doi: 10.4085/1062-6050-0135.24

# Relationship Between Athletic Trainer Access, Socioeconomic Status, and Race and Ethnicity in United States Secondary Schools

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# Relationship Between Athletic Trainer Access, Socioeconomic Status, and Race and Ethnicity in United States Secondary Schools

**Context:** Extensive research has exposed healthcare disparities regarding socioeconomic status (SES) and race/ethnicity demographics. Previous research has shown significant differences in access to athletic training services (AT access) in the secondary school setting based on SES, but with limited samples.

**Objective**: This study investigated differences in AT access based on race/ethnicity and SES on a national scale.

**Design:** Cross-sectional study

**Setting**: Database study using secondary analysis. Data were collected from the National Center for Education Statistics (NCES), Athletic Training Location and Services (ATLAS) database, and US Census Bureau.

**Patients or Other Participants**: 10,983 public schools.

**Main Outcome Measures**: Descriptive data was summarized by measures of central tendency. A one-way ANOVA determined differences between school characteristics: median household income (MHI), percent of students eligible for free and reduced lunch (%FRL), percent white students, and percent non-white students based on AT access: Full-time (FT-AT), part-time (PT-AT), and no athletic trainer (no-AT). A Bonferroni pairwise comparison was used for variables with significant main effects.

**Results:** Across all schools included in the study, 43.8% had no-AT (n=4,812), 23.5% had PT-AT access (n=2,581), and 32.7% had FT-AT access (n=3,590). There were significant effects between AT access and MHI (p<.001), %FLR (p<.001), percent white (p<.001), and percent

non-white (p<.001). FT-AT schools had a higher SES when compared to PT-AT and no-AT schools. Significant differences existed between AT access groups and race/ethnicity of schools. Schools with FT-AT had a significantly lower percent of non-white students (31.3%) compared to schools with no-AT (46.0%) (p<.001). No significant differences between FT-AT and PT-AT based on race/ethnicity demographics presented (p≥.13).

**Conclusions:** Schools with higher SES had greater AT access; whereas, schools with a higher percentage of non-white students were more likely to have no AT access, demonstrating the disparities in healthcare extends to athletic healthcare as well. To increase AT access, future initiatives should address the inequities where larger minority populations and counties of lower SES exist.

**Keywords:** Athletic training services, athletic health care, population disparities

Abstract word count: 298

Manuscript word count: 3,267

**Key points**

- There are statistically significant differences in AT access based on SES & Race and Ethnicity.
- Schools with larger ethnic and racial minority populations are less likely to have AT access.
- Schools with higher socioeconomic status are more likely to have AT access.

## INTRODUCTION

Health care access is defined as "the ability to obtain health care services in a convenient and affordable manner" and is a fundamental right that should be accessible to all humans.[1,2] However, in the United States access to health care is intertwined with many social and environmental factors that often lead to disparities for different groups, namely based on socioeconomic status and race.[3,4] Social determinants of health (SDOH) are conditions in the social environment in which people are born, live, learn, work, and play that contribute to health in a variety of ways and have been shown to have a large influence on health-related quality of life.[5] The five determinants are education access and quality, health care accesses and quality, neighborhood and built environments, social and community context, and economic stability. Though all of the SDOH are interconnected, economic stability and social or community context are innate intertwined to the others, where the SES of an individual or community greatly impacts the economic stability and thus the other SDOH. Economic stability and community context repeatedly linked to higher rates of illness and less access to health care.[3] There is evidence that racial and ethnic minorities tend to receive lower quality of care than non-minorities, and patients of minority ethnicity experience greater morbidity and mortality from various chronic diseases than non-minorities.[3,5] For example, racial minorities such as Black and Hispanic individuals are more likely to be impoverished and uninsured, impeding their ability to obtain health care services.[6,7] However, even when access to care, level of need, and sociodemographic factors are similar, racial/ethnic minority groups have lower rates of health service use than Whites.[6,7] These healthcare disparities are present in not only access to general health care, but similar disparities have been found in access to athletic training services.[8–10]

Previous research has shown that access to athletic trainers at the secondary school setting can have positive outcomes on patient health, including improved management of sport-related concussion, fewer cardiac-related deaths, fewer emergency room visits, and increased patient access to care and preventive medicine services. [11–14] Further, athletic trainers are uniquely positioned to improve access to additional healthcare services through relationship-centered care and decreasing the time to seek care. Relationship-centered care focuses on the quality of relationships between providers and patients to improve patient's trust in the provider and ability of the provider to help the patient navigate the health care system.[15] The nature of athletic training in the secondary school setting requires athletic trainers to institute relationship-centered care to increase access for patients in the schools they serve. By establishing trustworthy relationships and helping patients navigate the healthcare system better, athletic trainers in the secondary school can also help patients and families access necessary healthcare services in a more timely manner to improve health outcomes. However, the access to athletic trainers in the secondary school setting needs to be explored to reduce equity gaps.

Athletic trainers seek to find solutions to common healthcare problems by engaging in evidence-based practice and patient centered care.[16,17] Additionally, more recent investigations have shown how athletic trainers in the secondary school have sought to navigate SES challenges for their patients and increase access to care.[18] For athletic trainers to service communities in this way, they must be available and present in settings with acute injury risk such as college/university athletics, secondary school athletics, industrial settings, or military settings. With the current cost of healthcare and the high number of underinsured individuals in the US, athletic trainers provide a valuable service to those under their care.[13]

There has been a growing literature base regarding the access of athletic trainers in the secondary school setting.[8–10,19–21] The onset of the Athletic Training Locations and Services (ATLAS) project has allowed more investigation into athletic training services in the secondary school setting.[19] While a majority of this growing body of literature focuses on socioeconomic status and economic stability of the communities being investigated, economic stability is only one social determinant of health that can influence access to athletic training services. Further, each of the social determinants of health are highly interconnected and multifaceted, that simply examining one factor on athletic training access may not present the whole picture.[8,22] With athletic trainers being uniquely positioned to provide health care services to diverse populations, a more in-depth investigation into other associated factors with athletic trainer access needs to be investigated. Though there has been investigations into athletic training access and socioeconomic status there has been limited studies exploring the intersection of athletic trainer access and race and ethnicity on a national scale.

The primary purpose of this study is investigating athletic training access in secondary schools across the US based on race/ethnicity demographics and socioeconomic status (SES). Previous research has shown that schools in communities with higher SES have more AT access. With the interconnectedness between economic stability and the other SDOH, we hypothesize that similar trends that exist in the broader healthcare landscape will exist within AT access where communities with lower SES and higher percentage of non-white population will have less AT access. Our aim is to expand on existing literature by using a national sample. By identifying the factors influencing AT access, future steps can be taken to improve access for communities with less access and improve overall health outcomes for these patients.

**Methods:**

*Design*

We used a cross sectional study utilizing secondary analysis from different databases to explore school-level data. To answer the research questions, we used data from the U.S. Census Bureau (USCB) and the National Center for Education Statistics (NCES). We collected athletic trainer access data via the Athletic Training Location and Services (ATLAS) database.[23–25] No IRB approval was required for this study as all data was publicly available.

*Procedures*

The procedures for data collection for this project were modeled after the initial study by Barter et al. but expanded the database to all 50 states.[8] All data were collected between September 2022 and March 2023.

*U.S. Census Bureau (USCB)*

The USCB is an open access resource that can be used to investigate economic and demographic data that is solicited and collected during the census process.[26] Data gathered from the USCB included the Median Household Income (MHI) in dollars for each county the schools were located in from the last census in 2020. Previous literature shows strong correlations between Census-level data such as MHI and family income estimates, meaning MHI serves as a meaningful county metric to assess for the SES and economic stability of communities.[27]

*National Center for Education and Statistics (NCES)*

The NCES is housed in the U.S. department of education that is responsible for collecting and analyzing data for education in the U.S.[28] The NCES provides open access to the Common Core of Data (CCD), which is an annual survey schools are required to complete to remain in compliance with the Department of Education. Data we gathered from NCES included the school and county level data such as location, student population, student race/ethnicity demographics,

and the number of students eligible for free or reduced lunch. Race/ethnicity demographics were grouped as white and non-white which included American Indian/Alaska native, Asian or Asian Pacific Islander, Hispanic, Black, and two or more races. The two or more races category was excluded from analysis due to inability to determine if white was one of the identified races. Free and reduced lunch was collected as a variable of SES, with the higher population of students eligible for free and reduced lunch indicating lower levels of SES. Private schools were excluded because they are not required to submit public data. Elementary and middle schools (Grades K-8) were also excluded, as the focus was public secondary schools (Grades 9-12).

*Athletic Training Location and Services (ATLAS)*

The ATLAS project aims to collect information on athletic trainer access for secondary schools in the US, however, the reporting is voluntary.[19,23] From the ATLAS database we gathered school information on athletic training access. We used the ATLAS definitions of athletic training services which were divided into the following levels: full time athletic trainer (FT-AT, >30 hours/week, >5 days/week >10 months/year), part time athletic trainer only (PT-AT), and no athletic trainer (NO-AT). Part time athletic training services are defined as anything that is less than the defined full-time status. We also cross checked the names and addresses of the schools listed on ATLAS and compared them to the NCES data to verify accuracy.

*Statistical analysis*

Statistical analysis was replicated from the previous study.[8] Only schools with complete datasets were included in the analysis, schools with incomplete or missing data in the USCB, NCES, or ATLAS were excluded from analysis. We summarized school demographic data, SES, and race/ethnicity data using measures of central tendency (means, standard deviation, interquartile ranges). We calculated race/ethnicity data for each school as percent of student

population that is white and percent of student population that is non-white. Visual inspection of histograms and skewness was used to explore normality. School county MHI and race/ ethnicity demographics were not normally distributed; the percentage of students eligible for free and reduced lunch (%FRL) were normally distributed. A Kruskal-Wallis one-way ANOVA was used to determine differences in non-normally distributed data (MHI and percent of white students and percent of non-white students) based on athletic trainer access (FT-AT, PT-AT, or no-AT). A one-way ANOVA was used to determine differences in normally distributed data (percent of students on FRL) based on athletic trainer access (FT-AT, PT-AT, or no-AT). A Bonferroni pairwise comparison was used for post-hoc testing. Statistical significance was set as 2 sided, a priori at $P < .05$ and all analyses were performed using R statistical software (V.4.3.2, R Foundation for Statistical Computing, Vienna, Austria).

**Results:**

A total of 14,432 public schools were accessed within the NCES database, of which 10,983 schools had complete data across the various data sources and were included in the final analysis. The majority of schools had some form of athletic trainer access (56.2%, N=6,171). A total of 32.7% (N=3,590) had FT-AT access, while 23.5% (N=2,581) had access to PT-AT athletic training services, and 43.8% (N=4,812) had no-AT access. Descriptive statistics for the remaining demographic variables can be found in Table 1.

Differences in demographic variables based on AT access are presented in Table 2. There were statistically significant differences in athletic trainer access based on county MHI ($p \leq .001$). County MHI was the highest among schools with a FT-AT (Median [IQR]: $59,713 [$51,646-$71,358]) or schools with No-AT (Median [IQR]: $59,420 [$50,154-$71,358]). Schools with PT-AT access were located in counties with lower MHI (Median [IQR]: $57,376 [$48,418-

$68,037]) than the other two AT access categories. Schools with no AT access had significantly more students eligible for free/reduced lunch (Mean±SD: 48.2%±30.0%) compared to both PT-AT schools (Mean±SD: 44.7%±27.0%, p<0.001) and FT-AT schools (Mean±SD: 40.9%±26.0%, p<0.001).

There were also significant differences in the proportion of white (p<0.001) and non-white (p<0.001) students at schools based on AT access. In schools with No-AT, a greater proportion of the student body consisted of non-white students (Median [IQR]: 46.0% [14.3%-85.9%]) compared to PT-AT schools (Median [IQR]: 25.3% [7.6%-63.1%]) or FT-AT schools (Median [IQR]: 31.3% [12.6%-59.2%]). Conversely, the proportion of the student body consisting of white students was greater at FT-AT (Median [IQR]: 63.8% [36.1%-84.4%]) and PT-AT (Median [IQR]: 69.8% [32.1%-89.9%]) schools compared to No-AT schools (Median [IQR]: 47.8% [10.6%-81.5%]) .

## Discussion

Schools that had greater AT access had higher SES and lower percentage of non-white students demonstrating that similar healthcare equity challenges that exist in the general population also exist with athletic healthcare in the secondary school setting. Though previous research has identified the association of SES variables and AT access, this study was the first to explore the role of race/ethnicity as a variable for AT access of secondary schools.

Previous research exploring racial or socioeconomic disparities in athletic training access has never been conducted with a national sample,[8] which allows the results of this study to present a clear illustration of athletic training access across the country. We found that schools with no-AT access had a higher percentage of non-white students than the schools that had a

higher percentage of white students. Barter et al. introduced race/ethnicity as variables that may be associated with athletic trainer access in the secondary school setting and found that schools with higher percentages of racial/ethnic minority students, had more access to athletic training service.[8] The sampling strategy of this previous study was focused on stratifying schools by SES and not race or ethnicity data, which may have influenced this specific finding, in addition the study only including a sample of 15 states.[8] The sampling strategy stratifying states led to the inclusion of less diverse states at both the higher and lower SES levels and although SES has been linked to population based race and ethnicity broadly, a more representative and national dataset was needed. Whereby, our study included a national sample and found the opposite to Barter et al. regarding school race demographic and AT access, which aligns closer with other health care literature in that minority populations were less likely to have access to health care in the form of athletic training services.[29,30] There is a plethora of literature on the disparities that exist in health care access for racial minorities illuminating the disparate health outcomes in minoritized groups that are already under the strain of systemic racism in the US.[29,30] The findings from our study demonstrate that similar disparities in access to athletic health care exist necessitating further exploration into causation and interventions to address such disparities.

Past studies have observed the differences between SES variables and athletic trainer access in studies of individual states (California and Wisconsin), and in a study that included 15 states.[8–10] These previous studies laid the groundwork and revealed specific disparities, including the relationship between variables such as county MHI and percent of students eligible for free reduced lunch compared with athletic trainer access in secondary schools. Consistent findings in those studies showed that schools with lower SES have less access to athletic training services. [8–10] Our finding that schools with higher MHI had greater AT access was also consistent with

previous research.[8-10] In a study that investigated athletic director's perspectives and challenges regarding hiring athletic trainers, one of the barriers that was cited by almost all the participants was funding.[31] The connection between low SES and the lack of funding being a main barrier to AT access cannot be denied, therefore a variety of solutions outside of direct funding should be explored to address the lack of access.

Interestingly, the average county MHI for the no-AT schools ($59,420) is similar to that of the FT-AT schools ($59,713), indicating that the county SES variable alone may not account for the challenges in AT access. The SDOH are inextricably linked and although our study did not explore school location (rural, urban, or suburban) as a variable, the neighborhood and built environment of a community that the school is located in may also influence AT access. Additionally, there was a wide range of students eligible for free and reduced lunch for all AT access groups. This more comprehensive, nationally represented sample of schools demonstrates that no one single variable such as SES can determine whether or not a school will have AT access. Future research should continue to explore the interconnected nature of the SDOH and how location of schools influence AT access as well as additional factors influencing the placement of athletic trainers in these schools.

Athletic trainers are allied health care providers that are uniquely positioned to help bridge the gap in health care access and serve as an advocate for diverse patient populations in the broader healthcare system. Individuals in minoritized groups are more likely to be underinsured and may not have regular access to routine health care.[6,7] Further, the data from our study demonstrates that schools with greater racial/ethnic diversity and lower SES status have less access to athletic training services. However, the knowledge and skills of athletic trainers allows them to provide high quality care for a range of conditions for diverse patient populations.

The skillset and access athletic trainers poses create the perfect opportunity for athletic trainers to serve as a primary care provider in communities with limited care otherwise. Because athletic trainers are educated in illness and injury assessment, they are able to determine when patients may need to be seen by a physician and when their injury or condition can be managed outside of the mainstream healthcare system.[16] This in turn, can decrease the additional costs for otherwise unnecessary hospital visits.[13] Athletic trainers also possess the skills and knowledge to manage and educate their patients on chronic illnesses such as asthma which is known to be prevalent in people living in areas of lower SES.[3]

It is apparent that schools with higher percentage of non-white students and/or lower SES are likely to have no AT access. Interestingly, there were no differences in race and ethnicity data when comparing part-time and full-time AT access. This finding provides a tangible strategy to address the disparities in athletic training access, where the focus of interventions should be to fill the gap in schools with no AT access first. The schools may see substantial changes in emergency preparedness, injury prevention, and student athlete visits to the emergency department by having at-least PT-AT access.[13,14,32] Additionally, innovative strategies that rethink how athletic trainers are currently allocated should be explored. For instance, athletic trainers in the secondary school setting are traditionally designated at singular schools, yet resource sharing can occur between school corporations and districts, where athletic training positions can become more flexible. This would allow ATs to see student-athletes from different schools and could provide some level of access to under-resourced populations as opposed to having no access. There is also the opportunity to use an appointment scheduling system to assist in the creation of specified clinic hours for patient visits. Advancements in

technology also give athletic trainers the ability to engage in telemedicine encounters which can connect the patients to providers remotely.

Property taxes fund school districts in the community[33], therefore, schools with less funding driven by property taxes may have fewer resources to allocate to athletic training services. We found schools with no-AT were located in areas with lower SES and the highest percentage of students eligible for free and reduced lunch. One possible solution to explore would be lobbying for the state to grant tax credits or incentives to schools that employ athletic trainers.[34] Lobbying can pressure the state to include small taxes from insurance companies to supply funding for the care ATs can provide at the secondary school level. If possible, it would be best to secure multi-year funding agreements to solidify a continuous and sustainable athletic training/sports medicine program in these schools. One example of the successful implementation of this method was developed by Buxton et al. In which a needs assessment and a year-long injury surveillance survey was conducted to determine the differences between public and private schools. The results quantified and qualified the necessity for hiring athletic trainers, by demonstrating the normative incidence of injury rates in public schools compared to private.[35] The lobbying and media campaigns successfully convinced the State of Hawaii to fund a $1.2 million, 2-year contract for the pilot program. This eventually led to Hawaii being the only state to have athletic trainers in all public secondary schools.

Initiatives to increase athletic training access have been conducted in the past and have largely been backed by non-profit organizations, the NATA, and hospitals. One such initiative is TeamHEAL, A program backed by Cedars Sinai hospital in Los Angeles, California.[36] This program partners with Los Angeles Unified School District to provide full time athletic trainers and sports medicine services to several schools in underserved communities. Through this

program, student athletes are provided with athletic training services, preventative care, and access to specialists within the supporting hospital.[36] The NFL Foundation launched its grant program in 2016 to increase access to athletic training services by providing $35,000 over a three year period to the selected schools.[37] Additionally, fifteen schools were awarded $50,000 grants as a part of the Athletic Trainer Initiative, a joint project of the NATA, NFL, Professional Football Athletic Trainers Society (PFATS), and Gatorade.[38] The schools that were gifted these grants were able to use the funding as they pleased and several planned to allocate it towards hiring a full-time athletic trainer, partner with a nearby clinic or hospital outreach program, or provide athletic training coverage for practices and events. These grants provided the awarded schools with the means to begin their athletic training programs, but long-term solutions should continue to be sought out.

**Limitations**

While the sampling limitation from previous studies was addressed in this study, there were limitations in this research as well. First, we only included schools with complete datasets, which required schools to have complete reporting in both the NCES and ATLAS. Reporting to ATLAS is voluntary, there may be schools with unreported athletic training services which limits the total number of schools that can be included in the study. Another limitation is that the sample was limited to public schools and excluded all private schools, as private schools are not required to report information into NCES regarding free and reduced lunch, and race and ethnicity demographics. Finally, the analysis in this project excluded two or more races due to the inability of the researchers to determine if "white" was an indicated race in "two or more". The manner of data reporting in the NCES does not allow the dataset to parse out which two races were included in each.

## Conclusion

The findings of this study were consistent with those investigating health disparities throughout the US population. Schools in communities categorized as higher SES, were found to have more access to athletic training services than schools in communities with lower SES. Schools with a higher percentage of non-white students had less athletic trainer access when compared to schools with higher percentage of white students. Our findings along with the findings of previous studies can be used to inform future initiatives for athletic training and other professional organizations to close the gap in disparities in athletic training access. With consistent evidence demonstrating the disparities in athletic trainer access in the secondary school setting, future research should move away from continuing to investigate or characterize the issue and move to action. Future research should investigate strategies and approaches to truly addressing the disparities in athletic training access in the secondary school setting.

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**Table 1. Demographic Data All Schools**

| Variable | Mean ± SD or Median [IQR] |
|---|---|
| County MHI ($) | 59,000 [50,267-71,020] |
| School enrollment (n) | 736 [353-1480] |
| Students eligible for FRL | 268 [100-579] |
| %FRL | 45.0±28.2 |
| %Non-White | 35.2 [11.4-73.8] |
| %White | 59.5 [21.7-85.2] |

FRL=free and reduced lunch; %FRL = percent of student population eligible for free and reduced lunch; %Non-White= percent of student population that is non-white; %White= percent of student population that is white;

**Table 2. Differences in Demographic Variables Based on School AT Access. Results Presented as Medians [IQR] or Mean ± SD.**

| | No-AT (N=4812) | PT-AT (N=2581) | FT-AT (N=3590) | H (Kruskal-Wallis) or F (ANOVA) value | P |
|---|---|---|---|---|---|
| Median household income ($) | 59,420 [50,154-71,358] [a,c] | 57,376 [48,418-68,037] [a,b] | 59,713 [51,646-71,358] [b,c] | 58.5 | <0.001 |
| Percent (%) of students eligible for free and reduced lunch | 48.2±30.0[a,c] | 44.7±27.0 [a,b] | 40.9±26.0[b,c] | 69.9 | <0.001 |
| Percent (%) of student body white | 47.8 [10.6-81.5] [c] | 69.8 [32.1-89.9] | 63.8 [36.1-84.4] [c] | 304.3 | <0.001 |
| Percent (%) of student body non-white | 46.0 [14.3-85.9] [a,c] | 25.3 [7.6-63.1][a] | 31.3 [12.6-59.2][c] | 267.3 | <0.001 |

Post-hoc: NoAT > PT-AT > FT-AT
[a] significant differences between no-AT and PT-AT
[b] significant differences between PT-AT and FT-AT
[c] significant differences between no-AT and FT-AT