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Access to Dual Enrollment in the United States: Implications for Equity and Stratification

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Dual credit and dual enrollment (DE) programs are now offered at more public high schools in the United States than Advanced Placement (AP), and these courses are increasingly popular among both high academically achieving and average students (Thomas, Marken, Gray, & Lewis, 2013). DE and dual credit (hereby called dual enrollment) refer to coursework taken by high school students, which simultaneously confers them high school and college-level credit upon successful completion. Currently, all states offer some form of DE (Education Commission of the States, 2016) and about a third of students take classes for college credit during high school (National Center for Educational Statistics, 2019). Although other curricular alternatives such as AP or International Baccalaureate (IB) remain available in many districts, school leaders increasingly view DE programs as a means to improve college preparedness as well as a way to promote post-secondary access for disadvantaged students since it does not require the passing of an AP test for credit (Kryst, Kotok, & Hagedorn, 2018). However, states and school districts vary widely when it comes to which students have access to DE and who participates in the courses. Many heavily rural states utilize DE as a substitute for honors or advanced placement courses, while other jurisdictions view DE as a way to expose economically disadvantaged and minority students to post-secondary options (Kryst, Kotok, & Hagedorn, 2018; Education Commission of the States, 2016).

The aim of our research is to analyze DE participation in the United States in the current policy context to understand the distribution of DE access. Although extant research examines DE access and academic advantages at the state or district level (Haskel, 2016; Lichtenberger et al., 2017; Troutman et al., 2018), few, if any, recent studies examine DE access using nationally representative student-level data. National studies of DE either focus on the aggregate school or state-level data (Marken, Gray, & Lewis, 2013; Thomas et al., 2013) or utilize much older data on individual high school students, such as National Education Longitudinal Study of 1988 (NELS:88) (An, 2012; Swanson, 2007). These older and aggregate studies are able to capture the strong relationship between DE with post-secondary educational and occupational outcomes. However, DE policies and policy discussions have shifted immensely in the last 30 years (since NELS:88) with equity and access now being paramount goals in many DE initiatives in contrast to prior so-called merit based goals, which perpetuated a system of tracking that favors students from higher socioeconomic statuses (SES). In order to examine current trends in DE across the U.S., we use the High School Longitudinal Study of 2009 data set (HSLS: 09), the most recent nationally representative sample of high school students. Such an analysis sheds light on this form of advanced coursework in a national context and helps school leaders see where gaps in accessibility occur. This study makes a valuable contribution to the literature by providing a snapshot of DE participation and helping researchers think through a DE research agenda to reflect these current trends of enrollment and to promote access.

In order to appreciate the role of DE in the 21st century high school, we first discuss the history of dual enrollment and the current policy context across the United States. Subsequently, we review literature on who takes DE and then we situate DE literature into different educational values connected to human capital development (equity, efficiency, and excellence). This study contributes to the literature by providing a description of who actually takes dual enrollment, which is important to understand at a time when districts and states continue to expand DE programs.

Background on Dual Enrollment

Historical Context of Dual Enrollment

DE was first implemented in the United States in the late 1970s as an option for students wanting to take rigorous coursework that would allow them to obtain college-level credit. Many states enacted policies facilitating high school students' course taking at local community colleges, and Minnesota is considered a pioneer in implementing one of the first statewide DE policies. Gradually, DE programs and policies emerged in more states (Boswell, 2001) Although states pursue DE for various reasons, Mokher and McLendon (2009) suggested that states were more likely to enact DE policies if they had an active community college lobbying network, Republican legislatures, and other educational market reform policies (e.g., K-12 vouchers).

Currently, forty-seven states and the nation's capital have statutory provisions and regulations ruling over one or more statewide DE programs or policies. The remaining three states leave DE policies to the discretion of localities and their pertinent postsecondary institutions or systems (Education Commission of the States, 2016) . Growth in DE programs and policies have been aggressive in recent years. The National Alliance of Concurrent Enrollment Partnerships (NACEP) states that DE had an annual growth of seven percent from 2003-2011, and that four out of five high schools now offer college-level courses (NACEP, n.d). In the state of Texas alone, the number of students taking DE soared from around 42,000 in 2000 to over 150,000 by 2017 (Troutman, Hendrix-Soto, Creusure, & Mayer, 2018). In 2015, California passed a series of laws to expand DE, such as expanding the limit of credits students could receive and allowing tuition-free community colleges to teach courses on site at high schools, resulting in a large increase in DE courses and students (Ogul, 2019). Therefore, it is reasonable to believe that given the progressive adoption of DE across the United States, it is also becoming institutionalized (Kilgore & Taylor, 2016).

Funding and support for advanced coursework exists in major federal education reform and mandates. President Barack Obama's administration supported advanced coursework by proposing that Pell Grants be extended to cover DE courses (U.S. Department of Education, 2016). There has been both bipartisan congressional support and backing by Secretary of Education Betsy DeVos for DE (Klein, 2017). In fact, Secretary DeVos views DE as part of her chief priority as highlighted in her speech entitled "Empowering Families to Choose a High-Quality Education that Meets Their Child's Unique Needs" (U.S. Department of Education, 2017). In summary, DE has become widespread and a major component of U.S. higher education. However, studies of policy implementation suggest that most policies have unintended consequences and the target population for policies are not always the ones deriving the most benefit. Therefore, it is useful to examine what empirical research tells us about who is taking DE.

Who Takes DE in the United States?

States and districts vary widely in who participates in DE and other advanced coursework (Nelson & Waltz, 2019). This variance partially explains why studies exist to both support arguments

for DE as an equity measure as well as to raise concerns that DE leads to more tracking and stratification of human capital. Some states have crafted DE policies around equity and access, encouraging historically underrepresented students to take DE, while other states follow the excellence model, reserving spots only for students who maintain a high GPA, pass a college readiness exam, or receive recommendation from their teachers. States that have a GPA requirement typically utilize 3.0 as a minimum, but other states, such as Louisiana, employ a 2.0 requirement (Education Commission of the States, 2016).

Despite the best intentions of state policies aiming to increase access, prior research generally finds that DE participation maintains racial and economic stratification (Miller et al., 2017; Museus, Lutovsky, & Colbeck, 2007). Higher-SES students enroll in DE more often due to several advantages including higher-average achievement, family social capital, and the ability to pay extra fees in states where DE requires some form of payment (Miller et al., 2017). Racial disparities also continue to exist in DE programs in most states (Appleby et al., 2011; Miller et al., 2017). For instance, Freidman and colleagues (2011) found that despite DE equity initiatives in Texas, such as funding waivers, schools with high percentages of African Americans tended to have much lower DE participation.

Other possible predictors of DE enrollment include geographic location, gender, and attitudes towards education. In general, females participate in advanced coursework and attend college at greater rates than males (Handwerk, Tognatta, Coley, & Gitomer, 2008; Kena et al., 2016). DE participation also seems to mirror this gender gap with females far more likely to participate in DE. We also see geographic differences in DE enrollment. In a recent study of Texas DE, researchers found rural students always participated in DE at higher rates and that gap has increased over the last 15 years (Miller et al., 2017). For rural areas, DE is often viewed as more efficient than AP courses for a variety of reasons we explore in the next section.

This review of research about who takes DE provides us with a descriptive understanding of who takes these courses but also how these differences relate to future labor markets. Recent policy promotions of DE can be linked to economic theories. Therefore, we next analyze how DE can be viewed through a human capital theory framework as well as educational values, such as equity.

Human Capital Theory and Dual Enrollment

The vast expansion of higher education in the United States following World War II has coincided with the advent of human capital theory, the idea that individual skills and knowledge of workers hold economic value (Shultz, 1961). Human captial theorists view higher education as a means to increase individual skills for the workplace, increase individual earnings, and improve the overall economy of a jurisdiction. Some argue that human capital theory still offers a simplistic view of education by commodofying learning as purely an economic vehicle (Fitzsimons, 2015). Although these concerns are valid in considering a larger discussion on the purpose of education, human capital theory (HCT) still provides a useful lens for considering the rapid growth of DE, allowing researchers to articulate who benefits the most from these opportunities. According to Gary Becker (1994), "education and training are the most important investments in human capital," and higher education (including DE) is in many ways the ultimate manifestation of it (p. 17).

Yet, another criticism of HCT is that it unfairly priviledges certain social classes in the educational marketplace (Bowles & Gintes, 1975; Tan, 2014). Becker (1994) argued that the incorporation of HCT in socialist and communist countries is evidence that HCT has been interpreted to maximize both individual capitalistic impulses and more collective, national development. In many ways, differing DE policies in the United States offer a lens into how jurisdictions understand human capi-

tal development and whether they subscribe to a color/class blind meritocratic view or one that seeks to maximize opportunity, and thus human captial, for historically marginalized populations.

The Three Es and Why DE is So Popular

Although educational policymakers may not always make explicit reference to HCT, policy tensions reveal different philosophies on how jurisdictions should go about maximizing collective human capital. Hess (2005) described this tension as the balancing of three dominant educational values: equity (equality of opportunity), efficiency (maximizing resources), and excellence (emphasis on performance). The following literature review extends our discussion on HCT by exploring exactly how DE relates and conflicts with these three overarching concepts of educational policy.

Equity. Some education policy makers have increasingly touted DE as an effective tool to close the educational achievement and opportunity gap for low-income and minority students (Nelson & Waltz, 2019). The theoretical underpinning for these policies is a belief that DE increases equity and access by giving participants exposure to post-secondary opportunities and lightening the financial burden of college by providing them with college credit (Miller et al., 2017). When students take college-level courses during high school, it eases the academic transition into a two or four-year institution since they know what to expect of college-level courses. Participating in DE gives students a head start in both content and credits and, therefore, increases the likeliness of attaining a postsecondary degree (Karp, Calcagno, Hughes, Jeong, & Bailey, 2007).

Indeed, empirical studies on the benefits of DE classes and programs have shown benefits to low-income, racial minority, and other underrepresented student populations (An, 2012; Haskell, 2016; Hugo, 2001). For instance, Speroni (2011) found that racial minority students were 6.1 percent more likely to attain a bachelor degree and 6.5 percent more likely to enroll in a four-year college if they enrolled in DE than minority students who did not participate in DE. Similarly, DE participation has been found to increase college enrollment and persistence for Latinos (Swanson, 2007) as well as college degree attainment for first-generation college students (An, 2012).

Excellence. The educational value of excellence and HCT overlap in aspects that emphasize the individual over the collective. Meritocracy is a term often used to describe the value of excellence. DE develops human capital by increasing college readiness (Hoffman, Vargas, & Santos, 2009) and providing rigorous college-level work for students. However, in many contexts, DE targets only most academically advanced students. In fact, the first DE policies in the 1970s and 80s followed the traditional tracking model, focusing on "affluent, gifted" students (Miller et al., 2017, p. 7). Proponents of DE as an honors-level course presume this so-called merit based DE selection to be race-, gender-, and income-neutral. In essence, DE replaces Advanced Placement for some advanced students. Other students take both DE and AP courses as a wider and advanced portfolio. Programs such as DE are especially valuable for high achieving students in schools that may lack AP courses due to a lack of resources or demand for such rigor (Thomas et al, 2013).

The opportunity to take such courses is notable given the relationship between participation in DE with high school graduation as well as post-secondary attainment (Karp et al., 2007; Speroni, 2011; Swanson, 2008). For instance, using nationally representative data, An (2012) found that DE increased probability of a student attaining any postsecondary degree by 7 percent, and students participating in DE were 8 percent more likely to earn a college degree than those who did not participate. In a study of DE students in New York City, Allen and Dadgar (2013) concluded that students who participated in DE performed better academically in college, as measured by GPAs, and graduated quicker than students who did not take DE courses.

Efficiency. In the simplest terms, efficiency refers to producing the best results with the fewest resources (Johnes, Portela, & Thanassoulis, 2017). In a HCT framework, DE allows jurisdic-

tions (schools, districts, and states) to prepare students for college and provide high-level course work, often at a minimal cost. Students may also obtain a college degree faster and cheaper if they start taking subsidized DE courses earlier in their academic careers. (Miller et al., 2017). The incorporation of DE also makes some schools and districts more efficient. Smaller high schools, particularly in rural areas, often struggle to offer Advanced Placement courses (Kryst, Kotok, & Hagedorn, 2018). Already overstretched teachers in rural districts may be asked to teach AP courses, some schools may not have AP-certified teachers, and there may not be enough enrolled students to make an AP course financially efficient (Kena et al., 2016). Whereas AP can only be taught by high school teachers, DE can be taught by either certified high school teachers or college faculty. By offering DE courses through a community college or through distance education, it lessens the number of courses that high school teachers must prepare. At the same time, the proliferation of DE in rural communities may help sustain two-year colleges in areas with smaller populations (Ashford & Dembicki, 2018).

At the state-level, however, DE may not be efficient. A fiscal analysis of DE in Florida, Ohio, and Georgia revealed that DE did not save any money and caused two of the three states to spend more money (Roza & Brooks, 2017). In these two cases of financial losses, states were providing state funds for both the school district and the community college. Moreover, districts were spending more on DE than AP since they often paid student fees and/or provided transportation to the community college. Yet, it is important to note that the authors of the fiscal analysis point out that much of this inefficiency is a function of the policy design rather than an inherent cost of DE. For instance, the Early College High School Model—a magnet-like school that allows students to take several college courses on their campus—often provides DE on site, and many other traditional high schools certify their teachers as DE instructors (Kaniuka & Vickers, 2010).

Taken together, these aforementioned studies demonstrate that DE has the potential to balance equity, excellence, and efficiency for students and educational leaders. However, there are inherent tensions as to which of these values dominates and it is an empirical question as to which types of students are actually being targeted for and participating in dual enrollment. Given the benefits of DE, inclusiveness and access for underrepresented students is fundamental to the design and implementation of DE programs (Cassidy, Keating, & Young, 2010). Conversely, if DE continues to grow as an alternative to Advanced Placement, it could lead to more stratification through performance-based tracking favoring the most affluent students (Taylor, 2015). In fact, in a large study of DE in Illinois, Taylor (2015) found that while low-income and minority students derived benefit from being in DE, their participation rate lagged far behind higher-income and White peers. Taylor suggested DE is inequitable, despite promises to the contrary.

Thus, research examining the equity in the distribution of DE participation at a national level is timely and important in creating access and equity-enhancing educational policies. Although prior research guides our understanding of who participates in DE, we reiterate that no current nationally representative studies use individual data and inferential statistics to understand national trends in DE participation.[1] As a result, this study seeks to examine the following research questions:

1.) What individual characteristics predict participation in DE across the United States?
    1a) To what extent are there opportunity gaps by SES, gender, and race/ethnicity?
    1b) To what degree does individual achievement predict DE participation?
2.) To what extent does DE participation vary by school location (urbanicity and region of the United States)?

[1] See Shviji and Wilson (2019) for a nationally representative descriptive analysis or Kilgore and Taylor (2016) for a study using self-reported college data.

Methods

Data

We use publicly available data from the High School Longitudinal Study of 2009 (HSLS:09). The HSLS:09 follows a cohort of more than 24,000 9th graders from 944 high schools. So far, HSLS: 09 has released longitudinal data from the fall of 9th grade along with data from the spring of 2012 (anticipated 11th grade) and spring of 2013 (anticipated graduation). Our study mainly relies on the 9th grade data to capture demographic and school characteristics alongside the 2013 transcript data to capture DE participation throughout high school (Dalton, Ingels, & Fritch, 2018).

Variables. The dependent variable utilized is a dichotomous variable equal to one if a student has taken any DE course work during high school and equal to zero if the student has not and the estimation coefficients are presented as odds ratios. The independent variables include several demographic variables to capture equity. Socioeconomic status is a standardized composite variable based on parental education, income, and occupational prestige. The models in this paper control for gender with male students serving as the reference group. A set of dichotomous variables is included in the data set controlling for racial/ethnic groups: White, African American, Hispanic, Asian, and other race (Two or More races, American Indian and Pacific Islander). A variable was included for English Language Learner status. We also use measures to assess the tracking hypothesis that DE favors higher achieving students. Since DE enrollment can occur as early as the student's sophomore year, we control for prior achievement with overall ninth grade student GPA for academic courses. Attendance was controlled for using an ordinal variable for how many times students were absent during 11th grade year. We also included two standardized scale variables to measure student perception of engagement in school and perception of school belonging at their high school. Attitudes such as engagement and belonging have consistently been related to achievement and persistence in academically challenging courses (Christenson, Reschley, & Wylie, 2012). Several school-level variables were controlled for to assess the importance of location on DE participation. Geographic region was a categorical variable comparing the Southeast, West, Midwest, and Northeast (reference). The urbanicity variable used census-defined categories for urban, rural, small town, and suburban (reference). Finally, a variable was included for whether the school was public or private.

Analytical Approach

We used logistic regression to estimate the probability of a student enrolling in DE during high school. All results are presented in odds ratios with values above one indicating an increase in odds and those below 1 indicating a decrease in odds of enrolling in DE. Three models are presented in this paper to ascertain what student characteristics predict DE participation. In the first model, the dependent variable is regressed by individual demographics to assess the role of equity along racial and socioeconomic lines.

$$\log\left[\left(P[DE]/(1-P[DE])\right)\right] \quad \gamma_0+\gamma_1\,\text{Female}+\gamma_2\,\text{Black}+\gamma_3\,\text{Hispanic}+\gamma_4\,\text{Asian}+\gamma_5\,\text{Other-Race}+\gamma_6\,\text{SES\_U}+\gamma_7\,\text{ELL}+\upsilon$$

The second model below adds controls for 9th grade GPA, attendance, and attitudes towards school and education:

$$\log(P[DE]/(1-P[DE])) = \delta_0+\delta_1 \text{Female}+\delta_2 \text{Black}+\delta_3 \text{Hispanic}+\delta_4 \text{Asian}+\delta_5 \text{Other-Race}+\delta_6 \text{SES\_U}+\delta_7 \text{ELL}+\delta_8 \text{GPA09}+\delta_9 \text{Absent}+\delta_{10} \text{SchEngagement}+\delta_{11} \text{SchBelong}+w$$

The third model adds some school factors to answer the second research question in terms of locational importance:

$$\log(P[DE]/(1-P[DE])) = \beta_0+\beta_1 \text{Female}+\beta_2 \text{Black}+\beta_3 \text{Hispanic}+\beta_4 \text{Asian}+\beta_5 \text{Other-Race}+\beta_6 \text{SES\_U}+\beta_7 \text{ELL}+\beta_8 \text{GPA09}+\beta_9 \text{Absent}+\beta_{10} \text{SchEngagement}+\beta_{11} \text{SchBelong}+\beta_{12} \text{Rural}+\beta_{13} \text{Town}+\beta_{14} \text{City}+\beta_{15} \text{Public}+\beta_{16} \text{Midwest}+\beta_{17} \text{South}+\beta_{18} \text{West}+\varepsilon$$

All of the analyses presented in this paper use a student-level weight (W3W1W2STU) designed for longitudinal analysis across all three data collection periods. The use of the analytic weights helps to account for the study's complex survey design and allows for generalization of the findings at a national level for all high school students (Ingels et al., 2011). Lastly, all estimations in this research paper employ robust standard errors in order to address bias associated with weights and the complex, clustered nature of the data. We report McFadden's pseudo r-squared values base for all models in to display the degree that it increases, but these values are not to be interpreted in the same manner as r-squared for Ordinary Least Squares (OLS) regression, where the value provides exact measure of variance explained (Hoetker, 2007; Pampel, 2000).

Findings

Compared to the full sample, DE participants tended to differ on demographics such as gender, race, and SES as well as achievement levels (see Table 1). For instance, over 63% of DE students tended to be White compared to only about half of the full sample. In terms of SES, DE students were relatively more advantaged. Given the equity goals of many DE policies, these trends are somewhat concerning. In terms of achievement levels, DE participants scored about half a point higher than the full sample on their 9th grade GPA. However, perhaps due to more rigorous courses, the gap shrunk to about a third of a grade point by the end of high school. In terms of attitudes, students enrolled in DE tended to report higher average levels of engagement and school belonging. Notably, rural and small town schools had a higher proportion of students enrolled in DE courses than urban and suburban schools. This makes sense given what we know from the literature that rural school leaders may see DE as a substitute for AP courses (Gagnon & Mattingly, 2016).

Table 1

Weighted Descriptive Statistics for Full Analytical Sample and DE Participants

	All Students		DE Students	
	Mean	Std. Dev.	Mean	Std. Dev.
Demographics				
% White	51.79		63.43	
% Black	13.66		8.80	
% Hisp	21.94		16.39	
% Asian	3.54		3.99	
% Other	9.08		7.37	

% Female	49.59		57.60	
% ELL	17.49		13.60	
SES	-0.07	0.76	0.16	0.75
Academics				
Absence Scale	2.544	1.09	2.35	0.98
School Belong	0.03	0.98	0.20	0.89
School Engage	0.04	0.98	0.26	0.87
9th Grade GPA	2.56	0.95	3.09	0.77
12th Grade GPA	2.76	0.82	3.13	0.69
School Variables				
% Public	92.86		93.12	
% City	31.89		27.20	
% Suburb	33.31		31.62	
% Town	11.73		13.22	
% Rural	23.07		27.96	
% Northeast	17.41		15.90	
% Midwest	22.16		26.45	
% South	37.54		39.10	
% West	22.89		18.55	

Source: U.S Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS: 09)

In running the regressions, we found that despite equity intentions, SES and prior achievement are the strong predictors of whether students participate in DE (see Table 2). Such a finding is not completely surprising given numerous studies documenting the correlation between SES with academic opportunities as well as the strong belief in the U.S. that opportunity stems from merit such as higher prior achievement (Sirin, 2005). In model 1, we test the extent that demographic characteristics of students predict participation in DE. Without controlling for GPA, we find that, on average, racial minorities were significantly less likely to participate in DE, while being female and higher SES was positively associated with DE enrollment. On average, a one standard deviation increase in SES increased the odds of a student taking DE by 46%. Conversely, on average, Black students were 37% less likely ($p<.001$) and Hispanics were 25% less likely ($p<.05$) to take DE courses than Whites. On average, females were more than 1.5 times more likely than males to take DE, controlling for race, language, and SES.

Table 2

Odds of Participating in Dual Enrollment

	Student Background Model	Prior Achievement Model	School Model
Female	1.539***	1.304***	1.306***
Black	0.571***	0.808	0.789
Hispanic	0.749*	1.042	1.163
Asian	0.906	0.757	0.849
Other Race	.680***	0.821	0.864
SES	1.459***	1.085*	1.169**

ELL	0.906	0.771	0.803
9th Grade GPA		2.082***	2.093***
Absence Scale		.889***	0.895***
School Engagement		0.988	0.989
School Belonging		1.06	1.085*
Rural			1.251**
Town			1.282*
City			1.067
Public School			1.848***
Midwest			1.226
South			1.284*
West			0.890
N	14,920	13,112	13,112
Pseudo R Squared	0.043	0.083	0.092

Statistical significance as follows: *** p<.001; ** p<.01;* p<.05.

The findings from the second model reveal the crucial importance of prior academic achievement in the context of DE enrollment. Here, we add controls for individual achievement, attendance, and attitudes towards education as well as school. Ninth grade academic GPA significantly increased the odds of taking DE. In fact, a one-point increase in GPA doubled the odds of a student enrolling in DE. On average, as attendance problems increased, the odds of enrolling in DE decreased at a significant level. Model 2 seems to provide evidence that DE relies heavily on a perceived merit-based selection process.

In the third and final model, we add school variables to assess our second research question on locational importance and to consider individual characteristics when controlling for school factors. There is a relationship between where a student lives and DE access. Rural and town students being, on average, 25% and 28% more likely than suburban students to take DE courses. Regionally and on average, we find students in the South were significantly more likely than students in the Northeast to enroll in DE, while Midwest students were marginally more likely (p=.053) to participate in DE. Although not a focus of our research, it is notable that public school students were twice as likely as private school students to take DE courses.

In terms of the individual predictors, we find that perceived merit and affluence still play a factor in DE. Student SES and gender remain significantly related to DE participation in the third model while race/ethnicity is no longer significant. However, the relationship between SES and DE is only associated with a 17% increase in odds compared to almost 50% in first model, indicating SES alone is not that powerful of a factor. The coefficients for GPA and attendance remain significant and the magnitude does not change much when controlling for school factors. Notably, when controlling for school factors, the school belonging variable becomes significant, associated with a modest 8% increase in the odds of participating in DE. Overall, our analysis provides a snapshot of the characteristics of DE course takers and reveals that academic factors seem to be most important, but there are clear relationships between location and social class as well.

Discussion

Our study connects DE participation to human capital theory and related educational policy values of equity, excellence, and efficiency. DE policies have the potential for school leaders to create a more equitable pathway, but it also creates a pathway for the already advantaged students to subsidize their post-secondary education, widening the opportunity gap among students. Our study

suggests a mix of policy goals and outcomes across the United States, but DE tends to benefit the relatively advantaged students. Specifically, we find that higher SES students seem to be more likely to participate in DE. Although the magnitude of this difference was not massive, it demonstrates that DE is not necessarily closing the national opportunity gap as promised in the rhetoric (Klein, 2017). On the other hand, while racial disparities also exist in the DE pipeline, these differences seem to be mostly related to being lower-SES and having lower prior achievement since the race/ethnic gap was not statistically significant in the latter logistic models. Still, this finding is critical given the policy discussion around DE and equity and considering the research demonstrating the benefit for low-income and racial minorities (An, 2012; Haskel, 2016; Hugo, 2001). We would hope to see an overrepresentation of low-income minority students rather than a continuation of grouping and tracking practices by income and prior achievement, which often result in racial stratification.

Equity often comes at the expense of arguments for excellence as a fairer means for distributing resources. Excellence, or the so-called merit-based framework, continues to be an important aspect of human capital theory, and it appears to be more important than equity for many high schools when it comes to DE participation. DE seems to be serving as advanced work for higher-achieving 9th graders in most instances, and DE courses replace advanced placement courses for many of the highest 9th graders (although it is possible DE students are enrolled in both). The descriptive statistics and model estimations suggest that high achieving students are predominantly participating in DE. Although the GPA requirements can be as low as 2.0 in some states, the participants' ninth grade GPA around 3.1. The sample employed herein shows that GPA averages increase more over the high school years for non-participants than for DE students. In other words, GPA does not seem to change much during the high school years. Therefore, high achieving 9th graders will have a clear path to advanced coursework if they decide to take it. These findings are consistent with the roots of DE, which viewed concurrent college enrollment as opportunity for gifted students (Miller et al., 2017). At the least, excellence is being considered in conjunction with equity and may be limiting opportunities based on implicit biases associated with poverty and race.

Although the nature of our analysis makes efficiency arguments difficult, we think DE potentially complicates efficiency for both high schools and institutions of higher education. More research is needed in this area, but we are concerned that if higher-SES students are, in a sense, receiving a subsidy towards higher education completion, some lower-SES students will have to pick up the financial burden demanded from universities now receiving fewer tuition dollars. Since 9th grade GPA and SES seem to be important indicators of participation in DE, it seems that subsidizing these programs has not been effective at closing the gap and improving access for disadvantaged students. Rather than subsidizing DE for students with more affluent backgrounds, a more effective use of resources would be geared towards interventions that seek to close this gap at younger ages. Elongo et al. (2016) provide strong evidence that investment in early childhood education are important in improving the opportunities of students later in life.

On the other hand, the fact that rural areas and schools in the South and Midwest seem to be utilizing DE at higher rates than other regions suggests a possible market efficiency. The advent of DE may be offering a lifeline to community colleges in sparsely populated areas, allowing these schools to continue serving adult students as well. Certainly, more localized research on individual district budgets and outcomes could help us better understand this process.

There are also implications for gender gaps in DE. As mentioned previously, female students are overrepresented in DE coursework. This finding is parallel to work on other advanced coursework participation by Handwerk et al. (2008), which consistently found higher female student participation in a national analysis of AP participation. The gender disparity in advanced coursework participation, such as DE and AP, should be of concern to policy makers as it suggests that the gender

college gap is also present among high achieving students. More research is needed in this area to better understand the contributing factors for why females are so much more likely to participate in DE.

Limitations

Although this study adds greatly to our understanding of DE by using the most recent nationally representative sample of high school students, it sought out primarily to provide a snapshot and has some limitations. HSLS: 09 DE variables do not offer any specific insights about the content, quality, or other relevant aspects of DE coursework delivery. In using the publicly available data, we are unable to measures some school-level variables such as school-SES and we are prevented from using multi-level approaches. However, the high-level of significance and use of robust standard errors alleviates some of the limitations of the publicly available data. Moreover, our finding regarding the relationship between urbanicity as well as region with DE provides valuable insights in the distribution of DE participation across the U.S. Another limitation of this study is that we are not examining if participation leads to positive outcomes for students such as high school and college attainment. Although the relationship between DE has been well established, future research should continue to examine how DE affects these outcomes as policies evolve. However, given this new era of equity focused DE policies, this study makes a valuable contribution by concentrating on who actually has access to DE. Moreover, in using HSLS: 09, we could examine enrollment across the United States and start to understand the geography of opportunity.

Conclusion

Despite some limitations, this study enhances our understanding of access to dual enrollment. This paper set out to examine the characteristics of student populations participating in DE. As previously discussed, a concerted effort to provide access to DE to disadvantaged students is underway across the country. Because public funding and school districts are the main financiers of DE programs, it is then pertinent to understand if the equity goal is being achieved. The estimations presented in this paper leave three things clear: females participate in DE at higher rates than males; socioeconomic status is a strong predictor of DE participation; and that DE may predominantly be for high achieving students. As investment in DE programs continues to grow under the guise of human capital development, policymakers should engage in cost-benefit analyses, contemplate the opportunity costs involved, and ensure that opportunities are not being hoarded by already advantaged students.

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References

Allen, D., & Dadgar, M. (2012). Does dual enrollment increase students' success in college? Evi dence from a quasi-experimental analysis of dual enrollment in New York City. *New Directions for Higher Education, 2012*(158), 11-19.

An, B. P. (2012). The impact of dual enrollment on college degree attainment: Do low-SES students benefit? *Educational Evaluation and Policy Analysis*, *35*(1), 57-75.

Appleby, J., Ashton, K., Ferrell, J., Gesing, E, Jackson, S., Lindner, T., Mata, S. Shelnutt, A., & Wu, Y. (2011). *A study of dual credit access and effectiveness in the state of Texas.* College Station, TX: Texas A&M University. Retrieved from http://hdl.handle.net/1969.1/152074

Ashford, E., & Dembicki, M. (2018, October 22). Dual enrollment on the rise. *Community College Dai ly*. Retrieved from http://www.ccdaily.com/2018/10/growing-popularity-dual-enrollment/

Becker, G. S. (1994). Human capital revisited. In *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education (3rd Edition)* (pp. 15-28). Chicago, IL: The University of Chicago Press.

Boswell, K. (2001). State policy and postsecondary enrollment options: Creating seamless systems. *New Directions for Community Colleges, 2001*(113), 7-14.

Bowles, S., & Gintis, H. (1975). The problem with human capital theory--a Marxian critique. *The American Economic Review*, *65*(2), 74-82.

Cassidy, L., Keating, K., & Young, V. (2010, January). *Dual enrollment: Lessons learned on school-level implementation*. Menlo Park, CA: SRI International.

Christenson, S. L., Reschly, A. L., & Wylie, C. (Eds.). (2012). *Handbook of research on student engagement*. Berlin, Germany: Springer Science & Business Media.

Dalton, B., Ingels, S. J., & Fritch, L. (2018). *High school longitudinal study of 2009 (HSLS: 09). 2013 update and high school transcript study: A first look at fall 2009 ninth-graders in 2013*. Washington, DC: U.S. Department of Education, National Center for Education Statistics. Retrieved from https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2015037rev

Education Commission of the States (2016). *50 state comparison: Dual/ concurrent enrollment policies.* Retrieved from https://www.ecs.org/dual-concurrent-enrollment-policies/.

Elongo, S., Luis García, J., Heckman, J. J., & Hojman, A. (2016). Early childhood education. In R. Moffitt (Ed.), *Economics of means-tested transfer programs in the United States II* (pp. 235-298). Chicago, IL: University of Chicago Press.

Fitzsimons, P. (2015). Human capital theory and education. In M. A. Peters (Ed.), *Encyclopedia of educational philosophy and theory*. Springer, Singapore.

Gagnon, D. J., & Mattingly, M. J. (2016). Advanced placement and rural schools: Access, success, and exploring alternatives. *Journal of Advanced Academics*, *27*(4), 266-284.

Handwerk, P., Tognatta, N., Coley, R. J., & Gitomer, D. H. (2008). *Access to success: Patterns of advanced placement participation in U.S. high schools.* Princeton, NJ: Educational Testing Service, Retrieved from https://www.ets.org/Media/Research/pdf/PIC-ACCESS.pdf

Haskell, R. E. (2016). The effects of dual-credit enrollment on underrepresented students: The Utah case. *International Journal of Economics and Finance, 8*(1), 144-165.

Hess, R. T. (2005). *Excellence, equity, and efficiency: How principals and policymakers can survive the triangle of tension*. Lanham, MD: R&L Education.

Hoffman, N., Vargas, J., & Santos, J. (2009). New directions for dual enrollment: Creating stronger pathways from high school through college. *New Directions for Community Colleges, 2009*(145), 43-58.

Hugo, E. B. (2001). Dual enrollment for underrepresented student populations. *New Directions for Community Colleges, 2001*(113), 67-72.

Ingels, S. J., & Dalton, B. (2013). *High school longitudinal study of 2009 (HSLS: 09) first follow-up: A first look at fall 2009 ninth-graders in 2012*. Washington, DC: U.S. Department of Education, National Center for Education Statistics. Retrieved from https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2014360

Ingels, S. J., Pratt, D. J., Herget, D. R., Burns, L. J., Dever, J. A., Ottem, R., . . . Leinwand, S. (2011, July). *High school longitudinal study of 2009 (HSLS: 09): Base-year data file documentation*. Washington, DC: U.S. Department of Education, National Center for Education Statistics. Retrieved from https://files.eric.ed.gov/fulltext/ED566098.pdf

Karp, M. M., Calcagno, J. C., Hughes, K. L., Jeong, D. W., & Bailey, T. R. (2007). *The postsecondary achievement of participants in dual enrollment: An analysis of student outcomes in two states*. New York, NY: Community College Research Center, Teachers College, Columbia University.

Kaniuka, T. S., & Vickers, M. (2010). Lessons learned: How early college high schools offer a pathway for high school reform. *NASSP Bulletin*, *94*(3), 165-183.

Kena, G., Hussar, W., McFarland, J., de Brey, C., Musu-Gillette, L., Wang, X., . . . Dunlop Velez, E. (2016). *The condition of education 2016*. Washington, DC: U.S. Department of Education, National Center for Education Statistics. Retrieved from https://nces.ed.gov/pubs2016/2016144.pdf

Kilgore, W., & Taylor, A. (2016). *Dual enrollment in the context of strategic enrollment management*. Washington, DC: American Association of Collegiate Registrars and Admissions Officers. Retrieved from https://blogs.edweek.org/edweek/high_school_and_beyond/161004_AACRAO_Report.pdf

Klein, A. (2017, October 19). Could Betsy Devos' to expand school choice help dual enrollment? *Education Week*. Retrieved from http://blogs.edweek.org/edweek/campaign-k-12/2017/10/betsy_devos_school_choice_pitch_help_dual_enrollment.html

Kryst, E. L., Kotok, S., & Hagedorn, A. (2018). Pursuing higher education in rural Pennsylvania schools: Shaping the college path. *The Rural Educator*, *39*(1), 1-15.

Marken, S., Gray, L., & Lewis, L. (2013, February). *Dual enrollment programs and courses for high school students at postsecondary institutions: 2010-11: First look*. Washington, DC: U.S. Department of Education, National Center for Education Statistics. Retrieved from https://nces.ed.gov/pubs2013/2013002.pdf

Mokher, C. G., & McLendon, M. K. (2008). Uniting secondary and postsecondary education: An event history analysis of state adoption of dual enrollment policies. *American Journal of Education*, *115*(2), 249-277.

Miller, T., Kosiewicz, H., Wang, E. L., Marwah, E. V., Delhommer, S., & Daugherty, L. (2017). *Dual credit education in Texas: Interim report*. Santa Monica, CA: RAND Corporation. Retrieved from https://www.rand.org/pubs/research_reports/RR2043.html

Musu-Gillette, L., Robinson, J., McFarland, J., KewalRamani, A., Zhang, A., & Wilkinson-Flicker, S. (2016). *Status and trends in the education of racial and ethnic groups 2016*. Washington, DC: U.S. Department of Education, National Center for Education Statistics. Retrieved from https://nces.ed.gov/pubs2016/2016007.pdf

Museus, S. D., Lutovsky, B. R., & Colbeck, C. L. (2007). Access and equity in dual enrollment programs: Implications for policy formation. *Higher Education in Review, 4*, 1-19.

National Association Concurrent Enrollment Partnerships [NACEP]. (n.d.) NACEP's history. Retrieved from http://www.nacep.org/about-nacep/history/

Nelson, S. L., & Waltz, S. J. (2019). Dual enrollment programs: Litigation and equity. *Educational Policy, 33*(2), 386-417.

Ogul, D. (2019, March 14). California's dual-enrollment programs at a crossroad. *Community College Daily*. Retrieved from http://www.ccdaily.com/2019/03/californias-dual-enrollment-programs-at-a-crossroad/

Primo, D. M., Jacobsmeier, M. L., & Milyo, J. (2007). Estimating the impact of state policies and institutions with mixed-level data. *State Politics & Policy Quarterly*, *7*(4), 446-459.

Roza, M., & Brooks, C. (2017, November). *College credit in high school: Doing the math on costs*. Washington, DC: Georgetown, University, Edunomics Lab. Retrieved from http://edunomicslab.org/wp-content/uploads/2017/11/Dual-Enrollment-V2.pdf

Schultz, T. W. (1961). Investment in human capital. *The American Economic Review*, *51*(1), 1-17.

Shviji, A., & Wilson, S. (2019). *Dual enrollment: Participation and characteristics*. Washington D.C.: National Center for Education Statistics. Retrieved from https://nces.ed.gov/pubs2019/2019176.pdf

Speroni, C. (2011). *Determinants of students' success: The role of advanced placement and dual enrollment programs* (NCPR Working Paper). Washington, DC: U.S. Department of Education, National Center for Postsecondary Research. Retrieved from https://files.eric.ed.gov/fulltext/ED527528.pdf

Swanson, J. (2007). DE and advanced placement: Partners for student success. *Principal Leadership, 7*(7), 26-30.

Tan, E. (2014). Human capital theory: A holistic criticism. *Review of Educational Research*, *84*(3), 411-445.

Taylor, J. L. (2015). Accelerating pathways to college: The (in)equitable effects of community college dual credit. *Community College Review*, *43*(4), 355-379.

Thomas, N., Marken, S., Gray, L., Lewis, L., & Ralph, J. (2013). *Dual credit and exam-based courses in US public high schools: 2010-11: First look*. Washington, DC, U.S. Department of Education, National Center for Education Statistics. Retrieved from https://nces.ed.gov/pubs2013/2013001.pdf

Troutman, D. R. Hendrix-Soto, A. Creusure, M. & Mayer, E. (2018). *The University of Texas system dual credit study: Dual credit and success in college.* Austin, TX: The University of Texas System. Retrieved from https://www.utsystem.edu/sites/default/files/documents/ut-system-reports/2018/dual-credit-and-success-college/utsystem-dualcreditstudy.pdf

United States Department of Education. (2016). *Fact sheet: Expanding college access through the dual enrollment Pell experiment.* Retrieved from https://www.ed.gov/news/press-releases/fact-sheet-expanding-college-access-through-dual-enrollment-pell-experiment

United Stated Department of Education. (2017). *Secretaries proposed supplemental priorities and definitions for discretionary grant programs.* Retrieved at: https://www.federalregister.gov/documents/2017/10/12/2017-22127/secretarys-proposed-supplemental-priorities-and-definitions-for-discretionary-grant-programs