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RESEARCH PUBLICATIONS

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de Tablan, D. M. & Sanders, M. (2017). Community outreach programs. In K. Peppler (Ed.), *The SAGE encyclopedia of out-of-school-learning*. New York: SAGE.

Fedina, L., Lee, J., & **de Tablan, D.** (2018). MSW graduates’ readiness to respond to intimate partner violence. *Journal of Social Work Education*, 54(1), 3-48.

Rose, T., Sharpe, T. L., Shdaimah, C. & **de Tablan, D. M.** (2017). Through the looking glass: Exploring coping among urban youth through photovoice. *Qualitative Social Work*, 17(6), 795-813.

Rose, T., Shdaimah, C. , **de Tablan, D. M.** & Sharpe, T. L., (2016). Through the looking glass: Exploring wellbeing and agency among urban youth through photovoice. *Children and Youth Services Review*. 67:114-122.

De Tablan, D. M. (2014). Hope for a school. In Clark, E. & Hoffer, E. (Eds.), *Hope matters: The power of social work*, Washington, DC: NASW Press.

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Member, Middle School Curriculum Committee, Vallejo Unified School District, Vallejo, California, 1999

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Outstanding Partner Award, Baltimore City Public Schools, 2013
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Abstract

Title of Dissertation: Surviving High School Transfers: A Multilevel Study of Student and School Characteristics Related to School Transfer, Graduation, and College Entry

Dante M. de Tablan, Doctor of Philosophy, 2022

Dissertation Directed by: Dr. Bruce DeForge, Associate Professor, School of Social Work, University of Maryland, Baltimore

Background: Transferring schools frequently happens across the United States from kindergarten to college. While student mobility studies have focused more on elementary and middle school grades, research at the high school level is limited. In addition, studies on transfer during high school related to postsecondary education are even more scarce. This dissertation investigates transfer risk associated with student and school characteristics and its association with high school graduation and college enrollment.

Method: The dissertation used analytic samples from a cohort of 6,810 first-time ninth graders enrolled in Baltimore City Public Schools from 2012-2013 to 2017-2018. To examine the factors related to college entry, a second analytic sample included only students who obtained a high school diploma, a certificate of completion, or a GED (N = 4,297).

The study employed mixed-effects parametric proportional hazards modeling to investigate student- and school-level characteristics associated with time to the transfer

event, and multilevel binary logistic regressions to analyze student and school factors related to odds of high school graduation and college enrollment.

Results: Thirty-four percent of students transferred schools during the study period.

White students, those with missing 8th-grade math test scores, students who received a suspension, and employed students were at a reduced risk of transfer. Chronic absentees and those with standardized 8th-grade math scores had increased transfer risk. While the school percentage of students eligible for free and reduced meals related to a reduced transfer risk, the school special education rate was associated with increased transfer risk. Transferring schools was associated with lower odds of graduation and college entry, and percentage of school transfer was associated with lower odds of college enrollment.

Transfer, as it related to graduation and college entry, varied across schools.

Conclusion: School transfer is a multidimensional event related to adverse educational outcomes for many students. This dissertation identified student and school characteristics associated with time to transfer risk. Moreover, the study highlighted the adverse effects of transfer on graduation and college entry. Finally, a discussion of the limitations, strengths, and implications for research, policy, and practice are presented.

Surviving High School Transfers:
A Multilevel Study of Student and School Characteristics
Related to School Transfer, Graduation, and College Entry

by
Dante M. de Tablan

Dissertation Submitted to the Faculty of the Graduate School of the
University of Maryland, Baltimore in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
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A special thanks to the Maryland Longitudinal Data System Center for granting access to the datasets for this study. I am indebted to Dr. Henneberger for helping me shape the study and navigate the MLDS research process. A special thanks to Dr. Bess Rose for preparing the administrative data and guiding me through them. Understanding the data helped me delineate the scope of this dissertation. I also thank Ross Goldstein for reviewing the countless tables and graphs and making them available in record time.

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List of Abbreviations

8g	8 th grade
ACGR	adjusted cohort graduation rate
ach	achievement
AIC	Akaike's information criterion
b, b_i	estimated (unstandardized) regression coefficients
BCPS	Baltimore City Public Schools
BERC	Baltimore Education Research Consortium
BIC	Bayesian information criterion
CI	confidence interval
cons	constant
CONSORT	Consolidated Standards of Reporting Trials
cov	covariance
COVID-19	Coronavirus disease of 2019
df	degrees of freedom
ECO	education and career opportunities
Ed	education
ELL	English language learners
ELS:2002	Education Longitudinal Study of 2002
Eth	ethnicity
ExPRESS	Exchange of Student Records Electronically for Students and Schools
f	frequency

Farms, FARMs	Free and Reduced-Priced Meals Program
FDPIR	Food Distribution Program on Indian Reservations
GAO	General Accountability Office
GED	graduate equivalency degree
Grad	graduation
H.S.	high school
Hisp	Hispanic
<i>HR</i>	hazard ratio
ICC	intra-class correlation
IEP	individualized education plan
IFSP	Individualized Family Service Plan
IPEDS	Integrated Postsecondary Education Data System
K-12	kindergarten through 12 th Grade
K-4	kindergarten through 4 th Grade
K-8	kindergarten through 8 th Grade
MDOL	Maryland Department of Labor
MHEC	Maryland Higher Education Commission
MLDS, MLDSC	Maryland Longitudinal Data System Center
MRC	Maryland Report Card
MSDE	Maryland State Department of Education
MSRTS	Migrant Student Record Transfer System
<i>N</i>	total number of cases
<i>n</i>	total number of cases (subsample)

NCES	National Center for Education Statistics
NELS:88	National Education Longitudinal Survey of 1988
<i>OR</i>	odds ratio
<i>p</i>	probability
RD	regression discontinuity
<i>r_{pb}</i>	point biserial correlation
School id	school identification
<i>SD</i>	standard deviation
se	standardized error
SES	socioeconomic status
SJEP	Social Justice Education Project
SNAP	Supplemental Nutrition Assistance Program
SPEEDE	Standardization of Postsecondary Education Electronic Data Exchange
sqrt	square root
SST	successful student transfers
Std	standardized
SY	school year
TANF	Temporary Assistance to Needy Families
US	United States
var	variance
χ^2	chi-square test statistic
YPAR	Youth Participatory Action Research

CHAPTER 1: INTRODUCTION

Purpose

This dissertation explores relationships between student mobility and math achievement, obtaining a high school diploma, and college entry among a cohort of ninth-grade school students in an urban school district. This research examined demographic student-level variables such as race, gender, eligibility for free and reduced meals, and time-varying factors such as timing and frequency of moves and workforce participation. In addition, this study analyzed student body enrollment, percentage of students who receive special education services, and school suspension rates, among other school-level variables derived from administrative data routinely collected by Maryland public institutions. Linking high school and college data helped identify predictors of educational outcomes. As a result, practitioners, researchers, and policymakers may find helpful insights to understand, intervene, and improve students' educational destinations.

Problem

Children who experience school transfers have adverse educational outcomes (Herbers, Reynolds, & Chen, 2013; General Accountability Office [GAO], 2010, 1994; Rumberger et al., 1998, Welsh, 2017). The GAO (2010) reported that approximately 70 percent of a cohort of kindergarteners in 1998 transferred schools two times or less by 2007, while 18 percent moved schools three or more times during the same period. Nearly 13 percent of these children are primarily poor, Black, and renters and have moved four or more times before attending high school (GAO, 2010). The GAO Reports increased awareness among practitioners, policymakers, and researchers of the challenges

facing children who transfer schools (Herbers, Reynolds, & Chen, 2013; Mehana & Reynolds, 2004; Rumberger et al., 1998; U.S. Government Accountability Office [GAO], 2010, 1994). Furthermore, Rumberger (2015) reported that nine percent of 12th Graders transferred schools in their junior and senior high school years. Of the nine percent, six percent moved once, two percent moved twice, and one percent moved three times or more (Rumberger, 2015).

Compared to stable students, mobile and highly mobile students are less likely to complete secondary education (Herbers, Reynolds, & Chen, 2013; Rumberger et al., 1998; Uretsky, 2016). In addition, students who move during the academic year have lower odds of attending a four-year college, while students who move during summer are less apt to enroll in a highly selective four-year college or university (Sutton, Muller, & Langenkamp, 2013).

However, student transfer among high school students and its effect on graduation and postsecondary enrollment remain indeterminate. This uncertainty may have been due to mixed educational outcomes for students who transfer schools (GAO, 2010, 1994; Herbers, Reynolds, & Chen, 2013; Rumberger & Larson, 1998; Sutton, Muller, & Langenkamp, 2013; Swanson & Schneider, 1999). In addition, research conducted in Chicago, New York, California, and Connecticut employed varying terminology and definitions to measure student mobility (de la Torre & Gwynn, 2009; Rumberger & Larson, 1998; Swanson & Schneider, 1999; Selya, Engel-Rebitzer, Dierker, Stephen, Rose, Coffman & Otis, 2016). This lack of consistency in measuring student mobility makes it challenging to compare metrics for analysis, policy, and practice.

Moreover, previous studies bridging student mobility and college entry are in such short supply that they offer limited guidance in interpreting factors related to students who transfer schools. Nevertheless, local school systems regularly implement new programs and services in high schools with the hope of shoring up attendance, reducing suspensions, and increasing test scores (Sanders, Galindo & de Tablan, 2019).

However, if current trends continue, educational leaders and other stakeholders may overlook student mobility as a robust diagnostic measure for improving secondary and postsecondary educational outcomes. Moreover, demystifying student mobility can assist school partners in targeted approaches to improve the odds for students. Specifically, there is a need to examine school transfer during high school and its effects on high school graduation and postsecondary enrollment.

U.S. Government Accountability Office Reports

The U.S. Government Accountability Office (GAO) reported the challenges facing many U.S. children who frequently change schools (GAO, 2010; 1994). Under a congressional request, the 1994 GAO Report increased awareness of the educational outcomes of elementary school children who frequently changed schools and recommended the U.S. Department of Education to

- (1) determine the reasons(s) for the low Chapter 1 participation rates of low-achieving children who have changed schools frequently;
- (2) develop strategies so that all eligible children who have changed schools frequently, including migrant children, will have access to Chapter 1 services; and,
- (3) determine the feasibility of using electronic-student

record systems, such as those currently being adopted by some states and school districts for all students, instead of the Migrant Student Record Transfer System (MSRTS) (GAO, 1994, p. 16).

In response, the U.S. Department of Education examined how states met the needs of highly mobile students, including those who experience housing instability (GAO, 1994; 2021). In addition, Congress enacted legislation to authorize support from the Fund for the Improvement of Education to address the issue of student mobility (GAO, 1994; 2021). Moreover, the Improving America's Schools Act included language the Education Department proposed to foster comprehensive state and local planning and coordination of federally financed educational programs for qualified participants, including migrant students (GAO, 1994; 2021). Finally, the Department piloted the Standardization of Postsecondary Education Electronic Data Exchange (SPEEDE)/Exchange of Student Records Electronically for Students and Schools (ExPRESS) at selected state and local school districts (GAO, 1994; 2021).

The GAO's subsequent report found that changing schools frequently hurt academic achievement, as indicated by lower math and English scores on standardized tests (GAO, 2010). In addition, highly mobile students comprise nearly 13 percent of kindergarten to eighth-grade children and are mostly Black, poor, and rent their homes (GAO, 2010). Furthermore, approximately 11.5 percent of K-8 schools had high mobility rates and served a higher segment of students from lower socioeconomic backgrounds, classified as English language learners, and received Special Education services (GAO, 2010).

The report also found that mobile students arrive at their new schools with incomplete records, making it difficult for school officials to place them in appropriate classes and special education services (GAO, 2010). Correspondingly, principals and teachers found it challenging to address students' underlying reasons for changing schools (GAO, 2010). Fortunately, school administrators could assist students experiencing housing instability through the McKinney-Vento Education for Homeless Children and Youth Program (GAO, 2010). Nonetheless, mobile and highly mobile students require additional services tailored to their ongoing needs.

The Great Recession of 2008, with its concomitant housing foreclosures and housing instability, may have exacerbated student transfers, especially for under-resourced and minority students. However, the GAO did not include recommendations in the 2010 report, and the Education Department did not comment on the report's findings.

Despite a growing awareness of student mobility in the past three decades, researchers have not fully explored the relationship between student mobility in high school and college entry (Herbers, Reynolds, & Chen, 2013; Mehana & Reynolds, 2004; Rumberger & Larson, 1998; Government Accountability Office [GAO], 2010, 1994). Nevertheless, students of color, students with disabilities, and lower socioeconomic status continue to struggle to complete high school and enter college, as evidenced by national and state trends.

High School Graduation

The U.S. four-year adjusted cohort graduation rate (ACGR) for public high school students has climbed to 84.6 percent for the 2016-17 class (National Center for Education

Statistics, 2021; 2019). However, many American Indian/Alaskan Native, Black, and Hispanic students did not graduate from high school. Similarly, students with disabilities, limited English proficiency, and learners from low socioeconomic backgrounds still struggle to complete secondary education.

In Maryland, the four-year ACGR for public high school students in the class of 2017 was 87.67%, a 0.06 percentage point increase from 2016 at 87.61% (MSDE, 2019d). Hispanic students struggle to complete high school among racial subgroups, with a nearly three percent decrease in 2016. Blacks and American Indian students fared better with rate gains, while Hawaiian and Pacific Islander students experienced a slight rate decrease. English language learners fared worst with a nearly 55% non-completion rate. Although students with disabilities improved by more than half a percent, they would advance more than 30% towards graduation. Finally, about one-fifth of economically disadvantaged students do not receive a high school diploma in Maryland. What role, if any, does school transfer contribute to these graduation percentages?

College Enrollment

A postsecondary degree, early workforce participation, and positive relations with adults enhance youth and young adults' economic prospects (Annie E. Casey Foundation, 2019). The days when a high school diploma sufficed to secure a living wage are long gone, and a lack of postsecondary education makes entry difficult into the middle-class (Annie E. Casey Foundation, 2019). Dual enrollment and early college access programs have been implemented to help students obtain college credits (Henneberger, Witzgen, & Preston, 2018). In Maryland, two cohorts of high school students who enrolled in early access programs were more likely to enroll in college (Henneberger, Witzgen, & Preston,

2018). However, only 4.5 percent of Maryland high school students availed themselves of these programs in 2016-2017 (Maryland Longitudinal Data Systems [MLDS], 2018). In 2017, undergraduate enrollment among Maryland residents increased by 12.5 percent and 2 percent in two-year and four-year public institutions, respectively, in 2017 from the year before (Maryland Higher Education Commission, 2018; 2019). However, it is unclear how many of these enrollees had to change schools while in high school. In addition, to what extent do student mobility and other socioeconomic, cultural, and demographic factors contribute to high school graduation and college enrollment?

Terms and Definitions

The Maryland State Department of Education (MSDE) classifies students as entrants or withdrawals. Entrants are those who enter, re-enter, or transfer to a school from September to June after school commences (Maryland Report Card, 2017). Promoted students that move within the school district are not considered entrants for mobility purposes if they do not transfer after the first day of school. Withdrawals are students who transferred or are terminated during the school year after the first day of school (Maryland Report Card, 2017). MSDE calculates student mobility at the school level by dividing entrants and withdrawals by average daily enrollment (Maryland Report Card, 2017).

Student mobility is typically defined based on who initiates the change, the context, and the timing (Rumberger, 2015; Welsh, 2017). Timing of change can occur during the academic year or between the academic years. Summer moves occur between academic years and are usually associated with regular promotion or strategic moves

during the summer months. Mid-year or academic year moves occur during the school year from September to June.

The Current Study

Several studies on student mobility focus on the frequency of moves, as shown in the studies cited above. However, no study has explored the hazard risk of school transfer and the characteristics of students and schools associated with an increased risk of transfer from 9th to 12th grades with high school graduation and college entry.

However, no study has measured the transfer hazard rate comparing student characteristics nested in schools. In addition, the present study examines the probability of high school graduation, given student and school characteristics and school transfer. Finally, the study further investigates the likelihood of entering college given student and school characteristics and school transfer.

Baltimore City, Maryland

As of July 1, 2021, Baltimore City, Maryland had an estimated population of 576,498, of which 20.5% persons are under 18 years, 62.3% Black or African American, 29.7% White, 5.4% Hispanic or Latino, 2.5% Asian, and 3.2% Two or More Races (U.S. Census Bureau, 2022). In terms of educational attainment, 85.5% of Baltimore City residents 25 years or more graduated from high school or higher, and 32.9% possess a bachelor's degree or higher (U.S. Census Bureau, 2022). Median household income in 2020 dollars is \$52,164 while per capita income in the past 12 month (in 2020 dollars) is \$32,699 (U.S. Census Bureau, 2022). Twenty percent of the population live in poverty (U.S. Census Bureau, 2022).

Baltimore City Public Schools

In 2021, Baltimore City Public Schools (BCPS) had 77,856 enrollees, with an attendance rate of 80.6% and a graduation rate of 69.2% (MSDE, 2022). Black or African American students account for 75.7% of all enrollees, 7.5% White, 14.2% Hispanic, and 2.5% Other (Asian, Native American/Alaskan Native, Pacific Islander/Hawaiian, and Two or More Races, combined) (MSDE, 2022).

As a school choice district, BCPS encourages parents and students to select the school that best matches the student's interests and learning style as well as the best fit for college preparation and career opportunities (BCPS, 2022b). School choice applies to public and charter middle and high schools throughout the school district. Admission types consist of academic entrance criteria, specialized, school-based lottery, and choice lottery. Schools with academic entrance criteria require students to meet composite scores, which are computed as: *standardized test reading percentile + standardized test math percentile + (overall grade average x 6)* (BCPS, 2022b). Specialized schools have a variety of processes for admission, which include interest survey, audition, interview, testing, among others (BCPS, 2022b). School-based lottery schools are mostly charter schools with its application procedures and subsequent lottery to select students (BCPS, 2022b). Finally, schools designated as choice lottery do not have entrance requirements; and they hold a lottery if more students select the school beyond their enrollment limits (BCPS, 2022b).

BCPS's school choice policy may be a contributing factor to the school district's high mobility rate. In 2017, BCPS had a student mobility rate of 31.9% for all students while its high school student mobility rate was 35.8% (MSDE, 2022). The high school

mobility rate decreased by more than half in 2021 to 14% (MSDE, 2022) which may be due to several factors, including government supports during the COVID-19 Pandemic. During the same period, overall student mobility rate decreased from 31.9% to 9.1% (MSDE, 2022).

Furthermore, the BCPS 4-year adjusted cohort graduation rate trend was 70.67% in 2017 to 69.2% in 2021, showing a slight decrease (MSDE, 2022). In addition, the district's 5-year adjusted cohort graduation rate trend was 74.84 in 2016 to 72.37 in 2020, indicating a two and a half percentage point decrease (MSDE, 2022). Finally, college enrollment trends for all students remained steady from 47.4% in 2015 to 47.3% in 2020 (MSDE, 2022).

Research Questions

1. Which student and school characteristics are associated with school transfer risk after entering the 9th grade?

2. To what extent are school transfer and other factors associated with graduation? Does the magnitude of the effect of changing schools related to graduation vary across schools?

3. To what extent are school transfer and other factors associated with college entry? Does the magnitude of the effect of school transfer on college entry vary across schools?

CHAPTER 2: LITERATURE REVIEW

Framework

One way of exploring student mobility and post-secondary education is to investigate the relationships between student mobility and high school graduation. In addition, the literature review includes research on student mobility and math because math proficiency is required to obtain a high school diploma (MSDE, 2018). Previous research used mathematics proficiency to represent academic achievement (Selya et al., 2016; Swanson & Schneider, 1999) and will be sensitive to student moves because of disruptions to the sequence of lessons needed to achieve competence.

High School Graduation

Frequency and Timing of Transfers

Using data from the Chicago Longitudinal Study, Herbers, Reynolds, and Chen (2013) hypothesized that the number of school transfers predicts whether the student graduates on time. The researchers examined 25 years of data on student transfers and high school graduation, juvenile delinquency, and developmental outcomes (Herbers et al., 2013). The study hypothesized that transfers' frequency is inversely related to educational attainment, and transfers during high school adversely affect peer relationships than transfers during elementary years (Herbers et al., 2013). Of the 1,410 students in the sample, 15.9 percent transferred schools once among 8th-12th Grade students, and 2.8 percent transferred twice (Herbers et al., 2013). To account for the timing of the transfers, the researchers ran regression models by observing transfers on students grouped as K-4, 4-8, and 8-12 (Herbers et al., 2013).

From 8th to 12th grade, students who transferred during the academic year completed half a semester less of education than those who stayed put (Herbers et al., 2013). Furthermore, regarding on-time graduation, each additional residential move, not school transfers, accounted for a 12 percent to 19 percent decrease in the log odds of graduating on time (Herbers et al., 2013). Finally, school mobility in K-12 correlated with adult arrest (1.15 [1.03, 1.27] $p < .05$) but did not approach statistical significance with school mobility during 8th to 12th Grades (Herbers et al., 2013).

In another study on student mobility and high school graduation, Rumberger and Larson (1998) conducted a longitudinal panel study of a cohort of students who entered the eighth grade in 1988 and were included in the National Education Longitudinal Survey of 1988 (NELS:88). With 1988 as the base year, the investigators collected panel data in 1990, 1992, and 1994. The study tracked students ($n = 11,671$) if they lived in the United States (Rumberger and Larson, 1998).

The main variables of interest were student mobility and high school graduation. The study asked students about the number of schools and residential transfers from January 1, 1988, to Spring 1992. The students were also asked in 1992 and 1994 if they (a) had graduated from high school with a diploma or a Graduate Equivalency Degree (GED); (b) were presently attending school, or (c) had dropped out of school (Rumberger & Larson, 1998). The student's academic performance data and school characteristics came from students through the survey questionnaires and the school administrative data (Rumberger & Larson, 1998).

The study had three recursive models; that is, the effects in the set of relationships only move in one direction (Tabachnick & Fidell, 2013). The first model assessed the effects of student, family, and school characteristics in eighth-grade students on grade 12 status between 1988 and 1992 if the students (a) did not transfer schools, (b) transferred schools, or (c) left school altogether (Rumberger & Larson, 1998). The researchers differentiated student mobility from dropping out as a variation of students' disengagement from school. Models 2 and 3 predicted three outcomes: (a) high school completion, (b) obtaining a GED or another equivalent diploma, or (c) not finishing high school. Students graduated two years after the average four-year completion period and moving affected this academic milestone (Rumberger & Larson, 1998).

Students who transferred schools once had twice the odds of not graduating compared to those who remained in the same school (Rumberger & Larson, 1998). Those who transferred two or more times quadrupled their odds of not completing high school. For one-time movers, the odds decreased to 1.58, while those who moved twice or more decreased to 2.61 after controlling for student and family characteristics (Rumberger & Larson, 1998). Controlling for school experiences and eighth-grade achievement, students who transferred schools once, between the eighth and twelfth grades, had a 50 percent chance of graduation. In contrast, those who transferred schools twice or more have quadrupled odds of finishing with a GED than students who did not transfer schools. These results highlighted the influence of student characteristics, including their family backgrounds, on their chances of graduating from high school (Rumberger & Larson, 1998). Moreover, these results indicate that a student transfer lowers the odds of completing secondary education.

Transfer Covariates

Following a cohort of 9th-grade students in New York City (n = 70,130) from 2005 to 2009, Ready, Hatch, Warner, and Chu (2013) found that students who moved during their first year in high school failed to complete half of the needed credits to graduate. Covariates that lowered the odds of graduation are eighth-grade test scores, student mobility, >15 absences in the 9th grade, having been suspended, having an Individualized Education Plan (IEP), and social/academic background. Compared to White students, Black and Hispanic students ended their ninth-grade year with 1.35 and one (1) fewer credits, respectively, while Asian students had 0.33 credits more. Female students earned 0.75 more credits, while students with IEPs earned less than two (2) credits. An additional year in age correlated to approximately 0.5 fewer credits. Students who attended "safe" schools earned more credits than those deemed "less safe." Students who enroll in small and non-selective schools earn more credits than larger, selective schools. Credit accrual in the ninth grade varied mainly within schools (76%), while 24% of the variability existed between schools.

Compared to White students, those of Hispanic or Latino origin had twice the odds of earning a suspension, while Black students had three times the odds. Students with IEPs had twice the odds of being suspended than those without IEPs. The authors used a multilevel propensity score matching to measure the odds of suspensions of students nested in their ninth-grade schools matched in attendance, test scores, background characteristics, and suspension history. Students who received a suspension in the 9th grade had 46% lower odds of graduation. Had they not been suspended, these

students would have had twice the odds of obtaining their high school diploma (Ready et al., 2013).

Moreover, students with IEPs, Black and Hispanic students were more likely to transfer schools and more likely to be chronically absent and receive suspensions.

Finally, the study found that Black, Hispanics, and students with IEPs were more likely to attend schools with higher proportions of lesser-performing peers, making it more challenging to be on track for college (Ready et al., 2013).

College Enrollment

Sutton, Muller, and Langenkamp (2013) compared high school students who transferred schools during the summer with those who transferred during the school year and if mobile students entered two-year or four-year colleges. Using data from the Education Longitudinal Study (ELS:2002), the researchers identified college entry as the dependent variable and student mobility as the independent variable, accounting for prior differences among student groups in the sample ($N = 11,100$) (Sutton et al., 2013). Sutton et al. examined academic and nonacademic interruptions caused by the transfers to account for the type and selectivity of colleges mobile students entered compared to non-transferees. The study used the Integrated Postsecondary Education Data System (IPEDS) data and the 2005 Carnegie classifications to determine college selectivity, limiting selective colleges to four-year colleges (Sutton et al., 2013). The adverse effects of moving were related to previous differences between the students, such as socioeconomic status, family structure, behavior, academic achievement, and educational expectations (Sutton et al., 2013). Students with low SES and disrupted family structures tend to have poor attendance and behavioral issues (Sutton et al., 2013). In addition, those

who receive lower grades and depressed academic expectations tend to experience adverse educational outcomes (Sutton et al., 2013).

Discussion of Issues

Methods

Different methodological approaches capture essential dimensions of student transfers. For example, longitudinal analyses allow identifying developing trends compared to cross-sectional studies, and multilevel studies address the nestedness of student data within schools. However, estimates of β based on OLS regression alone tend to ignore school effects and produce misinformation (Bryk & Raudenbush, 1992). School-level characteristics furnish the context in which students perform and succeed.

In addition, a national study can monitor transfer patterns at the federal level (Swanson & Schneider, 1999) while focusing on a single school can give a more granular detail of what predicts transfer (Selya et al., 2016). Finally, selecting a local school district allows for studying variations in transfer between schools while assuming that the schools operate under the same transfer policy across the district.

Furthermore, school transfer requires employing methods that capture the characteristics and behavior of the event. Compared to high school graduation or entering college, the event of a school transfer can happen instantaneously, i.e., the students, their families, or school officials do not set a date for the transfer to occur. Survival analysis can capture the time of an event and the ratio of the event's rate between two groups (Cleves, Gould, & Marchenko, 2016; Kleinbaum & Klein, 2012; Rabe-Hesketh & Skrondal, 2012).

Finally, Rumberger and Larson (1998) acknowledged that measuring student mobility during the eighth grade may not provide the best baseline. Perhaps the ninth grade will provide a better baseline measure (Ready et al., 2013), which the present study proposed to use. Examining the first and initial transfer beginning in the ninth grade and regressing its occurrence and timing may reveal relationships with students' demographic characteristics and other school-level covariates.

Student and School Characteristics

Significant student-level characteristics related to moving and high school graduation are gender (being female), race (Asian, Black, and Hispanic) (Rumberger & Larson, 1998), ninth-grade credits, social/academic background (Ready et al., 2013), gender (being male), having received a suspension, and receiving public assistance (Metzger et al., 2015). Including eighth-grade math scores as a Level-1 covariate prevented bias in estimating level- 2 predictors because of the non-independence of these scores to math proficiency (Bryk & Raudenbush, 1992; Ready et al., 2013). In addition, students with IEPs were more likely to transfer schools, be chronically absent, and receive suspensions (Ready et al., 2013). Finally, educational upbringing (Rumberger & Larson, 1998), parents' educational attainment, and the number of siblings (Metzger et al., 2015) were family characteristics significantly related to the likelihood of graduation.

High school characteristics strongly predict college entry and success, particularly its student body's socioeconomic composition (Niu & Tienda, 2012) and school size (Ready et al., 2013). In addition, other school-level factors such as percentages of students with IEPs, free and reduced meals, and English Language Learners relate to high school graduation (Ready et al., 2013). Also, teaching quality and urban, Catholic, or

private schools were statistically significant factors influencing the odds of obtaining a high school diploma for students who move (Rumberger & Larson, 1998).

The present study includes most Level 1 characteristics cited above except for family characteristics and Level 2 variables limited to those noted above and what is available in the MLDS data set.

Transfer Classifications

The inconsistent classification of school transfers makes it difficult to compare results across studies. For example, one study classified students as *movers*, students who change residences but stay in their schools; *changers*, those who transfer schools but stay in their homes; and *leavers*, students who experience home and school moves (Swanson & Schneider, 1999). Another study classified students as *stable* if they remained in the school district from the sixth grade to the 10th grade and *mobile* if they moved within the district during the seventh or eighth grades or ninth or 10th grades.

Furthermore, student mobility can also be categorized based on who initiates the change, the context, and the timing (Rumberger, 2015; Welsh, 2017). Timing of change can occur during the academic year or between the academic years (Rumberger, 2015). Summer moves occur between academic years and are usually associated with regular promotion or strategic moves during the summer months (Rumberger, 2015). Mid-year or academic year moves occur during the school year from September to June (MSDE, 2016).

These categories describe the complexity of student transfers, but a more uniform categorization of student mobility can facilitate more precise comparisons. Uniform

categories can allow researchers to compare movers across schools, districts, and states. Perhaps stakeholders in policy, practice, and research can agree on consistent terms and definitions of the different types of mobile students to help various audiences grasp the importance of research and its implications on policy and practice.

One possibility is to use the terms the local school systems use. For example, the present study uses the term "transfer" to indicate a school change that is used by the Maryland State Department of Education and the Baltimore City Public Schools (BCPS, 2022a). A transfer student is also consistent with what schools use when referring to a mobile student.

In addition, the reasons for the move add to the variety of transfer terms, whether they are voluntary or involuntary (Rumberger, 2015). Unfortunately, administrative data provide limited information regarding the reasons for the move. The current study aims to establish a baseline using a longitudinal secondary data analysis.

Summary

Student transfer is related to high school graduation and post-secondary enrollment; however, student mobility research needs a clear and consistent classification to allow comparisons among groups and schools across districts and states. Although some studies show harmful effects of student mobility on math scores for certain students in particular grades (Swanson & Schneider, 1999), while others do not (Selya et al., 2016). Statistically significant student-level characteristics related to moving and high school graduation are race (Asian, Black, and Hispanic) and gender (Rumberger & Larson, 1998), ninth-grade credits, eighth-grade test scores, social/academic background

(Ready et al., 2013), suspension, and receiving public assistance (Metzger et al., 2015). Although there is now an 8-point difference between women and men in post-secondary education, it is mainly because high-income families invest heavily in their daughters' education (Bailey & Dynarski, 2011)

Moreover, the research strengths on post-secondary enrollment and student mobility show the continuing effects of high school inequities on college entry (Bailey & Dynarski, 2011; Niu & Tienda, 2012; Sutton et al., 2013). For example, SES and gender are factors, among others, that are associated with whether high school students can enroll in college (Bailey & Dynarski, 2011; Niu & Tienda, 2012; Sutton et al., 2013). In addition, well-resourced high schools offer AP courses and many extracurricular options for students compared to under-resourced communities (Niu & Tienda, 2012).

Gaps in Research

As demonstrated by the limited number of studies reviewed above, further research is needed to explore the effects of student mobility on high school graduation and post-secondary enrollment. Notably, researchers have not investigated the time to the event of a transfer and how it relates to student- and school-level characteristics. This research necessitates a longitudinal analysis of secondary administrative data. Additional research is needed to test student-level characteristics within school-level contextual factors that influence educational outcomes. Because educational policies generally fail or succeed at the school level (Bryk et al., 2010; Payne, 2008; Warren & Mapp, 2011), a closer examination and better understanding of the effect of student transfer is warranted. Furthermore, given that the disparities in college enrollment are but a reproduction of the inequities in secondary education, it would be helpful to know which school-level factors

are associated with adverse educational outcomes. The following section offers a theoretical framework for the present study.

Theoretical Framework: Reproduction and Resistance

"Any significant problem involves conditions that for the moment contradict each other" (Dewey, 1968, p. 3). Dewey's words capture the contradiction that frames the theoretical underpinnings of this transfer study. The first theory, reproduction theory, depicts reproduction in education; schools reproduce social hierarchies (Bourdieu & Passeron, 2000; Bowles & Gintis, 2011). The second, a theory of resistance submits schools as ideological battlegrounds where students assert themselves against the educational institution's rules and codes of conduct upon gaining a sense of agency (Giroux, 1983).

According to Bowles and Gintis (2011), schools promote inequality; they reproduce social rankings rather than a potential force for democracy. Moreover, because schools are nested within a hierarchical industrial system, they are designed to reproduce workers for such a system (Willis, 1977). Thus, schools are structurally unable to produce equality because public education aims to produce a workforce at different strata of the capitalist system (Willis, 1977).

Schools reproduce in three ways: first, they create social categories that track various strata in the workforce, e.g., laborers, service workers, and professionals (Giroux, 1983). Next, schools reproduce the accompanying culture, knowledge, and language to facilitate one's membership within the hierarchy (Giroux, 1983). Finally, schools are an

extension of the state that legitimizes the economic rationale for such reproduction (Giroux, 1983).

Student characteristics may create competing social categories, e.g., males vs. females, Black vs. White vs. Other Races, students receiving special education services vs. general education students, and eligible for free and reduced meals vs. non-FARMS-eligible students, and so on. In addition, hierarchies may extend to school characteristics; for example, schools with higher percentages of FARMS-eligible students than schools with lower percentages of non-FARMS-eligible, smaller schools with bigger school sizes, and low to high suspension rates.

These categories and hierarchies produce other social hierarchies: high school graduates and non-graduates, college entrants, and noncollege entrants. All four categories combined translate into an ordinal variable consisting of non-graduates, high school graduates, noncollege entrants, and college students. The business, public, and social sectors have opportunities for all of them, with the last category gaining the most options. Finally, high schools pride themselves on announcing their students' graduation and college acceptance rates, furthering the competition to produce the best and the brightest.

Challenging reproduction of social rankings and categories, resistance theory offers the role of human agency and understanding to analyze complex relationships between schools and a hierarchical society (Giroux, 1983). In addition, resistance theory provides a platform to examine dissent, battle, and opposition (Giroux, 1983). One of the tenets of resistance theory is that working-class students are not only a by-product of a

capitalistic market but are expected to defer to teachers and school leaders who, in turn, train them to behave accordingly to fit the workplace (Giroux, 1983). Schools accomplish this task by socializing students through courses, curricula, and cultures representing a stratified society's norms, values, and behaviors (Giroux, 1983). Moreover, schools are spaces where power structures are primarily asymmetrical; dominant groups tip power in their favor (Giroux, 1983). Given these inequalities, struggles continue in pockets of resistance (Giroux, 1983); for example, a student rejects their school's message to comply and assimilate by transferring schools.

However, this rejection is different from dissatisfaction with schooling, which leads to a complete withdrawal from education (Rumberger & Larson, 1998). Transfers are still hopeful that the student seeks to find another school to fit in. In addition, outside forces can cause school transfers, such as housing instability and economic insecurity, and more prominent economic and labor factors that force families to change schools.

Moving beyond and challenging reproduction theory, resistance theory offers the role of human agency and understanding to analyze complex relationships between schools and a hierarchical society (Giroux, 1983). Resistance theory provides a platform to examine dissent, struggle, and opposition (Giroux, 1983).

The present study evaluates the transfer event, arguably one of the fiercest battlegrounds between students, families, and schools, as each party tries to assert themselves. High schools are excellent places for students to assert themselves, challenging the rules and protocols they deem too stringent or oppressive. Here, student mobility translates as an exercise in human agency, a resistance to reproducing stratified

outcomes by schools. In this stage of human development, one expects adolescents to begin to assert themselves and test boundaries (Lerner & Du, 2010; Louw & Louw, 2014). However, student transfer is a double-edged sword that contradicts and struggles with the status quo, only to find oneself left behind academically at times. Unfortunately, many students change schools only to find that the rules they rejected also exist in their new schools.

While reproduction theory downplays the importance of human agency, resistance theory challenges schools' repressive markers (Giroux, 1983). Solórzano and Delgado Bernal (2001) classified resistance into different types, namely, reactionary behavior, self-defeating resistance, conformist resistance, and transformative resistance.

Reactionary behavior includes oppositional conduct that does not offer a critique of the school's oppressive conditions nor is the action motivated by social justice (Solórzano & Bernal, 2001). A student may transfer schools because of disruptive behavior without any connection to being oppressed or to seeking social justice. Self-defeating resistance recognizes human agency in the face of oppressive school situations; but demonstrates it through destructive behaviors (Solórzano & Bernal, 2001). In this category, students transfer schools as a protest against perceived harsh and rigid school rules and regulations; but without the awareness and purpose of creating a socially just educational institution. In the third type, students show conformist resistance when they strive for social justice but achieve it using approaches that do not critique oppression (Solórzano & Bernal, 2001). This type of resistance applies to transfers when reasons for the move are assigned to individuals, pathologies, or families, instead of changing structures and social conditions that reproduce inequities. Examples of this type of resistance may

include direct social and educational services to assist students to cope but not question or challenge institutional policies and practices that promote oppression (Solorzano & Bernal, 2001). Finally, transformational resistance refers to student actions that evaluate social oppression while motivated to achieve social justice (Solorzano & Bernal, 2001). An example of this type of resistance is the Social Justice Education Project (SJEP), a youth participatory action research (YPAR) project in Tucson, Arizona (Cammarota & Fine, 2010). Participating students in the SJEP chose and analyzed immigration policies because of their lived experiences and they further examined microaggressions and discrimination they experienced as Latinas and developed greater awareness about the institutional and societal conditions that bar them from educational and economic opportunities (Cammarota & Fine, 2010). Becoming engaged as both researchers and subjects, the students gained knowledge and understanding about their school and its many dimensions including teacher effectiveness, student-teacher relationships, school climate, service learning, school safety, and pedagogy, among others (Cammarota & Fine, 2010). The students' active engagement may have served as a protective factor against transferring schools as they confronted and wrestled with the challenges they faced at their school. In this YPAR project, the students developed agency, found more effective ways of coping, and improved their well-being.

The current study explores the fit of this theoretical framework to transfers, related student and school characteristics, and the effects of all of these on high school graduation and college entry.

CHAPTER 3: METHOD

The researcher requested a fully incorporated, de-identified data set from the Maryland Longitudinal Data Systems (MLDS), a state government agency created to provide information to assist policymakers and the public. The present study used administrative data from the Maryland State Department of Education (MSDE) and the Maryland Higher Education Commission (MHEC). MLDS uses state-of-the-art data management and data integration proficiency to provide technically reliable datasets for research projects. MLDS maintains an integrated longitudinal archival data for Maryland students. The current study will examine students enrolled as first-year high school students in School Year 2012-2013 to the first-year college in School Year 2017-2018.

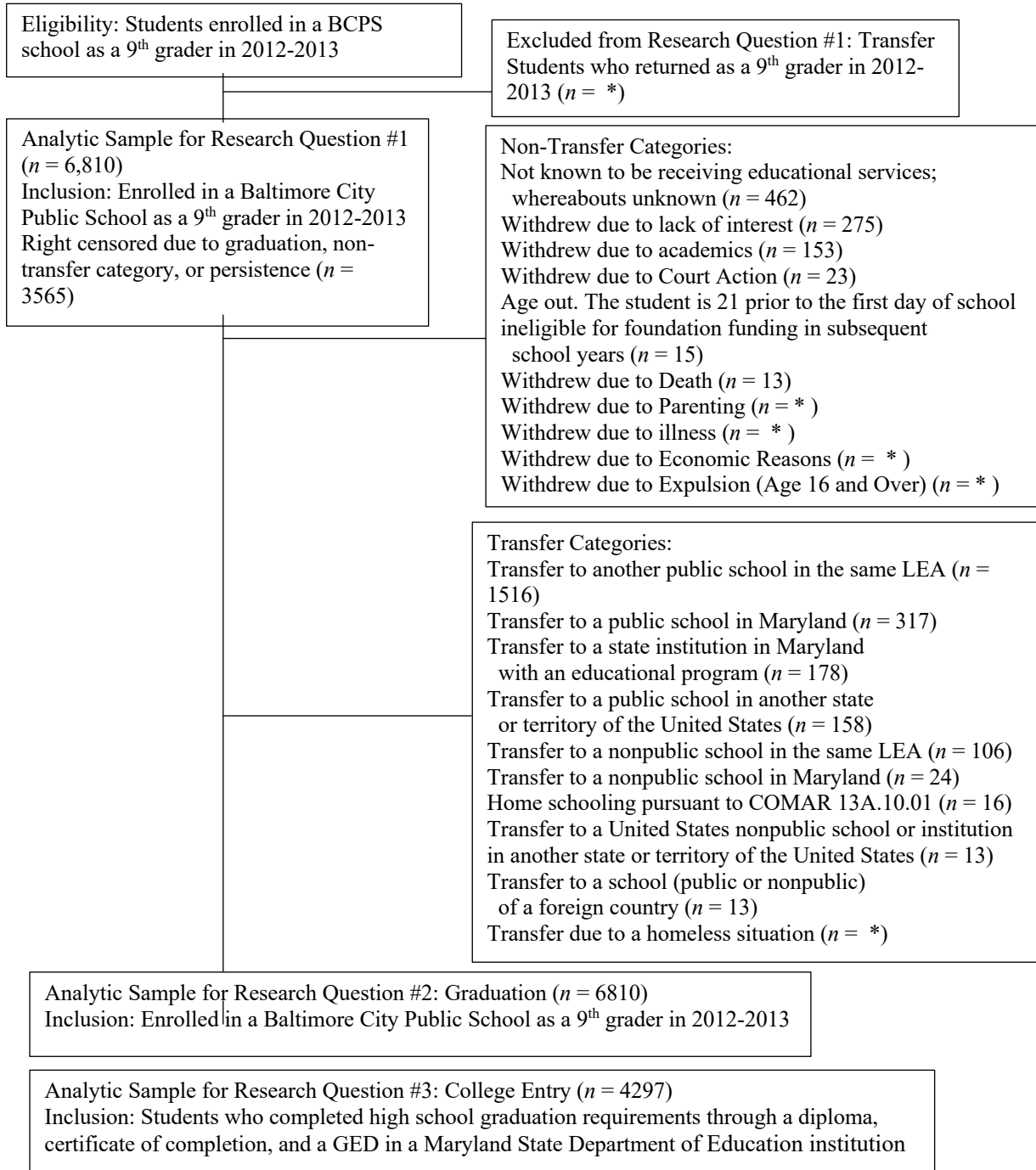
Sample Selection

Data and Cohort

The present study followed a cohort of 9th-grade students in public high schools in Baltimore City commencing their secondary education in School Year 2012-2013. This study examined student transfers, high school graduation, and college enrollment between school years 2012-2013 and 2017-2018 in Baltimore City, Maryland, USA. In addition to each student's characteristics, the study included each school's ninth-grade characteristics. The study identified the student's first or initial record of changing schools as 'time to the event.' The survival analysis censored students who did not change schools after four years (Years 1-4) in high school. The subsequent analysis examined whether students graduated from high school and entered college (Years 5 & 6). See Figure 1: CONSORT Diagram for study sample selection.

Figure 1. CONSORT (Consolidated Standards of Reporting Trials) Diagram for Selection of Study Sample

Selected population: Baltimore City Public School (BCPS) students who are *first time* 9th graders in the School Year 2012-2013, and/or completed secondary education, and/or enrolled in a postsecondary institution through the School Year 2017-2018



Note: *Sample sizes were suppressed per MLDSC data reporting requirements. This flowchart was adapted from the CONSORT Group (Moher, Shulz, & Altman, 2001). Journals publishing the original CONSORT flowchart have waived copyright protection.

The author selected the School Year 2012-13 9th Grade cohort to minimize the effect of the Great Recession, which took place beginning December 2007 to June 2009, when residential mobility was at its highest (Mordechay, 2018), and to ensure that student eligibility in the free and reduced meals program (FARM), a widely used measure for a child's poverty status, is measured consistently throughout the study. Baltimore City Public Schools and other school districts in Maryland stopped collecting FARM forms from students and parents in School Year 2015-16 (MSDE, 2016).

Measures

The first part of this section describes MLDS standards for reporting, followed by descriptions of dependent and independent variables chosen from past student mobility research related to academic achievement, high school graduation, and enrollment in postsecondary education.

Compliance to MLDSC Data Reporting

The author tabulated categorical variables by school to determine groups with cell sizes less than 10, complying with MLDSC reporting standards. Student groups that failed to meet these reporting requirements were not reported descriptively but were included in the analysis, assuming that the model was not negatively affected due to small cell size.

Variables consisted of student- and school-level variables in the Maryland Longitudinal Data System. Student-level variables were comprised of gender, race, ethnicity, eligible students for free and reduced meals, students who received special education services, English-language learners, suspended, chronic absentees, employed,

changed schools, 8th-grade, and high school math test scores. School-level variables included school total enrollment, percentage of FARM-eligible students, suspension rate, percentages of special education and ELL students, and school transfer rate. The study's outcome variables are (a) changing schools, (b) graduation from high school, and college entry. Table 1 describes the study variables, levels of measurement, and response options and ranges.

Table 1: Study Variables, Measurement Level, and Response Options or Range

Factor	Measurement Level	Response Options or Range
Outcome Variables		
Transfer		Categorical (0 = No, 1 = Yes)
High School Graduation (2015-2016)		Categorical (0 = No, 1 = Yes)
Diploma		Categorical (0 = No, 1 = Yes)
Certificate of Completion		Categorical (0 = No, 1 = Yes)
GED		Categorical (0 = No, 1 = Yes)
College Enrollment (2016-2018)		Categorical (0 = No, 1 = Yes)
Remedial Math		Categorical (0 = No, 1 = Yes)
Remedial English		Categorical (0 = No, 1 = Yes)
Two-Year College		Categorical (0 = No, 1 = Yes)
Four-Year College		Categorical (0 = No, 1 = Yes)
Public Institution		Categorical (0 = No, 1 = Yes)
Private Institution		Categorical (0 = No, 1 = Yes)
In-State College		Categorical (0 = No, 1 = Yes)
Out-of-State College		Categorical (0 = No, 1 = Yes)
Employment Only		Categorical (0 = No, 1 = Yes)
Independent Variables		
<i>Student Characteristics (SY 2012-2013)</i>		
Female		Categorical (0 = Male, 1 = Female)
Black		Categorical (0 = Other, White 1 = Black)
White		Categorical (0 = Other, Black 1 = White)
Other Race		Categorical (0 = Black, White 1 = Other)
FARMS		Categorical (0 = No, 1 = Yes)
Special Ed		Categorical (0 = No, 1 = Yes)
English Language Learner		Categorical (0 = No, 1 = Yes)
Suspension		Categorical (0 = No, 1 = Yes)
Chronic Absentee		Categorical (0 = No, 1 = Yes)
Job in High School		Categorical (0 = No, 1 = Yes)
Eighth Grade Math Score		Continuous
Missing Eighth Grade Math Score		Categorical (0 = No, 1 = Yes)
<i>School or Cluster Characteristics (SY 2012-2013)</i>		
Total Enrollment		Continuous
School FARMS		% Eligible for FARMS

School Special Ed	% with Individual Development Plans
School English Language-Learners	% as ELLs
School Suspension	Total Suspensions, Continuous
School Transfer	% Transfer Students

Independent Variables

Level 1: Student Variables

The author examined student characteristics from MSDE records, including race, gender, and eligibility in the free and reduced meals program. These variables have been generally included in educational research (Fantuzzo et al., 2013; Ready et al., 2013; Uretsky, 2016). Student-level covariates included those with Individualized Educational Plans (IEP) and English language learners. Each model controlled for prior eighth-grade Mathematics scores (Swanson & Schneider, 1999). Finally, the study assessed student transfer, suspension, chronic absentee, and employment during high school as covariates.

Black (race_black). The researcher coded this dichotomous variable with Black or African American (1) and (0) for White and Other Races. Black is the reference group in this study.

White (race_white). This dichotomous variable was coded 1 for White and 0 for Black and Other Race.

Other (race_other). This dichotomous variable was coded 1 for subgroups that consist of (a) American Indian/Alaska Native, (b) Asian, (c) Native Hawaiian or Pacific Islander, and (d) Two or more races. Black and White are coded as 0.

Hispanic (hisp_eth). This dichotomous variable for ethnicity was coded 1 for Latino or Spanish Origin of any race and 0 for those who are not of Latino or Spanish Origin.

Female (female). This gender variable was dummy coded as a dichotomous variable indicating if a student is Male (0) or Female (1) only. Administrative data did not contain codes for "transgender" or "non-conforming."

Eligibility in free and reduced meal program (FARMs). This dichotomous variable (0 = No, 1 = Yes) classified students as eligible to receive Free and Reduced-Price Meals (FARMs) under the National School Lunch Program (MSDE, 2016a). Eligibility was determined based on annual household application or a direct certification through the following: Supplemental Nutrition Assistance Program (SNAP), children certified through a letter provided to the household by SNAP, Food Distribution Program on Indian Reservations (FDPIR), Medicaid, homeless children, Temporary Assistance to Needy Families (TANF), Head Start participants, Migrant youth, runaways, non-applicants approved by local area education agencies, and foster children (MSDE, 2016a).

Special education (special ed). This dichotomous variable (0 = No, 1 = Yes) indicated if the student had an IEP or Individualized Family Service Plan (IFSP) and received Special Education services. In addition, these variable excluded students who have exited the program within the past two years and not receiving Special Education services, students under Section 504, and students who have exited Special Education services and placed in Section 504 Code (MSDE, 2016a).

English language learner (ell). This dichotomous variable (0 = No, 1 = Yes) designated students for whom a language other than English as their primary home language; who had been evaluated as having partial or unable to comprehend, converse,

or read English; and are currently receiving ELL services, who refused ELL services, and who moved out of the US while receiving ELL services (MSDE, 2016a).

Suspension (hs_suspension_pre_transf). This dichotomous variable (0 = No, 1 = Yes) indicated if a student received an out-of-school suspension prior to his/her first transfer in high school (MSDE, 2016a).

Eighth grade math score (std_math_8g). A continuous variable, the standardized 8th-grade Mathematics score, provided a measure of the student's achievement level in math, whether basic, proficient, or advanced, as specified in the Maryland Content Standards (MSDE, 2021).

Missing eighth-grade math score (std_math_8g_miss). This dichotomous variable indicates if the 8th-grade math score is missing =1 or not missing = 0 (MSDE, 2021).

Chronic absentee (chronic_absentee). Baltimore City Public Schools (BCPS) states that a student who absents herself "five days a quarter or two days a month is at risk of becoming a chronic absentee"(BCPS, 2021a). For this study, a chronic absentee is a student with absences of 20 or more days in a school year prior to their initial high school transfer.

Transfer (transfer). This dichotomous variable (0 = No, 1 = Yes) indicates a student's initial transfer to another school beginning in the ninth grade. A school transfer occurs when a student leaves a school to enroll in another school. A high school student's parent, guardian, or caregiver can request transfer consideration to other schools if the

requested non-criteria school has available space. The school district approves all intra-district transfer requests for out-of-zone school placements and considers medical and childcare hardship, safety concerns, and entrance to a criteria school as circumstances for transfers (BCPS, 2021b).

Job in high school (job_in_hs_pre_transf). This dichotomous variable (0 = No, 1 = Yes) indicates whether students worked prior to their initial school transfer.

High school graduation (ach_grad). This variable is coded (1) if a student graduated with a Certificate of Completion, GED, or High School Diploma, and (0) if the student did not achieve one of the stated items.

Time variable for survival analysis (time_att_begin_dt). Date of last high school attendance minus beginning date of high school attendance, divided by 365.25 (days) and multiplied by 12 (months).

College enrollment (enter_college). This dichotomous variable (0 = No, 1 = Yes) indicates if a student enrolled in a postsecondary educational institution.

College enrollment in state (college_in_state). This dichotomous variable (0 = No, 1 = Yes) indicates if a student enrolled in a postsecondary educational institution in Maryland.

College enrollment in a two-year postsecondary educational institution (college_2y). This dichotomous variable (0 = No, 1 = Yes) indicates if a student enrolled in a two-year college.

College enrollment in a four-year postsecondary educational institution

(college_4y). This dichotomous variable (0 = No, 1 = Yes) indicates if a student enrolled in a four-year college or university.

College enrollment in a private postsecondary educational institution

(college_private). This dichotomous variable (0 = No, 1 = Yes) indicates if a student enrolled in a private college or university.

College Enrollment in a public postsecondary educational institution

(college_public). This dichotomous variable (0 = No, 1 = Yes) indicates if a student enrolled in a public college or university.

College remedial math (rem_mth). This dichotomous variable (0 = No, 1 = Yes) indicates if a student took a remedial course in mathematics in a postsecondary educational institution.

College remedial reading (rem_rdg). This dichotomous variable (0 = No, 1 = Yes) indicates if a student took a remedial course in reading in a postsecondary educational institution.

College remedial English (rem_eng). This dichotomous variable (0 = No, 1 = Yes) indicates if a student took a remedial course in English in a postsecondary educational institution.

Employment only after high school (job_only). This dichotomous variable (0 = No if participated in an Apprenticeship program, attended a two-year or four-year college; 1 = Yes) indicates if a student only worked after high school.

Level 2: School Variables

The investigator reviewed secondary school characteristics from MSDE data, including total school enrollment, total FARM-eligible students, and Special Education students, suspensions and English Language Learners counts.

Enrollment (total_enrollment). This continuous variable indicates the number of students enrolled in a particular high school in SY 2012-2013.

School suspension (school_suspension_total). A continuous variable indicating the school's total number of student suspensions in SY 2012-2013.

School farms (school_farms_percent). A continuous variable indicating the percentage of eligible students for the free and reduced meals program in SY 2012-2013.

School special education (school_speced_rate_sqrt). A continuous variable indicating the percentage of students who have Individual Educational Plans and receive special education services in SY 2012-2013.

School English language learners (school_ell_rate). A continuous variable indicating the percentage of students for whom a language other than English is their primary home language in SY 2012-2013 (MSDE, 2016).

School Transfer (school_transfer2_rate). A continuous variable indicating the percentage of initial school exits, not including those promoted in SY 2012-2013 (MSDE, 2019d).

Analytic Plan

This section explains the steps taken to address the research questions in this dissertation, which include data cleaning, addressing missing data, checking assumptions, and bivariate and multivariate data analysis. The investigator conducted data analysis when the Maryland Longitudinal Data Systems Center granted access to the administrative data using Stata statistical software, Release 15 of StataCorp LLC: College Station, TX, USA.

Data Cleaning

Upon IRB approval, the investigator reviewed administrative data for accuracy and clarity. The investigator then 1) transformed the data to create the variables selected above; 2) converted the data from long to wide format for use in Stata; 3) examined data for validity, accuracy, and completeness by scrutinizing if data were numerically consistent; if the numbers or dates were within permissible values; observed no duplication of data from the same student id; and that each column had accurate and discrete values or codes. The researcher then 4) evaluated data for missingness, outliers, adequate level-1 and level-2 sample sizes, and (5) merged data files into one master file.

Power

The author conducted an a priori power analysis using Stata 17 (Cohen et al., 2003; Stata, 2022) to determine the estimated sample size for a Proportional Hazard regression with a hazard ratio of .5 and an alpha of .05. The result indicated that the analysis required a sample size $n = 66$ to achieve a power of .80 (Stata, 2022).

Handling Missing Data

Missing values can occur on level- 1 and level- 2 data, especially in educational administrative data. For example, 15.7% of 8th-grade math test scores were missing (1071 students) in the study sample. Assuming that the values were missing at random, the author created a dummy variable equal to one (1) for the cases with missing 8th-grade test scores and zero (0) for non-missing values. The author then replaced missing 8th-grade scores with zeros and included the new dummy variable as a control variable in the model (Institute of Education Sciences National Center for Education Evaluation and Regional Assistance, 2021). The researcher treated missing data as data because a missing value may be a valuable predictor of the outcome variable (Cohen, Cohen, West, & Aiken, 2003; Tabachnik & Fidell, 2013).

To detect for attrition bias, the author compared the percentages of transfer students who have 8th grade math scores (16%) to whose scores are missing (16%) and found them to be equivalent. A Pearson Chi-Square Test of Independence [missing 8th grade math score ($X^2(1) = 0.12, p < .74$)] indicated no statistically significant association between transfer, the outcome of interest and missing 8th grade math score. However, subsequent Pearson Chi-square tests of independence on graduation [missing 8th grade math score ($X^2(1) = 166.01, p < .001$)] and college entry [missing 8th grade math score ($X^2(1) = 102.48, p < .001$)] show statistically significant associations with missing 8th grade math score. Table 2 shows the results of the Chi-Square Tests of Independence.

Table 2: Results of the Chi-Square Test of Independence for Categorical Outcome Variables and Missing 8th Grade Math Score (N=6810)

		Missing		Not Missing		X^2	p
		f	%	f	%		
Total		1071	16	5739	84		
Transfer	Yes	358	16	1949	84	0.12	0.74
	No	713	16	3790	84		
Graduate	Yes	489	11	3808	88	166.01	0.000
	No	582	23	1931	77		
Enter College	Yes	207	9	2016	91	102.48	0.000
	No	864	19	3723	81		

Checking Assumptions

The present study employs two methodological approaches: the Parametric Proportional Hazard Model with Weibull distribution and Multilevel Logistic Regression. The Parametric PH Model assumes that the mean of the study sample accurately represents the center of the distribution and that the sample size is sufficient (Cleves, Gould, & Marchenko, 2016). In addition, this survival model also assumes that the skewness, kurtosis, and the presence of outliers fit the selected distribution (Cleves et al., 2016).

The Parametric Proportional Hazard Model with Weibull distribution is robust to highly skewed and highly kurtotic data (Cleves et al., 2016; StataCorp, 2021) and assumes proportional hazard ratios (Cleves et al., 2016; Hess, 1995; National Cancer Institute, 2022; StataCorp, 2021). The author tested the proportionality by graphing the survival curves of various student categories, e.g., Black, and White students, chronic absentees, and non-chronic absentees. Survival curves indicated proportionality and did not cross each other (Cleves et al., 2016; StataCorp, 2021).

The author also assessed the assumptions of the multilevel binary logistic regressions. The regressions require that the dependent variable is binary, that the data are independent, and not multicollinear (Cohen et al., 2003; UCLA Statistical methods and data analytics, 2022). In addition, the models assume the linearity of independent variables and log odds, and large sample size (Cohen et al., 2003; UCLA Statistical methods and data analytics, 2022). The models met all assumptions. However, observations are interdependent in the present study since they involve N participants equaling 6810 9th-grade students (Level- 1 units) from 44 schools and programs (Level- 2 units). Thus, students within a particular school functioned similarly to other schools (Sommet & Morselli, 2017). In multilevel logistic regression, having student- and school-levels imply that the (log-) odds that the outcome variables, such as graduation and college entry, are equal to one (1) rather than zero will be permitted to vary between schools. First, there will be a difference between the fixed intercept, the average log-odds that any of the outcome variables above will equal to one (1) in the total sample, and the random-intercept variance, the variation of the log-odds from one school to another (Sommet & Morselli, 2017). Next, the effect of student-level variables on the (log-) odds that any of the outcome variables will equal one (1) rather than zero will be allowed to vary between schools. Specifically, the fixed slope, the average effect of the student-level variable in the total sample, will differ from one school's random slope variance (Sommet & Morselli, 2017).

Data Analysis by Research Question

Given that educational data is hierarchal, students select their schools, and their school environments influence their academic performance (Ma, Ma, & Bradley, 2008;

Raudenbush & Bryk, 2002), students are no longer independent when grouped into schools. Therefore, in identifying student and school characteristics related to transfer, graduation, and college entry, the study required a multilevel model to account for students' nestedness within schools (Raudenbush & Bryk, 2002). Employing a two-level model, the author used two methods to analyze the research questions: first, a mixed-effects parametric proportional hazard model to determine the hazard rates of transfer of various student categories and school characteristics; and second, multilevel binary logistic regressions to examine student- and school-level factors associated with high school graduation and college entry.

Moreover, the study includes two corollary questions to determine if transferring varies across schools related to graduation and entering college. Again, multilevel modeling calculates the magnitude of the transfer variation between level 2 clusters (Raudenbush & Bryk, 2002). In addition, the study employs a random intercept model to address the corollary questions while ensuring that explanatory variables are fixed (Raudenbush & Bryk, 2002). Finally, school-level characteristics are based on the students' school entered in 2012-13.

Research Question 1. Which student and school characteristics are associated with school transfer risk after entering the 9th grade?

Mixed-effects parametric survival analysis examines the occurrence of a school transfer and timing with high school students in Baltimore City beginning in the ninth grade. This method addresses student and school characteristics and their relationship to the hazard risk of transferring schools. The study period began on the students' first day

of high school and ended when a student transfer occurred; observation of the student stopped when a student changed schools (Chimka, Reed-Rhoads, & Barker, 2007; Cleves et al., 2016; StataCorp, 2021). A student was at risk of transferring schools at the beginning of the study period and may have transferred anytime during high school. Some students changed schools early in their high school years (first- and second year), while others changed schools during the latter years. The study period was limited to four years, translating into 1461 days, and ended before some students changed schools. In survival analysis, the observation of non-mobile students ends when the study period concludes. Non-mobile students were (right) censored, which describes an incomplete event because of time study restrictions (Chimka et al., 2007; Cleves et al., 2016; Rabe-Hesketh & Skrondal, 2012b).

Mixed-effects parametric survival models require level 1 units to be nested in level 2 units and include fixed and random effects appropriate for students nested in schools because students share school-level random effects (Cleves et al., 2016; StataCorp, 2021). The researcher employed three models: a multilevel null model, a model with student-level predictors, and a two-level model adding school-level predictors. Survival models require the creating variables $_{t0}$, $_{t}$, and $_{d}$, which correspond to a time of entry $t0$, and end time, t , resulting in a transfer ($d = 1$) or being right censored ($d = 0$) at time t (StataCorp, 2021). In addition, Akaike's Information Criterion (AIC) and the Bayesian Information Criterion (BIC) were calculated after each model to measure model fit (Cohen et al., 2003).

Research Question 2. To what extent are school transfer and other factors associated with the odds of high school graduation? Does the magnitude of the effect of school transfer on graduation vary across schools?

To analyze this two-part question, the author employed a two-level binary logistic regression model to assess the odds of graduation. The investigator combined obtaining a high school diploma, a Certificate of Completion, and a Graduate Equivalency Degree (GED) into a variable 'ach_grad' to indicate that the student met graduation requirements.

The researcher employed five models: (1) a multilevel null model, (2) a model with student-level predictors, (3) a two-level model with student- and school-level predictors, (4) a two-level model with student- and school-level predictors with level 1 and level 2 transfer variables, and (5) a two-level model with student- and school-level predictors with transfer variables with an unstructured covariance, i.e., not imposing any patterns or constraints on the values.

An intra-class correlation (ICC) was computed after each model to determine the variance in the dependent variable that can be attributed to differences between schools. With a level 2 sample of 44 schools, the analysis has a sufficient sample size to produce unbiased estimates of coefficients, variances, and standard errors (Maas & Hox, 2005). In addition, Akaike's Information Criteria (AIC) and the Bayesian Information Criteria (BIC) were calculated after each model to measure model fit (Cohen et al., 2003).

Research Question 3. To what extent are school transfer and other factors associated with odds of college entry? Does the magnitude of the effect of school transfer on college entry vary across schools?

The author employed a two-level binary logistic regression model to analyze this two-part question to assess the odds of entering college after completing high school requirements in four years, and employed five models: (1) a multilevel null model, (2) a model with student-level predictors, (3) a two-level model with student- and school-level predictors, (4) a two-level model with student- and school-level predictors with level 1 and level 2 transfer variables, and (5) a two-level model with student- and school-level predictors with transfer variables with an unstructured covariance, i.e., not imposing any patterns or constraints on the values.

With 4297 students and 43 schools and programs, the analysis has a sufficient sample size to produce unbiased estimates of coefficients, variances, and standard errors (Maas & Hox, 2005). An intra-class correlation (ICC) was computed after each model to determine the variance in the dependent variable that can be attributed to differences between schools. In addition, Akaike's Information Criteria (AIC) and the Bayesian Information Criteria (BIC) were calculated after each model to measure model fit (Cohen et al., 2003)

CHAPTER 4: RESULTS

This chapter reports the study's preliminary and primary results. Preliminary results consist of the quality and properties of the data that include measures of central tendency, predictors, reliability of outcomes, intercepts, and slopes. Preliminary results also include model assumptions and steps of building the models. Primary results address each research question.

Research Question 1

Preliminary Results

Descriptive Statistics. Table 2 provides the count, mean, and standard deviation, as well as skewness, kurtosis, and outliers. Variables were evaluated for heteroscedasticity by plotting graphs, e.g., school enrollment and school FARMs and verifying that the data do not have patterns (Tabachnik & Fidell, 2013). Variables such as Hispanic and school special education were transformed to address nonnormality by reducing skewness and kurtosis. In addition, the large study sample size ($N=6810$) mitigates the effects of high skewness and kurtosis (Tabachnik & Fidell, 2013). Outliers were in the analysis because they provide the actual data on school-level variables (Cohen et al., 2003). Moreover, to prevent overcontrolling variables, the investigator ensured that variables, e.g., suspension, employment, and chronic absentee (having 20 or more absences) are fixed before the student changed schools (Gelman & Hill, 2016; Morgan & Winship, 2012).

Table 3 describes the analytic sample for research question 1. Nearly half of the 6810 first-time ninth graders are female (48%) and the majority Black (88%). Eighty one percent are eligible for free and reduced meals (FARMs), and 19% receive special education services. Nineteen percent are chronically absent, which according to

Baltimore City Public Schools, are students who are absent 20 or more days in a school year prior to their first transfer.

Table 3: Descriptive Statistics on Transfer and Study Variables in Two-Level Model with Students Nested Within Schools

Variables	Count	Mean	SD	Skewness	Kurtosis	Outliers
Female	6810	.48	.50	.07	1.00	None
Black	6810	.88	.33	-2.30	6.31	None
White	6810	.09	.29	2.79	8.76	None
Other	6810	.03	.17	5.65	32.95	None
Hispanic	6810	.04	.18	5.08	26.77	None
FARMS	6810	.81	.40	-1.55	3.40	None
Special Ed	6810	.19	.39	1.56	3.44	None
ELL	6779	.02	.13	7.69	60.21	None
Std. 8th Grade Math Score	6810	-1.70e-09	.92	.55	4.72	Yes
Missing 8th Grade Math Score	6810	.16	.36	1.88	4.55	None
Chronic Absentee	6810	.19	.39	1.56	3.44	None
Suspension	6810	.18	.38	1.71	3.92	None
Job in High School	6810	.34	.47	.70	1.49	None
Transfer	6810	.34	.47	.68	1.46	None
School Enrollment	6810	816.25	440.51	.58	2.19	None
School Suspension	6722	53.40	72.28	1.79	4.70	Yes
School Transfer	6742	.17	.08	1.37	10.43	Yes
School_FARMS	6810	.76	.12	-1.62	8.31	Yes
School_Special Ed	6809	.41	.16	-.48	3.87	Yes
School_ELL	6809	.01	.03	2.37	7.35	Yes

About a fifth of the study cohort received a suspension prior to their initial transfer. In addition, a third held jobs during high school prior to their first school transfer. In addition, the mean school size is 816 students, and the mean school transfer is 17%.

Table 4 indicates the various characteristics of transfers in this cohort. Of the 6810 students in this ninth-grade cohort, 52% did not transfer, 47% transferred one to two times, and 39% changed schools during the academic year. A fifth of the cohort transferred in the first year (21%), with decreasing percentages in the subsequent years.

Table 4: Descriptive Statistics on Transfers

	<u>Sum</u>
Transfer	2307
Transfers (0)	3557
Transfers (1-2)	3253
Transfers (3+)	0
Transfer in 1st Year	1407
Transfer in 2nd Year	865
Transfer in 3rd Year	500
Transfer in 4th Year	246
Transfer after 4th Year	235
Mid Semester Transfer	2637

Bivariate Correlations. Table 5 presents the Point-Biserial Correlations, the association's direction, and strength between 'transfer,' a dichotomous variable, and each of the continuous variables in the study (Tabachnik & Fidell, 2013). The standardized 8th-grade math score ('std_math_8g' r_{pb} (6808) = the r_{pb} (-.16), $p < .001$) was negatively correlated with transfer. Total enrollment was negatively correlated with transfer ('Total enrollment' r_{pb} (6808) = the r_{pb} (-.09), $p < .001$) The percent of school FARMs was positively correlated with transfer ('school_farms_percent' r_{pb} (6808) = the r_{pb} (.08), $p < .001$). The school special education percentage was positively with transfer ('School_speced_rate_sqrt' r_{pb} (6807) = the r_{pb} (.17), $p < .001$). Finally, The English language learner rate was positively correlated with transfer ('school_ell_rate' r_{pb} (6807) = the r_{pb} (.07), $p < .001$).

Table 5: Point Biserial Correlation Results for Continuous Variables and Transfer in Two-Level Model with Students Nested Within Schools

	Transfer	Math Score	Enrollment	Susp.	FARMs	Special Ed	ELL
Transfer	1.00						
Math Score	-.16***	1.00					
Enrollment	-.09***	.42***	1.00				
Sch. Suspen.	.01	-.06***	.55***	1.00			
Sch. FARMs	.09***	-.45***	-.44***	.05***	1.00		
Sch. Special Ed	.19***	-.57***	-.59***	.10***	.65***	1.00	
Sch. ELL	.07***	-.15***	.00	.06***	.17***	.19***	1.00

*** $p < .001$

Table 6 shows a series of Chi-Square Tests of Independence was conducted to determine if there is a statistically significant relationship between transfer, 'transfer' and another categorical variable. The findings include a statistically significant relationship exists between transfer, ('transfer') and female ('female' $X^2(1) = 24.81, p < .001$). Females are less likely to transfer than males. A statistically significant relationship exists between transfer ('transfer') and Black students ('race black' $X^2(1) = 10.52, p < .001$). Black students are more likely to transfer than White students and students of other races. A statistically significant relationship exists between transfer ('transfer') and White students ('race white' $X^2(1) = 9.70, p < .01$). White students are less likely to transfer than Black students and students of other races.

In addition, a statistically significant relationship exists between transfer ('transfer') and eligibility in free and reduced meals program ('farms' $X^2(1) = 45.79, p < .001$). FARMs-eligible students are more likely to transfer than non-FARMs-eligible students. A statistically significant relationship exists between transfer ('transfer') and students receiving special education services ('special-ed' $X^2(1) = 41.84, p < .001$).

Students who receive special education services are more likely to transfer than non-special education students.

Table 6: Results of the Chi-Square Test of Independence for Categorical Student Variables and Transfer (N=6810)

		Transfer		Did not Transfer		X^2	p
		f	%	f	%		
Total		2307	34	4503	66		
Female	Yes	1018	31	2274	69	24.81	.000
	No	1289	37	2229	63		
Black	Yes	2066	35	3910	65	10.52	.001
	No	241	29	593	71		
White	Yes	181	28	458	72	9.70	.002
	No	2126	34	4045	66		
FARMS	Yes	1964	36	3524	64	45.79	.000
	No	343	26	973	74		
Special Ed	Yes	543	42	766	58	41.84	.000
	No	1764	32	3737	68		
ELL	Yes	52	48	57	52	9.43	.002
	No	2246	34	4424	66		
Missing 8 th -Gr.	Yes	358	33	713	67	0.11	.74
Math Score	No	1949	34	3790	66		
Suspension	Yes	469	39	724	61	19.08	.001
	No	1838	33	3779	67		
Chronic	Yes	676	52	634	48	227.53	.000
Absentee	No	1631	30	3869	70		
Job in H.S.	Yes	273	12	2010	88	736.57	.000
	No	2034	45	2493	55		

Furthermore, a statistically significant relationship exists between transfer ('transfer') and suspension ('suspension' $X^2(1) = 19.08, p < .001$). Students who received a suspension are less likely to transfer than students who did not receive a suspension. A statistically significant relationship exists between transfer ('transfer') and chronic absentee ('chronic_absentee' $X^2(1) = 227.53, p < .001$). Chronic absentees are more likely to transfer schools than nonchronic absentees. Finally, a statistically significant relationship exists between transfer ('transfer') and employment ('job_in_hs_pre_transf' $X^2(1) = 736.57, p < .001$). Employed students are less likely to transfer schools than non-employed students.

Primary Results

Multivariate Analysis. As a time-to-event variable, the hazard rate represents the instantaneous occurrence rate, which denotes the probability that a student would experience transfer at a particular time point given their characteristic or category (de Bono et al., 2020). Therefore, a hazard ratio < 1 can be interpreted as a "percent reduction in risk" (de Bono et al., 2020). To determine which survival model to use, Cleves et al. (2016) recommended examining the "underlying process that generated the failure times in [the] data and specifically about the possible shape of the hazard function" (p. 280). Observing the increasing student transfer hazard rates initially, then decreasing student transfer hazard between student categories later in the study period, the proportional hazard model with Weibull distribution was determined to best describe the transfer occurrences (Cleves et al., 2016). Although a non-parametric proportional hazard model, e.g., Cox regression, allows not to make any precise assumptions about the functional form of the transfer hazard rate, a parametric model was selected for the study because the parameters of the study can be specified ((Cleves et al., 2016; Kleinbaum & Klein, 2012; UCLA Institute for Digital Research & Education, 2021). Therefore, a mixed-effects parametric proportional hazard analysis was built using three models: (1) a null model, (2) a model with student-level predictors, and (3) a model with student- and school-level predictors (StataCorp, 2021). Table 7 shows the regression analysis results for each of the models.

Table 7: Parametric Proportional Hazards Regression Analysis on Transfer for Two-Level Model with Students Nested Within Schools

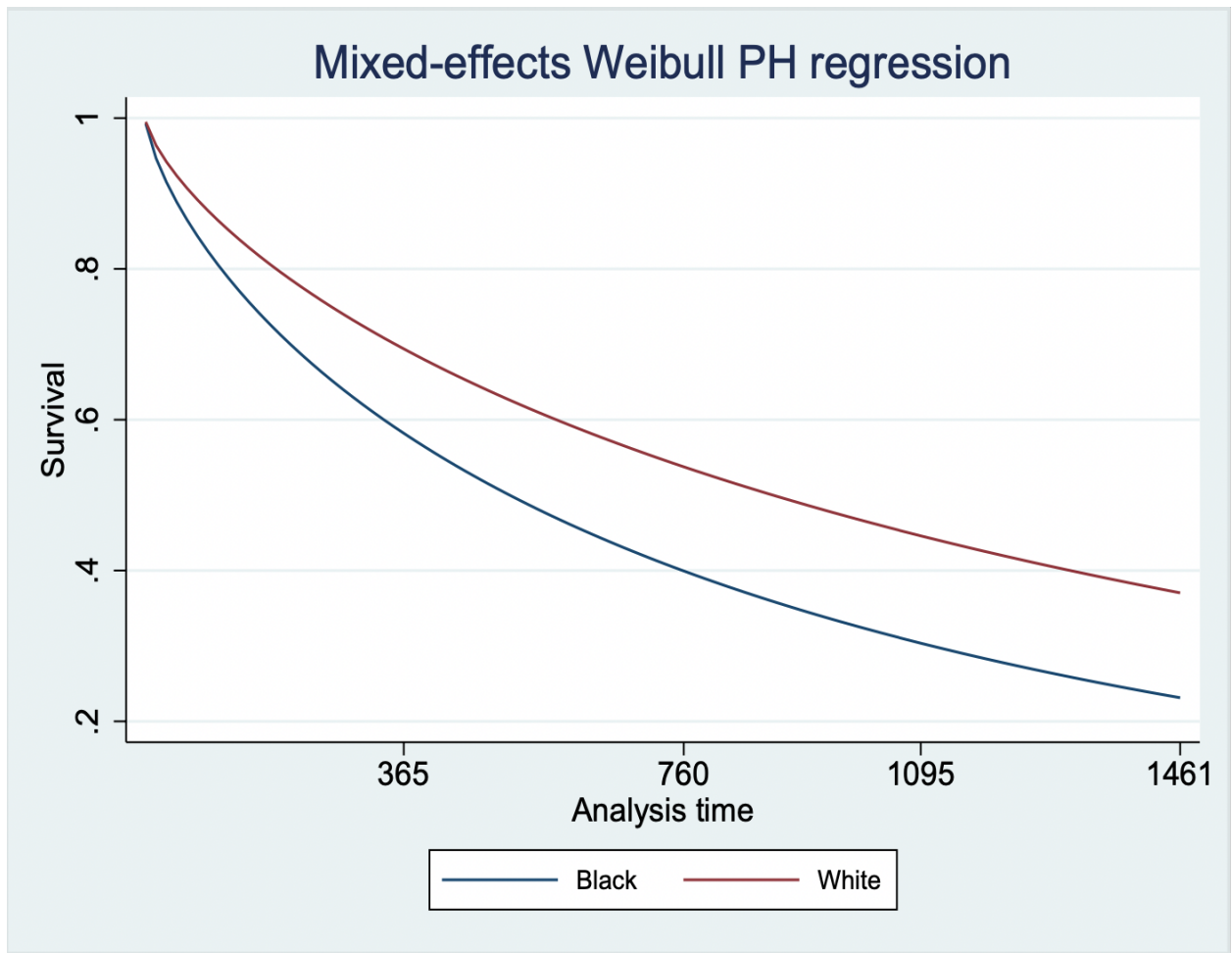
	Model 1	Model 2	Model 3
Transfer			
Female	1.05		1.05
	[0.96,1.15]		[0.96,1.15]
White	0.68***		0.67***
	[0.56,0.82]		[0.56,0.81]
Other	0.93		0.91
	[0.69,1.25]		[0.67,1.23]
Hispanic	0.91		0.91
	[0.67,1.24]		[0.67,1.24]
FARMs	0.96		0.99
	[0.85,1.08]		[0.88,1.12]
Special Ed	0.94		0.95
	[0.84,1.05]		[0.85,1.06]
ELL	1.40		1.40
	[0.99,1.98]		[0.98,1.99]
Standardized 8 th Grade	1.12***		1.11**
Math Score	[1.05,1.19]		[1.04,1.18]
Missing 8 th Grade	0.85*		0.86*
Math Score	[0.75,0.97]		[0.75,0.98]
Suspension	0.73***		0.73***
	[0.65,0.81]		[0.65,0.81]
Job in HS	0.26***		0.27***
	[0.23,0.30]		[0.23,0.31]
Chronic Absentee	1.64***		1.67***
	[1.48,1.82]		[1.51,1.86]
Total Enrollment			1.00
			[1.00,1.00]
School Suspension			1.00
			[1.00,1.00]
School FARMs			0.27**
			[0.12,0.61]
School Special Ed			2.10*
			[1.01,4.38]
School ELL			0.93
			[0.06,14.49]
ln_p	0.65***	0.72***	0.73***
	[0.63,0.68]	[0.69,0.75]	[0.70,0.76]
var(_cons[school_id])	1.06**	1.05*	1.04*
	[1.01,1.10]	[1.01,1.09]	[1.00,1.07]
N	3245	3234	3180

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Exponentiated coefficients; 95% confidence intervals in brackets

With a 32% reduction in transfer risk, the time to transfer was longer for White students than for Black students (hazard ratio of 0.68; 95% CI 0.56 to 0.82; $p < .001$) after adjusting for student-level variables. Controlling for student- and school-level factors resulted in a 33% reduction in the risk of transfer, i.e., the time to transfer was longer for White students than for Black students (hazard ratio of 0.67; 95% CI 0.56 to 0.81; $p < .001$). Figure 2 shows the transfer survival curves between Black and White students.

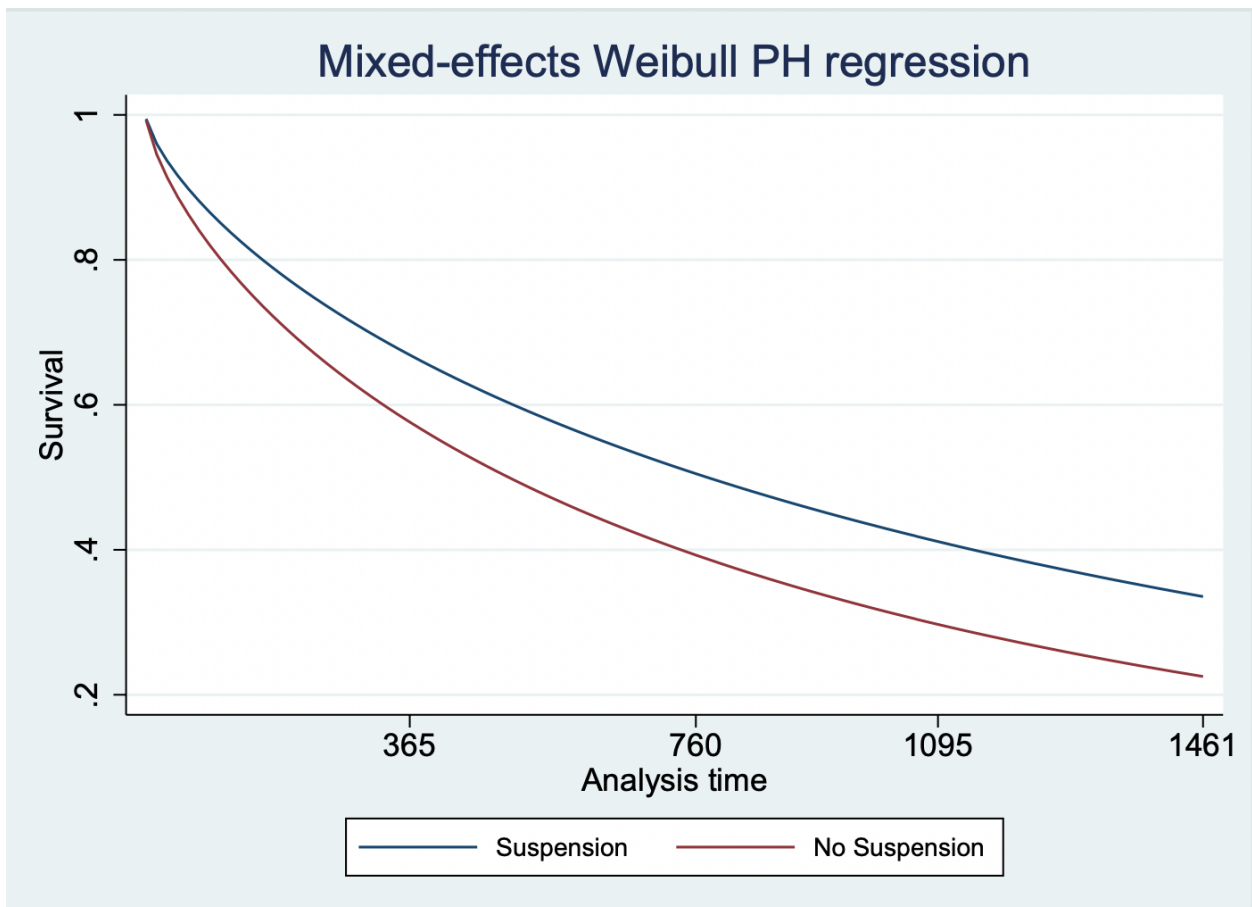
Figure 2. Transfer Survival Curves of Black and White Students



The y-axis indicates percentages of students who survived a transfer, and the x-axis indicates the four years of high school, the study period converted into days.

With a 27% reduction in transfer risk, the time to transfer was *longer* for students who received a suspension than for students who did not receive a suspension (hazard ratio of 0.73; 95% CI 0.65 to 0.81; $p < .001$) after adjusting for student-level variables. Controlling for student- and school-level factors resulted in the same 27% reduction in transfer risk, i.e., the time to transfer was *longer* for suspended students than for non-suspended students (hazard ratio of 0.73; 95% CI 0.65 to 0.81; $p < .001$). Figure 3 shows the transfer survival curves between suspended and non-suspended students.

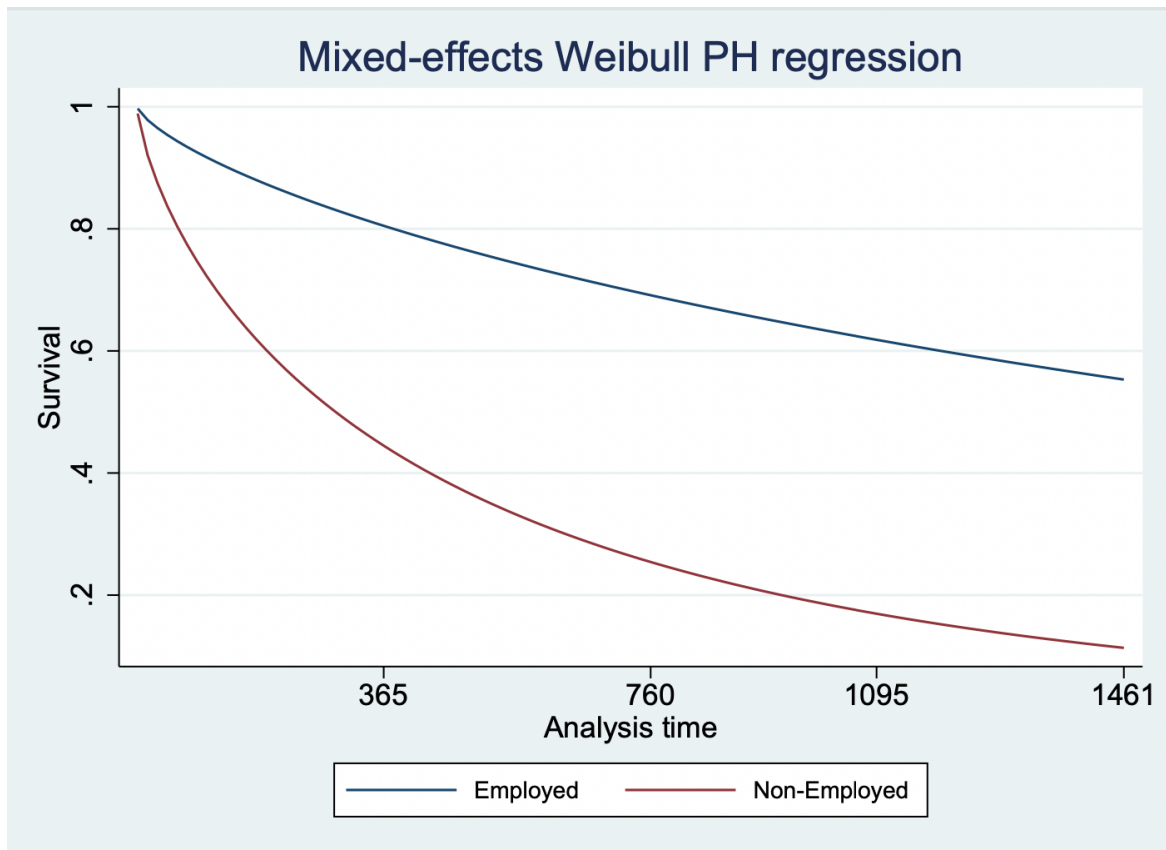
Figure 3. Transfer Survival Curves of Suspended and Non-Suspended Students



The y-axis indicates percentages of students who survived a transfer, and the x-axis indicates the four years of high school, the study period converted into days.

With a 74% reduction in transfer risk, the time to transfer was longer for *employed students* than for non-employed students (hazard ratio of 0.26; 95% CI 0.23 to 0.30; $p < .001$) after adjusting for student-level variables. Controlling for student- and school-level factors resulted in a 73% reduction in transfer risk, i.e., the time to transfer was longer for *employed students* than for non-employed students (hazard ratio of 0.27; 95% CI 0.23 to 0.31; $p < .001$). Figure 4 shows the transfer survival curves between employed and non-employed students.

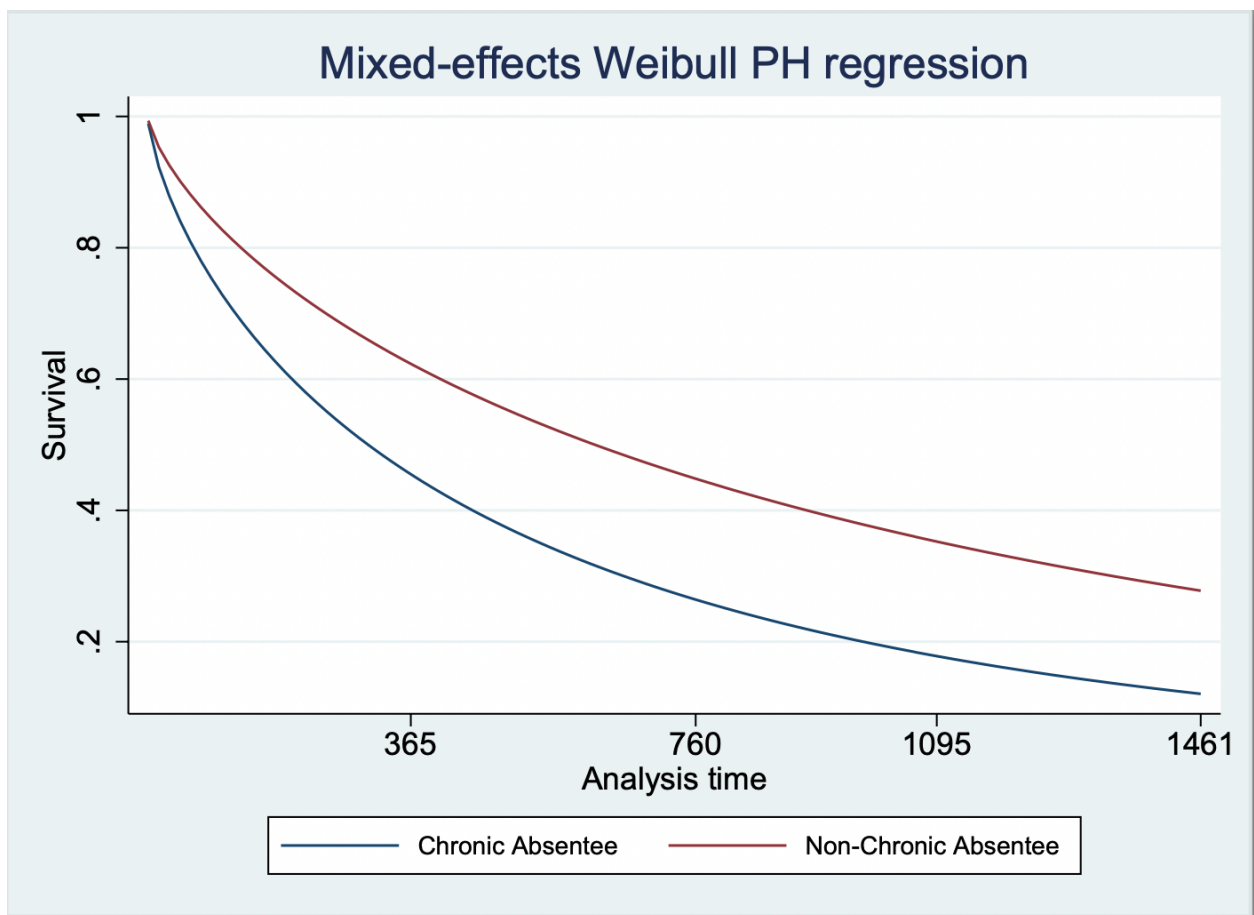
Figure 4. Transfer Survival Curves of Employed and Non-Employed Students



The y-axis indicates percentages of students who survived a transfer, and the x-axis indicates the four years of high school, the study period converted into days.

With 1.64 times the transfer risk, i.e., the time to transfer was significantly faster for chronic absentees than for nonchronic absentees (hazard ratio of 1.64; 95% CI 1.48 to 1.82; $p < .001$) after adjusting for student-level variables. Furthermore, controlling for student- and school-level factors resulted in 1.67 times the transfer risk, i.e., the time to transfer was significantly faster for chronic absentees than for nonchronic absentees (hazard ratio of 1.67; 95% CI 1.51 to 1.86; $p < .001$). Figure 5 shows the transfer survival curves between chronic and non-chronic absentees.

Figure 5. Transfer Survival Curves of Chronic and Non-Chronic Absentees



The y-axis indicates percentages of students who survived a transfer, and the x-axis indicates the four years of high school, the study period converted into days.

Furthermore, a standard deviation increase in the standardized 8th-grade math score corresponds to a 12% increase in transfer risk, adjusting for student-level variables (hazard ratio of 1.12; 95% CI 1.05 to 1.19; $p < .001$). Controlling for student- and school-level factors, a standard deviation increase in the standardized 8th-grade math score corresponds to an 11% increase in transfer risk (hazard ratio of 1.11; 95% CI 1.04 to 1.18; $p < .01$).

With a 15% reduction in transfer risk, the time to transfer was longer for students with missing 8th-grade math scores than students with 8th-grade math scores (hazard ratio of 0.85; 95% CI 0.75 to 0.97; $p < .05$) after adjusting for student-level variables. Controlling for student- and school-level factors resulted in a 14% reduction in the risk of transfer, i.e., the time to transfer was longer for students with missing 8th-grade math scores than students with 8th-grade math scores (hazard ratio of 0.86; 95% CI 0.75 to 0.98; $p < .05$).

In addition, one-percent increase in school FARMs corresponds to a 73% decrease in transfer risk, adjusting for student- and school-level variables (hazard ratio of 0.27; 95% CI 0.12 to 0.61; $p < .01$).

Finally, a one-unit increase in the square root of the school special education rate corresponds to twice the transfer risk, controlling for student- and school-level variables (hazard ratio of 2.10; 95% CI 1.01 to 4.38; $p < .05$).

Model Fit Indices. The Akaike's Information Criterion (AIC) and Bayesian Information Criterion (BIC) fit indices improved as the models progressed from the null

model (Model 1: AIC = 32429, BIC = 32447), the student model (Model 2: AIC = 31667, BIC = 31758), and finally to the two-level model (Model 3: AIC = 31209, BIC = 31330).

Research Question 2

Preliminary Results

Descriptive Statistics. Table 8 shows that 63% of the ninth-grade cohort graduated from high school. Most of the graduates obtained a diploma (59%) while the rest obtained a GED (3%) and certificates of completion (1%).

Table 8: Descriptive Statistics on High School Graduation and Study Variables in Two-Level Model with Students Nested Within Schools

Variables	Count	Mean	SD	Skewness	Kurtosis	Outliers
Graduate	6810	.63	.48	-.54	1.29	None
Certificate of Completion	6810	.01	.10	9.44	90.04	None
Diploma	6810	.59	.49	-.37	1.14	None
GED	6810	.03	.17	5.70	33.50	None

Bivariate Correlations. Table 9 shows point-biserial correlations which indicate associations between a binary outcome variable and continuous independent variables. Standardized 8th-grade math score, ('std_math_8g' $r_{pb} = .29, p < .001$), correlates positively with graduation ('ach_grad') and is statistically significant. School enrollment, ('total_enrollment' $r_{pb} = .23, p < .001$), correlates positively with graduation ('ach_grad') and is statistically significant. School suspension ('school_suspension_total' $r_{pb} = .03, p < .05$), correlates positively with graduation ('ach_grad') and is statistically significant. The percentage of school FARMS-eligibility ('school_farms_percent' $r_{pb} = -.20, p < .001$), correlates negatively with graduation ('ach_grad') and is statistically significant. School special education percentage ('school_speced_rate_sqrt' $r_{pb} = -.26, p < .001$), correlates negatively with graduation ('ach_grad') and is statistically significant. The percentage of

school English-language learners ('school_ell_rate' $r_{pb} = -.06, p < .001$), correlates negatively with graduation ('ach_grad') and is statistically significant. Table 8 indicates continuous variable associations with graduation.

Table 9: Point-Biserial Correlations for Continuous Variables and Graduation in Two-Level Model with Students Nested Within Schools

	Grad	Math Score	Transfer	School Enrollment	School Suspension	School FARMs	School Special Ed	School ELL	School Transfer
Graduate	1.00								
Math Score	0.29***	1.00							
Transfer	-0.22***	-0.16***	1.00						
School Enrollment	0.24***	0.42***	-0.11***	1.00					
School Suspension	0.03*	-0.07***	0.02	0.56***	1.00				
School FARMs	-0.23***	-0.47***	0.12***	-0.43***	0.03**	1.00			
School Special Ed	-0.28***	-0.58***	0.19***	-0.60***	0.10***	0.68***	1.00		
School ELL	-0.07***	-0.15***	0.08***	0.00	0.06***	0.17***	0.19***	1.00	
School Transfer	-0.24***	-0.42***	0.22***	-0.47***	-0.08***	0.42***	0.69***	0.16***	1.00

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

A series of Chi-Square Tests of Independence was conducted to determine if there is a statistically significant relationship between transfer and another categorical variable.

The findings are shown in Table 10.

A statistically significant relationship exists between graduation ('ach_grad') and female ('female' $X^2(1) = 115.44, p < .001$). Females are more likely to graduate than males.

Table 10: Results of the Chi-Square Test of Independence for Categorical Student Variables and High School Graduation (N=6810)

		Graduate		Did not Graduate		X^2	p
		f	%	f	%		
Total		4297	63	2513	37		
Female	Yes	2291	70	1001	30	115.4	0.000
	No	2006	57	1512	43		
Black	Yes	3782	63	2194	37	0.74	0.39
	No	515	62	319	38		
White	Yes	371	58	268	42	7.689	0.006
	No	3926	64	2245	36		
Other	Yes	144	74	51	26	9.959	0.002
	No	4153	63	2462	37		
Hispanic	Yes	141	59	96	41	1.37	0.24
	No	4156	63	2417	37		
FARMS-Eligibility	Yes	3397	62	2092	38	17.82	0.000
	No	900	68	421	32		
Special ed	Yes	688	53	621	47	77.30	0.000
	No	3609	66	1892	34		
ELL	Yes	50	46	59	54	13.98	0.000
	No	4222	63	2448	37		
Suspension	Yes	768	64	425	36	1.01	0.31
	No	3529	63	2088	37		
Chronic Absentee	Yes	270	21	1040	79	1.3e+03	0.000
	No	4027	73	1473	27		
Transfer	Yes	1113	48	1194	52	330.61	0.000
	No	3184	71	1319	29		
Missing 8 th Gr. Math Score	Yes	489	46	582	54	166.01	0.000
	No	3808	66	1931	34		
Job in H.S.	Yes	1476	65	807	35	3.56	0.06
	No	2821	62	1706	38		

A statistically significant relationship exists between graduation ('ach_grad') and White ('race_white' X^2 (1) =7.69, $p < .01$). White students are less likely to graduate than Black students.

A statistically significant relationship exists between graduation ('ach_grad') and Other races ('race_other' X^2 (1) =9.96, $p < .01$). Students of other races are more likely to graduate than Black students.

A statistically significant relationship exists between graduation ('ach_grad') and FARMS-eligibility ('farms' $X^2(1) = 17.82, p < .001$). FARMS-eligible students are less likely to graduate than non-FARMS-eligible students.

A statistically significant relationship exists between graduation ('ach_grad') and special education ('special-ed' $X^2(1) = 77.30, p < .001$). Students who receive special education services are less likely to graduate than non-special education students.

A statistically significant relationship exists between graduation ('ach_grad') and English language learners ('ell' $X^2(1) = 13.98, p < .001$). English language learners are less likely to graduate than non-English language learners.

A statistically significant relationship exists between graduation ('ach_grad') and chronic absentee ('chronic_absentee' $X^2(1) = 1.3e+03, p < .001$). Chronic absentees are less likely to graduate than nonchronic absentees.

Finally, a statistically significant relationship exists between graduation ('ach_grad') and transfer ('transfer' $X^2(1) = 330.61, p < .001$). Transfer students are less likely to graduate than non-transfer students.

Primary Results

Multivariate Analyses. The present study employed binary logistic and binary logistic odds ratio regressions to estimate the regression coefficient and the odds ratio corresponding to a one unit change in each of the study variables associated with graduation (Cohen et al., 2003; Minitab Express Support, 2022).

Multilevel binary logistic regression. The study employed multilevel binary logistic regression with five models: (1) a null model, (2) a model with student-level predictors, (3) a two-level model with student- and school-level predictors, (4) a two-level model with student- and school-level predictors with level 1 and level 2 transfer variables, and (5) a two-level model with student- and school-level predictors with transfer variables with an unstructured covariance, i.e., not imposing any patterns or constraints on the values. See Table 11 for regression results.

Table 11: Binary Logistic Regression Analysis on High School Graduation for Two-Level Model with Students Nested Within Schools

	Model 1	Model 2	Model 3	Model 4	Model 5
Graduate					
Female	0.44*** (0.06)	0.43*** (0.07)	0.42*** (0.07)	0.43*** (0.07)	0.43*** (0.07)
White	-0.80*** (0.13)	-0.81*** (0.13)	-0.86*** (0.13)	-0.86*** (0.13)	-0.86*** (0.13)
Other	-0.31 (0.21)	-0.30 (0.22)	-0.35 (0.20)	-0.36 (0.22)	-0.36 (0.22)
Hispanic	0.23 (0.21)	0.24 (0.21)	0.17 (0.21)	0.19 (0.21)	0.19 (0.21)
FARMs	-0.23** (0.08)	-0.21* (0.09)	-0.15 (0.09)	-0.13 (0.09)	-0.13 (0.09)
Special Ed	0.01 (0.08)	0.04 (0.08)	0.01 (0.08)	0.01 (0.08)	0.01 (0.08)
ELL	-0.13 (0.26)	-0.13 (0.26)	-0.02 (0.27)	-0.06 (0.27)	-0.06 (0.27)
Standardized 8 th Grade Math Score	0.54*** (0.05)	0.52*** (0.05)	0.50*** (0.05)	0.49*** (0.05)	0.49*** (0.05)
Missing 8 th Grade Math Score	-0.53*** (0.09)	-0.54*** (0.09)	-0.58*** (0.09)	-0.57*** (0.09)	-0.57*** (0.09)
Suspension	-0.18* (0.08)	-0.19* (0.08)	-0.11 (0.08)	-0.12 (0.08)	-0.12 (0.08)
Job in H.S.	-0.15* (0.07)	-0.17* (0.07)	-0.46*** (0.07)	-0.38*** (0.08)	-0.38*** (0.08)
Chronic Absentee	-2.042*** (0.09)	-2.049*** (0.09)	-1.88*** (0.09)	-1.74*** (0.10)	-1.74*** (0.10)
Total Enrollment		-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
School Suspension		0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
School FARMs		-0.56 (0.88)	-2.56* (0.89)	-0.06 (0.94)	-0.06 (0.94)

Table 11 continued

School Special Ed				-2.34**	0.01	-0.54
				(0.75)	(1.21)	(0.99)
School ELL				2.82	1.45	2.73
				(3.72)	(3.81)	(2.96)
Transfer					-0.86***	-0.89***
					(0.07)	(0.14)
School Transfer					-2.20***	-1.13***
					(1.56)	(1.29)
Chronic Absentee # Job in H.S.						-0.63**
						(0.22)
_cons	0.31*	1.13***	2.62**	3.71***	1.92**	
	(0.16)	(0.14)	(0.83)	(0.88)	(0.97)	
var(_cons[school_id])	1.36***	0.51***	0.36***	0.20***	0.478**	
	(0.30)	(0.13)	(0.10)	(0.09)	(0.161)	
var(transfer[school_id])					0.62**	
					(0.21)	
cov(transfer[school_id], _cons[school_id])					-0.64**	
					(0.22)	
<i>N</i>	6810	6779	6691	6637	6637	

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Adjusting for student-level factors, the regression slope for female is positive ($b_i = .44$, s.e.= .07, $p < .001$) and significant. The positive regression slope indicates that female students within schools have a greater likelihood of graduation than males within schools. Compared to males, the likelihood of graduation by females within schools is predicted to increase by .44. Finally, adjusting for the full model, females within schools continue to have a greater likelihood of graduation than males within schools ($b_i = .43$, s.e.=0.07, $p < .001$).

Adjusting for student-level factors, the regression slope for White is negative ($b_i = -0.80$, s.e.= .13, $p < .001$) and significant. The negative regression slope indicates that White students within schools are less likely to graduate than Black students. The model predicts that White students' likelihood of graduation decreases by .80 compared to Black students. This negative relationship holds in the final model ($b_i = -0.86$, s.e. = 0.13,

$p < .001$), which indicates that White students within schools have a lesser likelihood of graduating than Black students within schools.

The regression slope for FARMs-eligibility is negative ($b_i = -0.23$, $s.e. = 0.08$, $p < .01$) and significant, adjusting for student-level factors. Controlling for student- and school-level factors, the regression slope for 'FARM-eligibility' remains negative ($b_i = -.21$, $s.e. = 0.09$, $p < .05$). FARM-eligible students within schools are less likely to graduate than non-FARM-eligible students. However, when added transfer variables, this relationship does not hold in the full and final model.

Adjusting for student-level factors, the regression slope for standardized 8th grade math score is positive ($b_i = 0.54$, $s.e. = .05$, $p < .001$) and significant. The positive regression slope indicates that for every standard deviation increase in the standardized 8th-grade math score within schools, students' logits($Y=1$) of graduation are predicted to increase by .54. This positive relationship holds until the final model ($b_i = 0.49$, $s.e. = 0.05$, $p < .001$), which shows that for every standard deviation increase in the standardized 8th-grade math score within schools, students' logits($Y=1$) of graduation are predicted to increase by .49.

The regression slope for missing 8th-grade math score is negative ($b_i = -0.53$, $s.e. = .09$, $p < .001$) and significant. The negative regression slope indicates that students within schools who are missing 8th-grade math scores are less likely to graduate than those who have 8th-grade math scores. The model predicts students' likelihood of graduation within schools with missing 8th-grade math scores to decrease by .53 compared to students with 8th-grade math scores. This negative relationship holds until

the full and final model ($b_i = -0.57$, $s.e. = 0.09$, $p < .001$), indicating that students within schools who are missing 8th-grade math scores are less likely to graduate than those who have 8th-grade math scores.

Adjusting for student- and school-level variables, the regression slope for school special education is negative ($b_j = -2.34$, $s.e. = 0.75$, $p < .01$) and significant. The model predicts that every one-unit increase in the square root of the school special education percentage corresponds to a 2.34 decrease in the likelihood of graduation. However, this relationship does not hold when adding transfer variables and in the full and final covariance model.

The regression slope for the interaction between job in high school and chronic absentee is added in the full and final model, controlling for student- and school-level factors. The relationship is negative ($b_i = -.63$, $s.e. = 0.22$, $p < .01$) and is significant. The negative regression slope indicates that *non-employed* and chronically absent students within schools have a lesser probability of graduation than employed and nonchronically absent students within schools.

Controlling for student- and school-level factors, the regression slope for transfer is negative ($b_i = -.86$, $s.e. = 0.07$, $p < .001$) and significant. The negative slope indicates that students within schools who transfer are less likely to graduate than students within schools who do not transfer. Controlling for student- and school-level factors, this relationship holds in the full and final model ($b_i = -.89$, $s.e. = 0.14$, $p < .001$). Compared to non-transfer students within schools, transfer students within schools are less likely to graduate by a factor of .89.

Finally, in the full and final covariance model, the *variance of the slopes* is 0.62, s.e. = 0.21, $p < .01$, indicating that the magnitude of transfer related to graduation varies across schools.

Multilevel binary logistic odds ratio regression. In addition, the study employed multilevel binary logistic odds ratio regression with five models: (1) a null model, (2) a model with student-level predictors, (3) a two-level model with student- and school-level predictors, (4) a two-level model with student- and school-level predictors with level 1 and level 2 transfer variables, and (5) a two-level model with student- and school-level predictors with transfer variables with an unstructured covariance, i.e., not imposing any patterns or constraints on the values. These models assess the relationship between study variables and graduation. Table 12 shows study variables with statistically significant results.

Table 12: Odds Ratios for Binary Logistic Regression Analysis on High School Graduation for Two-Level Model with Students Nested Within Schools

	Model 1	Model 2	Model 3	Model 4	Model 5
Graduate					
Female		1.55*** [1.36,1.75]	1.53*** [1.35,1.74]	1.52*** [1.34,1.73]	1.54*** [1.35,1.75]
White		0.45*** [0.35,0.57]	0.44*** [0.35,0.57]	0.42*** [0.33,0.54]	0.43*** [0.33,0.55]
Other		0.73 [0.49,1.11]	0.74 [0.49,1.13]	0.70 [0.46,1.08]	0.70 [0.45,1.07]
Hispanic		1.262 [0.84,1.89]	1.27 [0.84,1.90]	1.19 [0.79,1.80]	1.22 [0.80,1.85]
FARMs		0.79** [0.67,0.94]	0.81* [0.69,0.96]	0.87 [0.73,1.03]	0.88 [0.74,1.04]
Special Ed		1.01 [0.86,1.19]	1.04 [0.88,1.22]	1.02 [0.86,1.20]	1.01 [0.86,1.19]
ELL		0.88 [0.53,1.46]	0.88 [0.53,1.47]	0.98 [0.58,1.65]	0.94 [0.56,1.58]
Standardized 8 th Grade		1.71***	1.69***	1.64***	1.63***
Math Score		[1.56,1.87]	[1.54,1.85]	[1.50,1.80]	[1.48,1.79]
Missing 8 th Grade		0.59***	0.58***	0.56***	0.56***
Math Score		[0.50,0.70]	[0.49,0.70]	[0.47,0.67]	[0.47,0.68]
Suspension		0.83* [0.50,0.70]	0.83* [0.49,0.70]	0.90 [0.47,0.67]	0.89 [0.47,0.68]

Table 12 continued

Job in HS		[0.71,0.97]	[0.71,0.97]	[0.76,1.05]	[0.76,1.05]
		0.86*	0.84*	0.63***	0.68***
Chronic Absentee		[0.76,0.98]	[0.74,0.96]	[0.55,0.73]	[0.58,0.80]
		0.13***	0.13***	0.15***	0.18***
Total Enrollment		[0.11,0.15]	[0.11,0.15]	[0.13,0.18]	[0.15,0.21]
			1.00	1.00	1.00
School Suspension			[1.00,1.00]	[1.00,1.00]	[1.00,1.00]
			1.00	1.00	1.00
School FARMs			[1.00,1.01]	[0.99,1.00]	[1.00,1.00]
			0.57	0.08*	0.94
School Special Ed			[0.10,3.20]	[0.01,0.62]	[0.09,9.39]
			0.10**	0.99	0.59
School ELL			[0.02,0.42]	[0.09,10.48]	[0.09,4.05]
			16.81	4.28	15.34
Transfer			[0.01,24774.7]	[0.00,653.2]	[0.05,5068.3]
				0.42***	0.41***
School Transfer				[0.37,0.49]	[0.31,0.54]
				0.11	0.32
Chronic Absentee #				[0.00,0.05]	[0.00,0.09]
Job in H.S.					0.53**
var(_cons[school_id])	3.89***	1.66***	1.43***	1.41***	2.21**
	[2.16,7.02]	[1.29,2.14]	[1.18,1.73]	[1.18,1.68]	[1.32,0.81]
var(transfer[school_id])					1.87**
cov(transfer[school_id], _cons[school_id])					[1.24,2.81]
					0.53**
					[0.34,0.82]
<i>N</i>	6810	6779	6691	6637	6637

Exponentiated coefficients; 95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Adjusting for student-level variables, the odds of graduation occurring for 'female' ($OR = 1.55$, 95% CI [1.36,1.75], $p < .001$) are approximately one and a half times or 1.55% of the odds of graduation than in males. The full and final model shows that female students' graduation odds ($OR = 1.54$ 95% CI [1.35,1.75], $p < .001$) remain at about one and a half times or 1.54% the odds of graduation than in males, controlling for student-and school-level covariates.

The odds of graduation among White students ($OR = 0.45$, 95% CI [0.35,0.58], $p < .001$) are about half or 45% of the odds of graduation for Black students, controlling

for student variables. The full and final model shows the odds of graduating for White students hold ($OR = 0.43$, 95% CI [0.32,0.55], $p < .001$) at 32% the odds of graduation for Black students, after controlling for student- and school-level covariates.

Controlling for student-level variables, FARM-eligible students' odds of graduation ($OR = 0.79$, 95% CI [0.67,0.94], $p < .01$), are more than half than those students who are not eligible for FARMs. Controlling for student- and school-level covariates, the odds of graduation for FARM-eligible students ($OR = 0.81$, 95% CI [0.69, 0.96], $p < .05$) is at 81% of the odds of graduation compared to non-FARM-eligible students. However, the odds of graduation for FARM-eligible students are not statistically significant with the addition of transfer variables in the full and final models.

Controlling for student-level variables, a one standard deviation increase in standardized 8th-grade math score ($OR = 1.71$, 95% CI [1.56,1.87], $p < .001$) increases the odds of graduation by more than one and a half times or 170%. Controlling for the school-level and transfer variables in the full and final model, a one standard deviation increase in the standardized 8th-grade math score ($OR = 1.63$, 95% CI [1.48,1.79], $p < .001$) increases the odds of graduation by more than one a half times or 163% the odds of graduation.

The odds of graduation among students with missing 8th-grade math score ($OR = 0.59$, 95% CI [0.50,0.70], $p < .001$) are more than half or 59% of the odds of graduation for students who have non-missing 8th-grade math scores, controlling for student-level variables. Adding and controlling for school-level and transfer variables, the odds of graduation among students with missing 8th-grade math scores ($OR = 0.56$, 95% CI

[0.47,0.68], $p < .001$) are more than half the odds of graduation for students who have non-missing 8th-grade math scores.

Adjusting for student-level covariates, the odds of graduation among students who receive a suspension ($OR = 0.83$, 95% CI [0.71,0.97], $p < .05$) is more than half the odds for students who do not have a suspension. The odds remained statistically significant with the addition of and controlling for school-level variables ($OR = 0.83$, 95% CI [0.76,1.05], $p < .05$). However, the relationship does not hold with the addition of transfer variables in the full and final models.

The odds of graduation among employed students during high school ($OR = 0.86$, 95% CI [0.76,0.98], $p < .05$) are 86% of the odds of graduation for non-employed students, adjusting for student-level covariates. Adding and controlling for school-level and transfer variables in the full and final model, the odds of graduation among employed students ($OR = 0.68$, 95% CI [0.58,0.80], $p < .001$) are about two thirds or 68% of the odds of graduation for non-employed students.

Adjusting for student-level covariates, the odds of graduation among chronically absent students ($OR = 0.13$, 95% CI [0.10,0.15], $p < .001$) are 13% of the odds of graduation for nonchronically absent students. Adding and controlling for school-level and transfer variables in the full and final model, the odds of graduation for chronic absentees ($OR = 0.18$, 95% CI [0.15,0.21], $p < .001$) increased slightly to 18% the odds of graduation of nonchronic absentees.

Controlling for student, school-level, and transfer variables, every unit increase in the school FARMs percentage ($OR = 0.08$, 95% CI [0.01,0.61], $p < .05$) decreases the odds

of graduation by 8% the odds of graduation of students who are not FARMs-eligible. However, the relationship does not hold final unstructured covariance model.

Controlling for student- and school-level variables, every one-percent increase in school special education ($OR = 0.10$, 95% CI [0.02,0.42], $p < .01$) decreases the odds of graduation by 10% the odds of graduation of students who are not receiving special education services. However, the relationship does not hold with the addition of transfer variables in the full and final covariance model.

The odds of graduation among transfer students ($OR = 0.42$, 95% CI [0.37,0.49], $p < .001$) are less than half or 42% of the odds of graduation for non-transfer students, controlling for student- and school-level covariates. The odds of graduation among transfer students ($OR = 0.41$, 95% CI [0.31,0.54], $p < .001$) decrease by less than half or 41% of the odds of graduation for non-transfer students, controlling for student- and school-level covariates in the full and final model.

The odds of graduation among *non-employed* and chronic absentees ($OR = 0.53$, 95% CI [0.35,0.81], $p < .01$), are half the odds of graduation of employed and *nonchronic* absentees, controlling for student-, school-level, and transfer variables in the full and final covariance model.

Model Fit Indices. The .29 Intraclass Correlation Coefficient (ICC) in the null model is considerably above .05 (Heck et al., (2014), the customary threshold that suggests more substantial proof of clustering at the school level (Crowson, 2020). The student model decreased the level 2 clustering to .13, then to .10 when school variables were added to the model. The ICC decreased slightly to .09 when transfer variables were

added in the fourth model. However, the ICC increased to .19 in the full and final unstructured covariance model indicating significant clustering at the school level.

Moreover, the Akaike's Information Criterion (AIC) and Bayesian Information Criterion (BIC) are 7700 and 7715, respectively. Using the maximum likelihood estimate, the AIC specifies the greatest share of variation in the model with the least number of parameters using the formula, $AIC = 2K - 2\ln(L)$, where K is the number of independent variables utilized and L is the log-likelihood estimate that the model could have yielded the observed y-values (Bevans, 2020). The AIC and BIC decreased to 6789 and 6885, respectively in the student model, then slightly decreased in the school and student model to 6678 and 6807, respectively. The model fit continued to improve when transfer variables were added to the model bringing the AIC to 6463 and the BIC to 6605. In the full unstructured covariance model, the AIC = 6406 and the BIC = 6569, indicating the best model fit.

Research Question 3

Preliminary Results

Descriptive Statistics. Table 13 shows that slightly more than half of the Maryland graduates entered college with 83% choosing to an in-state institution. More than a quarter attended a 2-year college while 24% chose a 4-year college or university. While 44% attended enrolled in a public college, only 8% enrolled in a private institution. Approximately a third of the graduates took remedial courses in English (32%), math (36%), and reading (29%).

Table 13: Descriptive Statistics on College Entry and Study Variables for Two-Level Model with Students Nested Within Schools

	Count	Mean	SD	Skewness	Kurtosis	Outliers
Enter College	4297	.52	.50	-.07	1.00	None
College in-State	2223	.83	.37	-1.77	4.12	None
2-Year College Enrollment	4297	.27	.45	1.02	2.04	None
4-Year College Enrollment	4297	.24	.43	1.20	2.43	None
Public College Enrollment	4297	.44	.50	.24	1.06	None
Private College Enrollment	4297	.08	.27	3.20	11.26	None
Remedial College English	4287	.32	.47	.76	1.58	None
Remedial College Math	4287	.36	.48	.60	1.36	None
Remedial College Reading	4289	.29	.45	.95	1.91	None
Job Only	4297	.48	.50	.07	1.01	None

Bivariate Analysis. Table 14 shows Point-Biserial correlations between college entry, a binary outcome variable and continuous independent variables. In this study, standardized 8th-grade math score, ($\text{std_math_8g } r_{pb} = .36, p < .001$), correlates positively with college entry (enter college) and is statistically significant. School enrollment (total enrollment $r_{pb} = .27, p < .001$), correlates positively with college entry (enter college) and is statistically significant. In addition, the total school suspension (school suspension $r_{pb} = -.04, p < .001$), correlates negatively with college entry (enter college) and is statistically significant. The percentage of school FARMs-eligibility, (school farms $r_{pb} = -.32, p < .001$), correlates negatively with college entry (enter college) and is statistically significant. The percentage of school special education (school special ed $r_{pb} = -.40, p < .001$), correlates negatively with college entry (enter college) and is statistically significant.

Finally, the percentage of school English-language learners (school ell $r_{pb} = -.11, p < .001$), correlates negatively with college entry (enter college) and is statistically significant. Finally, school transfer (school_transfer2_rate $r_{pb} = -.30, p < .001$) is negatively correlated with college entry, (enter college) and is statistically significant.

Table 14: Point-Biserial Correlations for Continuous Variables and College Entry for Two-Level Model with Students Nested Within Schools

	Enter College	Math Score	School Enrollment	School Suspension	School FARMs %	School Special Ed %	School ELL %	School Transfer %
Enter College	1.00							
Math Score	0.31***	1.00						
Total Enrollment	0.21***	0.42***	1.00					
School Suspension	-0.08***	-0.12***	0.50***	1.00				
School FARMs	-0.31***	-0.48***	-0.38***	0.11***	1.00			
School Special Ed	-0.38***	-0.60***	-0.61***	0.16***	0.73***	1.00		
School ELL	-0.12***	-0.18***	-0.05**	0.05**	0.23***	0.26***	1.00	
School Transfer	-0.30***	-0.46***	-0.49***	-0.03***	0.52***	0.70***	0.21***	1.00

Table 15 shows the results of a series of Chi-Square Tests of Independence that were conducted to determine a statistically significant relationship between 'enter_college,' a dichotomous variable, and another categorical variable.

Table 15: Results of the Chi-Square Test of Independence for Categorical Student Variables and College Entry (N=6810)

		Enter College		Did Not Enter College		X^2	p
		f	%	f	%		
Total		2223	52	2074	48		
Female	Yes	1334	58	957	42	82.88	0.000
	No	889	44	1117	56		
Black	Yes	1908	50	1874	50	20.84	0.000
	No	315	61	200	39		
White	Yes	194	52	177	48	0.05	0.82
	No	2029	52	1897	48		
Other	Yes	121	84	23	16	62.23	0.000
	No	2102	51	2051	49		
FARMs	Yes	1607	47	1790	53	127.32	0.000
	No	616	68	284	32		
Special Ed	Yes	193	28	495	72	183.98	0.000
	No	2030	56	1579	44		
ELL	Yes	17	34	33	66	6.30	0.000
	No	2189	52	2033	48		
Missing 8 th Gr. Math Score	Yes	207	19	864	81	102.48	0.000
	No	2016	35	3723	65		
Suspension	Yes	297	39	471	61	63.90	0.000
	No	1926	55	1603	45		
Chronic Absentee	Yes	90	33	180	67	39.06	0.000
	No	2133	53	1894	47		
Job in H.S.	Yes	880	60	596	40	56.01	0.000
	No	1343	48	1478	52		
Transfer	Yes	393	35	720	65	162.26	0.000
	No	1830	57	1354	43		

A statistically significant positive relationship exists between college entry ('enter_college') and female ('female' $X^2(1) = 82.89, p < .001$). Females are more likely to enter college than males.

A statistically significant negative relationship exists between college entry ('enter_college') and Black ('race_black' $X^2(1) = 20.84, p < .001$). Black students are less likely to enter college than White students and students of other races.

A statistically significant positive relationship exists between college entry ('enter_college') and other races ('race-other' $X^2(1) = 62.23, p < .001$). Students of other races are more likely to enter college than Black students.

A statistically significant negative relationship exists between college entry ('enter_college') and FARMs-eligibility ('farms' $X^2(1) = 127.32, p < .001$). FARMs-eligible students are less likely to enter college than non-FARMs-eligible students.

A statistically significant negative relationship exists between college entry ('enter_college') and special education ('special_ed' $X^2(1) = 6.30, p < .01$). Students who receive special education services are less likely to enter college than non-special education students.

A statistically significant negative relationship exists between college entry ('enter_college') and English-language learners ('ell' $X^2(1) = 13.98, p < .001$). English language learners are less likely to enter college than non-English language learners.

Furthermore, a statistically significant negative relationship exists between college entry ('enter_college') and suspension ('hs_suspension' $X^2(1) = 63.90, p < .001$). Students who received a suspension are less likely to enter college than students who did not receive a suspension.

A statistically significant negative relationship exists between college entry ('enter_college') and chronic absentee ('chronic_absentee' $X^2(1) = 39.06, p < .001$). Chronic absentees are less likely to enter college than nonchronic absentees.

A statistically significant positive relationship exists between college entry ('enter college') and employment ('job_in_hs_pre_transf' $X^2(1) = 162.26, p < .001$). Employed students are more likely to enter college than non-employed students.

Finally, a statistically significant negative relationship exists between college entry ('enter college') and transfer ('transfer' $X^2(1) = 162.26, p < .001$). Transfer students are less likely to enter college than non-transfer students.

Primary Results

Multivariate Analyses. The present study employed binary logistic and binary logistic odds ratio regressions to estimate the regression coefficient and the odds ratio corresponding to a one unit change in each of the study variables associated with college entry (Cohen et al., 2003; Minitab Express Support (2022)).

Multilevel binary logistic regression. The study employed multilevel binary logistic regression with five models: (1) a null model, (2) a model with student-level predictors, (3) a two-level model with student- and school-level predictors, (4) a two-level model with student- and school-level predictors with level 1 and level 2 transfer variables, and (5) a two-level model with student- and school-level predictors with transfer variables with an unstructured covariance, i.e., not imposing any patterns or constraints on the values. Table 16 shows regression coefficients associated with college entry.

Table 16: Binary Logistic Regression Analysis on College Entry for Two-Level Model with Students Nested Within Schools

	Model 1	Model 2	Model 3	Model 4	Model 5
Enter College					
Female		0.43*** (0.07)	0.42*** (0.07)	0.42*** (0.07)	0.42*** (0.07)
White		-0.62***	-0.67***	-0.66***	-0.64***

Table 16 continued

	(0.15)	(0.15)	(0.15)	(0.16)
Other	1.27***	1.19***	1.24***	1.26***
	(0.28)	(0.28)	(0.28)	(0.28)
Hispanic	-0.25	-0.23	-0.27	-0.30
	(0.25)	(0.25)	(0.25)	(0.25)
FARMs	-0.67***	-0.64***	-0.61***	-0.61***
	(0.09)	(0.09)	(0.09)	(0.09)
Special Ed	-0.55***	-0.46***	-0.47***	-0.46***
	(0.11)	(0.11)	(0.11)	(0.11)
ELL	-0.26	-0.21	-0.17	-0.16
	(0.38)	(0.38)	(0.38)	(0.38)
Standardized 8 th Grade	0.35***	0.32***	0.29***	0.29***
Math Score	(0.05)	(0.05)	(0.05)	(0.05)
Missing 8 th Grade	-0.11	-0.12	-0.17	-0.18
Math Score	(0.12)	(0.12)	(0.14)	(0.12)
Suspension	-0.44***	-0.43***	-0.40***	-0.42***
	(0.09)	(0.09)	(0.09)	(0.093)
Job in HS	0.28***	0.26***	0.15	0.14
	(0.08)	(0.08)	(0.08)	(0.08)
Chronic Absentee	-0.47**	-0.48***	-0.26	-0.26
	(0.15)	(0.15)	(0.16)	(0.16)
Graduate	0	0	0	0
	(.)	(.)	(.)	(.)
Total Enrollment		0.00	-0.00	0.00
		(0.00)	(0.00)	(0.00)
School Suspension		-0.00	-0.00	-0.00
		(0.00)	(0.00)	(0.00)
School FARMs		-1.72**	-1.50**	-1.55**
		(0.54)	(0.52)	(0.54)
School Special Ed		-2.28***	-2.11**	-1.69*
		(0.59)	(0.64)	(0.74)
School ELL		-1.06	-1.03	-1.11
		(1.76)	(1.56)	(1.58)
Transfer			-0.55***	-0.51***
			(0.09)	(0.12)
School Transfer			-1.46*	-1.62*
			(0.75)	(0.77)
_cons	-0.32**	0.24	2.58***	2.80***
	(0.12)	(0.13)	(0.45)	(0.41)
var(_cons[school_id])	0.64***	0.29***	0.03	0.01
	(0.16)	(0.09)	(0.02)	(0.02)
var(transfer[school_id])				0.23*
				(0.10)
cov(transfer[school_id]				-0.09
, _cons[school_id])				(0.05)
<i>N</i>	4297	4272	4226	4197

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Adjusting for student-level factors, the regression slope for female is positive ($b_i = .43$, $s.e. = .07$, $p < .001$) and significant. The positive regression slope indicates that female students within schools have a greater likelihood of college entry than males within schools. Compared to males, females' likelihood of college entry within schools is predicted to increase by .43. Finally, adjusting for student- and school-level factors in the full model, females within schools have a greater likelihood of college entry than males within schools ($b_i = .42$, $s.e. = 0.07$, $p < .001$).

Controlling for student-level factors, the regression slope for other races is positive ($b_i = 1.27$, $s.e. = .28$, $p < .001$) and significant. The positive regression slope indicates that students of other races (American Indian, Native American, Asian, Pacific Islander, and Two or more races) within schools have a greater likelihood of college entry than Black students within schools. Compared to Black students, students of other races' likelihood of college entry within schools is predicted to increase by 1.31. Finally, adjusting for student- and school-level covariates in the full model, other race students within schools, have a greater likelihood of college entry than Black students within schools ($b_i = 1.26$, $s.e. = 0.28$, $p < .001$) by a factor of 1.26.

Adjusting for student-level factors, the regression slope for standardized 8th grade math score is positive ($b_i = 0.35$, $s.e. = 0.05$, $p < .001$) and significant. The positive regression slope indicates that for every standard deviation increase in the standardized 8th-grade math score within schools, students' $\logit(Y=1)$ of college entry will increase by .35. This positive relationship holds until the final model ($b_i = 0.29$, $s.e. = 0.05$, $p < .001$), controlling for student- and school-level covariates, indicating that for every

standard deviation increase in the standardized 8th-grade math score within schools, students' logit($Y=1$) of college entry is predicted to increase by .29.

Adjusting for student-level factors, the regression slope for job in high school is positive ($b_i = .28$, $s.e. = .07$, $p < .001$) and significant. The positive regression slope indicates that employed students within schools have a greater likelihood of college entry than non-employed students within schools by a factor of .28. Furthermore, controlling for student- and school-level factors, employed students' likelihood of college entry within schools is predicted to increase by .26, compared to non-employed students. The regression slope remains positive ($b_i = .26$, $s.e. = .08$, $p < .001$). However, when adding transfer variables, this relationship does not hold in the full and final models.

Controlling for student- and school-level factors, the regression slope for White students is negative ($b_i = -0.62$, $s.e. = 0.15$, $p < .001$) and significant. The negative slope indicates that White students within schools are less likely to enter college than Black students within schools. This relationship holds until the full and final two-level covariance model ($b_i = -0.64$, $s.e. = 0.16$, $p < .001$), controlling for student- and school-level factors. Compared to Black students, White students are less likely to enter college by a factor of .64.

Controlling for student- and school-level factors, the regression slope for FARMs-eligible students is negative ($b_i = -.67$, $s.e. = .09$, $p < .001$) and significant. The negative slope indicates that FARM-eligible students within schools are less likely to enter college than non-FARM-eligible students within schools. This relationship holds in the full and final two-level covariance model ($b_i = -0.61$, $s.e. = 0.09$, $p < .001$). Compared to non-FARM-

eligible students, FARM-eligible students are less likely to enter college by a factor of .61, controlling for student- and school-level covariates in the full covariance model.

Controlling for student- and school-level factors, the regression slope for students receiving special education services within schools is negative ($b_i = -0.55$ s.e.=.11, $p<.001$) and significant. The negative slope indicates that Special Ed students within schools are less likely to enter college than non-Special Ed students within schools. This relationship holds in the full and final two-level covariance model ($b_i = -0.46$, s.e.=0.11, $p<.001$). Compared to non-Special Ed students, Special Ed students are less likely to enter college by .46, controlling for student- and school-level covariates in the full and final models.

Controlling for student- and school-level factors, the regression slope for students who have a suspension is negative ($b_i = -0.44$ s.e.=.09 $p<.001$) and significant. The negative slope indicates that suspended students within schools are less likely to enter college than students who do not have a suspension. This relationship holds in the full and final two-level covariance model ($b_i = -0.42$, s.e.=0.09, $p<.001$), controlling for student- and school covariates. Compared to non-suspended students, suspended students are less likely to enter college by a factor of .42.

Controlling for student-level factors, the regression slope for chronic absentee is negative ($b_i = -.47$, s.e.=0.15, $p<.001$) and significant. The negative slope indicates that students absent 20 or more days in a school year are less likely to enter college by .47 than students who are not chronically absent. This negative relationship remains after controlling for student- and school-level covariates ($b_i = -.48$, s.e.= 0.15, $p<.001$).

However, after adding transfer variables, this relationship does not hold in the full and final models.

Adjusting for student-level factors, the regression slope for school FARMs percent is negative ($b_j = -1.72$, $s.e. = 0.54$, $p < .01$) and significant. The negative regression slope indicates that for every unit increase in the percentage of school FARM-eligible students, students' logits($Y=1$) of college entry decrease by 1.72. This negative relationship holds until the final model ($b_j = -1.55$, $s.e. = 0.54$, $p < .01$), indicating that for every one percent increase in the school FARM-eligible students, students' logits($Y=1$) of college entry decreases by 1.48, controlling for student- and school-level covariates in the full and final model.

Adjusting for student-level factors, the regression slope for school special education is negative ($b_j = -2.28$, $s.e. = 0.59$, $p < .001$) and significant. The negative regression slope indicates that for every percent increase in the school special education, students' logits($Y=1$) of college entry decreases by 2.28. This negative relationship holds until the final model ($b_j = -1.69$, $s.e. = 0.74$, $p < .05$), which shows that for every percent increase in school special ed, students' logits($Y=1$) of college entry decreases by 1.69, controlling for student- and school-level covariates in the full and final model.

Controlling for student- and school-level factors, the regression slope for transfer is negative ($b_i = -0.55$, $s.e. = 0.09$, $p < .001$) and significant. The negative slope indicates that transfer students within schools are less likely to enter college than non-transfer students within schools. This relationship is significant in the full and final two-level covariance model ($b_i = -0.51$, $s.e. = 0.12$, $p < .001$). Compared to non-transfer students,

transfer students are less likely to enter college by a factor of .51, controlling for student- and school-level covariates.

Adjusting for student-level factors, the regression slope for school transfer is negative ($b_j = -1.46$, s.e. = 0.75, $p < .05$) and significant. The negative regression slope indicates that for every one-percent increase in school transfer, students' logits($Y=1$) of college entry decreases by 1.46. This negative relationship holds until the full and final model ($b_j = -1.62$, s.e. = 0.77, $p < .05$), indicating that for every percent increase in school transfer, students' logits($Y=1$) of college entry decrease by 1.62, controlling for student- and school-level covariates.

Finally, in the full and final model, the variance of the slopes is 0.23, s.e. = 0.10, $p < .05$, indicating that the magnitude of transfer related to college entry varies across schools.

Multilevel binary logistic odds ratio regression. In addition, the study employed multilevel binary logistic odds ratio regression with five models: (1) a null model, (2) a model with student-level predictors, (3) a two-level model with student- and school-level predictors, (4) a two-level model with student- and school-level predictors with level 1 and level 2 transfer variables, and (5) a two-level model with student- and school-level predictors with transfer variables with an unstructured covariance, i.e., not imposing any patterns or constraints on the values. These models assess the strength of the relationship between study variables and college entry. Table 17 shows the results of this assessment.

Table 17: Odds Ratios for Binary Logistic Regression Analysis on College Entry for Two-Level Model with Students Nested Within Schools

Enter college	Model 1	Model 2	Model 3	Model 4	Model 5
Female		1.54*** [1.33,1.77]	1.52*** [1.32,1.75]	1.52*** [1.32,1.75]	1.52*** [1.32,1.75]
White		0.54*** [0.40,0.73]	0.51*** [0.38,0.69]	0.52*** [0.38,0.70]	0.53*** [0.39,0.72]
Other		3.561*** [2.06,6.15]	3.30*** [1.91,5.70]	3.45*** [1.99,5.98]	3.52*** [2.02,6.11]
Hispanic		0.78 [0.48,1.25]	0.79 [0.49,1.28]	0.76 [0.47,1.24]	0.74 [0.46,1.21]
FARMs		0.51*** [0.43,0.61]	0.53*** [0.44,0.64]	0.54*** [0.45,0.65]	0.55*** [0.45,0.66]
Special Ed		0.58*** [0.47,0.71]	0.63*** [0.51,0.78]	0.62*** [0.50,0.77]	0.63*** [0.51,0.78]
ELL		0.77 [0.37,1.63]	0.81 [0.39,1.69]	0.85 [0.40,1.79]	0.86 [0.41,1.81]
Standardized 8 th Grade Math Score		1.41*** [1.275,1.565]	1.37*** [1.238,1.515]	1.33*** [1.20,1.48]	1.33*** [1.20,1.48]
Missing 8 th Grade Math Score		0.90 [0.71,1.14]	0.89 [0.70,1.13]	0.84 [0.66,1.08]	0.84 [0.66,1.07]
Suspension		0.65*** [0.54,0.78]	0.65*** [0.55,0.78]	0.67*** [0.56,0.80]	0.66*** [0.55,0.79]
Job in HS		1.32*** [1.14,1.53]	1.30*** [1.12,1.50]	1.16 [0.99,1.34]	1.15 [0.99,1.34]
Chronic Absentee		0.62** [0.47,0.84]	0.62*** [0.46,0.82]	0.80 [0.59,1.09]	0.80 [0.59,1.09]
Total Enrollment			1.00 [1.00,1.00]	1.00 [1.00,1.00]	1.00 [1.00,1.00]
School Suspension			1.00 [1.00,1.00]	1.00 [1.00,1.00]	1.00 [1.00,1.00]
School FARMs			0.18** [0.06,0.52]	0.24** [0.09,0.67]	0.21** [0.07,0.61]
School Special Ed			0.10*** [0.03,0.33]	0.12** [0.03,0.42]	0.19* [0.04,0.78]
School ELL			0.35 [0.01,10.86]	0.36 [0.02,7.55]	0.33 [0.02,7.35]
Transfer				0.58*** [0.48,0.68]	0.60*** [0.47,0.76]
School Transfer				0.23* [0.05,0.69]	0.20* [0.04,0.89]
var(_cons[school_id])	1.90*** [1.39,2.62]	1.34*** [1.13,1.59]	1.03 [0.99,1.07]	1.01 [0.98,1.05]	1.05 [0.98,1.12]
var(transfer[school_id])					1.25* [1.02,1.54]
cov(transfer[school_id]_cons[school_id])					0.91 [0.82,1.01]
N	4297	4272	4226	4197	4197

Exponentiated coefficients; 95% confidence intervals in brackets, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Adjusting for student-level variables, the odds of college entry occurring for female ($OR = 1.54$, 95% CI: [1.33,1.77], $p < .001$) are approximately one and a half times or 1.54% of the odds of college entry for males. The full and final model shows that female students' college entry odds ($OR = 1.52$, 95% CI [1.32,1.75], $p < .001$) remain at one and a half times or 1.52% of the odds of college entry for males, controlling for student- and school-level covariates.

The odds of college entry among White students ($OR = 0.54$, 95% CI [0.40,0.73], $p < .001$) are half or 54% of the odds of college entry for Black students, controlling for student variables. The full and final model shows the odds of entering college for White students hold ($OR = 0.53$, 95% CI [0.39,0.72], $p < .001$) at half or 53% of the odds of college entry for Black students, controlling for student- and school-level covariates.

The odds of entering college among students of other races ($OR = 3.56$, 95% CI [2.06,6.15] $p < .001$) are more than three and a half or 356% of the odds of entering college for Black students, controlling for student variables. The full and final model shows the odds of college entry for students of other races hold ($OR = 3.52$, 95% CI [2.02,6.11], $p < .001$) at three and a half or 352% of the odds of college entry for Black students, controlling for student- and school-level covariates.

Controlling for student-level variables, FARMs-eligible students' odds of college entry ($OR = 0.51$, 95% CI [0.43,0.61], $p < .001$) are half than the odds for students who are not eligible for FARMs. In the full and final model, the odds for FARM-eligible students ($OR = 0.55$, 95% CI [0.45,0.66], $p < .001$) increased slightly to 55% of the odds of college for non-FARM-eligible students, controlling for student- and school-level covariates.

The odds of college entry among students receiving special education services ($OR = 0.58$, 95% CI [0.47,0.71], $p < .001$) are slightly more than half or 58% of the odds of college entry for nonspecial education students, adjusting for student-level covariates. Adding and controlling for school-level and transfer variables in the full and final model, the odds of entering college for special education students ($OR = 0.63$, 95% CI [0.51,0.78], $p < .001$) are more than half or 63% of the odds of entering college for nonspecial education students.

Controlling for student-level variables, for every standard deviation increase in standardized 8th-grade math score ($OR = 1.41$, 95% CI [1.28,1.57], $p < .001$) increases the odds of entering college by nearly one and a half times or 141%. Adding and controlling for school-level and transfer variables, for each standard deviation increase in the standardized 8th-grade math score ($OR = 1.33$, 95% CI [1.20,1.48], $p < .001$) increases the odds of college entry by more than one and half times or 133%.

Adjusting for student-level covariates, the odds of college entry among students who receive a suspension ($OR = 0.65$, 95% CI [0.54,0.78], $p < .05$) is more than half the odds or 65% of the odds of college entry for students who do not have a suspension. Moreover, controlling for student- and school-level covariates, the odds of college entry for students who receive a suspension ($OR = 0.66$, 95% CI [0.55,0.79], $p < .001$) are more than half or 66% of the odds of college entry for non-suspended students in the full and final model.

The odds of entering college among employed students ($OR = 1.32$, 95% CI [1.14,1.53], $p < .001$) are nearly one and a half or 132% of the odds of college entry for

non-employed students, adjusting for student-level covariates. Adding and controlling for school-level variables, the odds of entering college for employed students ($OR = 1.15$, 95% CI [0.99,1.34], $p < .001$) show a slight decrease to 115% of the odds of college entry for non-employed students. However, the model lost its statistical significance when adding transfer variables in the full and final model.

Adjusting for student-level covariates, the odds of college entry for chronically absent students ($OR = 0.62$, 95% CI [0.47,0.84], $p < .001$) are more than half or 62% of the odds of college entry for nonchronically absent students. Adding and controlling for school-level variables, the odds of graduation for chronic absentees ($OR = 0.62$, 95% CI [0.46,0.82], $p < .001$) remained at 62% the odds of college entry for nonchronic absentees. However, adding transfer variables rendered the odds ratio statistically nonsignificant in the full and final models.

For every percent increase in school FARMs ($OR = 0.18$, 95% CI [0.062,0.052], $p < .01$), the odds of entering college decrease by 18%, adjusting for student- and school-level covariates. In the full and final covariance model, for every percent increase in school transfer ($OR = 0.21$, 95% CI [0.08,0.66], $p < .05$), the odds of graduation decrease to 21%.

Controlling for school-level variables, every percent increase in school special education ($OR = 0.10$, 95% CI [0.03,0.33], $p < .01$) decreases the odds of college entry by a tenth or 10%. In the full and final model, for every percent increase in school special education ($OR = .19$, 95% CI [0.04,0.78], $p < .05$), the odds of college entry decrease by 19%, controlling for student- and school-level covariates.

The odds of college entry for transfer students ($OR = 0.58$, 95% CI [0.49,0.69], $p < .001$) are slightly more than half or 58% of the odds of college entry for non-transfer students, adjusting for student- and school-level covariates. Furthermore, the odds of entering college for transfer students ($OR = 0.60$, 95% CI [0.47,0.76], $p < .001$) remains by more than half or 60% of the odds of college entry for non-transfer students controlling for student- and school-level covariates in the full and final model.

Finally, for every percent increase in school transfer ($OR = 0.23$, 95% CI [0.05,1.00], $p < .05$), the odds of graduation decrease by 23%, adjusting for student-, school-level, and transfer variables. In the full and final covariance model, for every percent increase in school transfer ($OR = 0.20$, 95% CI [0.04,0.89], $p < .05$), the odds of graduation decrease by 20%, controlling for student- and school-level covariates.

Model Fit Indices. The .16 Intraclass Correlation Coefficient (ICC) in the null model is considerably above .05 (Heck et al., 2014), the customary threshold that suggests more substantial proof of clustering at the school level (Crowson, 2020). The student model decreased the level 2 clustering to .08, then to .01 when school variables were added to the model. The ICC was reduced to .003 when transfer variables were added to the two-level model. Finally, although the ICC increased slightly to .01 in the full and final unstructured covariance model, level 2 clustering was not significant.

Moreover, the Akaike's Information Criterion (AIC) and Bayesian Information Criterion (BIC) are 5347 and 5360, respectively. Using the maximum likelihood estimate, the AIC specifies the greatest share of variation in the model with the least number of parameters using the formula, $AIC = 2K - 2\ln(L)$, where K is the number of independent

variables utilized and L is the log-likelihood estimate that the model could have yielded the observed y -values (Bevans, 2020). The AIC and BIC decreased to 5051 and 5140, respectively in the student model, then slightly decreased in the school and student model to 4965 and 5085, respectively. The model fit continued to improve when transfer variables were added to the model bringing the AIC to 4882 and the BIC to 5015. In the full unstructured covariance model, the AIC = 4871 and the BIC = 5016, indicating the best model fit.

CHAPTER 5: DISCUSSION

This dissertation aimed to explore several linkages with school transfer; first, individual and school characteristics related to its risk of occurring. Second, the effect of transfer and other student and school covariates to the odds of high school graduation and if the magnitude of the effect of transfer varies across schools. Third, the effect of transfer and student and school characteristics linked to the odds of college entry, and if the magnitude of the effect of transfer also varies across schools. This chapter highlights critical findings within previous literature on transfer, high school graduation, and college enrollment. After discussing the study's strengths and limitations, the chapter concludes with implications for policy, practice, and research.

Key Findings

This section discusses student and school characteristics related to the time of the transfer event and the odds of graduation and college entry. In addition, this section discusses if the magnitude of transfer varies across schools related to graduation and college entry.

Time to Transfer Risk

A mixed-effects parametric proportional hazard model indicated that 34% of the 6,810 study participants transferred during the four-year study period starting in the 9th grade. This percentage is more than twice the 15.9% of first-time transfers among the 1,410 students Herbers et al., (2013) tracked in Chicago, Illinois. However, this percentage may be smaller because the Chicago study included 8th graders with the 9th to 12th graders.

With a total of 1,461 days in the study period (4 years * 365.25 days), the first-time transfer students had a mean of 488 days to the time of transfer and a median of 376 days. However, some students took longer to transfer, while others had a faster transfer risk. Discussion on school-level factors that are associated with transfer follows.

Student Characteristics with Increased Risk. Chronic absentees have a faster time to transfer than students who are not chronic absentees. A constellation of factors associated with truancy include mental health, drug use, and large amounts of unsupervised time after school (Nolan et al., 2013). Disinterest in school, low grades, low educational aspirations, and parent's level of educational attainment are related variables (Nolan et al., 2013). In practice, Baltimore City Public Schools defines a 'chronic absentee' as a student with 20 or more absences in a school year (BCPS, 2021a). Recent research on absenteeism and student mobility (Welsh, 2018) found that the two are correlated and that poverty and economic insecurity, factors that are outside of school, in large part, drive the correlation (Welsh, 2018). Moreover, school-level factors also influence this correlation at a lesser degree (Welsh, 2018). Parke and Kanyongo (2012) also found the same correlation between absenteeism and student mobility in their study on math proficiency.

The survival analysis results also found that controlling for student- and school-level factors, a standard deviation increase in the standardized 8th-grade math score corresponds to an 11% increase in transfer risk. This finding differs from Parke and Kanyongo's (2012) framing of the impact of mobility and attendance on math achievement. They found the highest mean math scores for 'stable attenders' and the lowest for mobile nonattenders (Parke & Kanyongo, 2012). Although one can

hypothesize that students with higher math scores may wish to move to 'better' schools, the relationship between student mobility and math proficiency warrants a closer examination that considers school selectivity and school choice.

School Characteristics with Increased Risk. A unit increase in the square root of the school special education rate corresponds to twice the transfer risk, controlling for student- and school-level variables. Schools with high concentrations of students receiving special education services may face increasing churn (mobility) in their student body with a net effect of adverse educational outcomes. This finding is consistent with the GAO Report (2010), highlighting that schools with higher percentages of students receiving special education services had higher student mobility rates. However, the GAO report only referred to middle schools and not high schools (GAO, 2010). This finding highlights the challenge faced by high schools with high concentrations of students receiving special education services, where students are at a faster rate of transferring schools. Advocacy on behalf of parents and students, and other interventions are discussed in the implications section.

Student Characteristics with Decreased Risk. Compared to Black students, White students have a reduced transfer risk. In addition, students with missing 8th-grade math scores, students with suspensions, and employed students are associated with longer times to transfer compared to those with 8th-grade math scores, students without a suspension, and non-employed students, respectively. The GAO Report (2010) described mobile students as predominantly Black, which this study, in effect, confirms, given that the racial reference group in the survival regression is Black. While White students have a longer time to transfer, Black students have a shorter time to change schools.

Furthermore, with 88% of the study sample as Black, the same racial group are at a greater risk of transfer. This finding is consistent with the Herbers et al. (2013) study, with Black and African American students having the highest mobility rates in their study.

For students with missing 8th-grade math scores, a dummy variable created to address missingness showed statistical significance. Although approximately 16% of the cohort did not have 8th-grade math scores, this student-level factor delays the time to transfer schools. None of the previous studies included missing 8th-grade math scores that had shown to be significantly related to the risk of transfer.

Another category of students with a longer time to the transfer event is students with suspension compared to those without suspension. Welsh's (2019) study found that 5% of involuntary and voluntary student mobility and 8% of voluntary student mobility in Clark County, Nevada, were related to school discipline. In addition, the study also found that transfer students who moved because of school discipline were primarily Black, male, and low SES, have Individual Development Plans, and are low achievers (Welsh, 2019). While the Nevada study found that school discipline is related to the time of student transfers, it did not measure the *time to the event* for such students, a critical dimension of student mobility examined in the present study.

Furthermore, Engec's (2006) study in Louisiana public schools indicated that the in-school suspension rate was highest for students who moved four or more times in a school year and the lowest for those who did not transfer. In addition, Engec (2006) found the same mobility pattern for those with out-of-school suspensions. A suspended

student's longer time to the initial transfer risk may explain the patterns above, especially among the most stable students. Nevertheless, the seeming contradictory relationships warrant closer examination. Whether in-school or out of school, receiving a suspension is a complex process, and the causal order of events related to changing schools needs further examination.

Finally, employed students also have a longer time to transfer risk than their non-employed classmates. Approximately 34% of the students in this cohort were employed prior to their initial transfer. Employment may provide a stabilizing effect on students. This finding contrasts with Grey's (1997) study of students who worked in meatpacking plants in rural Iowa. Schools experienced fluctuations in their student body enrollments annually, which coincided with turnovers in the meatpacking plants, which provided secondary jobs to high school students (Grey, 1997). The difference, however, may lie in the type of students and jobs between Iowa's rural cohort versus Maryland's urban sample. Nevertheless, the growing number of immigrants and refugees, primarily new English-language learners in Baltimore and Maryland, requires attention and further analysis.

School Characteristics with Decreased Risk. Every one-unit increase in school FARMs percentage decreases the time to transfer risk. About 81% of the students in this cohort are eligible for free and reduced meals. Given that this variable serves as a proxy for socioeconomic status, families may not have as many options in choosing from several schools. Students may opt to enroll in the high school nearest to their residence, although they may attend other schools through BCPS's school choice policy (BCPS, 2022b). Specifically, students may choose from those with an academic entrance

criterion, specialized, school-based, or choice lottery. In addition, the school district may place students in an alternative program (BCPS, 2022b).

High School Graduation

Student Characteristics with Greater Odds. The female students' graduation odds are at about one and a half times or 1.53% of the odds of graduation in males. Of the 6810 participants in the study, 48% (3292) are female, and of the 3292, 70% (2,291) graduated. Among the 3,518 males in this cohort, 57% (2,006) completed their high school requirements for graduation. This finding is consistent with current trends of females outpacing males in educational attainment (Bailey & Dynarski, 2011). Females were graduating in higher percentages than males in 90 of the 100 largest school districts in the U.S. (Greene & Winters, 2006). Families, especially those with higher incomes, invest more in their daughters' education, thus creating this new inequality (Bailey & Dynarski, 2011).

One of the requirements for high school graduation in Maryland (MSDE, 2018), Math proficiency continues to be a significant predictor of high school graduation. A positive regression slope for 'standardized 8th-grade math score' indicates that for every standard deviation increase in the standardized 8th-grade math score within schools, students' logits($Y=1$) of graduation predicts an increase by .49.

School Characteristics with Greater Odds. None of the school characteristics included in the study indicated a relation to a greater likelihood of graduation.

Student Characteristics with Lower Odds. In the full and final model, the student-level attributes most strongly associated with a decreased likelihood of

graduation are White students, students missing 8th-grade math scores, suspended students, employed, chronic absentee, and transfer students. In addition, an interaction between chronic absentee and employed resulted in about half the odds (OR =.54) of graduation of non-employed and nonchronic absentees. These characteristics reflect some of the findings in a cohort of ninth-grade students in New York City that found mobile students, chronic absentees, and suspended students with decreased odds of four-year graduation (Ready et al., 2013). However, the current study differs by finding White students less likely to graduate and FARM-eligible students with lower odds of graduation. The latter category lost statistical significance when transfer and school transfer rate were added to the two-level model. In addition, the present study found that school special education and school transfer percentages to be associated with decreased odds of graduation. Interactions with various variables were performed but no other statistically significant relationships were found.

FARM-eligibility lost its statistical significance when the transfer variables were added to the model. which invites further exploration between transfer and SES and the role of transfer as a covariate to graduation. With nearly a third of students in this cohort changing schools, transfer plays an outsized role in these students' adverse educational outcomes. However, the percentage of school transfer was not found to be statistically significant as a measure associated with graduation.

School Characteristics and Lower Odds. Among school attributes, the percentage of school FARMs produced the only statistically significant coefficient that related negatively to graduation in Model 4, the full two-level model. However, its coefficient lost statistical significance in the final covariance model. Nevertheless, the

concentration of poverty in schools as represented by higher percentages of FARMs-eligible students needs further investigation given that SES manifests in employment, math scores, and other factors.

Transfer Variance Across Schools. Finally, the magnitude of transfer varies across schools by 62%, showing wide between-cluster variability. Transfer differences between schools require further study and interpretation. School selectivity, specialization, and other factors are important considerations.

College Entry

Student Characteristics with Greater Odds. The study found the following student attributes to be associated with a greater likelihood of entering college: female, other races (which includes Asians, Pacific Islanders, Native Americans, Hawaiian, and Two or more races, compared to Black students), standardized 8th-grade math score, and employed students. No school attributes contributed to an increased likelihood of college entry. These results mirror Ready and team's (2013) findings that females, math scores (in high school), and Asians, except for employed students, have increased odds of enrolling in college.

School Characteristics with Greater Odds. The study did not identify any school characteristics included in this study associated with a greater likelihood of entering college.

Student Characteristics with Lower Odds. On the other hand, student characteristics related to a decreased likelihood of college entry consist of White compared to Black students, FARM-eligible students, special education students,

suspended students, chronic absentees, and transferees. This list slightly mirrors findings in Ready et al. (2013) that identify FARM-eligible students and special education students to have decreased odds of college entry and place Black and other race students as having lower odds of graduation.

School Characteristics with Lower Odds. School-level attributes indicating lower odds of entering college are the school percentages of FARMs-eligible students and special education. However, both showed statistical significance in earlier models but not in the full and final model.

Finally, it is important to note that student-level transfer and school-level transfer were statistically significantly associated with lower odds of college entry in the full and final models. These results invite us to look further into transfer as a critical factor related to college enrollment, especially in schools with higher transfer rates. This finding contributes to the literature by bridging the link between high school transfer and postsecondary education and providing a key indicator in addressing lower college entry rates.

Transfer Variance Across Schools. The magnitude of transfer related to college entry varies across schools by 22%. None of the previous literature provided this within-cluster difference, which requires more exploration regarding differences between schools. With 34% of the students in the cohort moving during the four-year study period, a transfer is a factor that is hard to ignore.

Strengths and Limitations

Strengths

This study bridged transfer in high school with postsecondary enrollment, a research area that needs further research. Much of the extant literature on student mobility focuses on elementary and middle schools. The present study identifies the student and school factors associated with transfer and graduation and transfer and college enrollment. Aside from finding wide variability in transfers across schools associated with graduation and college entry, this research also focuses on the transfer and school transfer rate as critical variables to consider in evaluating educational outcomes.

In addition, the present study employed event history or survival analysis to investigate transfers. As an instantaneous event, transfer lends itself naturally to measuring hazard rates (Rabe-Hesketh & Skrondal, 2012b). Information on time *to* event risk can help comprehend transfer as a multidimensional factor, adding to event frequencies and occurrence, affecting educational attainment.

Moreover, this dissertation employed a combined multilevel and longitudinal approach, which is required to observe patterns in the transfer event among students nested within schools (O'Connell & McCoach, 2008; Rabe-Hesketh & Skrondal, 2012a; 2012b). In addition, utilizing multilevel models avoids ecological and atomistic fallacies by simultaneously considering student and school levels and including explanatory variables from both levels (Rabe-Hesketh & Skrondal, 2012a; 2012b). Moreover, schools influence students through school policies, culture, and practices (O'Connell & McCoach, 2008; Rabe-Hesketh & Skrondal, 2012a; 2012b). Untangling processes and policies acting at these levels; for example, distinguishing the effects of transfer within- and

between cluster effects of lower-level covariates. In addition to the effect of a student's transfer, the school-average transfer rate can be strongly related to graduation and college entry, both through classmate effects and because transfer students tend to end up in schools with high transfer rates (Rabe-Hesketh & Skrondal, 2012a).

Furthermore, this study demonstrated that transfer in high school as a multidimensional variable relates differently to student demographics, behavior, and performance characteristics. Hopefully, this dissertation helps disentangle transfer, an oft-misunderstood term, for practitioners and policymakers. This study offers some guidance in identifying student characteristics at risk of transferring faster and school characteristics related to adverse educational outcomes.

Finally, the whole population of students who entered the 9th grade in 2012-2013, minus a few returning 9th graders, made up the data pool for the present study. The size of this data pool is integral to producing valid results, and the computing power of state-of-the-art statistical programs like Stata aided in designing the data structure and swift analysis (StataCorp, 2021). Finally, the study used all available information, including missing data, which created a dummy variable for missing 8th-grade math scores, a statistically significant covariate to outcome variables (Rabe-Hesketh & Skrondal, 2012b).

Limitations

The study is limited mainly to the ninth-grade student and school characteristics. The author did not conduct *cross-classification* of students and schools to simplify the analysis at this time. Therefore, only the student's initial school characteristics were

included in the analysis. In addition, the study focused on an urban school district in Maryland to reduce the variability in resources, policy, and practice. However, this decision presented limitations, and the findings may not apply to other school districts.

Moreover, administrative data revealed the following limitations:

1. The data do not provide more information on school selectivity, e.g., academic entrance criteria, specialized, school-based lottery, and choice lottery. See the Future research section.
2. The MSDE does not track students who leave Maryland prior to the 12th grade. In addition, the National Student Clearinghouse does not track these students for Maryland. Data on graduation and college entry on students in this category are not included in the sample data unless they attended a postsecondary institution in Maryland. Caution must be exercised in interpreting graduation and college entry data, particularly if the measure of success is capturing continued enrollment within the state public school system and completing high school graduation requirements.
3. Students who withdrew from Maryland public schools may return to school, whether in Maryland or out of state.

Furthermore, participant censoring, and data truncation may have introduced bias to the sample selection. Censoring happens when the exact time-to-event, e.g., transfer, is not observed for an included observation. For example, right-censored subjects, students who transferred schools after the four-year study period, may present bias in the sample selection (Cleves et al., 2016; Rose & Bowen, in press). Finally, left truncation is likely

to introduce bias to the data when transfer observations are excluded. Many students may have already experienced a transfer before entering the ninth grade (Cleves et al., 2016; Rose & Bowen, in press; Wohlfahrt-Veje et al., 2016).

Finally, the relationships found in this study may not be readily generalized to other school districts, because of factors unique to Baltimore City, e.g., school choice policies, school selectivity, district resources, racial, socioeconomic, and other demographic factors. Understandably, Kent County, a rural school district with one high school and a cohort of 139 9th graders in 2017 will present a different story. But for school districts that have sample sizes with statistical power and do not violate the methodological assumptions, this study can be used as a template regardless of urbanicity or rurality. In addition, the theoretical framework of reproduction and resistance still applies to other school district settings.

Implications

Theory

The present study yielded results that reproduced a pyramidal hierarchy. Nearly a third of the 6,810 students making up the base "resisted" the rules and conditions of their initial ninth-grade school and transferred to another school. However, the general effect of this transfer event was adversely related to graduation and college entry. Transferring schools is linked to individual attributes that were identified to have lower chances of graduating compared to individuals whose characteristics have greater odds. Moreover, transferring was significantly related to student and school attributes with lower odds of entering college than those with better odds. These relationships effectively place non-

graduates below high school graduates, narrowing the pyramid to 4,297 students. This number narrows further (52%) to account for college students, who have more opportunities than the strata below. This ranking seems to mirror society, confirming the theoretical framework that schools reproduce inequality. However, readily accepting these results only allows these trends to continue.

In a seminal ethnographic study of a New York City public high school, Fine (1991) describes the social-psychological milieu and ideology that reproduced inequalities through a continual withdrawal of students of color from the educational institution. She asserts that universal access to education, good intentions by educators, and the “naturalness” of the split in public and private education tend to eclipse concerns regarding high dropout rates (Fine, 1991). Although dropping out from school is dissimilar from transferring schools (Rumberger & Larson, 1998), one can theoretically generalize that the same indifference can “move from one context to another” (Fine, 2006, p. 98); such that transferring schools tend to be generally accepted as part of the American educational experience in urban, suburban, rural, or mixed settings. However, transformational resistance offers an opportunity to nurture critical thinking, agency, and well-being among high school students through participatory action research, social justice courses, and community organizing activities. Such transformational resistance activities may serve as protective factors against transferring schools.

Research

The current research on student mobility attempts to bridge the gap between transfers during high school and educational outcomes. More multilevel research needs to be undertaken to effectively span the divide and to test the relationships found here.

Equally important, especially for scholars of oppression and resistance, is extending and deepening qualitative research with those whose lived experiences reflect the social inequities reproduced by schools (Cammarota & Fine, 2010; Fine, 1991; 2006; Sanders, 1997; Solorzano & Bernal, 2001). Pursuing participatory action research on transformational resistance programs can effectively critique social oppression and move towards creating socially just educational institutions. Examples of such research includes youth participatory action research (Cammarota & Fine, 2010) and examining academic achievement among students of color to address discrimination and racism (Sanders, 1997). A strong underpinning of one's racial identity, background and values instilled by family and relatives ameliorates oppressive experiences in schools (Sanders, 1997). Further research examining the link between transfer and transformational resistance (and other types of resistance), shows great promise.

The relationship between school level transfer and outcomes above and beyond the relationship with individual student transfer requires further investigation. Because schools are nested in communities, neighborhood factors such as unemployment rate, percentage of affordable housing, and crime statistics, among others, need to be included in future research to see the magnitude of the effect of such factors on graduation and college entry.

Moreover, because administrative data do not indicate the reasons for the transfer, qualitative studies are needed to investigate why students move. These studies will require considering familial, neighborhood, and societal factors as students are nested in families and schools in communities. Meeting students where they are and understanding their relationships, neighborhoods, and other environmental "locations" will help capture

a deeper depth of field (Bronfenbrenner, 1979). Parents, teachers, principals, and community partners are some of the key informants in these qualitative interviews. In addition, case studies of schools who have been able to show a decrease in student transfers can provide insights on the characteristics and requirements that can promote a strong and positive school environment.

However, researchers need to agree on consistent types, terms, and definitions of student mobility to help various audiences compare, analyze, and apply results. Moreover, convening policymakers, practitioners, students, and other stakeholders to discuss and map out the different conceptualizations of transfers will help connect the dots in this multidimensional variable. Furthermore, consistency and agreement on the constellation of transfers will assist in reevaluating policies and practice.

Moreover, the present study needs to extend retrospectively to include kindergarten, elementary, and middle school transfer data to identify earlier student transfer events and other covariates, including residential moves. At the same time, prospective studies from early childhood years onwards help address questions about mobility throughout a student's career and its effects on academic, occupation, economic, social, and other outcomes. In addition, a lifespan study design minimizes sample bias because it prevents left truncation, ensuring that all transfers are considered (Cleves et al., 2016; Rose & Bowen, in press; Wohlfahrt-Veje et al., 2016). Furthermore, longitudinal mixed-methods cohort studies may reveal points in time when transferring schools are more critical than other instances (Padgett, 2008). Such moments may offer opportunities for intervention that can produce favorable outcomes. Finally, replicating this longitudinal cohort study in

school systems in rural, suburban, and mixed settings may reveal relationships that differ from the current findings.

Because reducing student-level transfer should reduce school-level transfer, follow-up studies evaluating the effectiveness of Full-Service Community Schools with its wraparound programs and services as a multidimensional intervention to decrease student transfers are needed. For example, Durham, Connolly, and the Baltimore Education Research Consortium (2016) compared Community Schools in Baltimore City Public Schools with non-Community Schools and found that Community Schools collectively reduced school transfers. Tailored for non-experimental interventions like Community Schools, Regression Discontinuity (RD) design is a rigorous approach to study Community Schools (Cattaneo, Idrobo, & Titiunik, 2019; Khandker, Koolwal, & Samad, 2010; Lee, 2016). With Full-Service Community Schools as a key component of the Maryland Blueprint for Educational Excellence, student transfer may serve as a link between the Community Schools Strategy and graduation and college entry.

The interaction between chronic absenteeism and youth employment needs further investigation. With 81% of the students in the lower socioeconomic levels as indicated by the high percentage of FARMs-eligible students in the district, there may be added pressure on students to earn and contribute to their family expenses and basic needs (Doll, et al., 2013). However, although employment by itself can be a protective factor against changing schools, demand to work more hours may increase because of economic pressures on lower SES students and their families. It is plausible that students may prioritize working over attending school, and therefore, incur more absences. Chronic absenteeism can then derail them from finishing high school and pursuing

postsecondary education. On the other hand, there may be other reasons besides employment that can cause students to become chronic absentees. Because employment relates to lower transfer risk, jobs during high school and truancy warrants further examination.

More specifically, the relationships between student employment, transfer, and related educational outcomes needs to be examined further. Because many students work during high school, hours worked need to be investigated, including potential hazardous order occupations. For example, how many hours do high school students work in a workweek when schools are in session? Do 9th graders, who comprise primarily 14 to 15-year-olds, exceed the permissible hours of employment, that is, three hours on school days and eight on non-school days (Maryland Department of Labor, 2021)? Do these students work after 9 pm after Labor Day until May 31st? Do 16 to 17-year-olds spend more than 12 hours (school and work hours combined) in a day (Maryland Department of Labor, 2021)? If hours-time standard violations occur, are they associated with transferring schools? In addition, what jobs do these students perform? For example, do any 14 to 15-year-olds work in restricted areas of employment, such as manufacturing, processing, or mechanical occupations (Maryland Department of Labor, 2021)? In addition, do students engage in the original 17 hazardous order occupations and the recently added ten hazardous occupations (Maryland Department of Labor, 2021; United States, 2011)? If hazardous occupation order violations occur, are they related to transferring schools during high school? Moreover, do wages earned influence academic outcomes? Do hours worked, wages earned, and occupation orders relate to transfer, high school graduation, and college entry?

Furthermore, because of the wide variability in transfers across schools, further research on these differences will assist policymakers and practitioners in identifying effective practices related to reducing transfers. Examining these distinctions between and among types of schools, e.g., academic entrance criteria, specialized, school-based lottery, and choice lottery, can be particularly informative.

Considering the COVID-19 pandemic, further research on the relationship between student mobility and lack of homeownership, unstable housing, and evictions may shed more light on the root causes of school transfers. These topics serve as a follow-up on previous GAO reports (GAO, 2010; 1994). The COVID-19 pandemic has exacerbated housing instability, particularly among students of color and lower SES. Renters of color have difficulty paying their rent: Black, not Latino (28%), Asian, not Latino (20%), Latino, any race (18%), Other multiracial, not Latino (18%), and White, not Latino (12%) (Center on Budget and Policy Priorities, 2021). In addition, approximately 23% of renters who live with children reported having difficulty paying rent, compared to 12% without children (Center on Budget and Policy Priorities, 2021). Further research on housing instability and its relationship to student transfers includes examining students' addresses and subsequent changes in residence and comparing them to their changes in schools where they enroll. These topics serve as a follow-up on previous GAO reports (GAO, 2010; 1994).

Policy

Transfers will continue to be associated with adverse educational outcomes if it is left undisturbed. Although transfers occur as a student's private struggle, the phenomenon warrants illumination as a public issue because of its impact on the state and its citizens.

In addition, its damaging effect on educational attainment and concomitant economic productivity advances claims for amelioration through public resources (Bardach, 2009). Understandably, the magnitude of the transfer effect on one wave in a school district may not be enough to attract attention to the issue; but multiply this trend across schools, districts, and beyond Maryland, and one can imagine a series of tsunamis that can devastate economies.

Bardach (2009) states that evidence is needed for three reasons. The first is to assess the nature and breadth of the transfer problem. Building on extant literature, the present study identified student and school effects related to transfer, graduation, and college entry, however limited. Because reducing student level transfer should reduce school level transfer, a policy of transferring schools as a last resort should be considered by the district. In addition, reducing school transfer rates can be incentivized. Moreover, the school district can reconsider its school choice policy. Does the current policy encourage transfers? If so, is the current policy achieving its desired ends or is it harming students? Transformational resistance projects and activities may decrease student-level transfers, and therefore, school-level transfers. A combination of student- and school-level policies need to be explored.

Second, it is essential to assess district workloads, budgetary constraints, demographic changes, staff attitudes, leadership competencies, and political ideologies that influence current policies governing transfer (Bardach, 2009). Schools are expected to provide more than education; instead, they have become similar to Jane Addams' Hull-House, full-service community schools with social services, job leads, and emergency food, among other programs (de Tablan, 2014; Sanders, 2016; Sanders et al., 2019).

Third, best practices in education or other industries must be surveyed, analyzed, and adapted to the current challenge (Bardach, 2009). For example, because the U.S. military requires families to change duty stations and anticipates transferring schools for children and youth, its existing programs may be potential sources of effectual practices. Adapting and improving upon comprehensive schooling, trade, and employment services to military spouses to transfer students may be an excellent first step. Finally, it is equally important not to ignore critics and their perspectives on the problem to obtain feedback and iterate alternatives (Bardach, 2009).

While policy analysis is not the focus of this paper, here are a few recommendations: Track every child regardless of whether they moved within a district or out of state. In addition, a renewed request to Congress to follow up on the GAO report on student mobility needs to be made. Given the critical findings in the 2010 GAO report, it is time to update the state of student mobility especially given the economic, housing, health, and educational effects of the COVID-19 pandemic.

Furthermore, there needs to be coordination of education, career, and support services, including socioemotional and housing, among providers like the United Way and other lead agencies in the public, private, and social sectors to support students and families. These and other solutions need to be considered, designed, and implemented to interrupt current trends.

Finally, given the higher transfer risk for those enrolled in schools with high concentrations of students receiving special education services, a policy may be needed to redistribute their enrollment to other schools with lesser concentrations of same

category students to equalize the percentages and the service capacities among high schools. Such a policy may not only help lower the transfer rate for special education students, but it may also increase their odds of college enrollment even if only to take a few courses.

Practice

Most of the interventions in social work tend to be ameliorative rather than changing the system fundamentally. Practitioners respond to emergent needs with programs; however, current trends will continue if structures and policies stay unchanged. Using transformational resistance approaches, schools may offer social justice courses that can develop students' awareness of oppression and acquire skills to analyze and challenge them. Examples are youth participatory action research projects (Camarota & Fine, 2010), youth-led community organizing (Free Your Voice, 2013), and strengthening racial identity (Sanders, 1997). Through these offerings, students gain agency, build alliances, and challenge oppressive systems to reduce school churn (mobility).

Further, redesigning system-level interventions, such as student mobility teams at all levels: school, district, state, and national, can ensure the tracking of children and youth. Systems that anticipate school transfers and strengthen effective practices are needed to reduce student mobility. For example, a Baltimore Education Research Consortium (BERC) study has shown that Community Schools, as a strategy, may be an effective intervention to reduce school transfers (Durham, Connolly, & BERC, 2016). Community Schools can create customized programs and services that welcome and embrace each student, especially during their first year in high school. Services can

include school-level interventions to improve coordination between and among schools to track students, programs to address and reduce chronic absenteeism, and promote student belonging with a particular focus on the 9th grade.

Moreover, students receiving special education services need additional resources to integrate them immediately into school culture and programs. Specifically, parents and students who receive special education services need more advocates to help them navigate the complex regulations governing special education. These regulations need further interpretation, not only in translating them into various foreign languages, but also translating them for parents who may not have obtained a high school diploma. Making the regulations and procedures accessible will help parents and caregivers comprehend the services their children are entitled. Building their capacity to advocate for themselves during special education conferences may be a protective factor against transferring schools.

Furthermore, A particular focus on the challenges facing FARMs-eligible White males is critical to get them back on track for graduation and college entry. Furthermore, students and families need a Successful Student Transfers (SST) program to offer comprehensive education, career, and employment services to all students and their families through coaching, machine learning, and partnerships. Education and Career Advisors support students and families through the Education and Career Opportunities (ECO) Program by connecting families and students with academic and employment opportunities, including legal assistance for at-risk renters.

Finally, conversations, participatory action research, and social justice projects with students, parents, schools, and other stakeholders about the effects of school transfers need to be held to discuss changing schools as a last resort because of the adverse educational outcomes found in the present study. Equally important, if the transfer needs to occur, is to provide a supportive environment and resources to ensure student success. In addition, such conversations help gather information on the reasons for the transfer to help practitioners detect them early in the process.

Conclusion

This dissertation explored student and school characteristics related to the time of the transfer event, high school graduation, and college entry. While many school attributes associated with these outcome variables are similar to those found in extant student mobility literature, others are not. Notably, youth employment requires further investigation as working students equal those who transferred schools in this cohort. In addition, as economic pressures mount on young people to contribute to their household finances and as housing instability brought about by the COVID-19 pandemic continues, the confluence of these forces may drive more students and families to transfer schools.

Finally, children and youth need a stable home to learn, and schools have become such a place for many. A school transfer may be the attempt of children, parents, and schools to find such a home only to find that doing so, as this study finds, puts students at a higher risk of adverse educational outcomes. In addition, more attention is required to understand the role of schools, their wide transfer variability, and attributes related to educational outcomes examined here.

A transfer is a multidimensional event more than a frequency of moves, timing, or hazard rates. Although it may be a double-edged solution to discontentment with a particular school, opportunities abound to build the youth's capacity to resist oppressive conditions and to transform inequities into favorable outcomes. Further, school districts and state agencies already report student mobility as an indicator in their data dashboards. However, the importance of this complex indicator may not have been fully emphasized. Hopefully, this research provided some evidence and openings to change the odds.

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