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

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Context: Authors of extensive research have exposed health care disparities regarding socioeconomic status (SES) and race and ethnicity demographics. Previous researchers have shown significant differences in access to athletic training services (athletic trainer [AT] access) in the secondary school setting based on SES, but with limited samples.

Objective: To investigate differences in AT access based on race and 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, Athletic Training Location and Services database, and US Census Bureau.

Patients or Other Participants: A total of 10 983 public schools.

Main Outcome Measure(s): Descriptive data were summarized by measures of central tendency. A 1-way analysis of variance determined differences between school characteristics (median household income, percentage of students eligible for free and reduced lunch, percentage of White students, and percentage of non-White students) based on AT access: full-time (FT-AT), part-time (PT-AT), and no AT (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 = 4812), 23.5% had PT-AT access (n = 2581), and 32.7% had FT-AT access (n = 3590). Significant effects were found between AT access and median household income ($P < .001$), the percentage of students eligible for free and reduced lunch ($P < .001$), the percentage of White students ($P < .001$), and the percentage of non-White students ($P < .001$). Schools with FT-AT access had a higher SES than PT-AT and no-AT schools. Significant differences existed between AT access groups and the race and ethnicity of schools. Schools with FT-AT access had a significantly lower percentage of non-White students (31.3%) than schools with no-AT (46.0%; $P < .001$). No significant differences between FT-AT and PT-AT access based on race and ethnicity demographics presented ($P \geq .13$).

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 health care extends to athletic health care as well. To increase AT access, future initiatives should address the inequities where larger minority populations and counties of lower SES exist.

Key Words: athletic training services, athletic health care, population disparities

Key Points

- Statistically significant differences in athletic trainer access have been found based on socioeconomic status and race and ethnicity.
- Schools with larger ethnic and racial minority populations are less likely to have athletic trainer access.
- Schools with higher socioeconomic status are more likely to have athletic trainer access.

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 (SES) and race.[3,4] Social determinants of health (SDOHs) 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 5 determinants are education access and quality, health care accesses and quality, neighborhood and built environments, social and community context, and economic stability. Though all SDOHs are interconnected, economic stability and social or community

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context are innately intertwined to the others, where the SES of an individual or community greatly impacts economic stability and thus the other SDOHs. Economic stability and community context have been repeatedly linked to higher rates of illness and less access to health care.[3] Racial and ethnic minorities tend to receive a lower quality of care than nonminorities, and patients of minority ethnicity experience greater morbidity and mortality from various chronic diseases than nonminorities.[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 and ethnic minority groups have lower rates of health service use than Whites.[6,7] These health care disparities are not only present in access to general health care, but similar disparities have been found in access to athletic trainer (AT) services.[8–10]

Previous researchers have shown that access to ATs 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, ATs are uniquely positioned to improve access to additional health care 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 patients' trust in providers and the ability of providers to help patients navigate the health care system.[15] The nature of athletic training in the secondary school setting requires ATs to institute relationship-centered care to increase access for patients in the schools they serve. By establishing trustworthy relationships and helping patients navigate the health care system better, ATs in secondary school can also help patients and families access necessary health care services in a timelier manner to improve health outcomes. However, the access to ATs in the secondary school setting needs to be explored to reduce equity gaps.

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

The literature base is growing regarding the access of ATs 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 AT services in the secondary school setting.[19] While most of this growing body of literature focuses on the SES and economic stability of the communities being investigated, economic stability is only 1 SDOH that can influence access to AT services. Further, each of the SDOHs are highly interconnected and multifaceted, such that simply examining 1 factor on AT access may not present the whole picture.[8,22] With ATs being uniquely positioned to provide health care services to diverse populations, a more in-depth investigation into other associated factors with AT access needs to be made. Though investigations into AT access and SES exist, studies in which authors have explored the intersection of AT access and race and ethnicity on a national scale are limited.

The primary purpose of this study is investigating AT access in secondary schools across the United States based on race and ethnicity demographics and SES. Previous researchers have shown that schools in communities with higher SES have more AT access. With the interconnectedness between economic stability and the other SDOHs, we hypothesize that similar trends that exist in the broader health care landscape will exist within AT access, where communities with lower SES and a 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 with secondary analysis from different databases to explore school-level data. To answer the research questions, we used data from the US Census Bureau (USCB) and the National Center for Education Statistics (NCES). We collected athletic trainer access data via the ATLAS database.[23–25] No institutional review board approval was required for this study, as all data were 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.

US Census Bureau (USCB)

The USCB is an open-access resource that can be used to investigate economic and demographic data that are 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 in from the last census in 2020. Authors of previous literature have shown 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 US Department of Education, which is responsible for collecting and analyzing data for education in the United States.[28] The NCES provides open access to the Common Core of Data, which is an annual survey schools are required to complete to remain in compliance with the Department of Education. Data we gathered from the NCES included the school- and county-level data such as location, student population, student race and ethnicity demographics, and the number of students eligible for free or reduced

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Table 1. Demographic Data of All Schools

Variable	Mean ± SD or Median [IQR]
County MHI, $	59 000 [50 267–71 020]
School enrollment, n	736 [353–148]
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]

Abbreviations: FRL, free and reduced lunch; IQR, interquartile range; MHI, median household income; %FRL, percentage of student population eligible for FRL; %Non-White, percentage of student population that is non-White; %White, percentage of student population that is White.

lunch. Race and ethnicity demographics were grouped as White and non-White, which included American Indian or Alaska native, Asian or Asian Pacific Islander, Hispanic, Black, and 2 or more races. The 2 or more races category was excluded from analysis due to an inability to determine if White was 1 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 Locations and Services (ATLAS) Project

The ATLAS Project aims to collect information on AT access for secondary schools in the United States; however, the reporting is voluntary.[19,23] From the ATLAS database, we gathered school information on AT access. We used the ATLAS definitions of AT services, which were divided into the following levels: full-time AT (FT-AT; >30 h/wk, >5 d/wk > 10 mo/y), part-time AT only (PT-AT), and no AT (no-AT). Part-time AT 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 the ATLAS database and compared them with 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 Project were excluded from analysis. We summarized school demographic data, SES, and race and ethnicity data using measures of central tendency (means ± standard deviation, interquartile ranges). We calculated race and ethnicity data for each school as the percentage of student population that is White and percent of student population that is non-White. Visual inspection of histograms and skewness were used to explore normality. School county MHI and race and ethnicity demographics were not normally distributed; the percentage of students eligible for free and reduced lunch (%FRL) were normally distributed. A Kruskal-Wallis 1-way analysis of variance was used to determine differences in nonnormally distributed data (MHI, percentage of White students, and percentage of non-White students) based on AT access (FT-AT, PT-AT, or no-AT). A 1-way analysis of variance was used to determine differences in normally distributed data (%FRL) based on AT 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 (Version.4.3.2; R Foundation for Statistical Computing).

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. Most schools had some form of AT access (56.2%, N = 6171). A proportion of 32.7% (N = 3590) had FT-AT access, while 23.5% (N = 2581) had access to PT-AT services, and 43.8% (N = 4812) 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. Statistically significant differences in AT access existed 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 2 AT access categories. Schools with no-AT access had significantly more students eligible for free and reduced lunch (mean ± SD = 48.2% ± 30.0%) than both PT-AT schools (mean ± SD = 44.7% ± 27.0%, $P < .001$) and FT-AT schools (mean ± SD = 40.9% ± 26.0%, $P < .001$).

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

	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][b,d]	57 376 [48 418–68 037][b,c]	59 713 [51 646–71 358][c,d]	58.5	<.001
Students eligible for free and reduced lunch, %	48.2 ± 30.0[b,d]	44.7 ± 27.0[b,c]	40.9 ± 26.0[c,d]	69.9	<.001
Student body White, %	47.8 (10.6–81.5)[d]	69.8 (32.1–89.9)	63.8 (36.1–84.4)[d]	304.3	<.001
Student body non-White, %	46.0 (14.3–85.9)[b,d]	25.3 (7.6–63.1)[b]	31.3 (12.6–59.2)[d]	267.3	<.001

Abbreviations: ANOVA, analysis of variance; FT-AT, full-time AT; IQR, interquartile range; PT-AT, part-time AT.
[a] Post hoc: No-AT > PT-AT > FT-AT. Results presented as medians (IQR) or mean ± SD.
[b] Significant differences between no-AT and PT-AT access.
[c] Significant differences between PT-AT and FT-AT access.
[d] Significant differences between no-AT and FT-AT access.

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Significant differences were also found in the proportion of White ($P < .001$) and non-White ($P < .001$) 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%]) than 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 than no-AT schools (median [IQR] = 47.8% [10.6%–81.5%]).

DISCUSSION

Schools that had greater AT access had higher SES and a lower percentage of non-White students, demonstrating that similar health care equity challenges that exist in the general population also exist with athletic health care in the secondary school setting. Though previous researchers have identified the association of SES variables and AT access, in this study, we were the first to explore the role of race and ethnicity as a variable for AT access of secondary schools.

Previous research exploring racial or socioeconomic disparities in AT access has never been conducted with a national sample, which allows the results of this study to present a clear illustration of AT access across the country.[8] 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 and ethnicity as variables that may be associated with AT access in the secondary school setting and found that schools with higher percentages of racial and ethnic minority students had more access to AT services.[8] The sampling strategy of the authors of the 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 authors of the study only included a sample of 15 states.[8] The sampling strategy of 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. In our study, we 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 AT services.[29,30] A plethora of literature exists 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 United States.[29,30] The findings from our study demonstrate that similar disparities in access to AT care exist, necessitating further exploration into causation and interventions to address such disparities.

Authors have observed the differences between SES variables and AT access in studies of individual states (California and Wisconsin) and in a study that included 15 states.[8–10] The authors of these previous studies laid the groundwork and revealed specific disparities, including the relationship between variables such as county MHI and %FRL compared with AT access in secondary schools. Consistent findings in those studies showed that schools with lower SES have less access to AT 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 in which authors investigated athletic directors' perspectives and challenges regarding hiring ATs, 1 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 like 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 SDOHs are inextricably linked, and although, in our study, we did not explore school location (rural, urban, or suburban) as a variable, the neighborhood and built environment of a community that the school is in may also influence AT access. Additionally, a wide range of students eligible for free and reduced lunch exists for all AT access groups. This more comprehensive, nationally represented sample of schools demonstrates that no single variable such as SES can determine whether a school will have AT access. Future researchers should continue to explore the interconnected nature of the SDOHs and how the location of schools influence AT access as well as additional factors influencing the placement of ATs 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 advocates for diverse patient populations in the broader health care 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 demonstrate that schools with greater racial and ethnic diversity and lower SES status have less access to AT services. However, the knowledge and skills of ATs allow them to provide high-quality care for a range of conditions for diverse patient populations. The skillset and access ATs possess create the perfect opportunity for ATs to serve as a primary care provider in communities with limited care otherwise. Because ATs are educated in illness and injury assessment, they can determine when patients may need to be seen by a physician and when their injuries or conditions can be managed outside of the mainstream health care 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 a higher percentage of non-White students, lower SES, or both are likely to have no-AT access. Interestingly, no differences in race and ethnicity data were found when comparing PT-AT and FT-AT access. This finding provides a tangible strategy to address the disparities in AT access, where the focus of interventions should be to fill the gap in schools with no-AT access first. 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 ATs are currently allocated should be explored. For instance, ATs in the secondary school setting are traditionally designated at singular

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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 underresourced populations as opposed to having no access. The opportunity also exists to use an appointment scheduling system to assist in the creation of specified clinic hours for patient visits. Advancements in technology also give ATs the ability to engage in telemedicine encounters, which can connect patients to providers remotely.

Property taxes fund school districts in the community; therefore, schools with less funding driven by property taxes may have fewer resources to allocate to AT services.[33] We found schools with no-AT access were located in areas with lower SES and had the highest %FRL. One possible solution to explore would be lobbying for the state to grant tax credits or incentives to schools that employ ATs.[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 multiyear funding agreements to solidify a continuous and sustainable athletic training or 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 ATs, by demonstrating the normative incidence of injury rates in public schools compared with private schools.[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 ATs in all public secondary schools.

Initiatives to increase AT access have been conducted in the past and have largely been backed by nonprofit organizations, the National Athletic Trainers' Association, and hospitals. One such initiative is TeamHEAL, a program backed by the Cedars-Sinai Medical Center in Los Angeles, CA.[36] This program partners with the Los Angeles Unified School District to provide full-time ATs and sports medicine services to several schools in underserved communities. Through this program, student-athletes are provided with AT services, preventative care, and access to specialists within the supporting hospital.[36] The National Football League Foundation launched its grant program in 2016 to increase access to AT services by providing $35 000 over a 3-year period to the selected schools.[37] Additionally, 15 schools were awarded $50 000 grants as a part of the Athletic Trainer Initiative, a joint project of the National Athletic Trainers' Association, National Football League, Professional Football Athletic Trainers Society, 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 toward hiring a FT-AT, partner with a nearby clinic or hospital outreach program, or provide AT coverage for practices and events. These grants provided the awarded schools with the means to begin their AT programs, but long-term solutions should continue to be sought out.

LIMITATIONS

While the sampling limitation from previous studies was addressed in this study, limitations existed 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 the ATLAS Project is voluntary; schools with unreported AT services may exist, 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 the NCES regarding free and reduced lunch and race and ethnicity demographics. Finally, the analysis in this project excluded 2 or more races due to the inability of the researchers to determine if "White" was an indicated race in "2 or more races." The manner of data reporting in the NCES does not allow the dataset to parse out which 2 races were included in each.

CONCLUSIONS

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 AT services than schools in communities with lower SES. Schools with a higher percentage of non-White students had less AT access than schools with a 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 AT access. With consistent evidence demonstrating the disparities in AT access in the secondary school setting, future researchers should move away from continuing to investigate or characterize the issue and move to action. Future researchers should investigate strategies and approaches to truly addressing the disparities in AT access in the secondary school setting.

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