Mastery of Cultural Capital,
Social Class Segregation of High Schools and Winning at Sports

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ABSTRACT

According to cultural capital theory, middle-class families cultivate their children's cultural capital to promote their social mobility through success in school. We advance the explanatory power of the theory by measuring cultural capital in terms of *mastery* rather than participation or attendance using data on more than 12 thousand schools about their success in interscholastic athletics. We find that predominantly middle-class schools win more contests and by larger margins than economically integrated and predominantly working-class schools. The margins of victory become larger as the social class differences between the opposing schools grows. We also find evidence consistent with resistance theory because predominantly working class schools also experience success, albeit relatively modest. Our findings have implications for cultural capital theory, resistance theory, and our methods for studying them. By measuring mastery of cultural capital, we identify large social class differences among participants in cultural capital and a close alignment between middle-class culture and school culture.

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Cultural capital theory portends to explain why children with middle-class parents achieve and attain more education than children with working-class parents (Calarco 2018; Lareau 2003). According to the theory, middle-class parents use a model of concerted cultivation to develop their children's cultural capital at home and in non-school activities. Working-class parents use a model of natural development, where they provide for their children's basic needs instead of developing their skills.¹ The theory also maintains that schools reward children that possess cultural capital (Jæger 2011).

Recent investigations of cultural capital theory have been coupled with resistance theory (Calarco 2018). This theory acknowledges that working-class children are penalized for not having cultural capital, but gives them more agency than the theory of cultural capital by acknowledging how they develop values, practices, and codes that resist their subordination (Calarco 2018; Willis 1977; MacLeod 1987).

Evidence for cultural capital theory and resistance theory are mixed (Eder and Parker 1987; Kingston 2001; Dumais 2002). One reason for these mixed findings may be the way cultural capital is measured in the quantitative literature, which is usually in terms of attendance at highbrow events or participation in highbrow activities (Jæger 2011). We believe these measures miss an important part of cultural capital. Because of differences in the logic of concerted cultivation and natural development, middle-class children are likely to develop much more *mastery or proficiency of cultural capital* than working-class children. Measures of cultural

¹ We use a simplified model of social class that conceives of children as either from working-class or middle-class families. We use class rather than something like SES because theories of class are better at capturing the type of group conflict and domination discussed by Bourdieu (1984). We understand these two classes as being of relatively equal size in the US, with the largest difference between them being in the area of educational attainment of parents.

capital among children focusing on participation may be missing large social class differences in mastery even among participants.

In this article, we extend arguments about class differences in child development by examining social class differences in the mastery of cultural capital at the level of schools. Schools are useful units for this analysis because they are highly segregated along the lines of social class and operate as key locations of social class reproduction (Owens 2018; Rumberger and Palardy 2005). To measure mastery of cultural capital, we use continuous measures of winning and losing in interscholastic athletics. A high correlation between winning and schools' social class composition is consistent with cultural capital theory and indicates that there are large social class differences in mastery of cultural capital among participants. The strength of the correlation also shows how closely middle-class culture aligns with school culture, a key claim of cultural capital theory but so far not investigated quantitatively at the level of schools.

Examining how schools' social class composition relates to winning and losing in athletics may provide insight into resistance theory as well. Athletics is believed to entice working-class youth because it is framed as relatively more meritocratic and open to social mobility than other institutions (Eitzen 2003). In addition, the historical record is replete with examples of working-class "underdog" teams that develop alternative aesthetics and styles of play that are reminiscent of the type of working-class agency emphasized by the theory (Giulianotti 2015). We look for systematic evidence of resistance in predominantly working class schools.

Our analyses also adds to the literature on sport performance, which primarily focusses on skill development, organizational resources, and the quantification of effective technique and strategy (e.g., Macnamara, Moreau, and Hambrick 2016; O'Donoghue and Ingram 2001;

Vandendriessche et al. 2012; Omondi-Ochieng 2019; Won and Chelladurai 2016). Sports performance is a burgeoning academic field, but sociologists rarely study it (but see Chambliss 1989; Goldsmith 1999; Macaulay, Cooper, and Dougherty 2019; Allison, Davis, and Barranco 2018). This study draws attention to sports performance and social class.

We analyze these issues with three data sets. Our data on winning and losing comes from Scorestream, a social media site devoted to interscholastic sports that provides scores from thousands of high school contests in 2017-2018. We link these data to information on public schools using the 2017-18 Common Core of Data and to private schools using the 2017-18 Private School Survey. In all, we use data on approximately 38 percent of high schools in the United States. We estimate the relationship between winning/losing and schools' social class composition at the level of schools and in head-to-head contests between schools.

We begin by explaining cultural capital theory and resistance theory. Because researchers usually apply these theories to families or small groups of peers, we also discuss how they are likely to operate at the level of schools. After this discussion, we apply these theories to the case of schools' social class composition and success in athletics to develop two testable hypotheses. The methods, results, and discussion follow.

LITERATURE REVIEW

Theory

Cultural capital theory relies heavily on the work of Bourdieu (1984). For Bourdieu, middle-class and working-class students arrive in high school with different amounts of cultural capital, which includes highbrow cultural objects, credentials or labels (e.g., honors student), and knowledge and skills related to highbrow culture. School personnel prefer students with more cultural capital and reward them with higher grades and more opportunities. Middle-class culture

thus aligns with the cultural demands of the school (Lareau 2003), producing social class differences in student performance and unequal treatment in schools. Working-class and middle-class students also have a different habitus. Habitus is a student's predispositions and habits that stem from a knowledge of the social structure and their place in it as middle-class or working-class students (Bourdieu 1984; Dumais 2002). Habitus contributes to the structures of class domination as students habitually reproduce their assigned place in the stratification system at school.

The middle class distinguishes their superiority, in part, through participation and mastery of highbrow culture and an appreciation for an eclectic range of cultural genres (Peterson and Kern 1996). This eclectic range is referred to as omnivorousness, and it implies that the middle class participates in highbrow and popular culture. The middle class is believed to avoid forms of culture associated with the working class, called "proles" (Bryson 1996; Stempel 2005). Beyond participating in different activities, social classes differ in their approach to cultural activities, with the middle class pursuing them as a form of "self-actualization" for themselves or as, "concerted cultivation" for their children (Lareau 2003; Lamont 1992). Thus, the middle class's approach to cultural activities stresses personal improvement and proficiency.

Indicative of "concerted cultivation" is the practice of parents structuring their children's time in non-school organized activities. Weininger and colleagues (2015) show in a national sample that the time children spend in non-school organized activities rises with family income and wealth, but the largest differences are related to mother's education. When the mother has a college degree (compared to no high school diploma), the children spend an extra 3 hours a week in organized activities net of family income and wealth. They also find that net of all other factors, children in private schools spend more than two hours a week in non-school organized

activities than children in public schools.

Participation in organized activities is likely to improve children's mastery of cultural capital more than unorganized play (Macnamara et al. 2016). Research on performance shows that it does not arise from innate talent. Chambliss (1989), for example, argues that labelling people as "talented" obfuscates the social process of developing mastery. For Chambliss, excellent performance develops as participants learn and carry out more and more skills and techniques. Each skill is mundane, but when they are packaged together, they create excellence. He shows that excellent swimmers, for example, know how to hold their hands, how to take breaths, how to do flip turns and so on. As swimmers learn more of these skills, they swim faster and become seen as "talented."

Cultural capital theory, at least in some formulations (Bourdieu 1984), allows for little agency because individuals' habitus gives them predispositions that reproduce the system of domination. For middle-class parents and children, these predispositions include interactions with teachers or other professionals that ensure their children are successful and which observers might see as entitlement. For working-class parents and children, these predispositions include an internalization of inferiority and disinvestment in their own education. When dominated groups consider their subordination as legitimate, it is referred to as symbolic violence (Menjívar and Abrego 2012).

We raise issues of agency because resistance theory, although it builds on cultural capital theory, postulates that dominated groups have agency and produce new meanings and values within the official culture of the school. For example, Willis' (1977) "lads," who value toughness and MacLoud's "hallway hangers" (1987), who participate in a drug culture, are male working-class peer groups who create cultural values and norms contrary to the official culture of schools.

We may be able to discern large-scale patterns of resistance using measures of mastery of cultural capital across many schools.

Mastery of Cultural Capital and Schools

Research on cultural capital theory and resistance theory do not consider how social class differences in cultural capital shape school level outcomes. In this section, we discuss what these theories imply for predominantly middle class schools and predominantly working class schools. This consideration is important because high schools are highly and increasingly segregated on the basis of social class (Owens, Reardon, and Jencks 2016). As Fiel (2015) demonstrates, status groups (including social classes) compete with other groups to monopolize high status schools for their own group. As a consequence, the more desirable schools enroll primarily middle-class students and the less desirable schools enroll primarily working-class students. Middle-class parents also enroll their children in private schools to avoid low-status schools. In 2002, less than 1 in 10 (8.7 percent) students were in private schools, but nearly 1 in 5 (17.3 percent) students in the top SES quartile and not even 3 in 100 (2.7 percent) students from the bottom quartile attended private schools (Cahalan et al. 2006).

The most significant difference between middle-class and working-class schools for this study is in their students' unequal backgrounds. According to cultural capital theory, the students in predominantly middle class schools possess more mastery of cultural capital than the students in predominantly working class schools because of past differences in socialization.

Predominantly middle and working class schools may also have different cultural climates.

School cultures are influenced by the mix of students in the school (Berkowitz et al. 2017). This means that in general, the peer groups in middle-class schools are more likely to value concerted cultivation and mastery of cultural capital. According to cultural capital theory, middle-class

culture aligns with school culture, implying that middle-class children will have mastery in the types of activities that schools offer. Thus, middle-class schools, filled with a critical mass of students with specific forms of mastery of cultural capital and within a climate focused on success and skill development, are likely to have many outstanding teams and clubs. These schools will excel in theater, musicals, jazz and so on.

Cultural capital theory and resistance theory make different predictions about working-class schools. Cultural capital theory argues that working-class students will produce their own subordination, so peer effects in the school should encourage disinvestment in education and school. If this prediction is correct, then the quality of schools' teams and clubs will steadily decline as the schools' proportion of as the proportion of working-class students rises.

In contrast, resistance theory suggests that working-class students develop unique and oppositional cultures. In predominantly working class schools, the theory predicts that a peer culture emerges and challenges the dominant model of rewarding middle-class students for their cultural capital. The prediction that this culture will form in predominantly working class schools is consistent with the two classic studies of resistance theory, which both occurred in these kinds of schools (Willis 1987; MacLeod 1987). If the development of a cohesive working-class culture can raise the quality of teams and clubs, then we should observe high quality teams and clubs in predominantly working class schools as well as in predominantly middle class schools. In this theoretical approach, integrated schools will have the lowest quality teams and clubs.

Connecting Theory to Interscholastic Sports

In this section, we consider how cultural capital theory and resistance theory apply to knowledge about interscholastic sports competition. We develop one hypothesis from each theory, beginning with cultural capital theory.

Cultural Capital Theory and School Sports

Interscholastic athletic competition is a substantial portion of many high schools' official culture (Bissinger 2015; Foley 1990; Eckert 1989; Yow 2017). Each year, around 7 million high school students participate in interscholastic athletic contests sanctioned by the National Association of State High School Federations (NFHS). These contests involve tens of thousands of adult coaches, referees, administrators, custodians, and volunteers in an infrastructure of tens of thousands of fields, courts, and swimming pools (NFHS 2018).

The culture of interscholastic athletics appears to align with middle-class culture. In Stempel's (2005) analyses of adult sports participation, he concludes that "competitiveness," the "will to win," and "physical domination" are important components of upper-class distinction (411). Similarly, Friedman (2013) finds that middle-class parents consciously choose competitive sports leagues for their children instead of those that reward participation. These parents view competitive sports as training for the competition the children will experience in schools and in the labor market. They want their children to win and to earn trophies, honors and awards, which Friedman views as forms of cultural capital. Her review of the history of youth sports also suggests that since the 1970s, sports leagues offered to the working class (through organizations like the Boys and Girls Club) have increasingly emphasized participation rather than competition.

Students from middle-class families have higher participation rates in high school sports than students from working-class families, and the gap has grown over the last quarter century (Meier, Hartmann, and Larson 2018). In part, the association occurs because high schools tend to offer sports with high levels of middle class participation. While there are dozens of sports governed by the NFHS, only about 10-15 of them are omnipresent, including football, volleyball,

basketball, tennis, baseball, softball, soccer, swimming, track and field, golf and tennis.

Goldsmith (2003) analyzes the SES backgrounds of high school participants with national data on six sports. He finds that SES is positively related to participation in soccer, swimming, cheerleading, and to a lesser extent basketball. In the other two sports, American football and baseball/softball, there is no relationship between participation and SES. Goldsmith does not categorize any of the sports as “proles.”² Thus, the available evidence indicates that high schools mostly offer exclusive sports played relatively more by middle-class students and popular sports played by both classes.

Another reason for the middle-class advantage in sports participation is social class differences in mastery of cultural capital. Parents in middle-class families invest in their children’s sports performance just like they invest in other forms of cultural capital (Friedman 2013). In addition to differences in tastes, parents and children in working-class families have limited sports options for their children, organized or not, because of costs, transportation, inflexible work hours (Weininger et al. 2015). Many towns, rural areas, and high-poverty urban neighborhoods where working class families live frequently lack opportunities to play the exclusive sports available in suburban communities (Goldsmith 2003). Since participants develop mastery learning mundane skills, middle-class children’s opportunities to participate in organized sports will improve their athletic skills and make them better at sport than their working-class peers. At the beginning of high schools, sports participation drops rapidly among children, especially among children with less mastery of cultural capital, or as Clark (2012) refers to it, as socially constructed images of “ability.”

² Giulianotti (2015) suggests that prole sports include pub games like darts. Other prole sports might include marbles, pitching pennies, or pier fishing.

The application of cultural capital theory to sports thus suggests that in predominantly middle class schools, there will be many students across a range of sports that have mastery of cultural capital in the form of sports skills. When these high “ability” students attend schools together, they are likely to form a cultural climate that promotes success and development. Thus, the schools will have excellent athletic teams. As the composition of the school becomes less middle class, there will be fewer excellent players on the teams because working-class athletes have not had the opportunities to develop athletic skills. The school teams will win less. When the school is predominantly working class, the school will have a peer culture that views their failure in sports as justified and legitimate. For these reasons, cultural capital theory predicts,

Hypothesis one: There is a negative association between schools’ percent of students that are working class and schools’ interscholastic athletic performance.

The strength of the relationship between schools’ social class composition and schools’ success in athletics indicates how closely middle class culture aligns with school culture. If predominantly middle class schools cannot win consistently, or if predominantly working class schools win consistently in the sports that schools offer, then it is hard to see how middle class and school culture align.

Resistance Theory and School Sports

Resistance theory suggests that working-class students will not so easily submit to subordination. Instead, they develop unique and original cultural approaches that allow them to resist. As Giulianotti (2015) shows, the theory has been routinely applied to sports. In the sport literature, scholars argue that dominated groups construct distinctive aesthetic practices, traditions and codes that allow them to challenge dominant cultural meanings and customs in sports (Giulianotti 2015). In addition, the large number of individuals from working-class

backgrounds who become popular athletes suggest that resistance may be particularly potent in sports, perhaps because athletics ideologically framed as more meritocratic than other institutions (Eitzen 2003). In addition, people from dominated groups are prone to disregard their roles as subordinates in sporting contests and spaces (Giulianotti 2015; Mohamed 2017).

There are historical studies of athletic success in predominantly working-class schools. For example, Haygood (2018) tells how an all-black urban high school won state championships in Ohio in basketball and baseball in 1968-69, the year of Martin Luther King's assassination. Garcia (2013) details the success of a predominantly Mexican-American high school basketball team in San Antonio in the 1920s-1940s. There is also evidence of working-class participants developing alternative ways of playing that led to success. Negro League Baseball players took more chances on the base paths and the pitchers had greater variety than those in Major League Baseball (Paige and Lipman 1962). In the early 1900s, the football team at the Carlisle Indian Industrial School invented an aggressive passing attack to beat many of the best collegiate football teams in the country (Jenkins 2007). Other examples of cultural distinctiveness include the fluid and highly skilled style of black basketball (George 1999; Boyd 1997; Mohamed 2017); and the violent masculine style of American football practiced among boys in southern towns (Bissinger 2015; Foley 1990).

The application of resistance theory to sports in predominantly working class schools suggests that the relationship between schools' social class composition and team performance will not be linear. As schools proportion middle class declines, performance in sport will decline until schools become predominantly working class. At that point, peer culture in schools increases the chances of the students developing alternative cultural approaches to sports that can compete with middle class schools. Thus, we arrive at,

Hypothesis two: the association between schools' social class composition and athletic performance will be a U-shaped relationship, with performance highest in predominantly working class and predominantly middle class schools and lowest in economically integrated schools.

Notice that support for the second hypothesis implies that the working class does not participate in their own subordination, which is contrary to the predictions of cultural capital theory.

To test our two hypothesis, we account for other school characteristics that are likely to associate with winning. We control for schools' racial composition because many of the examples of working-class success in sports are about minoritized groups and we are focusing on social class. We also expect suburban schools and schools with more resources to be more successful in athletics (Omondi-Ochieng 2019; Won and Chelladurai 2016). We also expect schools with large enrollments to win more (Goldsmith 1999). We now describe how we test our hypotheses.

METHODS

Data

This study uses data on the 2017-18 school year from three sources: (1) the National Center for Education Statistics' (NCES) Common Core of Data (CCD), (2) the Private School Universe Survey (PSS), and (3) the fan-driven high school sports platform Scorestream. The CCD is the primary NCES database one the universe of all public elementary and secondary schools and districts. The non-fiscal data includes information on students and staff. The CCD's School District Finance Survey (F-33) provides annual revenue and expenditure data for all school districts in the U.S. The PSS biennially collects information on the population of private

schools and their students and staff.

The online Scorestream platform provides data on high school sports contests, including the names and locations of both schools, the score, level of play, sport and gender. The data include contests from all 50 US states and with a range of sports for girls and boys (mostly in volleyball, soccer, softball, football, basketball, and baseball, see Table A1 in the Appendix). The data is not a complete register of all high school sports contests in the United States. Instead, it contains scores reported by the public. We limit our analyses to high school varsity contests. To link Scorestream data to the CCD and PSS, we use school and city names, which are available in all three data sets. We use the data to construct two data sets. The first one is a school-level data set with full information on 10,849 public schools and 1,889 private schools, representing 40 percent of public schools and 23 percent of private schools in the United States that have 10-12th grades.³ The second data set is at the contest level and includes 222,004 contests when we include private schools and 188,263 when we limit the analyses to public schools.

Variables

We discuss the construction of variables in the school-level data here, leaving the discussion of the variables in the contest-level data for later. We measure mastery of cultural capital, our dependent variable, in two ways. Both measures are continuous and based on high schools' success in interscholastic contests. Our first measure is schools' average winning percentage across all varsity sports contests. Average winning percentage is calculated as wins divided by contests. Contests ending in a tie are included as half the value of a win.

³ We use 10th grade rather than 9th as the minimum grade because in some districts 9th grade is part of middle school.

Second, we estimate schools' average standardized margin of victory or defeat. Margin of victory/defeat estimates how much better or worse a team is than their opponent, so it contains more information about athletic success than does winning. If a school wins a contest, the margin of victory/defeat is positive and equal to the number of points they win by. If a school loses, the margin of victory/defeat is negative and equal to the number of points they lose by. To estimate a schools' average margin of victory/defeat across all contests, it is necessary to account for differences in it between sports. For example, margins of victory/defeat tend to be larger in American football, where it is common for teams to win or lose by 10 points, than in soccer, where teams usually win or lose by one or two points. To standardize margins of victory/defeat, we divide them by their sport specific standard deviation. We then average them by school to create schools' average standardized margin of victory/defeat. For simplicity, we will refer to this variable as schools' margin of victory (whether it is positive or negative) from here on.

There are two indicators of schools' social class. The first is the schools' percentage of students on free or reduced price lunch (SPFL). We use this measure, which is available on the CCD, because these lunch programs are means tested and only children from low-income families qualify for them. Because SPFL is a continuous variable which ranges from zero to 100, we can estimate non-linear relationships with it in regression models. However, information on SPFL is not available for private schools. While we could omit private schools entirely, including them in the analyses is informative because they enroll high SES students who spend many hours in non-school organized activities (Weininger et al. 2015; Cahalan et al. 2006). They may have exceptionally high mastery of cultural capital. When private school information is included, we measure schools' social class composition with a dummy variable for school sector (private = 1 and public = 0).

We include controls for schools' size, percent white, and rurality. Schools' size is measured as the natural log of students per grade. In private schools, students per grade equals schools' number of students divided by its number of grades. In public schools, it is the average enrollment in 10th, 11th, and 12th grades. Here and elsewhere, we transform highly skewed variables by taking their natural log, which reduces the influence of extreme values on the regression coefficients. Rurality is measured with dummy variables for suburban schools and urban schools. Schools that are in rural areas or towns are combined into one reference category because we find little difference in winning between them.

We use two measures of school resources. First, we use the natural log of expenditures per student, which is available on the CCD for public school districts. We also use the student/teacher ratio to measure resources because teacher salaries are a large share of school expenditures. The latter variable is available for public and private schools.

Analysis

Our goal is to examine the relationship between schools' social class and schools' winning. We begin by estimating models with schools as the unit of analyses. We use OLS to predict 1) schools' average winning percentage and 2) schools' margin of victory. OLS is appropriate because both dependent variables have relatively normal distributions. Their distributions peak at their central tendencies, which are near 0.5 and zero for winning percentage and margin of victory, respectively. Both variables are also symmetrical with gradually declining tails.

In the school-level data, we test our hypotheses by regressing schools' winning percentage and schools' margin of victory onto SPFL and SPFL-squared. Hypothesis one will receive support if the coefficient for SPFL is negative and the one for SPFL-squared is not

significant. Hypothesis two will receive support if the coefficient for SPFL is negative and the one for SPFL-squared is positive.

One drawback of the school-level models is that they do not account for characteristics of opponents. Teams are less successful against strong opponents and vice-versa. Because interscholastic competition is often organized into conferences, divisions, and ratings, schools are likely to play opponents who are similar to themselves on characteristics like schools' social class composition and size. As a result, many teams will appear average and the school level models may underestimate differences in athletic performance across schools.

We overcome this limitation in the second part of the analysis by using contests as the unit of analysis and including school fixed effects. In these models, we use the home-team's margin of victory as the dependent variable (y). The independent variables are measured as differences between the home (h) and away (a) team ($\Delta x = x_h - x_a$). This makes our main independent variable, the difference in SPFL, range from -100 to 100. When it is negative -100, the home team has no students on free lunch and the away team has all of their students on free lunch, so the home teams margin of victory should be large. As the difference in SPFL becomes larger (going towards 100), the home team becomes more working class and the away team becomes more middle class, so the margin of victory should become smaller, eventually becoming negative because the home team is outmatched. In these models, hypothesis one will receive support if the difference in SPFL (Δx) is negatively related to the home team's margin of victory.

Hypotheses two suggests that predominantly working-class teams will also be successful because they can develop unique and alternative ways to play. We cannot test this hypothesis by adding a squared term in these models because the U-shaped relation is not predicted in these

models. According to our logic, cultural capital theory predicts that the team that has relatively fewer students on free lunch is likely to win. If there is working class resistance, then the prediction from cultural capital theory will not be true when one the opponents is working class. In these contests, the differences between the schools in free lunch participation will matter less. Thus, cultural capital predicts that the coefficient for the difference in SPFL is negative, and resistance theory predicts that it should be less negative when one of the schools is predominantly working class. Based on this logic, we test hypothesis two with an interaction between the difference in SPFL and a dummy variable indicating if one of the schools is working class, which we define as schools with $SPFL \geq 90$ percent.

We use school fixed effects (for the home team school) because there are multiple contests per school. Doing so reduces autocorrelation and controls for school characteristics that are constant over all of the contests schools play. These characteristics include, for example, a particularly strong or weak athletic culture, school policies, eligibility rules and so on. They do not control for school characteristics that vary across the contests a school plays (such as the difference in SPFL between the home and away team).

RESULTS

Table 1 about here

Table 1 shows the descriptive statistics for the 12,738 schools in our sample. Table A2 in the Appendix shows them for the contest-level sample. As seen in the table, the high schools win 46.37 percent of their contests. Their margin of victory is close to zero, which would occur if a school had an average score of a tie in all their contests. If a school has margin of victory equal to one, it means that they win all their contests by one standard deviation above the mean. How much is that? In basketball, football, and softball, one standard deviation in margin of victory is

22.4 points, 29.0 points and 7.8 runs, respectively, all of which most fans would consider blowouts.

Schools' percent of students on free or reduced priced lunch (SPFL) has a mean of 46.9 percent across schools. Almost 10 percent of the schools are private. On average, there are 15.2 students per teacher. The natural log of students per grade in school averages 4.88, which is about 131 students. The natural log of expenditures per student averages 15.2, which is about 13.3 thousand dollars. Schools' percent white averages 63.9 percent. Many of the schools are in rural areas or small towns (57.5 percent). Fewer are in urban (16.8) and suburban (25.7) areas.

Our main interest lies in the association between schools' winning and schools' social class. Tables 2 and 3 report the results of the regression models using schools as the unit of analyses, and Table 4 reports those using contests as the unit of analyses.

Table 2 and 3 about here

We begin by summarizing the results for the control variables. We find consistent and robust coefficients for school size. As expected (Goldsmith 1999), they show that larger schools have higher winning percentages (Table 2), win by a larger margin (Table 3), and beat smaller schools by a larger margin the greater their size advantage (Table 4). Table 2 shows that rural/town schools have higher winning percentages and margins of victory than urban schools and sometimes suburban schools. However, most of the differences in athletic performance associated with rurality disappear in the contest models that include a variable about differences in SPFL (Table 4). We expected schools' pupil-teacher ratios to have negative coefficients because more students per teacher suggests fewer resources. However, it usually has a positive coefficient, suggesting that it might be capturing additional variation in school size. Schools' percent white has positive coefficients unless it is in a model with SPFL or difference in SPFL.

In those cases, it is either not significant or it is small and negative. These results suggest that its positive coefficients are capturing whites' relatively higher social class rather than a racial process per se.

We now turn to our findings about social class. Table 2 shows the school-level regression models predicting schools' winning percentage. Model 1 includes a dummy variable for private schools, one of our measures of schools' social class. The coefficient (0.02) indicates that private schools' winning percentage is two percentage points higher than that of public schools. This is a small but statistically significant difference. In Model 2, which includes the control variables, the private school coefficient is 0.04, indicating that private schools' winning percentage is 4 percentage points higher than that of public schools holding constant other factors. Further investigation indicates that the coefficient for private schools becomes larger in Model 2 because it is suppressed by school size. Private schools tend to be small. When the models adjust for size, the private school advantage grows. These results are consistent with hypothesis one from cultural capital theory, but they suggest social class differences in mastery of cultural capital are small. They also suggest a weak alignment between middle class culture and school culture.

Figure 1 and 2 about here

Model 3 uses the public-school sample to regress winning percentage onto SPFL and its square. Cultural capital theory predicts that the relationship will be negative. Resistance theory predicts a U-shaped relationship. As seen in model 3, the linear (-0.0033) and squared (-0.000019) coefficients⁴ are both significant. Figure 1 visually depicts the predicted relationship. Instead of a U-shaped relationship, the curve declines and then flattens out. The steep decline

⁴ These are the actual coefficients. The ones in the table are multiplied by 100 to show more digits with meaning. We use the actual coefficients to construct the figure.

that occurs when SPFL goes from zero to 50 percent shows that winning is highest in predominantly middle class schools (SPFL = 0) and then declines rapidly as SPFL increases. The steep decline in that part of the curve is consistent with cultural capital theory's prediction that mastery of cultural capital will be highest in predominantly middle class schools.

However, cultural capital theory cannot explain why the curve flattens out after SPFL reaches about 50 percent. According to hypothesis two, the line should curve up as SPFL gets closer to 100. Instead, it flattens out, suggesting that mastery of cultural capital stops declining after SPFL reaches about 50 percent. Schools that are predominantly working class develop enough mastery in cultural capital to win about the same percentage of contests as economically integrated schools. The result is consistent with resistance theory, but suggests that resistance is not efficacious enough to challenge predominantly middle class schools. The alignment between middle class culture and school culture is strong until SPFL reaches about 50 percent, after which it is weaker to not existent.

Model 4 shows that the coefficients for SPFL and its square change little when the control variables are added. The curve produced by them, which is also shown in Figure 1, is very similar to the one produced from the model without control variables. Because the findings for SPFL do not change when the control variables are added, we conclude that their relationship to winning is not explained by resources, school size, racial composition, or rurality.

The regression models reported Table 3 are the same as those in Table 2 except the dependent variable is schools' margin of victory, which is a better measure of athletic performance. In Model 1, the coefficient for private schools indicates that they win their contests by .07 standard deviations more than public schools do on average. In Model 2, the coefficient increases to .13 (because the model adjusts for school size). This coefficient indicates that private

schools' margins of victory are greater than those of public schools by about $(0.13 * 22.4 =) 2.9$ points in basketball, 3.8 points in football and 1.0 runs in softball. These margins are not small, especially given that they occur net of other factors and across all of a school's sporting contests.

Model 3 shows that when the dependent variable is schools' margin of victory, the linear and squared coefficients for SPFL are negative and positive, respectively, just as they are when winning percentage is the dependent variable. As shown in Figure 2, the curve produced by these coefficients declines and then stops declining just like the curve for winning percentage. It shows that predominantly middle class schools have better athletic performance than economically integrated and predominantly working class schools. The two latter types of schools have similar athletic performance. Theoretically, cultural capital explains the success of predominantly middle class schools, but not the relatively minor success of predominantly working class schools. Looking at the magnitude of the coefficients shows that schools with no students on free lunch are expected to win by about 0.38 SDs. In basketball, football, and softball, these are margins of victory of 8.5 points, 11.0 points and 3.0 runs, respectively, which are large. When SPFL is 90 percent, the margins of victory (defeat) are -4.0 points, -5.4 points and -1.5 runs in the same three sports.

Table 4 about here

Table 4 shows the results from the contest level data. These analyses estimate social class differences in mastery based upon differences between opponents, so we can see what happens when schools with different social class compositions actually play each other. In Model 1, we include two dummy variables about private schools. The first one equals one when a private school hosts a public school. Its coefficient indicates that private schools win by a larger margin of victory (0.11 standard deviations) when they host public schools than when they host private

schools. The second one equals one when a public school hosts a private school. Its coefficient indicates that public schools lose by (-0.16 standard deviations) larger margins when they host private schools than when they host public schools. Both of these findings are consistent with hypothesis one, that middle class schools have better athletic performance. In Model 2, which controls for size and other independent variables, these two coefficients become 0.29 and -0.31, respectively. The magnitude of these coefficients are large. The coefficient of -0.31, for example, indicates that compared to when public schools host another public school, they lose by an average of 6.9, 9.0, and 2.4 more points, in basketball, football, and softball, respectively, when they host a private school. Thus, we find large differences in athletic performance by schools' social class composition when we look at contests where they play against each other, and thus a strong alignment between middle class and school culture.

Models 3 and 4 show the coefficients for differences in SPFL between opponents. Recall that the difference in SPFL is negative when the home team has fewer students on free lunch. For this reason, cultural capital theory predicts that the difference in SPFL is negatively associated with the home school's margin of victory. According to resistance theory, the relationship should be less negative or even positive when one of the opposing schools is predominantly working class (which is defined as 90 percent or more on free lunch). We test this by interacting the difference in SPFL with a dummy variable for contests with one predominantly working class school.

The results are shown in Model 3 and 4, with the latter containing the control variables. For both models, the main effect is negative, and the interaction is positive. Because the estimated slopes are similar, we will focus on those in Model 4 and plot them in Figure 3. For contests not including a working-class school, a ten-percentage point decrease in the difference

in SPFL raises the home team's margin of victory by $(-10 * .0087 =) 0.087$ standard deviations in margin of victory. For contests involving a working-class school, the same decrease raises the margin of victory by $(-10 * (-0.0087 + .0054) =) 0.033$ standard deviations. This means that both slopes are negative, indicating that schools' social class composition is correlated with school level measures of mastery of social capital whether or not one of the schools is working class. By the same logic, they show an alignment between middle class culture and school culture across all schools. However, the difference in the slopes indicates less alignment and smaller social class differences in mastery when one of the opponents is a predominantly working class school.

Figure 3 about here

To see the effects more clearly, we compare the predicted margins of victory when the difference in SPFL is -50 percentage points.⁵ If a working class schools is not involved, the more middle class team is expected to win by 9.3 points, 12.6 points, and 3.4 runs in basketball, football and softball, respectively. If a working class team is involved, the more middle class team is expected to win by 4.0 points, 5.4 points and 1.5 runs in the same three sports.

Theoretically, these findings suggest that predominantly working class schools develop more mastery of cultural capital than would be predicted by cultural capital theory, which we suspect is a form of resistance. It keeps margins of victory against more middle class schools relatively small, but it does not consistently lead to winning against them.

DISCUSSION

In this paper, we examine the relationships between schools' social class composition, mastery of cultural capital, and school culture by examining how the segregation of schools by

⁵ These estimates and Figure 3 assume the intercept in the model is about zero. It is negative in the model because it appears that the public reports more outcomes to Scorestream when the team they follow wins on the road.

social class relates to winning in interscholastic competition. We find that predominantly middle class schools are more successful in athletics than economically integrated and predominantly working class schools. We also find that predominantly middle class schools consistently win by lopsided margins when they compete against predominantly working class schools and economically integrated schools. These findings evince large social class differences in mastery of cultural capital among participants and that middle class culture aligns with the official culture of schools. The latter two types of schools are equally unsuccessful, losing a majority of their contests. However, predominantly working class schools have more mastery of cultural capital than would be expected by cultural capital theory, providing evidence that working class agency exhibits resistance to middle class domination, at least in athletics.

Quantitative literature on cultural capital usually measures it in terms of participation (see the review by Jæger 2011). We improve on these approaches by measuring cultural capital in terms of mastery rather than participation by using continuous measures of schools' athletic performance. Our findings have implications for research examining whether or not cultural capital can explain social class differences in educational outcomes. According to cultural capital theory, teachers and school personnel favor students with more skills in cultural capital, so it is likely that teachers can identify students with mastery and treat them more favorably than students who participate but lack mastery. Participation-based measures of cultural capital are imprecise and obscure social class differences in cultural capital, so studies using them will likely underestimate the relationship between cultural capital and educational outcomes.

Measuring mastery of cultural capital in sports rather than other forms of highbrow or popular culture has two advantages. First, it is possible to measure mastery of cultural capital with much greater precision. Rather than using measures that lump all schools or individuals into

two or three categories, mastery can be measured on a continuous gradient with small distinctions. In addition, it is possible to adjust the measurement of mastery by examining competitive contests that have winners, losers, and scores. The clearest evidence that the contest data improves our measures of mastery involve the findings about school sector. When we examine a schools' overall margin of victory in the school level data, private schools appeared to have a modest advantage in mastery of cultural capital in comparison to public schools. But when we examined the actual contests between public and private schools, we find that the advantage is sizable, especially when the schools have equal size. This finding is substantively important because it shows that competitive contests allow us to estimate mastery of cultural capital precisely. But it also shows how difficult it can be to estimate mastery of cultural capital in activities that do not include competitive contests. There may be alternative ways to measure cultural capital at the individual level that do capture mastery. In theory, we suggest avoiding questions about participation ("yes" or "no) or frequency (e.g., "a little", "some", and "a lot") in favor of questions on mastery ("beginner," "intermediate," and "advanced").

In addition, the measurement of mastery in cultural activities may also have important implications beyond the theories we use. Many studies examine the effects of athletic participation on, for example, substance abuse, academic achievement, and deviance. Participation might have different effects on these outcomes depending on the individuals' or the teams' mastery. Do the effects of athletic participation on deviance for example vary depending upon the success of their team or by the individuals role on the team (e.g., such as an mvp)? We need to look at these relationships theoretically and empirically, but it is clear from this study that mastery in athletics is highly related to social class. It would be surprising if it did not have tangible benefits on other outcomes.

A second implication for cultural capital theory is about the alignment of school culture and middle-class culture. In Bourdieu (1984), the alignment occurs because schools do not teach cultural capital but nevertheless reward students for having it. For Lareau (2003), the alignment occurs because only middle class parents are able to fulfill the demands placed on parents by schools. Our approach begins by treating interscholastic sports as a key component of school culture, which is a common finding in school ethnographies and even large quantitative studies (Bissinger 2015; Coleman 1961; Foley 1990; Eckert 1989; Yow 2017). Then we examine whether or not the social class segregation of schools relates to mastery of cultural capital in the sports that schools offer. The approaches of Bourdieu and Lareau both view the systemic process of rewarding parents and children for their possession of cultural capital as unofficial and hidden. In theory, by hiding the mechanisms of domination, it receives less critique and dominated groups become more compliant. Mastery of athletic skill appears to be like other forms of cultural capital in that it is highly related to social class, but this distribution is explicitly promoted by schools rather than hidden by it. One could interpret the public nature of sport as a weakness as a form of domination. Our evidence of working class resistance in sport is consistent with this interpretation. On the other hand, the public nature of athletic contests may further middle class domination by creating a public display of “physical superiority,” as Stempel (2005) suggests. In this sense, wins and losses are literally symbolic victories and defeats of dominating and dominated groups.

Furthermore, the alignment of middle class culture and school culture in our approach is not a theoretical claim or dependent upon the behaviors of school personnel. Instead, it is the link between the cultural activities that the middle class practices and the cultural activities that schools offer. Since we estimate this relationship net of school size and school resources, our

quantitative estimates of this relationship implies that the mastery developed by the middle-class students prior to beginning high school prepares them to succeed in the central cultural activities provided by the school. Notice also that the ability to measure the link between school culture and middle class culture is almost completely dependent upon being able to measure mastery of cultural capital, at least in our formulation. Researchers have been measuring the social class composition of schools for decades, but the official school culture doesn't vary much if you only look at what sports or cultural activities schools offer. Much of the differences is not in participation; it is in the level of mastery within the activities schools offer.

Cultural capital theory suggests that working-class students have habits and dispositions that produce the structures of their own domination. In such a world, the middle class would develop mastery of cultural capital and the working class would submit to and even legitimate their subordination. In our study, we operationalize this prediction as a negative relationship between schools' social class composition and winning. If we found unconditional support for this prediction, the graphs we use to describe our findings would have negatively sloping lines with no curve at the bottom and no interaction. In such a world, the middle class's domination of athletics might be described as hegemonic in the sense that it is unchallenged.

For resistance theory, the working class struggles against domination. We systematically test for working class resistance by looking for evidence that predominantly working class schools can challenge middle class schools in athletics, a location likely to spur working class resistance (Giulianotti 2015). Our findings are consistent with resistance theory and give reason to question the claim from cultural capital theory that working-class students produce their own domination. We find that predominantly working class schools lose less often and by smaller margins than would otherwise be predicted by their social class composition. If hegemonic

means unchallenged, then the middle class' domination of school culture is not completely hegemonic, at least not in athletics.

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Table 1: Descriptive Statistics for Variables in the School-Level Sample (N=12,738).

	Mean	Standard Deviation
Schools' Winning Percentage	0.4637	0.1743
Schools' Adjusted Margin of Victory	-0.0009	0.6157
Schools' % on Free Lunch (SPFL) ^a	46.9320	23.7318
Schools' Students Per Grade (nl)	4.8817	1.0593
Private Schools	0.0958	0.2943
Schools' Students Per Teacher	15.1740	4.4198
Districts' Expenditures per Pupil ^a (nl)	9.5005	0.3115
Schools' Percent White	63.8330	30.1524
Urban Schools	0.1676	0.3735
Suburban Schools	0.2570	0.4370
Rural Schools	0.5754	0.4943

^a Only available for public schools (N=10,849)

Table 2. Coefficients from the Regression of Schools' Winning Percentage onto Selected Variables, School-Level Data.

Variables	Model 1	Model 2	Model 3	Model 4
Private School	0.0191***	0.0332***		
Schools' % on Free Lunch (SPFL) ^a			-0.3335***	-0.3402***
SPFL squared ^a			0.0019***	0.0020***
Schools' % White ^a		0.0721***		0.0007
Schools' Students/Grade (nl)		0.0241***		0.0149***
Schools' Pupil/Teacher Ratio ^a		0.1393**		0.1752***
Urban School ^b		-0.0132*		-0.0295***
Suburban School ^b		-0.0065		-0.0287***
Districts' Expenditures/Pupil (nl)				-0.0048
Constant	0.4619***	0.2797***	0.5678***	0.5231***
Observations	12,738	12,738	10,849	10,849
R-squared	0.0010	0.0301	0.0438	0.0554

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

^a Coefficient multiplied by 100 to show more meaningful digits.

^b Compared to Rural Schools

Table 3. Coefficients from Regression Models onto Schools' Margin of Victory in Interscholastic Competition onto Selected Variables, School-Level Data.

Variables	Model 1	Model 2	Model 3	Model 4
Private School	0.0742***	0.1346***		
Schools' % on Free Lunch (SPFL) ^a			-1.2803***	-1.3758***
SPFL squared ^a			0.0076***	0.0083***
Schools' % White ^a		0.2204***		-0.0444
Schools' Students/Grade (nl)		0.0777***		0.0422***
Schools' Pupil/Teacher Ratio ^a		0.6090***		0.6783***
Urban School ^b		-0.0625***		-0.1228***
Suburban School ^b		-0.0453**		-0.1143***
District Expenditures/Pupil (nl)				-0.0549**
Constant	-0.0080	-0.6039***	0.3846***	0.6920**
Observations	12,738	12,738	10,849	10,849
R-squared	0.0013	0.0257	0.0415	0.0536

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

^a Coefficient multiplied by 100 to show more meaningful digits.

^b Compared to Rural Schools

Table 4. Coefficients from Regression of Margin of Victory onto Selected Variables Describing Differences between Opponents, Contest-Level Data.

Variables	Model 1	Model 2	Model 3	Model 4
Private School Hosts Public School	0.1149***	0.2929***		
Public School Hosts Private School	-0.1642***	-0.3100***		
Δ Schools' % on Free Lunch (SPFL) ^a			-0.0095***	-0.0087***
Δ SPFL Squared ^a			-0.0229	-0.0224
Δ SPFL Cubed ^a			0.0050***	0.0054***
Δ Schools' % White ^a		0.4568***		-0.0376*
Δ Schools' Size (ln)		0.3383***		0.3079***
Δ Schools Students Per Teacher ^a		0.7097***		0.8238***
Rural School Hosts Suburban School		-0.0551***		-0.0067
Rural School Hosts Urban School		-0.0240*		-0.0102
Urban School Hosts Rural School		-0.0064		-0.0456**
Suburban School Hosts Rural School		0.0408***		0.0089
Suburban School Hosts Urban School		0.0063		-0.0089
Urban School Hosts Suburban School		-0.0240		-0.0101
Δ Expenditures per Pupil ^a (nl)				0.8273
Constant	-0.1268***	-0.1191***	-0.1279***	-0.1221***
Observations	222,004	222,004	188,263	188,263
R-squared	0.1951	0.2222	0.2166	0.2336

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

^a Coefficient multiplied by 100 to show more meaningful digits.

Δ indicates the difference in the variable between the home and away team (h – a).

Figure 1. Expected winning percentage as a function of percentage of students on free or reduced price lunch.

Figure 2. Expected margin of victory as a function of percentage of students on free or reduced price lunch.

Figure 3. Predicted Home Team Margin of Victory Standardized by Sport Plotted Against the Difference in Percent of Students on Free/Reduced Price Lunch in Head-to-Head Contests.

Estimated from Table 4, Model 3.

Appendix

Table A1. Extent of representation of sports in the contest-level data.

Sport	Percentage
Baseball	8
Basketball	44
Football	20
Soccer	10
Softball	6
Volleyball	5
Other	7
N	222,004

Table A2. Descriptive Statistics, Contest-Level Data

	Mean	Standard Deviation
Home team Average Margin of Victory	-0.1289	0.9989
Δ Schools' percent on Free Lunch ^a	0.7333	23.6445
Δ Schools' Size (ln)	-0.0091	0.5241
Δ Schools Students Per Teacher	-0.0144	3.1677
Δ Expenditures per Pupil ^a (nl)	0.0025	0.2398
Δ Difference % White Students	-0.4581	23.8924
Private School Hosts Public School	0.0357	0.1855
Public School Hosts Private School	0.0378	0.1906
Rural School Hosts Suburban School	0.0750	0.2634
Rural School Hosts Urban School	0.0436	0.2042
Urban School Hosts Rural School	0.0421	0.2008
Suburban School Hosts Rural School	0.0747	0.2629
Suburban School Hosts Urban School	0.0488	0.2155
Urban School Hosts Suburban School	0.0496	0.2171
N	222,004	

^a Only available for public schools (N=188,263).

Δ indicates the difference between the home team and the away team.