

School and Community Socioeconomic Status and Access to Athletic Trainer Services in Wisconsin Secondary Schools

Eric Post, PhD, ATC*; Andrew P. Winterstein, PhD, ATC*; Scott J. Hetzel, MS†; Blaire Lutes, BS‡; Timothy A. McGuine, PhD, ATC‡

Departments of *Kinesiology, †Biostatistics and Medical Informatics, and ‡Orthopedics and Rehabilitation, University of Wisconsin, Madison

Context: Secondary schools have made significant progress in providing athletic trainer (AT) coverage to their student-athletes, but the levels of access at schools with ATs may vary widely. Socioeconomic disparities in medical coverage and access have been noted in other health care fields, but such disparities in the level of access to AT services have not been thoroughly examined.

Objective: To determine if (1) access to AT services or (2) the level of access (AT hours per week and athletes per AT hour) differed based on the socioeconomic characteristics of secondary schools.

Design: Cross-sectional study.

Setting: Mailed and e-mailed surveys.

Patients or Other Participants: High school athletic directors and ATs from 402 Wisconsin high schools.

Main Outcome Measure(s): Respondents provided information as to whether their school used the services of an AT and the number of hours per week that their school had an AT on-site. The number of athletes per AT hour was calculated by

dividing the total number of athletes at the school by the number of hours of AT coverage per week. The socioeconomic status of each school was determined using the percentage of students with free or reduced-cost lunch and the county median household income (MHI).

Results: Schools without an AT on-site were in lower MHI counties ($P < .001$) and had more students eligible for a free or reduced-cost lunch ($P < .001$). Lower levels of AT access (fewer hours of AT access per week and more athletes per AT hour) were observed at schools in the lowest third of the county MHI and with the highest third of students eligible for a free or reduced-cost lunch ($P < .001$).

Conclusions: Socioeconomic disparities were present in access to AT services. New models are needed to focus on providing a high level of AT access for all student-athletes, regardless of socioeconomic status.

Key Words: secondary schools, appropriate medical coverage, health care access, socioeconomic status

Key Points

- Schools without an athletic trainer (AT) available on-site had more students eligible for a free or reduced-cost lunch and were in counties with lower median household incomes.
- Schools with fewer students eligible for a free or reduced-cost lunch or in counties with higher median household incomes had greater access to AT services (AT was available for more hours per week).
- Socioeconomic disparities in access to AT services existed for high school athletes.

Participation in U.S. secondary school interscholastic athletics is increasingly popular, with an estimated 7.9 million adolescents involved during the 2016–2017 school year.¹ With the large number of adolescents participating in secondary school athletics, extensive efforts have been exerted to encourage secondary schools to provide access to athletic trainer (AT) services for their athletes.^{2,3} Medical organizations such as the American Medical Society for Sports Medicine, the American Academy of Pediatrics,² and the National Athletic Trainers' Association³ have all recommended that secondary schools employ certified ATs to ensure that their student-athletes are receiving proper medical care. Extensive efforts have focused on determining the proportion of US secondary schools using the services of an AT, with recent estimates^{4–8} indicating that 50% to 78% of high

schools relied on an AT for at least some events or practices.

Although most secondary schools in these studies reported providing some level of access to AT services, the actual levels of access at schools with ATs may vary widely. Pryor et al⁴ found that 70% of secondary schools reported having AT services, but the AT was a full-time employee in only 37% of schools. Similar studies^{7,8} have shown that only 19% to 28% of secondary schools reported having access to an AT on a full-time basis, a much lower proportion than the overall number of schools providing AT services. Without ATs consistently present at practices and other events, the responsibility for medical care often falls to coaches, who are often not properly trained in injury diagnosis, management, or emergency care.⁷ Further, employment in a part-time capacity may limit the level of

access that student-athletes have to AT services due to increased time demands during the more limited hours the AT is at the school.⁹ Students with access to a full-time AT were more likely to report non-time-loss injuries, which represent the majority of all injuries sustained at the secondary school level.^{9,10} The mere presence of an AT is important for emergency response and initial care, yet those activities represent a fraction of the National Athletic Trainers' Association practice domains.¹¹

Socioeconomic disparities in medical coverage and access have been widely noted in other health care fields. Lower socioeconomic status (SES) is associated with decreased access to a variety of health care services, including preventive and routine physician services.¹² However, socioeconomic disparities have not been directly examined in relation to AT services. Lack of funding has been repeatedly identified as a primary barrier to hiring an AT, which may be tied to fewer community resources and decreased property tax revenue, which is a major source of school funding.^{8,13,14} Some researchers^{14,15} have examined the effects of geographic location on the availability of AT services using a rural or urban location as a proxy for SES. Only 1 group¹⁵ has attempted to examine the relationship of AT services to a more direct measure of SES; they found that schools with an AT on staff had a smaller proportion of students eligible for a free or reduced-cost lunch (%Free). However, they examined only the effect of school SES on the probability of an AT being employed in some capacity by a school and not specific employment characteristics (eg, full time, part time) that may alter the level of access to AT services.¹⁵ To our knowledge, no authors have examined whether differences are present in the level of access to AT services based on school socioeconomic characteristics.

Therefore, the purpose of our study was to determine if (1) access to AT services or (2) the level of access (AT hours per week and athletes per AT hour) differed based on the socioeconomic characteristics of secondary schools. We hypothesized that schools without the services of an AT would report more students qualifying for %Free and would be in counties with lower median household incomes (MHIs). We also hypothesized that schools in counties with higher MHIs or with fewer students qualifying for %Free would have more hours per week of AT access and that the ATs at those schools would be responsible for the care of fewer athletes per hour.

METHODS

Participants

This study was approved by the Institutional Review Board of the University of Wisconsin-Madison, and informed written consent from each person was obtained before participation. High school athletic directors and ATs responsible for providing AT services for each school in the state of Wisconsin ($n = 492$) were solicited via e-mail during the 2014–2015 school year to complete an electronic survey. Nonrespondents were contacted by mail and phone and given the opportunity to complete a paper form of the survey. Officials from a total of 402 schools completed the survey, resulting in a response rate of 81.7%.

Instrument

Respondents completed a questionnaire that was developed for this project. Questions were developed using the feedback of a panel of content-area experts, including ATs and physicians with specialties in pediatric sports medicine. These experts judged the face and content validity of the survey items to ensure that the questions were clear and appropriate for the aims of this project. The questionnaire consisted of 2 sections: (1) school and AT employment information and (2) AT availability. Questions in the first section included the name of the high school, the number of athletes at the high school, whether the high school provided AT services at any time, and who employed the AT (hospital/regional medical provider or school). In the second section, respondents were asked to list the number of hours an AT was at the school each day for a typical week during the school year. They were also asked whether the AT was at the school between 3:00 PM and 6:00 PM for each day of the week. The number of athletes per AT hour was calculated by dividing the total number of athletes at the school by the number of hours per week of AT coverage.

The SES of each school was determined using 2 methods: (1) the percentage of students with %Free and (2) county MHI, both of which were provided by the Wisconsin Department of Public Instruction. These 2 variables were stratified into tertiles for data analysis (lowest third %Free, middle third %Free, highest third %Free; lowest third MHI, middle third MHI, highest third MHI).

Data Analysis

Data were summarized using means and standard deviations, medians and interquartile ranges, and frequencies and proportions. Independent t tests were calculated to investigate differences in %Free and MHI between schools with or without the services of an AT. One-way analyses of variance were used to examine potential differences in AT hours per week or athletes per AT hour between tertiles of %Free or MHI. Post hoc least significant difference tests were conducted to determine differences between specific tertile pairs. Two-sided statistical significance was set a priori at $P < .05$. All analyses were performed using R statistical software (R Foundation for Statistical Computing, Vienna, Austria).

RESULTS

A summary of schools and conditions is provided in Table 1. Nearly 95% of schools indicated that they provided access to AT services. The ATs were employed by a regional or local hospital/medical provider for all schools that supplied AT services. Two-thirds of schools (66.7%, $n = 268$) reported that an AT was present between 3:00 PM and 6:00 PM an average of 5 school days per week (median d/wk = 5.0; range = 0.0–5.0). School officials reported that ATs were present on-site for an average of 12 h/wk. Across all schools, roughly 42% of students qualified for %Free, and the average county MHI was just over \$52 000 per year. More student-athletes at schools without an AT on-site qualified for %Free compared with student-athletes at schools that did have an AT on-site (%Free = $59.8\% \pm 16.2\%$ versus $40.8\% \pm 16.2\%$; $P < .001$).

Table 1. Secondary School Characteristics

Variable	No. ^a
Schools	402
Enrollment	400.5 (207.0–979.8)
Athletes ^b	504 (325)
AT? Yes	381 (94.8%)
Athletes/AT h	15 (10.0–30.0)
AT h/wk	12.0 (3.0–20.0)
AT available between 3:00 PM and 6:00 PM	268 (66.7%)
AT d/wk between 3:00 PM and 6:00 PM	5.0 (0.0–5.0)
Students eligible for free lunch, %	41.8 (16.7)
County median income, \$	52 176 (8629)
County % in poverty	12.6 (4.2)

Abbreviation: AT, athletic trainer.

^a Data reported as N, median (interquartile range), mean (SD), or n (%).

^b Number of athletic roster spots per school. Greater than average enrollment due to multisport athletes.

Similarly, the MHI for schools that did not have an AT on-site was lower than for schools with an AT on-site (\$44 299.8 ± \$3705.6 versus \$52 610.0 ± \$8616.3; *P* < .001).

Schools in the lower third of %Free had more AT access per week (17.1 ± 10.1 hours) than schools in the middle third (11.4 ± 10.0 hours) and highest third (10.3 ± 9.6 hours; *P* < .001; Table 2). Similarly, schools in counties in the highest third of MHI had more AT access per week (17.4 ± 11.0 hours) than schools in the middle (11.6 ± 8.7 hours) or lower (8.8 ± 8.6 hours) third of MHI (*P* < .001). The ATs at schools in the lower third of %Free were responsible for providing care to fewer athletes per AT hour (17.8 ± 14.7 athletes) than ATs at schools in the middle third (24.5 ± 21.0 athletes) or highest third (27.5 ± 23.0 athletes; *P* < .001). This result was matched when using MHI as the measure of school SES. The ATs at schools in the upper third of MHI were responsible for fewer athletes per AT hour (19.0 ± 21.6 athletes) than ATs at schools in the middle (22.2 ± 16.9 athletes) or lower (29.3 ± 3.2 athletes) third of MHI (*P* < .001).

DISCUSSION

The most important finding of our study was that both access to AT services and the level of access were significantly associated with secondary school socioeconomic characteristics in Wisconsin. Specifically, schools with an AT on-site had fewer %Free students and were in

counties with higher MHIs. Additionally, schools in the highest socioeconomic categories (fewer %Free, higher MHIs) had more hours per week of AT coverage, and the school AT was responsible for fewer athletes per hour. To our knowledge, we are the first to examine AT services at secondary schools in Wisconsin in more than 25 years.¹⁶ Previous researchers¹⁵ have examined the association between AT coverage and proportion of %Free students specific to the diagnosis of concussion. They reported that schools with a higher proportion of %Free students had less access to AT services and that greater levels of AT services corresponded to higher numbers of concussions diagnosed among football and soccer athletes.¹⁵ We examined differences in the level of AT access based not only on %Free students but also on county MHI as a socioeconomic variable. Similar disparities were present in the level of AT access based on socioeconomic factors. Although we did not track the effect of this disparity on a specific diagnosis such as concussion,¹⁵ we would expect similar findings across the breadth of AT services provided in the secondary school setting.

Secondary schools without an AT on-site had a higher percentage of students who qualified for %Free and lower county MHI than schools that reported having an AT on-site. As mentioned previously, Kroshus et al¹⁵ observed that schools with an AT on staff had a smaller proportion of students eligible for %Free than schools without an AT on staff. The presence of ATs at secondary schools has been found to result in a higher level of medical care for student-athletes.⁶ However, lack of funding has been repeatedly identified as a primary reason that secondary schools were unable to employ ATs.^{6,8,13,14} In a qualitative survey¹³ of secondary school athletic directors, 95% listed lack of funding as the reason they did not employ an AT. A large proportion of school funding comes from local property taxes, so schools in less affluent counties may lack the ability to fund an AT position, especially when these schools may already be feeling pressure to reduce spending in other areas of their budget.^{13–15} Beyond the lack of funding, districts may choose to prioritize other educational needs (eg, more teachers, educational materials, teaching aides) in lieu of AT services. However, these districts have still elected to participate in interscholastic athletics, and we contend that the presence of an AT is a necessity for participation. Although we did not examine the reasons for not providing AT services, our results demonstrated that disparities existed in AT access based on school and

Table 2. Differences in Levels of Athletic Trainer (AT) Access By School Socioeconomic Category^a

Variable	AT h/wk	<i>P</i> Value	Athletes/AT h	<i>P</i> Value
Students eligible for free lunch		<.001		<.001
Lower third	17.1 ± 10.1 ^{b,c}		17.8 ± 14.7 ^{b,c}	
Middle third	11.4 ± 10.0 ^b		24.5 ± 21.0 ^b	
Upper third	10.3 ± 9.6 ^c		27.5 ± 23.0 ^c	
County median household income		<.001		<.001
Lower third	8.8 ± 8.6 ^b		29.3 ± 23.2 ^{b,c}	
Middle third	11.6 ± 8.7 ^{b,d}		22.2 ± 16.9 ^b	
Upper third	17.4 ± 11.0 ^d		19.0 ± 21.6 ^c	

^a Data reported as mean ± SD.

^b Difference between lower and middle thirds (*P* < .05).

^c Difference between lower and upper thirds (*P* < .05).

^d Difference between middle and upper thirds (*P* < .05).

community socioeconomic factors, no matter what specific reason schools had for not providing AT services. Compounding the effects of SES on AT access was the trend toward athletes at large public high schools being served by ATs with the least experience and having the fewest budgetary resources.¹⁷

Access to health care providers is of particular importance in the secondary school age group. For student-athletes from lower SES backgrounds, encounters with an AT may be one of the only regular interactions the student-athlete has with a health care provider. These encounters may increase an athlete's awareness and knowledge regarding many health topics (eg, concussion, injury prevention).¹⁸ Marcell et al¹⁹ reported that male adolescents (aged 16 to 20 years) had fewer encounters with health care providers compared with younger boys or their female counterparts. Adolescents from lower SES backgrounds were subject to a range of health care inequities, including lack of insurance or underinsurance, greater reliance on public insurance, and less access to usual care providers.^{20,21} Given the documented inequities for those with lower SES in the broader health care system, access to an AT may provide a needed bridge to care for a vulnerable patient population. Limiting AT access for lower SES students can create an added health care disparity. We believe that all athletes, regardless of SES, deserve access to the broadest range of health care, including AT services.

Schools with the lowest proportion of %Free students and the highest county MHI had more hours of AT access per week and fewer athletes per AT hour. Most previous investigators who looked at AT services at the secondary school level examined whether a school relied on an AT to provide some level of medical coverage. Our results suggest that providing medical coverage may not be equivalent to providing sufficient access to AT services.

Nearly all schools in this study provided some level of access to AT services for medical coverage, but the levels provided by ATs, as measured by hours per week of AT coverage and number of athletes per AT hour, varied widely. Further, schools in the lowest SES categories (highest third %Free, lowest third county MHI) demonstrated lower levels of access to AT services. Models that focus on coverage over improved access limit the athletic training profession's ability to demonstrate the breadth of health care services that can be provided by ATs, such as preventive care.¹¹ Previous researchers in a practice-based research network attempted to determine the practice patterns of secondary school ATs. Lam et al¹¹ reported that secondary school ATs spend nearly half of their time providing preventive services, with the remaining time split between treating ongoing and new injuries. Based on these data, ATs in the secondary school setting tend to spend more time working in certain clinical domains, such as prevention, and less in other domains, such as evaluation and diagnosis.¹¹ This may reflect a disparity in practice patterns and the overall types of care provided to secondary school athletes. Although we did not specifically examine practice patterns, we would expect the disparity in access to AT services found in our study to further compound the disparity in practice patterns observed by Lam et al.¹¹

Overall, nearly 95% of all secondary schools in this study used the services of an AT. This is higher than previously reported rates of AT coverage in secondary school athletics,

which have ranged between 50% and 78%.⁴⁻⁸ This is evidence of the increased recognition of the importance of ATs at the secondary school level and the progress the athletic training profession and secondary schools have made in providing coverage to their student-athletes. However, our results suggest that limited resources may be a primary factor in the medical coverage decisions of the schools that do not provide an AT. Additionally, the level of access provided at the schools with ATs was highly variable and related to the socioeconomic characteristics of the school. Many schools, regardless of SES, have adopted a model of AT coverage without incorporating the wider breadth of care that ATs can provide. Recent efforts have been aimed at increasing the presence of ATs on the sidelines, which represents a significant achievement, yet new ways of thinking are needed to deliver models that can heighten the level of access to and the care provided by ATs instead of simply providing coverage.

It is important to note that none of the responding high schools in this study directly employed their ATs. Rather, all of the ATs were employed by local or regional hospitals and clinics and contracted to the high schools. Clinic outreach for AT services was the primary model for secondary school AT coverage in Wisconsin. The differences observed in access to AT services based on SES indicate that this model is limited by the resources the high school has available for contracting with a local clinic or hospital for AT services. Therefore, we would expect our findings to be similar in schools that directly employ their AT, as both models depend on funds being available in the secondary school or district budget.

This study had several limitations. The survey was conducted only in the state of Wisconsin, and therefore, the results may not be generalizable to other states or regions. However, the high response rate allowed us to survey the majority of secondary schools in Wisconsin, making our sample highly representative of the state's overall secondary school characteristics and patterns of AT services. The presence of an AT at the school and number of hours of AT services per week were determined via respondent recall, which may have made those responses more prone to recall bias than the more objective measures of SES provided by the Wisconsin Department of Instruction. However, we attempted to limit the potential for recall bias by surveying athletic directors and ATs, who would have direct knowledge of these variables. Finally, we did not directly measure the types of services provided by ATs but instead used measures of AT access (hours per week and athletes per AT hour) as a proxy for the care provided by ATs. It is possible that rather than providing increased levels of care in terms of preventive or treatment services, an AT with more hours per week at a school may simply be covering more events at that school.

CONCLUSIONS

Schools without an AT on-site were located in lower MHI counties and had more students eligible for %Free. Lower levels of AT access (fewer hours of AT access per week and more athletes per AT hour) were observed at schools in the lowest third of county MHIs and highest third of students eligible for %Free. New models are needed that focus on providing a high level of AT access for all student-

athletes, regardless of SES, to overcome the health care disparities that are present in AT services at the secondary school level.

REFERENCES

1. High school sports participation increases for 28th straight year, nears 8 million mark. National Federation of State High School Associations Web site. <https://www.nfhs.org/articles/high-school-sports-participation-increases-for-28th-straight-year-nears-8-million-mark/>. Accessed July 24, 2018.
2. Courson R, Goldenberg M, Adams KG, et al. Inter-association consensus statement on best practices for sports medicine management for secondary schools and colleges. *J Athl Train*. 2014;49(1):128–137.
3. Almquist J, Valovich McLeod TC, Cavanna A, et al. Summary statement: appropriate medical care for the secondary school-aged athlete. *J Athl Train*. 2008;43(4):416–427.
4. Pryor RR, Casa DJ, Vandermark LW, et al. Athletic training services in public secondary schools: a benchmark study. *J Athl Train*. 2015;50(2):156–162.
5. Salzman GA, Burke RV, Muller VM, Spurrier RG, Zaslow TL, Upperman JS. Assessing medical care availability for student athletes of a large urban high school district. *J Pediatr Surg*. 2015;50(7):1192–1195.
6. Wham GS Jr, Saunders R, Mensch J. Key factors for providing appropriate medical care in secondary school athletics: athletic training services and budget. *J Athl Train*. 2010;45(1):75–86.
7. Johnson ST, Norcross MF, Bovbjerg VE, Hoffman MA, Chang E, Koester MC. Sports-related emergency preparedness in Oregon high schools. *Sports Health*. 2017;9(2):181–184.
8. Pike AM, Pryor RR, Vandermark LW, Mazerolle SM, Casa DJ. Athletic trainer services in public and private secondary schools. *J Athl Train*. 2017;52(1):5–11.
9. Kerr ZY, Lynall RC, Mauntel TC, Dompier TP. High school football injury rates and services by athletic trainer employment status. *J Athl Train*. 2016;51(1):70–73.
10. Dompier TP, Marshall SW, Kerr ZY, Hayden R. The National Athletic Treatment, Injury and Outcomes Network (NATION): methods of the surveillance program, 2011–2012 through 2013–2014. *J Athl Train*. 2015;50(8):862–869.
11. Lam KC, Snyder Valier AR, Anderson BE, Valovich McLeod TC. Athletic training services during daily patient encounters: a report from the Athletic Training Practice-Based Research Network. *J Athl Train*. 2016;51(6):435–441.
12. Adler NE, Newman K. Socioeconomic disparities in health: pathways and policies. *Health Aff (Millwood)*. 2002;21(2):60–76.
13. Mazerolle SM, Raso SR, Pagnotta KD, Stearns RL, Casa DJ. Athletic directors' barriers to hiring athletic trainers in high schools. *J Athl Train*. 2015;50(10):1059–1068.
14. Schneider K, Meeteer W, Nolan JA, Campbell HD. Health care in high school athletics in West Virginia. *Rural Remote Health*. 2017;17(1):3879.
15. Kroshus E, Rivara FP, Whitlock KB, Herring SA, Chrisman SPD. Disparities in athletic trainer staffing in secondary school sport: implications for concussion identification. *Clin J Sport Med*. 2017;27(6):542–547.
16. Nass SJ. A survey of athletic medicine outreach programs in Wisconsin. *J Athl Train*. 1992;27(2):180–183.
17. Valovich McLeod TC, Huxel Bliven KC, Lam KC, Bay RC, Snyder Valier AR, Parsons JT. The National Sports Safety in Secondary Schools Benchmark (N4SB) study: defining athletic training practice characteristics. *J Athl Train*. 2013;48(4):483–492.
18. Wallace J, Covassin T, Nogle S, Gould D, Kovan J. Knowledge of concussion and reporting behaviors in high school athletes with or without access to an athletic trainer. *J Athl Train*. 2017;52(3):228–235.
19. Marcell AV, Klein JD, Fischer I, Allan MJ, Kokotailo PK. Male adolescent use of health care services: where are the boys? *J Adolesc Health*. 2002;30(1):35–43.
20. Berdahl TA, Friedman BS, McCormick MC, Simpson L. Annual report on health care for children and youth in the United States: trends in racial/ethnic, income, and insurance disparities over time, 2002–2009. *Acad Pediatr*. 2013;13(3):191–203.
21. Newacheck PW, Hung YY, Park MJ, Brindis CD, Irwin CE Jr. Disparities in adolescent health and health care: does socioeconomic status matter? *Health Serv Res*. 2003;38(5):1235–1252.

Address correspondence to Timothy A. McGuine, PhD, ATC, Department of Orthopedics and Rehabilitation, University of Wisconsin, 1685 Highland Avenue, Madison, WI 53705. Address e-mail to mcguine@ortho.wisc.edu.