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Differences in Access to Athletic Trainers in Public Secondary Schools Based on Socioeconomic Status

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Context: Significant health care disparities exist in the United States based on socioeconomic status (SES), but the role SES has in secondary school athletes' access to athletic training services has not been examined on a national scale.

Objective: To identify differences in access to athletic training services in public secondary schools based on school SES.

Design: Cross-sectional study.

Setting: Database secondary analysis.

Patients or Other Participants: Data for 3482 public high schools.

Main Outcome Measure(s): Data were gathered from the Athletic Training Locations and Services (ATLAS) database, US Census Bureau, and National Center for Education Statistics. We included schools from 5 states with the highest, middle, and lowest poverty percentages (15 states total) and collected county median household income, percentage of students eligible for free or reduced-price lunch, race and ethnicity demographics, and access to athletic training services (full-time athletic trainer [AT], part-time AT only, no AT) for each school. Data were summarized in means, SDs, medians, interquartile ranges (IQRs), frequencies and proportions, 1-way analyses of variance, and Kruskal-Wallis tests.

Results: Differences were present in school SES between schools with full-time, part-time-only, and no athletic training services. Schools with greater access to athletic training services had fewer students eligible for free or reduced-price lunch (full time: 41.1% ± 22.3%, part time only: 45.8% ± 24.3%, no AT: 52.9% ± 24.9; $P < .001$). Similarly, county median household income was higher in schools with increased access to athletic training services (full time median [IQR]: $56 026 [$49 085–$64 557], part time only: $52 719 [$45 355–$62 105], and no AT: $49 584 [$41 094–$57 688]; $P < .001$).

Conclusions: Disparities in SES were seen in access to athletic training services among a national sample of public secondary schools. Access to ATs positively influences student-athletes' health care across several measures. Pilot programs or government funds have been used previously to fund athletic training services and should be considered to ensure equitable access, regardless of school SES.

Key Words: health care access, social determinants of health, athletic health care

Key Points

- Socioeconomic disparities were present in access to athletic training services in public secondary schools across the United States.
- Individual clinicians should start by understanding the community they provide care for and learn about the social factors that may affect the health of patients.
- Actionable steps, including research, lobbying efforts, media campaigns, and stakeholder education, should be taken by individual athletic trainers and by athletic training professional organizations to improve access to equitable health care.

Health care is internationally identified as a human right by the World Health Organization, yet health care disparities still exist in the United States.[1–3] *Social determinants of health* 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 a large influence on health-related quality of life.[2] Two major social determinants are socioeconomic status (SES) and race or ethnicity.[2] Of the 10 leading causes of death in the United States, clear disparities have been demonstrated based on SES and race or ethnicity.[2] Individuals of lower SES have a higher rate of being uninsured or underinsured and show a higher prevalence of serious health conditions, including diabetes, AIDS and HIV, cancer, and hypertension, indicating they may miss out on preventive care, diagnostic testing for cardiovascular disease and diabetes, and interventions that insured people are more likely to receive.[2,4,5] People of color, specifically Black, Hispanic, and American Indian or Alaskan Native individuals, are more likely to be uninsured or publicly insured than the non-Hispanic White population.[2,5,6] Although insurance increases the likelihood of receiving health care, those who are underinsured still struggle to cover out-of-pocket costs or deductibles that are more expensive relative to their income.[7] Socioeconomic status and race or ethnicity health care inequities are problems

within the US health care system and therefore may also exist in the provision of athletic training services.

Athletic trainers (ATs) are allied health care professionals who work in a variety of settings, including secondary schools.[8] Previous researchers[9–13] have found that access to an AT in the secondary school setting positively influenced the reported incidence of sport-related concussions and postconcussion management activities, reduced emergency room visits and cardiac-related deaths, provided preventive medicine services, and increased patient access to care. One reason for this is that high school ATs are often not reimbursed through a third party, which makes care accessible to a wider variety of SES groups.[13] Furthermore, at the local practice level, ATs can implement several steps to supply better patient-centered care to these underserved populations, which can increase access to care. However, not all schools provide athletic training services and even fewer schools offer them full time.[14,15] Earlier investigators[16–18] looked at differences in access to athletic training services based on school and community SES in Wisconsin, Washington, and California. All noted that lower-SES schools were less likely to employ an AT than those with higher SES in each state.[16–18] The authors gave insight into individual states but did not review race or ethnicity demographics. However, no researchers have examined whether SES-based differences in access to secondary school ATs exist more broadly across the United States or whether differences to access are based on school race or ethnicity demographics.

An understanding of how SES affects access to athletic training services from a more representative national sample can promote future action to increase access among underserved populations at the individual and systematic levels. Therefore, the primary purpose of our study was to identify differences in access to athletic training services in public secondary schools based on school SES. Secondarily, we assessed differences in access to athletic training services based on race or ethnicity. We hypothesized that schools in low-SES communities would have less access to athletic training services. We also hypothesized that schools with more people who identified as groups other than White would have less access to athletic training services.

METHODS

Design

We conducted a cross-sectional database study using secondary analysis. Information was gathered from the Athletic Training Locations and Services (ATLAS) database, the US Census Bureau, and the National Center for Education Statistics (NCES) in the spring of 2020.[19–21]

Procedures

Institutional review board approval for this study was not required because all data analyzed were publicly available at the school level. The ATLAS is a publicly available database that lists all high schools with school-sanctioned interscholastic athletic programs; we used it to identify public institution school names, addresses, and level of athletic training services.[11,22] We labeled the level of services as full-time AT, part-time AT only, or no AT. In ATLAS, *full-time ATs* were defined as those at schools that received services for $\geq$30 hours per week, $\geq$5 days per week, and $\geq$10 months, whereas *part-time athletic training services* were defined as anything less than full time. In our study, a school was classified as having a full-time AT when $\geq$1 full-time AT was employed, whereas a school was classified as having a part-time AT when only 1 part-time AT was employed. The NCES provided the school's county, the number of students eligible for free or reduced-price lunch, and the race and ethnicity demographics at each school for the 2017–2018 school year. The name and address for each school were cross-matched between ATLAS and NCES to ensure that correct data were collected. The NCES used the following categories to describe the race and ethnicity demographics: American Indian/Alaskan Native, Asian or Asian/Pacific Islander, Hispanic, Black, White, Hawaiian Native/Pacific Islander, or 2 or more races. School SES was determined using 2 variables: (1) the percentage of students eligible for free or reduced-price lunch at the school and (2) the median household income (MHI) for the county in which the school was located. The National School Lunch Program is a federal program that provides free or reduced-price lunches to students based on family income. A larger proportion of students eligible for free or reduced-price lunch indicates a lower school SES, whereas a larger county MHI indicates a higher school SES. The US Census Bureau provided the county MHI in 2018 dollars for each county per school, with data taken from 2014 to 2018 in the American Community Survey.

The criteria to determine the included states were selected and reviewed by the research team. This work expands on the previous investigations that examined only a single state and gives a more representative sample of the United States. We used the percentage of the population living in poverty in 2017 and 2018 according to the US Census Bureau to determine the top 5, middle 5, and bottom 5 states included. If the percentages were tied during 2017 and 2018, we used a 3-year average instead of a 2-year average to determine which state would be included. These 15 states were included in data collection to provide a nationally representative sample of states that spanned a variety of poverty levels. The inclusion criteria required that the statistics for the categories listed in the previous paragraph be provided and available in the NCES, US Census Bureau, and ATLAS databases for each US state. Private high schools were excluded because these schools are not required to report either the percentage of students eligible for free or reduced-price lunch or their race and ethnicity demographics to the NCES. The included states and stratification can be found in Table 1.

Statistical Analysis

Data were summarized using means, SDs, medians, interquartile ranges (IQRs), frequencies, and proportions. Assumptions of normality were determined via visual inspection of histograms and the calculation of skewness or kurtosis values for all continuous variables in both the overall sample and separately based on school athletic training services (full-time AT, part-time AT, or no AT). We examined SES status and race and ethnicity statistics

Table 1. Grouping of States Based on the Percentage of People in Poverty in Each State[a]

State by Group	People in Poverty From 2017–2018, %
High	
Louisiana	19.8
Mississippi	19.0
New Mexico	18.2
West Virginia	16.5
Alabama	15.6
Middle	
Indiana	11.6
Idaho	11.5
Pennsylvania	11.4
Wyoming	11.2
North Dakota	11.1
Low	
Iowa	8.2
Minnesota	8.1
Utah	7.8
Maryland	7.8
New Hampshire	6.6

[a] Source: US Census Bureau, Current Population Survey, 2016–2019 Annual Social and Economic Supplements.

Table 2. Public Secondary Schools Included From Each State

State	Total Sample, % (n)
High poverty	
Louisiana	8.6 (298)
Mississippi	6.7 (233)
New Mexico	3.6 (124)
West Virginia	3.3 (115)
Alabama	10.3 (360)
High poverty total	32.5 (1130)
Middle poverty	
Indiana	10.3 (359)
Idaho	4.4 (154)
Pennsylvania	15.6 (542)
Wyoming	2.0 (70)
North Dakota	4.0 (142)
Middle poverty total	36.3 (1267)
Low poverty	
Iowa	9.2 (320)
Minnesota	10.9 (379)
Utah	3.6 (125)
Maryland	5.2 (181)
New Hampshire	2.3 (80)
Low poverty total	31.2 (1085)
Total	100 (3482)

independently. The percentage of students eligible for free or reduced-priced lunch was normally distributed, whereas school county MHI and race and ethnicity demographics were not normally distributed. A 1-way analysis of variance was used to determine differences in the percentage of students eligible for free or reduced-price lunch based on school AT availability. Kruskal-Wallis 1-way analyses of variance by ranks were calculated to identify differences in county MHI or school race and ethnicity demographics based on school AT availability. Statistical significance was set as 2 sided, a priori at $P < .05$. All analyses were performed using R statistical software (version 4.03; R Foundation for Statistical Computing).

RESULTS

A total of 3482 public secondary schools from 15 states were included in the data analysis. A summary of the number of schools included in each state is provided in Table 2. Most schools (73.1%, n = 2546) had access to an AT (full-time AT: 38.7%, n = 1347, part-time AT only: 34.4%, n = 1199), with approximately one-fourth having no AT (26.9%, n = 936).

The county MHI differed based on access to athletic training services, with increased county MHI in schools with greater access (full-time AT, median [IQR]: $56 026 [$49 085–$64 557], part-time AT only: $52 719 [$45 355–$62 105], no AT: $49 584 [$41 094–$57 688]; $P < .001$; Figure 1). Similarly, the proportion of students eligible for free or reduced-price lunch differed based on AT access, with fewer students eligible at schools with greater access (full-time AT: 41.1% ± 22.3%, part-time AT only: 45.8% ± 24.3%, no AT: 52.9% ± 24.9%; $P < .001$; Figure 2).

A summary of the differences in school race or ethnicity demographics based on AT access is offered in Table 3. Overall, the percentage of students classified as White was smallest at schools with more AT access (full-time AT, median [IQR]: 80.7% [55.4%–91.1%], part-time AT only: 83.8% [53.8%–93.3%], no AT: = 84.1% [47.3%–93.4%]; $P = .02$). The percentages of students classified as American Indian/Alaskan Native ($P = .01$), Asian/Pacific Islander ($P < .001$), Hispanic ($P < .001$), Black ($P < .001$), Hawaiian Native/Pacific Islander ($P < .001$), or 2 or more races ($P < .001$) were all the largest at schools with more AT access.

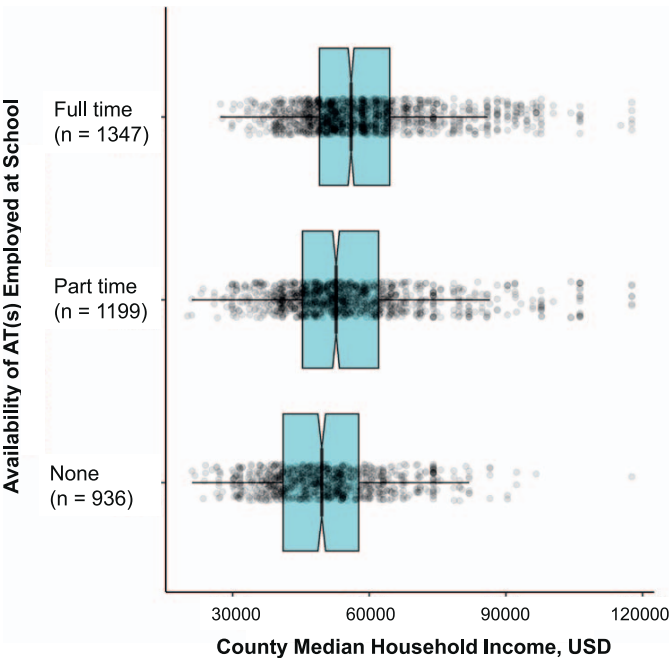

Figure 1. Comparison of school county median household income by school athletic trainer (AT) employment status. Each circle represents data from an individual school, with outliers presented as solid black circles. Presented as a notched box plot, with the box representing the interquartile range (IQR), line indicating the median, notch displaying the 95% CI of the median, whiskers representing the range within 1.5 × IQR of the upper or lower quartile, and individual data points for each school.

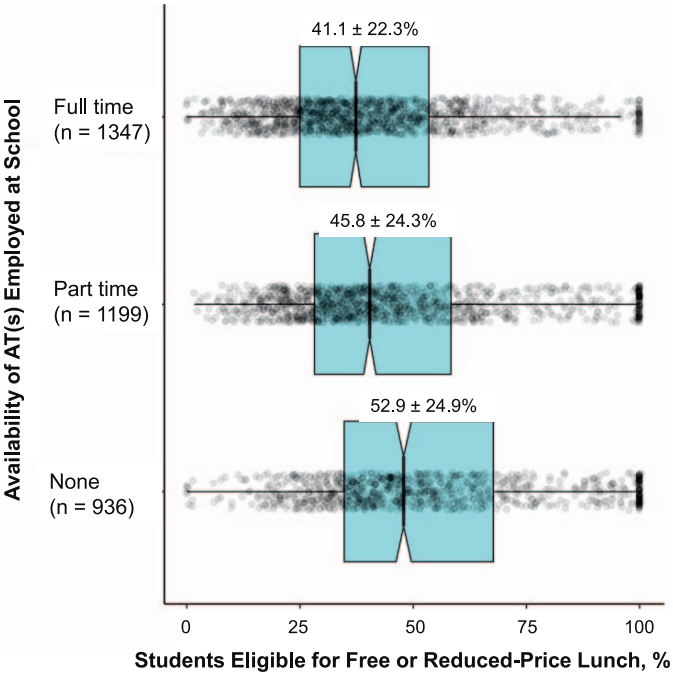

Figure 2. Comparison of proportion of students eligible for free or reduced-priced lunch based on athletic training services in secondary school settings. Each circle represents data from an individual school. Presented as a notched box plot, with the box representing the interquartile range (IQR), line indicating the median, notch displaying the 95% CI of the median, whiskers representing the range within 1.5 × IQR of the upper or lower quartile, and individual data points for each school. The mean and SD are presented above each box.

DISCUSSION

Previous authors have evaluated differences in access to athletic training services based on school SES within specific states. We are the first to review differences between school SES and access to athletic training services in a national sample of states of various SES statuses across the United States. These findings are in agreement with earlier observations[16–18] of disparities in Wisconsin, Washington, and California. Our consistent results suggest that school SES was directly related to access to AT services in the public secondary school setting. Thus, students in lower-SES communities were likely to have less access to the vital medical treatments that ATs provide.

We found that schools with higher county MHI had greater access to athletic training services. In Wisconsin, similar results were reported using a survey method to determine AT accessibility and MHI[16]: schools with higher county MHI had more hours of athletic training services per week than schools with lower county MHI.[16] Similarly, we also noted that schools with a larger percentage of students eligible for free or reduced-price lunch had less access to athletic training services. This was the same trend that was seen in Wisconsin, Washington, and California.[16–18] Counties with lower MHI have less property tax revenue, which is the primary funding source for local governments and school districts.[23] Without that revenue, school budgets in these communities are more restricted. School budget is often listed as the most common barrier for many schools hiring ATs,[14,18,24,25] which could explain why this inequity exists. Schools can receive athletic training services at reduced or no cost as part of an outreach program from health care systems. However, a health care system in a low-income county may be less likely to provide those services free or at a reduced cost.

We identified differences in race or ethnic diversity based on access to athletic training services, in that populations who identified as White had less access to athletic training services. However, this finding did not agree with the documented race and ethnicity inequities regarding access to quality care in the US health care systems.[2,26] Latino children were less likely to have a usual source of care and to receive preventive care and were more likely to obtain delayed care than their White counterparts[6]; in addition, emergency room visits were greater among American Indian and Alaskan Native children and Black children than their White counterparts.[2] Our findings challenge many assumptions, including our own, that lower-SES populations would have more people who identify as groups other than White. For example, West Virginia was included as 1 of the 5 highest-poverty states, and 93% of the population identified as White.[20] The primary purpose of our investigation was to examine access to athletic training services in a larger sample of states with various levels of SES. Therefore, our inclusion criteria for states consisted of poverty statistics and not race or ethnicity demographics, which may have influenced the results of the secondary analysis on race and ethnicity. Thus, the race and ethnicity demographics in this sample are not representative of the demographics of the United States, because the data from the states we included in this study demonstrated a predominance of White students, regardless of athletic training access. Associations between race or ethnicity and SES status do exist but depend on a variety of intersecting factors, including geography. This study should be replicated by evaluating states with a more diverse sample to better examine potential differences in access to athletic training services based on race or ethnicity and to build on our results.

Table 3. Percentage of the Combined School Race and Ethnicity Demographics Based on School Athletic Training Services[a]

	Athletic Trainer Status, Median Interquartile Range			
Race or Ethnicity	None	Part Time	Full Time	*P* Value[a]
American Indian/Alaskan Native	0.2 [0–1]	0.2 [0–0.5]	0.2 [0–0.4]	.01
Asian/Pacific Islander	0.3 [0-0.9]	0.5 [0–1.4]	1 [0.4–2.5]	<.001
Hispanic	3.3 [1.1–8.9]	3.2 [1.4–7.6]	4.6 [2–10.3]	<.001
Black	1.1 [0.2–9.1]	2.2 [0.7–21.9]	3.7 [1.1–18.7]	<.001
Hawaiian Native/Pacific Islander	0 [0–0]	0 [0–0.1]	0 [0–0.1]	<.001
White	84.1 [47.3–93.4]	83.8 [53.8–93.3]	80.7 [55.4–91.1]	.02
Two or more races	1.1 [0.2–2.4]	1.5 [0.6–2.9]	2 [1.0–3.6]	<.001

[a] From Kruskal-Wallis 1-way analyses of variance.

At an individual level, ATs can take several actionable steps to provide better patient-centered care to their patient populations. These steps can help improve the quality of patient care and further demonstrate the value ATs bring to underserved communities with the hope of improving access. Athletic trainers can start by understanding and learning about the social factors that may affect health.[27] Learning about health statistics, community health programs, legislation, and environmental, geographic, cultural, occupational, educational, and nutritional factors may help ATs better understand their communities.[27,28] Social factors can also be screened in questionnaires that assess social determinants of health.[28] Another step is for ATs to identify their own implicit biases in clinical practice, starting by taking the Harvard Implicit Association Test.[29] Addressing bias can aid ATs in avoiding the categorization of patients based on appearance, culture, or any other identities or social groups.[27] Clinicians should also consider the health literacy and language barriers of their patient populations when creating and distributing patient education tools.[27] Advocating for health in policymaking is another way to be a part of the change in addressing health inequity.[28] These small changes by ATs can enable them to provide better patient-centered care and can translate to create systems-level change. Athletic trainers should empower their colleagues to create an inclusive environment for patient-centered care.

The first step in addressing inequality in the health care system is to recognize the medical need and risk of athletic participation in the high school setting as well as the benefits of ATs. Making decisions on the distribution of athletic training services based on factors other than medical need and risk raises ethical questions about distributive justice.[30] After the medical need is studied, a cost-benefit analysis would demonstrate the economic benefit of athletic training services.[31] One group[10] found that ATs reduced the number of emergency visits; other authors[32] determined that emergency visits cost an average of $2032. Two-thirds of hospital emergency visits annually are avoidable, which has the potential to save $32 billion per year.[32] Athletic trainers can be a part of this solution. Secondary schools with sports should consider the risk and make the best decisions for the health and safety of their student-athletes. Previous investigators showed that access to an AT in the secondary school setting positively influenced the reported incidence of sport-related concussions and postconcussion management activities,[9] reduced the number of emergency room visits[10] and cardiac-related deaths,[11] provided preventive medicine services,[12] and increased patient access to care.[13] Employing an AT at a secondary school has key health and monetary benefits for patients and the medical system.[9–13]

The main barrier reported to hiring ATs has been budget concerns and not medical need, indicating that funding may be the solution for providing equitable health care.[14,18,24,25] The next logical step is increasing lobbying efforts and media campaigns highlighting the economic and other positive effects of ATs with the goal of funding services. After extensive research, lobbying efforts, and media campaigns, legislative funding was provided to the state of Hawaii to start a pilot program for athletic training services in the secondary school setting during a recession.[33] The 2 states with the most athletic training coverage in the secondary school setting are Hawaii and New Jersey, where ATs are predominantly employed by their school districts.[11,34] One challenge to obtaining this funding is that state legislators have limited knowledge of the athletic training profession and may not consider ATs the most appropriate individuals to provide medical care to high school athletes.[35]

Limitations and Future Directions

This study was not without limitations. We excluded all private schools, which constitute a large demographic. However, this was necessary because school SES was determined by free or reduced-price lunch program eligibility, and private schools are not required to report the percentage of eligible students or their race or ethnicity demographics to the NCES. Future researchers should explore these questions in private schools. Another limitation was the number of states in the study. Though our work expanded on earlier investigations looking at a single state, due to our resources, we selected a small sample of states from each SES category. Future authors should collect data from every state. Last, the sampling strategy focused on SES and not race or ethnicity, which may have influenced the race and ethnicity data that were obtained. We expected that varied SES statistics would yield a varied racially and ethnically diverse sample. To better determine whether differences in access to athletic training services are based on school race or ethnicity demographics, future researchers should choose their research samples by comparing states with the most, middle, and least levels of racial diversity. Expanding cost-benefit analyses of ATs' services by looking into the cost savings for each stakeholder would also be beneficial.

CONCLUSIONS

Socioeconomic disparities are present in access to athletic training services in public secondary school settings on a national scale. Clinicians should be aware of the current disparities in health care in the United States and in athletic training to focus on providing equitable care to patients along the entire SES spectrum. Individual clinicians should start by understanding the communities they provide care for and learn about the social factors that may affect the health of patients. Actionable steps, including research, lobbying efforts, media campaigns, and stakeholder education, should be pursued by individual ATs and by athletic training professional organizations to improve access to health care. We found differences in access to athletic training services based on race or ethnicity, though the sample demographics may not have fully represented the US population. Future investigators should use methods that sample states based on racial diversity to provide more representative samples.

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