department of Education has a panoply of options for parents on *how* to switch schools, but no document which outlines *if* parents should switch schools, the cons of transferring schools, how to encourage a seamless transition, how to prepare for hardship, resources available for transfer students, and/or what to do *after* a student switches schools. Thus, a greater emphasis needs to be placed on weighing the risks of school choice and the further academic implications on the student by parents and guardians.

Limitations, Future Research, and Conclusion

Though this study reveals insights into the effects of school mobility, it should be taken with several considerations. The first is that this study did not look at the contextual factors of why students switched schools. By grouping students who switch schools into subgroups (switched because of parent's choice, switched because parents relocated, switched because of expulsion, switched because the student was a victim of bullying, etc..), the results could more accurately reflect which students are more adversely affected by school mobility. Further, some students switched only schools, while some switched both schools and residences. Not knowing the contexts of these variables limits the scope of this study, but should nonetheless be explored

in future investigations on school mobility. Next, this sample had an unusually high proportion of minority students (18.3% White, 81.7% non-White), which may affect the generalizability of the findings. Investigating the interface of ethnicity and school mobility would be helpful in determining the risk this variable presents to each ethnic group, with other possible implications for gender as well.   Nonetheless, this study is accompanied by several strengths. The first is that is it a population-based sample with district-wide representation. Next is its temporal characteristics, as this study has wave 1 data in 7th grade, wave 2 data in 8th/9th grades, and wave 3 data at graduation. Lastly, this study uses an SEM model which permits relationships amongst multiple variables (amongst multiple time points) to be modeled and statistically tested. To date, this study is the only study to use an SEM model testing the longitudinal effects of early adolescents' school mobility trends with actual graduation data.

Results from this study highlight the detrimental effects on the student in the areas of peer selection, parent-child closeness and student work ethic. This study should be used not only as a framework for exploring the facets of school mobility in future research, but also as evidence for practical implications for parents, teachers and school administrators.

CHAPTER 4

CONCLUSION

The purpose of this research was to examine middle school prediction models of high school graduation. Previous research has examined high school achievement using high school variables (Soland, 2013; Haynie & South, 2005), however, the present work add a new understanding to high school achievement by looking at middle school variables, thereby allowing intervention programs to start earlier. Findings from the two studies comprised in this dissertation are delineated below following their respective research questions and hypotheses:

Manuscript 1: Overview, Research Questions, Hypothesis and Findings

The first manuscript of this dissertation examined if middle teacher predictions had statistical associations with 12th grade graduation. Additionally, this examination used three moderators (student's/mother's/father's attitudes towards the importance of education) to see if significant interactions attenuated the original relationship between teacher predictions and student graduation. Findings generally showed that middle school teacher predictions have statistical associations with 12th grade graduation. The specific hypothesis and findings were as follows:

Research question #1. The first research question investigated differences in the favorability and accuracy of teacher predictions based on student race/ethnicity and gender, and teacher race/ethnicity, gender, and experience by using a series of Chi-Square tests. There were several hypotheses association with this research question. The first hypothesis predicted that teachers will have less favorable predictions of minority students, and no difference by gender. Results showed a significant difference in teachers predicting lower graduation favorability among minority students, however, there was a difference between the genders (male students were significantly less favorable). Because of this, hypothesis #1 was partially supported. The second hypothesis predicted that teachers will have less accurate predictions of minority students, and no difference by gender. Findings showed that teachers did not significantly differ in their accuracy of minority students, but were more accurate in predicting female students than male students. As such, hypothesis #2 was not supported. Hypothesis #2 predicted that minority teachers will have more accurate predictions than white teachers. Results found that minority teachers were not significantly different from White teachers in their predictions of all students or minority students, however, were more accurate in their predictions of White students. Because of this, hypothesis #3 was partially supported. The last hypothesis postulated that teachers with more experience will have more accurate predictions than teachers with less experience. Contrary to prior research on this (see Soland, 2013), this investigation found that teachers with less experience were significantly more accurate than teachers with more experience. As such, hypothesis #4 was not supported.

Research question #2. The second research question analyzed if middle school teacher's predictions significantly predicted student graduation. They hypothesis for this research question hypothesized that there is a significant link between middle school teacher's predictions and

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graduation rates. Findings indicated that middle school teacher's predictions were significantly linked to future graduation rates. Thus, this hypothesis was fully supported.

Research question #3. The third research question of this study examined if mother's, father's and student's attitudes towards the importance of education moderate the relationship between teacher prediction and graduation. The hypothesis for this research question predicted that all moderators will be significant in attenuating the link between teacher predictions and actual graduation. Findings showed that only father's attitudes towards the importance of education was found to be a statistically significant moderator, while student's and mother's attitudes were not significant moderators. Because father's attitudes were significant yet student's and mother's were not, this hypothesis was partially supported.

Research question #4. The final research question of this study investigated if parent's and student's attitudes towards education was a risk factor for students who were predicted to graduate but dropped out, or a protective factor for students who were predicted to drop out but graduate. The predicted hypothesis stated that low levels of parent's and student's attitudes will be a risk factor for students predicted to graduate but dropped out, and high levels of parent's and student's attitudes will be a protective factor for students who were predicted to drop out but graduated. Findings revealed that statistically lower levels of father's and student's attitudes towards the importance of education was a risk factor for students who were predicted to graduate then dropped out. No protective factors were found, and mother's attitudes towards education were neither a protective nor risk factor. As such, this hypothesis was partially supported.

Manuscript 2: Overview, Research Questions, Hypothesis and Findings

The second manuscript of this dissertation investigated the effects of school mobility in 7th grade on 12th grade graduation through a structural equation model with two levels of mediators. Level 1 mediators consisted on student work ethic, parent-child closeness and delinquent peer selection. Level 2 mediators was comprised of 8th/9th grade GPA and 8th/9th grade attendance. Findings showed that school mobility was a significant predictor of 12th grade graduation only through both levels of mediators, thus rendering the original relationship between school mobility and graduation a non-significant association. The specific hypothesis and findings were as follows:

Research question #1. The first research question of this study examined if school mobility in middle school predictedhigh school graduation. The hypothesis associated with this question postulated that students who report a higher number of moves will be less likely to graduate high school compared to students who not do not report changing schools. Findings showed that students who reported more moves were statistically more likely to dropout compared to students who reported less or no school changes, and as such, this hypothesis was fully supported.

Research question #2. Research question #2 analyzed if the first and second levels of mediators (student work ethic, peer relationships, and parent-child closeness, and 8th/9th grade GPA/attendance, respectively) fully or partially mediate the relationship between school mobility and graduation. The first hypothesis of this study expects that due to the mediating factors between the independent and dependent variables, the relationship will be fully mediated. Findings fully supported this hypothesis as the structural equation model fully mediated the original relationship, rendering the association between school mobility and graduation non-significant. Hypothesis #2 postulated that school mobility will be negatively and significantly

related to student work ethic and parent-child closeness, and positively and significantly related to delinquent peer behavior. Findings revealed school mobility was negatively and significantly related to student work ethic and parent-child closeness, and positively and significantly related to delinquent peer behavior. Because of this, hypothesis #2 was fully supported. The third hypothesis of this manuscript predicted student work ethic and parent-child closeness to have a positive and significant relationship to attendance and GPA, and delinquent peer behavior to have a negative and significant relationship to attendance and GPA. This hypothesis was partially supported, as findings showed student work ethic and delinquent peer selection were both significantly associated as hypothesized, however, parent-child closeness was only statistically associated with GPA. The final hypothesis expected to find that both GPA and attendance will have a positive and significant relationship to graduating high school. Results showed that both GPA and attendance had a significant and positive association with a higher likelihood of graduating, and fully supported the hypothesis.

Strengths and Limitations

There are a number of limitations that may warrant consideration within the two manuscripts comprised in this dissertation. The first is the sample used for both sets of analyses. The same is highly ethnic (18% White; 45% Latino) and may present generalizability issues with respect to populations that are dissimilar to the one used in this investigation. Next, is that these studies are purely quantitative. Because large scale datasets are difficult to gather qualitative data, only numerical statistical tests were performed. Having access to qualitative data would provide further insights to research questions and enhance the findings of this dissertation. Lastly, a large amount of graduation data (almost one-third) was lost from by the time of

graduation. Some of this was inevitable (students transferred out of district, homeschooled, jailed, etc.), making tracking the graduation/dropout of these students not possible. This should be taken into consideration when interpreting results, and may also suggest conservative results.

Implications

Results have a number of practical implications with regards to schools and families that are discussed specifically within both manuscripts, but more importantly is the over-arching idea that middle school characteristics are exceedingly predictive of high school achievement (or the lack thereof). It is quite common for geographic and institutional changes from middle school to high schools (i.e. the American paradigm of smaller, local middle schools feeding into a larger high school), and thus, critical data points are lost in transition. Adolescence has often been characterized as a critical developmental period (Fisher, 1988), yet the pivoting years of 7th and 8th grades which transitions students from childhood to adolescence are not taken into consideration by most high school markers for at-risk students. This dissertation serves to bolster the idea of greater focus on middle school predictors used throughout both middle and high school to better capture students who may otherwise be beyond intervention once identified as at-risk of potentially not graduating. In this case, *prevention* may eclipse *intervention* in terms the efficacy of decreasing high school dropout.

Future Research

In their discussion of school mobility and graduation, South, Haynie and Bose (2005) call for research that better examines the interplay between the numerous variables that could be act as mediators between school mobility and graduation. The present study fills this gap, but

findings create many more questions. Results indicate a need for qualitative and mixed-method research to better understand first, the contextual experiences of school mobility, and next, how those specific subgroups would play out in the model this dissertation proposes. With respect to teacher predictions, an investigation of multiple teachers in middle school predicting the longitudinal outcomes of their students would greatly enhance the reliability of the teacher prediction model. This study captured a single teacher data point, however, those experiences could be tainted by biases of that single teacher. Nonetheless, any study that uses data from a non-high school context (i.e. middle school, elementary school, Kindergarten) would be beneficial in the ultimate goal of high school achievement.

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APPENDICES

Institutional Review Board Approval

Oklahoma State University Institutional Review Board

Date: 04/12/2018
Application Number: HS-18-17
Proposal Title: Pathways to Student Success: An Examination of Graduation Models

Principal Investigator: Zachary Giano
Co-Investigator(s):
Faculty Adviser: MICHAEL MERTEN
Project Coordinator:
Research Assistant(s):

Processed as: Not Human Subjects Research

Status Recommended by Reviewer(s): Closed

Based on the information provided in this application, the OSU-Stillwater IRB has determined that your project does not qualify as human subject research as defined in 45 CFR 46.102 (d) and (f) and is not subject to oversight by the OSU IRB. Should you have any questions or concerns, please do not hesitate to contact the IRB office at 405-744-3377 or irb@okstate.edu.

Sincerely,

Hugh Crethar, Chair Institutional
Review Board

VITA

Zachary Giano

Candidate for the Degree of

Doctor of Philosophy

Dissertation: PATHWAYS TO STUDENT SUCCESS: AN EXAMINATION OF
GRADUATION MODELS

Major Field: Human Development and Family Science

Education:

Completed the requirements for the Doctor of Philosophy in Human Development and Family Science at Oklahoma State University, Stillwater, Oklahoma in May 11, 2018.

Completed the requirements for the Master of Communication at Hawaii Pacific University, Honolulu, Hawaii in 2011.

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Select Publications:

Shreffler, K. **Giano, Z.**, Cox, R., Merten, M. J. & Gallus, K. (2018). Parental Documentation Status and Academic Attitudes and Expectations among Early Adolescent Latinos. *Journal of Adolescence.*

Giano, Z., Merten, M., & Tuttle, B. (In Press). Sleeping Away from Home: A Vehicle for Adolescent Delinquency? *Journal of Children's Services*.

Giano, Z., Tuttle, B., Merten, M. J., Gallus, K., Cox, R., & Shreffler, K. (In Press). Parental Documentation Status and Educational Aspirations among Latino Adolescents: Mediating Effects of School Connectedness and Parental Attitudes towards Education. *Hispanic Journal of Behavioral Sciences.*

Shreffler, K. **Giano, Z**., Tiemeyer, S., Gallus, K., Cox, R., & Merten, M. J. (In Press) Trauma and Early Adolescent Perceptions about Sex and Parenthood: The Mediating Role of Emotion Regulation. *Youth and Society.*

Tuttle, B., **Giano, Z**., & Merten, M. J. (In Press) Law Enforcement Spill Over Effect: A Redefining of Current Terms. *The Family Journal.*

Professional Memberships:

National Council on Family Relations, Society for Research on Adolescence, Society for Research in Child-Development, Palestinian-American Research Center.