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Distinguishing the Roles of Poverty and Homelessness in Long-Term Academic and Workforce Outcomes

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Executive Summary

The purpose of this study was to examine the role of homelessness above and beyond the role of poverty alone in contributing to academic and workforce outcomes. Linked longitudinal data from the Maryland Longitudinal Data System (MLDS) and multiple membership multilevel models (Chung & Beretvas, 2012) were used to help disentangle student and school factors to determine the relevant importance of each across a number of outcomes, including high school dropout and graduation, standardized test scores, college enrollment, and annual workforce wages. Academic outcomes for students experiencing homelessness were significantly worse than those for similar, stably housed students experiencing only poverty. Workforce outcomes in terms of total wages earned in the first year after on-time high school graduation were no different for students who had experienced homelessness compared to those who experienced poverty without homelessness. The current study expanded on prior research by distinguishing the roles of poverty and homelessness in relation to longer-term academic and career outcomes. This report also includes policy implications and directions for future research.

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Introduction

Decades of research point to the critical role of childhood poverty in creating, maintaining, and exacerbating inequalities in long-term outcomes (Brooks-Gunn & Duncan, 1997; Jencks & Mayer, 1990; Orfield & Lee, 2005). Above and beyond the critical role of personal experiences with poverty (Brooks-Gunn & Duncan, 1997), increasing residential segregation by income level between 1990 and 2009 has resulted in concentrated levels of poverty within neighborhoods (Bischoff & Reardon, 2014). Since public school boundaries typically follow neighborhood geographic boundaries, disparities in concentrated levels of poverty within schools also exist (Reardon & Owens, 2014). Further compounding the challenges associated with household, neighborhood, and school poverty are the historical patterns of racial discrimination and segregation leading to the disproportionate impoverishment of minority households and high-minority schools (Reardon, 2016).

Prior research using data from the MLDS aimed to disentangle the roles of student-level and school-concentrated poverty on long-term academic and workforce outcomes and found that both student and school-level poverty were related to long-term academic outcomes, even after controlling for individual student race/ethnicity and school racial/ethnic composition (Henneberger et al., 2019).¹ Students who experienced poverty for longer periods of time had worse educational outcomes, including lower predicted likelihoods of high school graduation, higher predicted likelihoods of high school dropout, lower predicted standardized assessment scores, and lower predicted likelihoods of enrolling in postsecondary education. School concentration of poverty, regardless of an individual student's poverty experience and race, usually predicted worse educational outcomes. Racial and ethnic gaps in standardized test scores persisted regardless of student and school-level poverty. However, racial and ethnic gaps in student dropout, high school graduation, and postsecondary enrollment disappeared or reversed when controlling for student and school-level poverty and school racial/ethnic composition. Student and school-level poverty were associated with lower annual wages for students who did not enroll in college and higher annual wages for students who did enroll in college immediately following high school.

The current study builds on this prior research conducted by the MLDS Center to further disentangle the role of homelessness above and beyond the role of poverty alone in contributing to academic and workforce outcomes. Multiple membership multilevel models

¹ Multilevel multiple membership models (Chung & Beretvas, 2012) were used to account for students nested within schools and to allow for students to attend more than one middle and high school. Student poverty was measured by calculating the total proportion of school enrollments between 6th and 12th grades that students were eligible for FARMS. This measure was aggregated to the school level to calculate school concentrated poverty.

(Chung & Beretvas, 2012) are used to help disentangle student and school factors to determine the relevant importance of each across a number of outcomes, including high school dropout and graduation, standardized test scores, college enrollment, and annual workforce wages.

Background

Homelessness and Academic and Workforce Outcomes

Families experiencing extreme poverty may also experience homelessness. Youth in U.S. public schools are considered homeless if they lack a fixed, regular, and adequate nighttime residence; generally, they are divided into the four categories of sheltered, unsheltered, hotels or motels, and doubled-up (Aratani, 2009). The most recent national statistics indicate that during the 2018-2019 school year, over 1.3 million students enrolled in public schools were identified as experiencing homelessness at some point over the last three years (National Center for Homeless Education, 2021). In Maryland, approximately 17,429 youth who were enrolled in school during the 2016-2017 academic year experienced homelessness during that year (Maryland Interagency Council on Homelessness (MICH), 2018). This was a 5.5% increase from the year before, and of those students, the majority (81%) were doubled up with other families, 9% were in a shelter, 9% were in a hotel/motel, and 2% were unsheltered (MICH, 2018).

Homeless youth are subject to experiencing greater adversity through the accumulation of risk factors such as disadvantaged backgrounds, single-parent families, racial/ethnic or sexual minority status, poor physical health, sexual and physical abuse, mental health problems, substance use, delinquent behavior (e.g., assault, theft), lack of positive social supports, and child welfare system involvement (Aratani, 2009; Morton & Farrell, 2018; National Conference of State Legislatures, 2021; Brakenhoff et al., 2015; Thompson et al., 2010).

Homelessness is also associated with educational challenges such as absenteeism, poor grades, low standardized test scores, increased school mobility, and high rates of school dropout and learning disabilities (Buckner, 2008; Miller, 2011). Prior research indicates the detrimental role of homelessness on educational and workforce outcomes. For example, among North Carolina students, homeless students scored significantly lower than housed students in reading comprehension and math (Hendricks & Barkley, 2011). Homeless students consistently graduate from high school at a lower rate than their peers; while the exact rate varies across school systems in the United States, many systems report a discrepancy of 17-31% when comparing graduation rates for homeless students to the overall student population (Erb-Downward, 2018; Ingram et al., 2017). Nationally, the overall graduation rate in 2018-19 was 85.8%, but for homeless students it was 67.7% (Atwell, 2021).

The negative associations between homelessness and early labor market outcomes parallel those observed in education, with homeless youth reporting elevated unemployment rates, as high as 75% compared to 16% for housed peers (Slesnick et al., 2018). Since homeless youth are more likely to drop out of high school, they have an increased chance of being and remaining unemployed. Seeking employment becomes more cumbersome when youth are unable to list a permanent address on job applications. In 2019, the labor force participation rate for 16-24-year-olds was 38.2% for high school dropouts, compared to 72.2% of high school graduates (U.S. Department of Labor, 2020). In addition, homeless students are more likely than stably housed peers to be unemployed since residential stability is linked to employment outcomes (Slesnick et al., 2018). Detailed research on the link between adolescent homelessness and adult workforce outcomes in the U.S. is lacking; an Australian study by Cobb-Clark and Zhu (2017) revealed that youth experiencing homelessness prior to age 15 were less likely to be employed in adulthood.

To address these challenges and circumvent disruptions in homeless students' learning experiences, the McKinney-Vento Homeless Assistance Act (42 U.S.C. 11431 et seq.; MCKV) was enacted to ensure the identification of homeless students and reduce educational barriers for enrollment (e.g., waiving required documents) and attendance (e.g., transportation needs), in addition to targeting mainstreaming efforts by maintaining access at students' school of origin, despite their residential status (Pavlakis et al., 2017; Stone & Uretsky, 2016).² However, research evaluating the effectiveness of MCKV funding found that it did not improve academic achievement among homeless students when comparing local education agencies with and without MCKV funding (Hendricks & Barkley, 2012).

Homelessness and Poverty

Statistics comparing homeless and housed youth likely underestimate the differences since many studies include both youth in poverty and better-off youth in the "housed" category. Further complicating the distinction, homeless and low-income youth share a host of overlapping risk factors. In fact, some researchers posit that negative outcomes for homeless youth are due only to poverty and that housing status is not the deciding factor (Park et al., 2011). Homeless students and low-income students share multiple overlapping risk experiences (Brumley et al., 2015; Buckner, 2008; Masten et al., 2014), and, as such, some research finds no

² Although national estimates of the homeless student population are obtained from calculating participants enrolled in MCKV programs across school districts, the identification of eligible students remains a challenging task (Uretsky & Stone, 2016). Homeless youth often experience fluid housing arrangements throughout the school year; however, point-in-time counts fail to capture homelessness on other nights, resulting in the undercounting of homeless youth (Morton et al., 2018). As a result, significant undercounting of homeless youth occurs, inadvertently reducing their access to needed resources and supports (Stone & Uretsky, 2016).

significant differences in outcomes between homeless and housed low-income students in academic achievement, absenteeism, and behavior problems (Buckner et al., 2001; Miller, 2011; Tobin, 2016; Rafferty et al., 2004; Ziesemer et al., 1994). Despite experiencing similar risks, other research suggests that homelessness further exacerbates the negative association between poverty and academic outcomes, highlighting distinct differences between homeless and housed, low-income youth (Buckner, 2008; Canfield et al., 2016; Masten et al., 2014; Pavlakis et al., 2017). For example, when compared to low-income, stably, housed peers, homeless students are more likely to experience higher rates of school mobility, absenteeism, dropout, and grade retention, as well as lower academic achievement and plans for postsecondary education (Aratani, 2009; Cutuli et al., 2013; Herbers et al., 2012; Miller, 2011; Obradović et al., 2009; Pavlakis et al., 2017; Rafferty et al., 2004).

Although poverty and homelessness are distinct experiences, few studies have managed to disentangle their effects, thus limiting the understanding of their distinct effects on long-term outcomes (Buckner, 2008; Carrasco, 2019; Hyman et al., 2011; Pavlakis et al., 2017). Additional research is warranted given myriad methodological variations in conceptual definitions and operationalizations of poverty and homelessness (e.g. point-in-time versus longitudinal studies), which have yielded inconsistent findings (Buckner, 2008; Edidin et al., 2012; Morton et al., 2018). Furthermore, most studies focus on the primary and secondary academic trajectories of homeless youth (Cutuli, 2013; Metzger et al., 2015), therefore, little is known about postsecondary and early labor market outcomes within this population. Since a dearth of literature exists examining the combined long-term effects of homelessness and poverty on academic achievement and early labor market outcomes, the goals of this study are two-fold: a) to determine whether homeless students experience worse outcomes than students experiencing poverty without homelessness, controlling for race/ethnicity, prior academic performance, and school context; and b) estimate the associations between poverty and homelessness and long-term academic (e.g. high school dropout, college enrollment) and workforce (annual wages) outcomes.

The Current Study

The present study draws from the “continuum of risk” framework to better understand the associations between poverty and homelessness and long-term educational and workforce outcomes. This framework, proposed by Masten et al. (1993), postulates that increased exposure to adverse risk factors results in poorer outcomes, particularly for homeless children. Homelessness falls at the extreme end of the continuum, given its association with increased levels of three types of risk, including common risks for all students (e.g., biological and behavioral factors), poverty-related risks (e.g. neighborhood and school factors), and homelessness-specific risks (e.g. stigma, shelter environments; Buckner, 2008; Masten et al.,

2014; Pavlakis et al., 2017). Homeless students face cumulative risk factors, beyond those experienced by their housed, low-income peers (Cutuli et al., 2013; Pavlakis et al., 2017). Homelessness alone does not expose youth to experiencing poor educational outcomes, rather, increased exposure to multiple co-occurring risks linked to poverty (Brumley et al., 2015). Yet, homeless students and low-income students share multiple overlapping risk experiences (Brumley et al., 2015; Buckner, 2008; Masten et al., 2014), and, as such, some studies report little to no observed differences in outcomes among homeless and housed, low-income youth (Buckner, 2008).

The purpose of this study is to examine the role of homelessness above and beyond the role of poverty alone in contributing to academic and workforce outcomes. Multiple membership multilevel models (Chung & Beretvas, 2012) are used to help disentangle student and school factors to determine the relevant importance of each across a number of outcomes, including high school dropout and graduation, standardized test scores, college enrollment, and annual workforce wages. The current study builds on prior research by distinguishing the roles of poverty and homelessness in relation to longer-term academic and career outcomes.

Method

Data Source

The data used for this report are from the Maryland Longitudinal Data System (MLDS), which contains linked longitudinal data from three State agencies. The Maryland State Department of Education (MSDE) provides data for public PreK-12 students and schools. The Maryland Higher Education Commission (MHEC) provides data for Maryland public and state-aided independent college students and colleges. The Department of Labor (Labor) provides wage data for Maryland employees who work for employers who are subject to Maryland's Unemployment Tax law.¹ The workforce data do not include information for federal employees, military employees, individuals who are self-employed, or private contractors. Out-of-state college enrollments and degrees are obtained through the National Student Clearinghouse (NSC; Dynarski et al., 2015). This report responds to the MLDS Center Research Agenda question: *Are Maryland students academically prepared to enter postsecondary institutions and complete their programs in a timely manner? and What are the workforce outcomes for Maryland students who earn a high school diploma (via high school graduation or GED®) but do not transition to postsecondary education or training?*

Measures

Independent variables

Poverty and homelessness. A categorical variable was created using students' experiences with homelessness and poverty (eligibility for FARMSⁱⁱ) from 6th through 12th grades. This variable consisted of three mutually exclusive categories: experienced homelessness (for any length of time), never experienced homelessness but experienced poverty (for any length of time), and never experienced homelessness or poverty. (As students experiencing homelessness are automatically deemed eligible for FARMS, there is no category for students who experienced homelessness but never experienced poverty.)

Ever homeless. Students who were ever identified in MSDE data as homeless at any point in time from 6th through 12th grade (2007-2008 through 2016-2017) for any duration of time were considered "ever homeless." Homeless students are defined by the McKinney-Vento Homeless Assistance Act (42 U.S.C. §11301 et seq.) as children/youth that lack a fixed, regular, and adequate nighttime residence. This includes living in shared housing due to economic hardship, living in motels, hotels, trailer parks, or camping grounds due to the lack of alternative adequate accommodations; living in emergency or transitional shelters; living in cars, parks, public spaces, abandoned buildings, substandard housing, bus or train stations, or similar settings; and having a primary nighttime residence that is a public or private place not designed for or ordinarily used as a regular sleeping accommodation for human beings.³

Poverty, never homeless. Students who were never identified as homeless but were ever identified in MSDE data as eligible for FARMS at any point in time from 6th through 12th grade (2007-2008 through 2016-2017) for any duration of time were considered as having experienced "poverty, never homeless." The FARMS eligibility flag comes from data collected in accordance with the National School Lunch Program, an income-based eligibility program that provides low-income students with improved access to meals at school. Students with household incomes at or below 130% of the federal poverty level were eligible for free meals, while students with household incomes between 130% and 185% of the federal poverty level were eligible for reduced-priced meals (U.S. Department of Agriculture, 2017). The free and reduced-price meals (FARMS) indicator associated with each school enrollment record in the MLDS data does not distinguish between eligibility for free meals and eligibility for reduced-price meals, which means that this variable merely indicates that the student's household income was below 185% of the poverty line at that particular point in time. This group was used as the reference group in models.

³ The definition of homeless children and youth also included "children awaiting foster care placement" until the reauthorization of the McKinney-Vento Act by the Every Student Succeeds Act (ESSA) in December 2015.

Never homelessness or poverty. Students who never experienced homelessness or eligibility for FARMS at any point between 6th and 12th grade (2007-2008 through 2016-2017) were placed into this category.

Race/ethnicity. Student race/ethnicity was measured using mutually exclusive categorical dummy variables. Students were categorized as Black/African-American (non-Hispanic), White (non-Hispanic), or other (this includes Hispanic of any race, Asian, Pacific Islander and American Indian/Native American). Non-Hispanic White students were used as the reference group in models.

Student baseline academic performance. Students' achievement in reading and math at baseline (6th grade) was measured using their scaled scores on the 2008 Maryland School Assessments (MSA) in Reading and Math. The MSA tests, part of Maryland's accountability system under No Child Left Behind, were developed by MSDE and Pearson with the involvement of a National Psychometric Council as well as committees that reviewed for content, bias, and vision accessibility. The tests were aligned to the Maryland reading and math standards set forth in the Voluntary State Curriculum and were administered statewide in April, 2008.

School-level variables. School-level composition characteristics were measured in order to help separate out student-level effects from compositional effects. We included school percent ever homeless, school percent never homeless or FARMS, school percent non-Hispanic Black, school percent Other race/ethnicity, and school mean scaled score on 6th grade reading and math MSA. The percentage variables were based on all schools attended by the student from 6th through 12th grade.

School homelessness and poverty. School percent ever homeless and school percent never homeless or FARMS were measured by first creating a school-by-year measure calculating the percentage for each school for each school year, for all schools in the state across all years of the study. Next, for the study cohort, this school-by-year measure was then linked to each student's enrollment record(s) in each school. Each cohort member's overall school context was then assessed by taking the mean percentage measure across all schools attended over the course of their enrollment in grades 6 through 12. This was rescaled by multiplying by 10.

School racial/ethnic composition. The proportion of White, Black, and Other students for each school for each academic year was obtained first by linking compiled school-by-year MLDS data with public data from the Common Core of Data provided by the National Center for Educational Statistics. For each student, the mean of each of these proportions was calculated

from all the schools each student attended from grades 6 to 12. This was rescaled by multiplying by 10.

School baseline academic performance. The academic performance of each school at baseline was measured using the school mean 2008 MSA Reading and Math Grade 6th grade scores. Due to high collinearity between school mean reading scores and school mean math scores, the two mean scores for each school were averaged to obtain a single measure of school baseline academic performance.

Dependent variables

Dropout. Students' high school dropout was measured by examining whether students formally withdrew from school prior to the end of academic year 2016-2017. Students whose last enrollment record did not indicate formal withdrawal or transfer out of Maryland public schools but for whom no subsequent record was found were considered dropouts.

College enrollment. Enrollment records in Maryland and out-of-state public and state-aided independent 2-year and 4-year colleges were used to indicate college enrollment among those who graduated from high school on time (2013-2014 academic year). The MLDS had complete data on both in-state and out-of-state postsecondary enrollment only through the 2014-2015 school year at the time data were extracted for this study; therefore, college enrollment is examined only for the students in this cohort who graduated from high school on time (by 2013-2014), and only college enrollment within one year after high school graduation could be included. Enrollment included any record of postsecondary enrollment including non-degree programs.

Workforce wages. The sum of Maryland quarterly wages in the first four quarters after on-time high school graduation (i.e. for most students, total wages earned July 2014 through June 2015) was calculated for each student. The wage variable was log-transformed due to high skewness. Because enrollment in college limits availability for working, wage outcomes were examined separately for students who were not enrolled in college and students who were enrolled in a Maryland college. Students enrolled in college outside of Maryland were excluded from wage analyses as wage data are only available for cohort members who remained in Maryland.

Sample Selection and Description

In order to have sufficient years of data for examining the roles of poverty and homelessness during the adolescent years on academic and workforce outcomes, the cohort of students who were in 6th grade in the 2007-2008 academic year ($N=63,282$) was used as the

initial sample for the current study. This enabled the study to obtain a reliable measure of student poverty during adolescence (across their entire middle and high school years) as well as to have a full year of postsecondary and workforce data post-high school (for those who graduated from high school on time in 2013-2014). Students ($n=10,672$) were excluded from the final sample for the following reasons: (1) transferring out of the Maryland public school system ($n=7,811$); (2) never enrolling in any Maryland public school at any time during 9th through 12th grade despite not being recorded as transfers out of Maryland public schools ($n=955$); (3) missing values in race/ethnicity ($n=414$) or 6th grade academic performance data ($n=1,492$). Thus, the final analytic sample consisted of 52,610 students. A figure detailing the sample selection process is presented in Figure 1.

Figure 1. Sample Selection

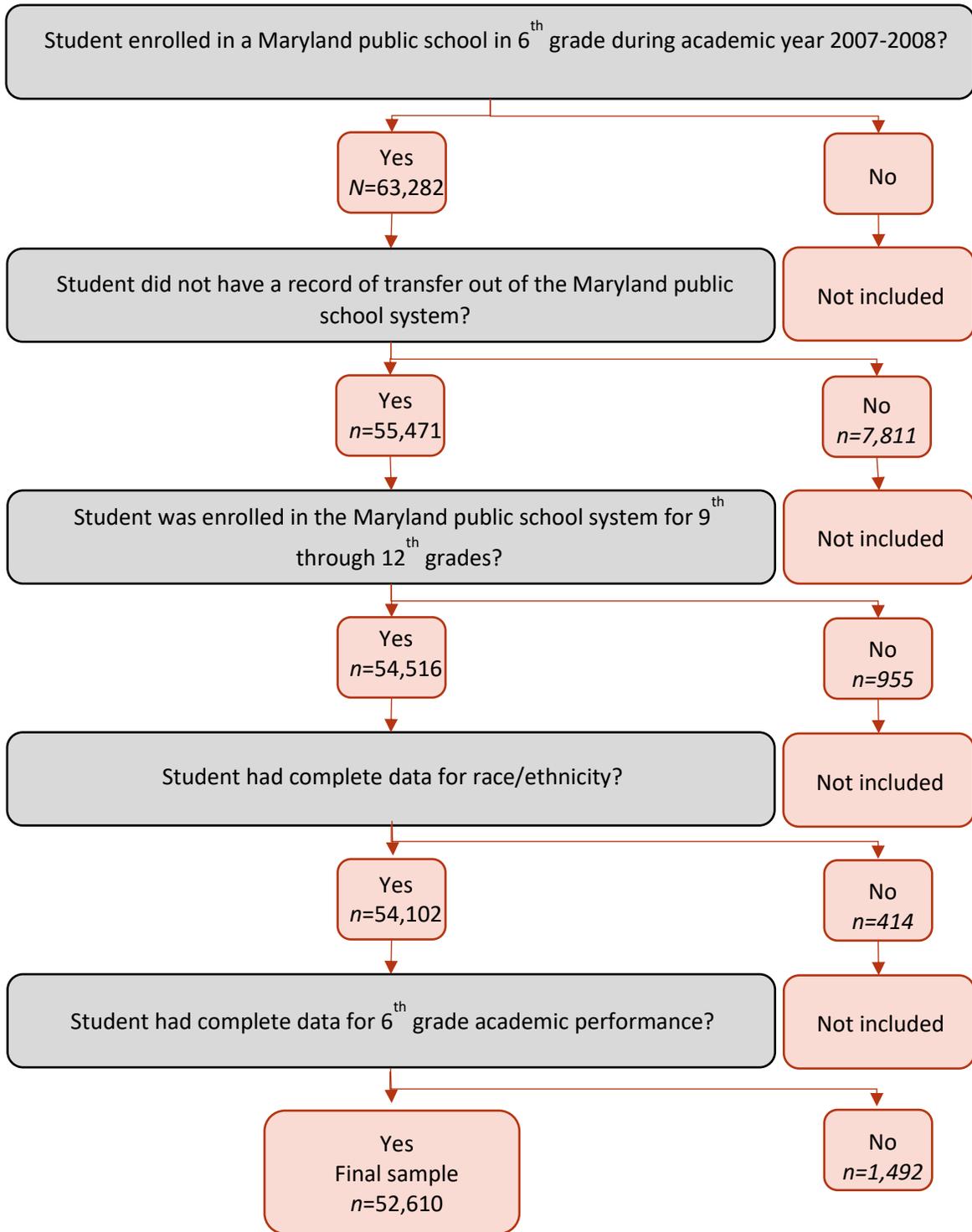
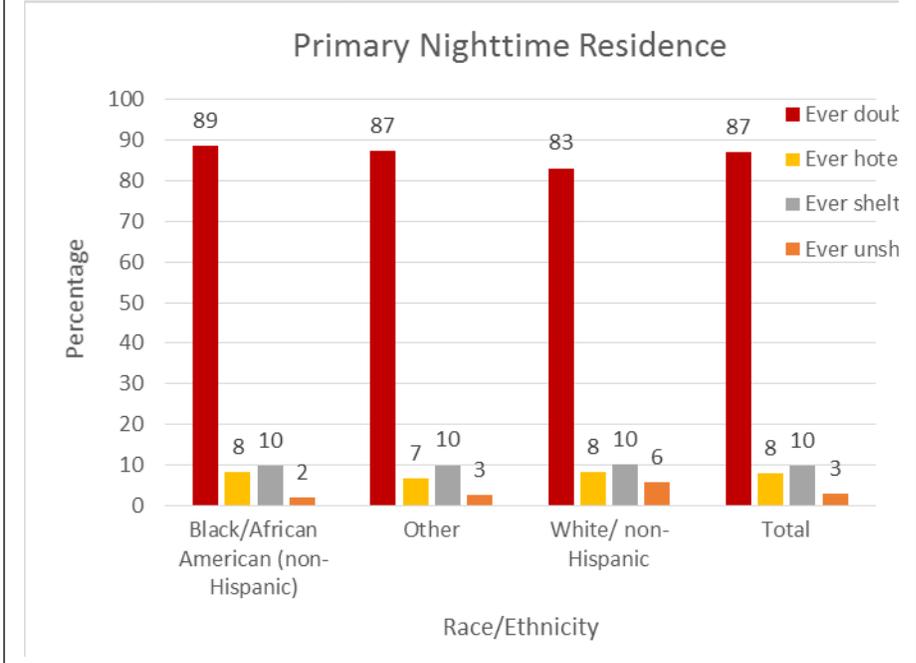


Figure 2. Primary Nighttime Residence of Homeless Students in Sample, by Race/Ethnicity

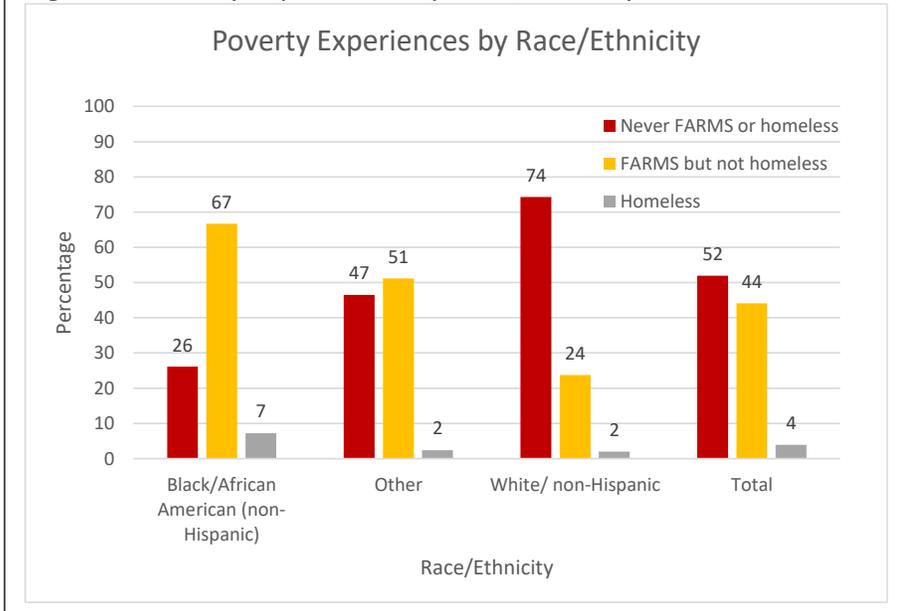


About 44% of our cohort were students who experienced poverty (as indicated by eligibility for free or reduced-price meals) without ever being homeless. Students who experienced homelessness at any point between 6th and 12th grade constituted about 4% of our cohort (n=2,065). Since students could be homeless at multiple points in time from 6th through 12th grade, they could have

multiple types of living situations as well. For the students who experienced homelessness, we examined the primary nighttime residence associated with their homelessness (see Figure 2). Most (87.1 percent) were ever “doubled-up,” that is, sharing the housing of other people due to loss of housing, economic hardship, or a similar reason. Staying in a hotel/motel or shelter were experienced by 8.0 percent and 9.9 percent, respectively. Just under 3 percent ever were unsheltered. This last category was disproportionately experienced by whites relative to blacks.

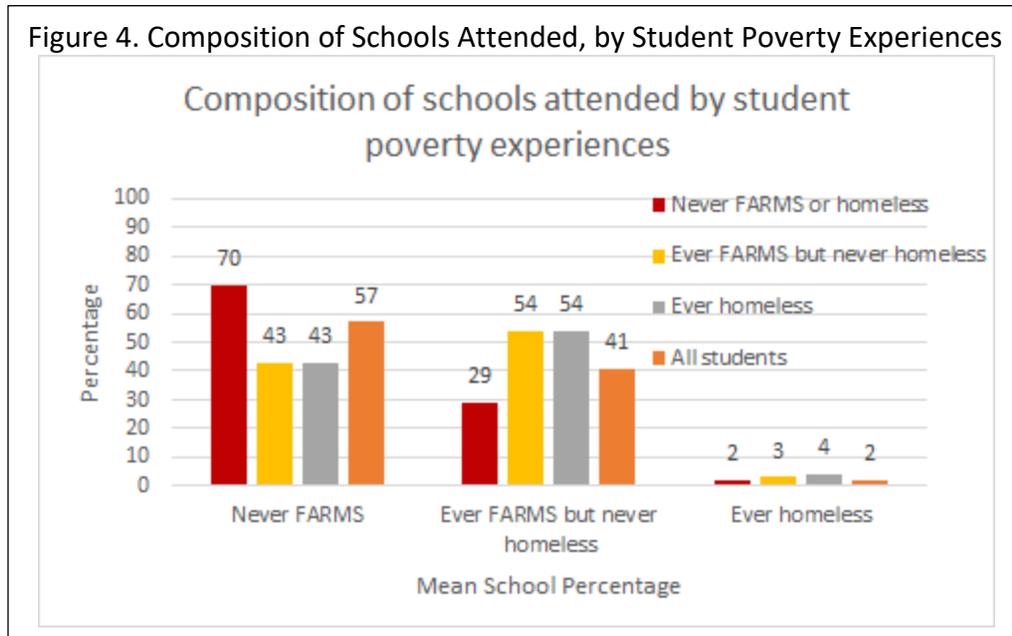
Poverty and race/ethnicity. As seen in Figure 3, homelessness disproportionately affects Blacks, with over 7% of Black students in this cohort experiencing homelessness – 3½ times the rate for White students. Another two-thirds of Black students experienced poverty without homelessness. Only 1 in 4 Black students in our cohort never experienced any form of poverty. For White students this is reversed: only 1 in 4 White students experienced any form of poverty.

Figure 3. Poverty Experiences by Race/Ethnicity



School context. Figure 4 displays differences in the composition of schools students attended based on students' own experiences with poverty and homelessness. Students who had never experienced poverty or homelessness, on average, attended schools where most

Figure 4. Composition of Schools Attended, by Student Poverty Experiences



(70%) students had also never experienced poverty or homelessness. Further, at those schools less than a third (29%) had experienced poverty without homelessness and only 2% of students had ever been homeless. By

contrast, students who experienced poverty or homelessness tended to attend schools where the majority of students (54%) had also experienced poverty and where the experience of homelessness was more prevalent.

Analyses

The goal of this observational study was to estimate and compare the relationships of homelessness and poverty with educational and workforce outcomes. In order to statistically control for other factors (race/ethnicity, baseline academic achievement, school composition), analyses used a form of regression known as multilevel modeling or hierarchical linear modeling. This approach accounts for the fact that data violate the assumption of independence of observations that is needed for regression analyses (i.e. students who attend the same school often have similar outcomes). This study used multiple membership multilevel modeling (Beretvas, 2011) to account for the fact that most students attended more than one school over the study time frame (6th through 12th grades). Students (level 1) were nested within schools (level 2). Traditional multilevel models assume that each lower-level unit or individual (e.g., student) is nested within only one higher-level cluster (e.g., school; Raudenbush & Bryk, 2002). In the present study, most students (63%) belonged to two schools (usually one middle school and one high school) over the course of their educational history from 6th through 12th grade (or until dropping out), 22% of students attended three schools, and 3% attended 6 or more. Less than one percent of the analytic sample attended one school for the entire period. A multiple membership approach was used to account for the relative influence of all schools attended by students (see appendix for additional information on the modeling strategy).

Findings

Descriptive statistics for the outcome variables examined in the current study can be found in the Appendix. The primary focus of this study was to estimate the relationship of homelessness with outcomes and determine whether the relationship of homelessness with outcomes was different from the relationship of poverty (without homelessness) with outcomes. Table 1 provides the final multilevel modeling results for each outcome examined in the current study. Full modeling results can be found in the Appendix.⁴

⁴ Additionally, because the descriptive statistics suggested different relationships between poverty/homelessness and wages by racial/ethnic group, we estimated wage models separately for Blacks, Whites, and other race/ethnicity individuals. The results of these models can be found in the Appendix.

Table 1. Final Multilevel Modeling Results

	Dropout		College Enrollment		Wages for Non-College Students		Wages for College Students	
	B	se	B	se	B	se	B	se
Intercept	-2.89***	.14	1.14***	.03	8.50***	.02	8.03***	.01
Never FARMS or homeless	-1.24***	.05	0.73***	.03	0.08*	.03	-0.22***	.02
Homeless	0.74***	.06	-0.35***	.06	-0.05	.06	-0.03	.07
Black, non-Hispanic	-0.89***	.06	0.65***	.04	-0.27***	.04	-0.34***	.03
Other race/ethnicity	-0.60***	.06	0.47***	.04	0.02	.05	-0.06*	.03
Grade 6 Reading	-0.00**	.00	0.01***	.00	-0.00*	.00	-0.00***	.00
Grade 6 Math	-0.02***	.00	0.01***	.00	0.00*	.00	-0.00***	.00
% never FARMS or homeless (0-10)	-0.33***	.05	0.25***	.02	-0.01	.01	-0.08***	.01
% homeless (0-10)	-7.03***	.34	-1.31***	.21	-0.27*	.12	0.07	.11
% Black (0-10)	0.16***	.04	0.13***	.01	-0.06***	.01	-0.09***	.01
% Other race (0-10)	-0.36***	.07	0.20***	.02	-0.02	.01	-0.08***	.01
Mean Grade 6 Reading & Math	-0.01***	.00	0.02***	.00	-0.00**	.00	-0.01***	.00
Random parameters								
Level-2 variance	7.58***	.58	0.45***	.05	0.04*	.01	0.05***	.01
Level-1 variance					1.45***	.02	1.46***	.02
Model fit (DIC)	23,888.22		43,704.31		27,464.88		58,603.49	

Note. Level-1 (student) variables are group-mean centered; Level-2 (school) variables are grand-mean centered. FARMS=free or reduced-price meals. DIC=Deviance information criterion. For full models, referent is FARMS-only, white non-Hispanic, avg test scores in avg school.
 * $p < .05$; ** $p < .01$; *** $p < .001$

Findings for High School Dropout

The average likelihood of dropout for average-performing white students experiencing poverty without homelessness attending the average school (the model intercept) was estimated in log odds as -2.89 or 5 percent ($e^{-2.89}/(1+e^{-2.89})=0.05$). The average relationship between homelessness and dropout, controlling for race/ethnicity and achievement as well as school context, is more than doubled likelihood of dropout ($e^{0.74}=2.10$); the likelihood of dropout for a homeless student, all else being equal, is one in 10 ($(e^{-2.89+0.74})/(1+e^{-2.89+0.74})=0.10$). Students who had never experienced poverty or homelessness had lower predicted rates of dropout when compared to students who had experienced poverty only ($B = -1.24, p < .001$); expressed as an odds ratio this is $e^{-1.24}$ or 0.29, indicating that these students are 71 percent less likely to drop out of high school than students experiencing poverty alone.

Findings for College Enrollment

The college enrollment analyses were based on cohort members who graduated from high school on time ($N = 45,580$). Those who had experienced homelessness had lower predicted rates of college enrollment when compared to those who experienced poverty only ($B = -0.35, p < .001$). Students experiencing homelessness were 30 percent less likely to attend college compared to their stably housed peers experiencing poverty without homelessness ($e^{-0.35}=0.70$). Those who had never experienced poverty or homelessness had higher predicted rates of college enrollment when compared to those who had experienced poverty only ($B = 0.73, p < .001$) and were twice as likely to enroll in college ($e^{0.73}=2.08$).

Findings for Wages

Wage analyses were based on cohort members who graduated from high school on time and were found in the Maryland wage data. Because being enrolled in college affects availability for working, analyses were conducted separately for cohort members who did not enroll in college ($N = 8,529$) and cohort members who were enrolled in a Maryland college ($N = 18,177$). Cohort members who enrolled in college outside of Maryland were excluded from wage analyses.

Among those not enrolled in college, average log wages for average white cohort members experiencing poverty without homelessness (the model intercept) were estimated to be 8.50, or roughly \$4,915. After controlling for race/ethnicity and achievement and school-level factors, wages for those who had experienced homelessness were not statistically different from wages for those who experienced poverty only ($B = -0.05, p > .05$). Those who had never experienced poverty or homelessness had predicted wages that were 8 percent or

\$418 higher when compared to cohort members who had experienced poverty only ($B = 0.08, p < .05$).

Among on-time high school graduates who did enroll in a Maryland college, average log wages for average white cohort members experiencing poverty without homelessness (the model intercept) were estimated to be 8.03, or roughly \$3,072. After controlling for race/ethnicity and achievement and school-level factors, wages for those who experienced homelessness were not statistically different from wages for those who experienced poverty only ($B = -0.03, p > .05$). Those who had never experienced poverty or homelessness had predicted wages that were 22 percent or \$676 lower when compared to cohort members who had experienced poverty only ($B = -0.22, p < .001$).

Summary of Findings

In sum, this study found that students' experiences with poverty and homelessness during middle and high school are related to long-term academic and workforce outcomes, even after controlling for student race/ethnicity and achievement and school-level factors. Students who were homeless experienced a variety of nighttime residences, with the majority being doubled-up. Only 2.9% of homeless students were ever unsheltered, but White students were unsheltered at a disproportionately high rate compared to Black/African American students and students of other races. Poverty disproportionately affected Black/African American students, who experienced homelessness at a rate 3½ times that of White students. Approximately 1 in 4 Black/African American students was never FARMS or homeless; conversely, only approximately 1 in 4 White students experienced poverty or homelessness. Schools were also highly segregated by race/ethnicity and by poverty experiences.

Academic outcomes for students experiencing homelessness were significantly worse than those for similar, stably housed students experiencing only poverty. After controlling for student race/ethnicity and achievement and school-level factors, students who experienced homelessness had higher predicted rates of dropout and lower predicted rates of college enrollment compared to students who experienced poverty only. Students who had never experienced poverty or homelessness had lower predicted rates of dropout and higher predicted rates of college enrollment compared to students who experienced poverty only.

Workforce outcomes in terms of total wages earned in the first year after on-time high school graduation were no different for cohort members who had experienced homelessness compared to those who experienced poverty without homelessness. However, there were differences for those who never experienced poverty. Among non-college students, those who had never experienced poverty or homelessness had higher predicted wages, and among

college students, those who had never experienced poverty or homelessness had lower predicted wages, compared to students who experienced poverty only.

Discussion

This study examined the relationship between poverty and homelessness during adolescence and academic and early labor force outcomes. Statewide longitudinal data from the MLDS was used to assess the roles of student-level and school-level factors using multilevel models. Student poverty was calculated using FARMS eligibility for each year from 6th to 12th grade that a student was enrolled. Approximately 48% of students in this study experienced poverty at some point, a finding consistent with prior research in Maryland (Henneberger et al., 2019). This measure of student poverty was then aggregated to the school level to measure the school concentration of poverty. Student homelessness, which affected 4% of the sample, was also measured and aggregated to the school level to measure the school concentration of homelessness. Students were classified in one of three groups based on their experiences: ever homeless; poverty, never homeless; and never homeless or poverty. The relationship between race/ethnicity, group membership, and the academic and early labor market outcomes was also examined. Sample descriptive statistics indicated that most students who experienced homelessness were “doubled-up,” sharing housing with other people. Just under 3% of students were ever unsheltered. These findings were consistent with prior research on homeless youth in Maryland (MICH, 2018). This study found that White students were unsheltered at a rate disproportionately higher than Black/African American students; however, poverty and homelessness disproportionately affected Black/African American students compared to White students. Students who never experienced homelessness or poverty tended to attend schools where the majority of students never experienced homelessness or poverty, while students who experienced poverty tended to attend schools where the majority of students also experienced poverty.

In order to understand whether students experiencing homelessness and students experiencing poverty without homelessness have distinct experiences, a multilevel model was used to compare predicted academic and early labor market outcomes for these two groups. After controlling for student-level race/ethnicity and achievement, students who experienced homelessness had higher rates of dropout and lower rates of college enrollment, but not significantly different predicted wages for either non-college students or college students. These findings were consistent with the results from other studies that found there to be differences in academic outcomes between homeless and low-income, stably-housed adolescents (Buckner, 2008; Canfield et al., 2016; Masten et al., 2014; Pavlakis et al., 2017).

Prior research indicates that homeless students experience unique risks, including encountering more disruptions in their educational experiences due to frequent residential changes (Metzger et al., 2015). Additionally, homeless students are more likely to struggle with academic problems, such as absenteeism, underperformance, and grade retention, which are associated with future high school dropout (Gubbels et al., 2019; Kennelly & Monrad, 2007; Rumberger, 2020). Early academic difficulty cascades to subsequent academic problems, including lower levels of planning for and enrolling in college (Havlik et al., 2018; Kull et al., 2019; Rafferty, 2004). As an additional risk, above and beyond that experienced by students in poverty, it is possible that homeless students are preoccupied with their immediate survival and safety needs (Maslow, 1943), reducing the ability to provide attention to longer-term educational goals, such as attending college, making those goals seeming unattainable (Havlik et al., 2018). Given homeless youth are more likely to be first-generation college students, unfamiliarity with the college selection process (e.g., college entrance exams, application deadlines, and financial aid) and/or lack of support in navigating the college environment may also limit their access to college (Havlik et al., 2018; Tierney et al., 2008).

On average, non-college attending homeless and stably housed, low-income students earned roughly 10% less in annual workforce wages than those who never experienced poverty or homelessness. This finding supports previous research showing students with poverty experiences to earn significantly lower wages than their more affluent peers (Duncan et al., 2012; Henneberger et al., 2019). It may be that homeless and stably housed, low-income youth have increased odds for experiencing unemployment or occupying low-paying jobs, which contribute to lower workforce earnings (Cobb-Clark & Zhu, 2017; Duncan et al., 2012; Slesnick et al., 2018). Similarly, results examining annual workforce earnings between homeless students and their stably housed, low-income peers who were enrolled in college revealed no significant differences, yielding comparable annual workforce wages. Previous research suggests that students exposed to poverty for extended periods of time are more likely to earn lower wages (Duncan et al., 2012; Henneberger et al., 2019). However, it is important to note that the workforce earnings of homeless students enrolled in college were higher than those without poverty or homelessness experiences, approximately 21% higher. This finding supports other research indicating that college students with poverty experiences earn significantly higher wages than their more affluent peers (Henneberger et al., 2019), which may be due to their lack of financial resources. Students from low socioeconomic backgrounds are more likely to work longer hours or occupy multiple jobs to cover college-related expenses, such as tuition and housing (Long & Riley, 2007; Pike et al., 2008), which may explain observed trends in higher annual wages.

This study faced some limitations that should be taken into consideration. Due to under-identification of homeless students, the population of students identified as homeless likely

does not reflect the full population of students actually experiencing homelessness. If the full population were more accurately identified our estimates may change. Our estimates of the relationships examined here may be confounded by overlapping risk factors, not measured here, that students experiencing homelessness or poverty may also experience. Thus, our estimates of relationships may instead be partially attributable to the roles of other factors such as participation in the child welfare or juvenile justice systems. In our examination of wages earned after high school, we do not take into account experiences with working during high school; those experiences could partially explain observed differences in post-high school wages. Finally, our study did not examine variation in relationships from school to school or by local school system. This is an important area for future research.

Policy Implications

The findings from this study indicate that the populations of students experiencing poverty with homelessness and poverty without homelessness have distinct risks when it comes to academic outcomes like high school dropout and college enrollment, but overlapping risks when it comes to wages earned whether or not they are enrolled in college. Interventions such as those provided by McKinney-Vento programs should continue to address the unique needs of students experiencing homelessness, such as ensuring their ability to remain in their schools of origin, including providing necessary transportation, and filling in academic gaps. While all local school systems in Maryland are required to adhere to McKinney-Vento law in terms of promoting the identification and reporting of homeless students, not all local school systems in Maryland receive grant funds to support this unique population. Policymakers likely should consider widening the availability of such funds.

When it comes to examining wages earned after high school, the disparity appears to be between students who never experienced poverty at all versus those who experienced poverty in any form whether or not accompanied by homelessness. Policymakers should consider ways to enable access to more job opportunities and higher-paying jobs for students from impoverished backgrounds who do not attend college in the first year after high school. For students attending college, policymakers need to continue to identify ways to support students from poverty so that needing to work does not hinder their paths to attaining college degrees. Currently, Maryland provides tuition waivers for public 2-year and 4-year colleges to homeless youth under the age of 25 who are unaccompanied (i.e. not in the physical custody of a parent or guardian) (MHEC, n.d.); this program could be expanded to accompanied youth and homeless individuals 25 and older. Furthermore, access to college and financial aid application support often hinges on family social and cultural capital and school-based counseling and informational resources; these resources are often lacking or insufficient for impoverished

families and at higher-poverty schools. State and local education agencies could consider developing or expanding resources for these populations.

Future Research

Future research into the academic and workforce outcomes of students experiencing homelessness should examine the roles of McKinney-Vento grants in promoting success. While prior research comparing local education agencies with and without MCKV funding found that McKinney-Vento grants did not improve academic achievement among homeless students (Hendricks & Barkley, 2012), research conducted by the MLDS Center could use individual student data to examine the impact of McKinney-Vento funding on Maryland's homeless students, controlling for local school system characteristics that might differentiate those that do and do not receive these funds from the State. Future research could also more closely examine the wage disparities between individuals who experienced poverty and those who did not, in order to understand whether these disparities are caused by job sector differences. For example, among non-college enrollees, are the lower wages earned by individuals who experienced poverty due to working in lower-paying sectors, such as food service and retail? Further research should also examine the academic performance of later cohorts of homeless students in order to understand the impact of policy changes under the reauthorization of MCKV under ESSA, which now requires school counselors to provide college and career support for students experiencing homelessness (Havlik, 2017; Pavlakis & Duffield, 2017).

Conclusion

This study set out to examine whether academic and workforce outcomes for students experiencing homelessness during middle and high school were significantly worse than those for students experiencing poverty without homelessness. Findings confirmed that academic outcomes were significantly worse, but wage outcomes were statistically equivalent. School staff and policymakers should continue to explore ways to further support homeless students, who are uniquely disadvantaged.

ⁱ The MLDS workforce data are primarily from the quarterly Contribution and Employment Reports that Maryland employers who are liable to pay unemployment insurance taxes are required to submit to the Maryland Department of Labor. Examples of employers that are not required to file UI include the federal government (including the military), certain non-profits, and self-employed and independent contractors. Individuals working in temporary employment, including federal postsecondary work-study programs, are also not subject to UI filings. These omissions mean it is incorrect to assume that individuals not counted as “employed” in this report are unemployed. The wages reported reflect the compensation paid during the quarter, not when the compensation was earned. UI wages reflect the sum of all compensation, including bonuses, commissions, tips and other forms of compensation. The UI wage data do not distinguish between part-time and full-time employment, hourly and salaried wages, regular wages and commissions, bonuses and other incentive pay. The UI wage data provided do not indicate the number of days or the number of hours a person worked in a particular fiscal quarter.

ii This report uses student-level data on free or reduced-price meals (FARMS) eligibility. FARMS is part of the National School Lunch Program (NSLP), administered by the United States Department of Agriculture (USDA). Students may be eligible for free or reduced-price meals through participation in certain need-based Federal Assistance Programs or if their family's income falls below a specified poverty threshold. Eligibility status may be determined through annual household applications or through direct certification. Students living in households with incomes at or below 130% of the federal poverty level are eligible for free meals, while students living in households with incomes between 130% and 185% of the federal poverty level are eligible for reduced-priced meals. Some students are directly certified based on participation in certain programs (e.g., migrant education program, education of homeless children and youth, foster care) rather than exclusively on income-based eligibility for free/reduced priced meals.

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Appendix

A sequential modeling approach was used where, first, each outcome of interest was modeled with an unconditional model (Model 1). The outcome for student i who attended the set of schools $\{j\}$ was modeled at level 1 as the average outcome for all students who attended the set of schools $\{j\}$ plus the error term for student i . The average outcome for all students who attended the set of schools $\{j\}$ was modeled at level 2 as the average outcome across all schools plus the sum of the weighted error terms for each school h that was a member of the set of schools $\{j\}$. We weighted each school equally such that the weights summed to 1. For example, if a student attended 2 schools, each was weighted 0.5.

Unconditional model for normally distributed outcomes:

Level 1 (students):

$$Y_{i\{j\}} = \beta_{0\{j\}} + e_{i\{j\}}$$

Level 2 (schools):

$$\beta_{0\{j\}} = \gamma_{00} + \sum_{h \in \{j\}} w_{ih} u_{0h}$$

In model 2, dummy variables for *ever experienced homelessness* and *never experienced homelessness or poverty* were added at the student level. The omitted category, never experienced homelessness but ever experienced poverty, was used as the reference category. In model 3, student race/ethnicity (White was the omitted reference category) and student's grade 6 MSA Reading and Math scores were added at the student level. In model 4, the school-level variables were added. All level 1 variables were group-mean centered, and all level 2 variables were grand-mean centered, in order to estimate pure associations between the level 1 predictors and the outcome and between the level 2 predictors and the outcome (Bell, Jones, & Fairbrother, 2018; Enders & Tofighi, 2007). For model parsimony all level-1 variables were also constrained as fixed at level 2. Thus, the full model (for normally distributed outcomes) was a random intercept model:

Full model:

Level 1 (students):

$$Y_{i\{j\}} = \beta_{0\{j\}} + \beta_{1\{j\}}NeverPov_{i\{j\}} + \beta_{2\{j\}}Homeless_{i\{j\}} + \beta_{3\{j\}}Black_{i\{j\}} + \beta_{4\{j\}}Other_{i\{j\}} \\ + \beta_{5\{j\}}MSAR_{i\{j\}} + \beta_{6\{j\}}MSAM_{i\{j\}} + e_{i\{j\}}$$

Level 2 (Schools):

$$\beta_{0\{j\}} = \gamma_{00} + \sum_{h \in \{j\}} [w_{ih} (\gamma_{01} PctNeverPov_h + \gamma_{02} PctHomeless_h + \gamma_{03} PctBlack_h + \\ \gamma_{04} PctOther_h + \gamma_{05} MeanMSA_h + u_{0h})]$$

$$\beta_{1\{j\}} = \gamma_{10}$$

$$\beta_{2\{j\}} = \gamma_{20}$$

$$\beta_{3\{j\}} = \gamma_{30}$$

$$\beta_{4\{j\}} = \gamma_{40}$$

$$\beta_{5\{j\}} = \gamma_{50}$$

$$\beta_{6\{j\}} = \gamma_{60}$$

Our coefficient of interest, γ_{20} , quantifies the size of the association between homelessness and the outcome compared to the size of the association between experiencing poverty without homelessness and the outcome. Binary outcomes, such as graduating from high school or enrolling in postsecondary education, were modeled in a similar fashion but using logistic models. All models were fitted using Markov Chain Monte Carlo (MCMC) procedures in MLwiN version 3.02 (Charlton et al., 2017; Browne, 2017) from Stata/SE version 15 using runmlwin (Leckie & Charlton, 2012). Models for Maryland workforce participation and earnings were conducted separately for students who enrolled in postsecondary in Maryland colleges and students who did not enroll in postsecondary.

Descriptive Statistics for Outcome Variables

The current study examined three outcomes: dropping out of high school, enrollment in college within the first year after high school, and workforce wages during the first year after high school. As seen in Table A1, educational and workforce outcomes vary greatly based on students' experiences with poverty/homelessness. Students who have experienced

homelessness have elevated rates of dropout and lower rates of college enrollment within the first year after on-time graduation from high school. They also have lower wages while not enrolled in college and higher wages while enrolled in college, compared to those who never experienced poverty or homelessness.

Table A1. Educational and workforce outcomes for study cohort, by poverty experience in 6th-12th grade

	Dropout rate	College enrollment rate	Mean wages (not in college)	Mean wages (in MD college)
Never FARMS or Homeless	3%	83%	\$9,256	\$4,882
FARMS but not Homeless	16%	59%	\$7,633	\$5,965
Homeless	29%	48%	\$6,857	\$5,852

We examined these outcomes broken out by racial/ethnic group as well as by poverty/homelessness. Patterns for dropout rates (Table A2) and college enrollment rates (Table A3) were similar across racial/ethnic groups.

Table A2. Dropout rates for study cohort, by poverty experience in 6th-12th grade and race/ethnicity

	Black/African-American (non-Hispanic/Latino)	Other race/ethnicity	White (non-Hispanic/Latino)
Never FARMS or Homeless	4%	2%	2%
FARMS but not Homeless	16%	13%	17%
Homeless	29%	26%	28%

Table A3. College enrollment rates for study cohort, by poverty experience in 6th-12th grade and race/ethnicity

	Black/African-American (non-Hispanic/Latino)	Other race/ethnicity	White (non-Hispanic/Latino)
Never FARMS or Homeless	80%	89%	83%
FARMS but not Homeless	60%	68%	50%
Homeless	50%	56%	40%

However, patterns for wages showed disparate relationships between wages and poverty/homelessness across the three racial/ethnic groups. This was true for both non-college enrollees (Table A4) and college enrollees (Table A5).

Table A4. Wages in first year after on-time high school graduation, non-college enrollees, for study cohort, by poverty experience in 6th-12th grade and race/ethnicity

	Black/African-American (non-Hispanic/Latino)	Other race/ethnicity	White (non-Hispanic/Latino)
Never FARMS or Homeless	\$6,437	\$8,245	\$10,136
FARMS but not Homeless	\$6,487	\$8,712	\$8,951
Homeless	\$6,358	\$8,985	\$7,265

Table A5. Wages in first year after on-time high school graduation, MD college enrollees, for study cohort, by poverty experience in 6th-12th grade and race/ethnicity

	Black/African-American (non-Hispanic/Latino)	Other race/ethnicity	White (non-Hispanic/Latino)
Never FARMS or Homeless	\$4,474	\$4,547	\$5,055
FARMS but not Homeless	\$5,115	\$6,640	\$7,096
Homeless	\$4,786	\$6,138	\$8,534

Full Multilevel Model Results

The racial pattern of poverty along with the segregation of schools by race/ethnicity and poverty makes it difficult to identify the impact of homelessness apart from the impact of things like systemic racism and the racial segregation of neighborhoods and schools. We used multilevel models to disentangle all these student and school factors. Multilevel model results for dropout are presented in Table A6.

Table A6. Results of multilevel regression models predicting dropout (N = 52,610)

	Model 1		Model 2		Model 3		Model 4	
	B	se	B	se	B	se	B	se
Intercept	-2.19***	0.09	-2.44***	0.10	-2.69***	0.09	-2.89***	0.14
Never FARMS or homeless			-1.41***	0.05	-1.27***	0.05	-1.24***	0.05
Homeless			0.70***	0.06	0.68***	0.06	0.74***	0.06
Black, non-Hispanic					-0.90***	0.06	-0.89***	0.06
Other race/ethnicity					-0.60***	0.06	-0.60***	0.06
Grade 6 Reading					-0.00**	0.00	-0.00**	0.00

Grade 6 Math									
Sch pct never FARMS or homeless (0-10)									
Sch pct homeless (0- 10)									
Sch pct black (0-10)									
Sch pct other race (0- 10)									
Sch mean Grade 6 Reading & Math									
Random parameters									
Level-2 variance	6.29***	0.453	5.62***	0.41	5.15***	0.37	7.58***		0.58
Model fit (DIC)		26,947.08		25,798.37		24,617.66			23,888.22

Note. Level-1 (student) variables are group-mean centered; Level-2 (school) variables are grand-mean centered. FARMS=free or reduced-price meals. DIC = Deviance information criterion. For full models, referent is FARMS-only, white non-Hispanic, avg test scores in avg school.
* $p < .05$; ** $p < .01$; *** $p < .001$

Multilevel model results for college enrollment are presented in Table A7.

Table A7. Results of multilevel regression models predicting college enrollment within 1st year of on-time HS graduation (N = 45,580)

	Model 1		Model 2		Model 3		Model 4	
	B	se	B	se	B	se	B	se
Intercept	0.68***	0.06	0.77***	0.06	0.82***	0.05	1.14***	0.03
Never FARMS or homeless			0.91***	0.03	0.74***	0.03	0.73***	0.03
Homeless			-0.37***	0.06	-0.36***	0.06	-0.35***	0.06
Black, non-Hispanic					0.64***	0.04	0.65***	0.04
Other race/ethnicity					0.46***	0.04	0.47***	0.04

Grade 6 Reading			0.01***	0.00	0.01***	0.00		
Grade 6 Math			0.01***	0.00	0.01***	0.00		
Sch pct never FARMS or homeless (0-10)					0.25***	0.02		
Sch pct homeless (0- 10)					-1.31***	0.21		
Sch pct black (0-10)					0.13***	0.01		
Sch pct other race (0- 10)					0.20***	0.02		
Sch mean Grade 6 Reading & Math					0.02***	0.00		
Random parameters								
Level-2 variance	2.05***	0.16	1.82***	0.14	1.81***	0.14	0.45***	0.05
Model fit (DIC)		48,078.28		46,869.46		43,822.41		43,704.31

Note. Level-1 (student) variables are group-mean centered; Level-2 (school) variables are grand-mean centered. FARMS=free or reduced-price meals. DIC = Deviance information criterion. For full models, referent is FARMS-only, white non-Hispanic, avg test scores in avg school.
* $p < .05$; ** $p < .01$; *** $p < .001$

Multilevel model results for wages for non-college enrollees are presented in Table A8.

Table A8. Results of multilevel regression models predicting log wages in the first year after on-time graduation from high school, non-college enrollees (N = 8,529)

	Model 1		Model 2		Model 3		Model 4	
	B	se	B	se	B	se	B	se
Intercept	8.45***	0.02	8.47***	0.02	8.47***	0.02	8.50***	0.02
Never FARMS or homeless			0.10**	0.03	0.06	0.03	0.08*	0.03
Homeless			-0.09	0.06	-0.06	0.06	-0.05	0.06
Black, non-Hispanic					-0.28***	0.04	-0.27***	0.04
Other race/ethnicity					0.01	0.05	0.02	0.05

Grade 6 Reading					-0.00*	0.00	-0.00*	0.00
Grade 6 Math					0.00*	0.00	0.00*	0.00
Sch pct never FARMS or homeless (0-10)							-0.01	0.01
Sch pct homeless (0-10)							-0.27*	0.12
Sch pct black (0-10)							-0.06***	0.01
Sch pct other race (0-10)							-0.02	0.01
Sch mean Grade 6 Reading & Math							-0.00**	0.00
Random parameters								
Level-2 variance	0.13***	0.02	0.13***	0.02	0.11***	0.02	0.04*	0.01
Level-1 variance	1.46***	0.02	1.45***	0.02	1.45***	0.02	1.45***	0.02
Model fit (DIC)		27,566.11		27,556.57		27,506.24		27,464.88

Note. Level-1 (student) variables are group-mean centered; Level-2 (school) variables are grand-mean centered. FARMS=free or reduced-price meals. DIC = Deviance information criterion. For full models, referent is FARMS-only, white non-Hispanic, avg test scores in avg school.
 * $p < .05$; ** $p < .01$; *** $p < .001$

Because the descriptive statistics suggested different relationships between poverty/homelessness and wages by racial/ethnic group, we estimated wage models separately for Blacks, Whites, and other race/ethnicity individuals. Table A9 presents full model (i.e. Model 4) results for the individuals who were not enrolled in college. The pattern identified previously (Table A8) where those who never experienced poverty/homelessness earn significantly more than those in poverty holds only for non-Hispanic Whites. For this racial/ethnic group only, those who experienced homelessness earn 21 percent less ($\exp(-0.24)=0.79$) than those who experienced poverty alone, controlling for baseline achievement and school context. Among Black/African-American non-college enrollees, average wages are lower than those for their White peers (e.g. for those who experienced poverty, log wages 8.40 vs. 8.56, or in dollars \$4,426 vs. \$5,225), with no significant differences based on poverty experiences.

Table A9. Results of multilevel regression models predicting log earnings in the first year after on-time graduation from high school, non-college enrollees, by race/ethnicity

	Blacks (n=3,506)		Other (n=1,064)		Whites (n=3,959)	
	B	se	B	se	B	se
Intercept	8.40***	0.04	8.52***	0.05	8.56***	0.04
Never FARMS or homeless	0.08	0.06	-0.11	0.09	0.14**	0.04
Homeless	0.04	0.08	0.06	0.19	-0.24*	0.11
Grade 6 Reading	-0.00	0.00	-0.00	0.00	-0.00**	0.00
Grade 6 Math	0.00*	0.00	0.00	0.00	0.00	0.00
Sch pct never FARMS or homeless (0-10)	-0.01	0.02	-0.02	0.04	0.03	0.02
Sch pct homeless (0-10)	-0.43**	0.16	-0.22	0.37	0.01	0.20
Sch pct black (0-10)	-0.03*	0.01	-0.03	0.02	-0.01	0.02
Sch pct other race (0-10)	-0.02	0.02	0.02	0.03	-0.12***	0.03
Sch mean Grade 6 Reading & Math	-0.00	0.00	-0.00	0.00	-0.01**	0.00
Random parameters						
Level-2 variance	0.01	0.02	0.02	0.02	0.05*	0.02
Level-1 variance	1.48***	0.04	1.36***	0.06	1.45***	0.03
Model fit (DIC)	11,333.20		3,362.87		12,752.87	

Note. Level-1 (student) variables are group-mean centered; Level-2 (school) variables are grand-mean centered. FARMS=free or reduced-price meals. DIC = Deviance information criterion. For full models, referent is FARMS-only, white non-Hispanic, avg test scores in avg school.
 * $p < .05$; ** $p < .01$; *** $p < .001$

Multilevel model results for wages for Maryland college enrollees are presented in Table A10.

Table A10. Results of multilevel regression models predicting log wages in the first year after on-time graduation from high school, Maryland college enrollees (N = 18,177)

	Model 1	Model 2	Model 3	Model 4
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	B	se	B	se	B	se	B	se
Intercept	8.01***	0.02	8.01***	0.02	8.04***	0.02	8.03***	0.01
Never FARMS or homeless			-0.24***	0.02	-0.21***	0.02	-0.22***	0.02
Homeless			-0.02	0.07	-0.01	0.07	-0.03	0.07
Black, non-Hispanic					-0.33***	0.03	-0.34***	0.03
Other race/ethnicity					-0.05*	0.03	-0.06*	0.03
Grade 6 Reading					-0.00***	0.00	-0.00***	0.00
Grade 6 Math					-0.00***	0.00	-0.00***	0.00
Sch pct never FARMS or homeless (0-10)							-0.08***	0.01
Sch pct homeless (0-10)							0.07	0.11
Sch pct black (0-10)							-0.09***	0.01
Sch pct other race (0-10)							-0.08***	0.01
Sch mean Grade 6 Reading & Math							-0.01***	0.00
Random parameters								
Level-2 variance	0.14***	0.02	0.14***	0.02	0.15***	0.02	0.05***	0.01
Level-1 variance	1.50***	0.02	1.49***	0.02	1.46***	0.02	1.46***	0.02
Model fit (DIC)		59,155.70		59,042.14		58,659.74		58,603.49

Note. Level-1 (student) variables are group-mean centered; Level-2 (school) variables are grand-mean centered. FARMS=free or reduced-price meals. DIC = Deviance information criterion. For full models, referent is FARMS-only, white non-Hispanic, avg test scores in avg school.

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

As with the non-college enrollees, we analyzed wage models separately by racial/ethnic group for the MD college enrollees. Results are presented in Table A11. The previously identified pattern, where those who never experienced poverty earn significantly less while enrolled in college, held true only for the “other” and White racial/ethnic groups.

Table A11. Results of multilevel regression models predicting log wages in the first year after on-time graduation from high school, Maryland college enrollees, by race/ethnicity

	Blacks (n=5,313)		Other (n=3,536)		Whites (n=9,328)	
	B	se	B	se	B	se
Intercept	7.93***	0.03	8.09***	0.03	8.24***	0.03
Never FARMS or homeless	-0.07	0.04	-0.31***	0.05	-0.26***	0.03
Homeless	-0.01	0.09	-0.01	0.19	0.07	0.13
Grade 6 Reading	-0.00	0.00	-0.00***	0.00	-0.00***	0.00
Grade 6 Math	-0.00*	0.00	-0.00	0.00	-0.00***	0.00
Sch pct never FARMS or homeless (0-10)	-0.06***	0.01	-0.11***	0.02	-0.06***	0.02
Sch pct homeless (0-10)	-0.11	0.15	-0.08	0.25	0.23	0.15
Sch pct black (0-10)	-0.06***	0.01	-0.05**	0.02	-0.02	0.01
Sch pct other race (0-10)	-0.10***	0.02	-0.06***	0.02	-0.13***	0.02
Sch mean Grade 6 Reading & Math	-0.00	0.00	-0.01***	0.00	-0.01***	0.00
Random parameters						
Level-2 variance	0.016	0.01	0.031	0.02	0.04***	0.01
Level-1 variance	1.58***	0.03	1.59***	0.04	1.33***	0.02
Model fit (DIC)		17,525.85		11,719.80		29,238.10

Note. Level-1 (student) variables are group-mean centered; Level-2 (school) variables are grand-mean centered. FARMS=free or reduced-price meals. DIC = Deviance information criterion. For full models, referent is FARMS-only, white non-Hispanic, avg test scores in avg school.
* $p < .05$; ** $p < .01$; *** $p < .001$