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Athletic Training Employment in US Secondary Schools by Geographic Setting and School Size

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Context: The Athletic Training Locations and Services (ATLAS) Annual Report suggested that athletic trainer (AT) employment status differed based on geographic locale. However, the influence of geographic locale and school size on AT employment is unknown.

Objective: To determine if differences existed in the odds of having AT services by locale for public and private schools and by student enrollment for public schools.

Design: Cross-sectional study.

Setting: Public and private secondary schools with athletics programs.

Patients or Other Participants: Data from 20 078 US public and private secondary schools were obtained.

Main Outcome Measures(s): Data were collected by the ATLAS Project. Athletic trainer employment status, locale (city, suburban, town, or rural) for public and private schools, and school size category (large, moderate, medium, or small) only for public schools were obtained. The employment status of ATs was examined for each category using odds ratios. Logistic regression analysis produced a prediction model.

Results: Of the 19 918 public and private schools with available AT employment status and locale, suburban schools had the highest access to AT services (80.1%) with increased odds compared with rural schools (odds ratio = 3.55 [95% CI = 3.28, 3.85]). Of 15 850 public schools with known AT employment status and student enrollment, large schools had the highest rate of AT services (92.1%) with nearly 18.5 times greater odds (odds ratio = 18.49 [95% CI = 16.20, 21.08]) versus small schools. The logistic model demonstrated that the odds of access to an AT increased by 2.883 times as the school size went up by 1 category.

Conclusions: Nationally, suburban schools and large public schools had the greatest access to AT services compared with schools that were in more remote areas and with lower student enrollment. These findings elucidate the geographic locales and student enrollment levels with the highest prevalence of AT services.

Key Words: high schools, rural schools, health care, small schools, student enrollment, safety

Key Points

- Secondary schools in city, suburban, and town locales had increased odds of access to athletic trainer services and to those services in a full-time capacity compared with schools in rural locales.
- Large-, moderate-, and medium-sized public secondary schools had increased odds of access to athletic trainer services and to those services in a full-time capacity compared with small schools.

Participation in secondary school athletics programs has reached 7.8 million student-athletes in the United States,[1] and an increased risk of injury has paralleled this participation growth in interscholastic athletics.[2,3] Comstock et al[1] found an injury rate of 2.32 per 1000 athlete-exposures among secondary school sports. The National Center for Catastrophic Sport Injury Research noted that 112 catastrophic injuries and illnesses were reported in 2015 to 2016, of which 101 were sport related.[4] The vast majority (82%) of these sport-related catastrophic incidences occurred at the secondary school level.[4] A majority of athletic injuries that occurred during secondary school interscholastic athletic activities were classified as *minor* (no days lost due to the injury in 64.5%) to *mild* (>7 days lost due to injury in 79%) in the 1990s,[5,6] with knee and ankle injuries accounting for the largest proportions.[5,6] However, these values may have been artificially low because of less awareness of more serious conditions, such as concussions, that receive increased public awareness and media attention today compared with the 1990s. During this time frame, the most commonly diagnosed secondary school athletic injury was concussion (24.6%).[1] Although concussion clearly requires proper management immediately after injury and the awareness of sequelae (eg, malignant cerebral edema, permanent neurologic disability, or death), the heightened sense of awareness led to a dramatic increase in the rate of concussion.[7] To more adequately and accurately assess concussion at the time of injury in sport, a health care provider who is trained and qualified to provide appropriate medical care on-site in such emergent situations is critical to student-athlete safety. In addition to concussions, several other emergent conditions

that may be sustained in secondary school athletics require immediate and appropriate intervention (eg, sudden cardiac arrest, exertional heat stroke, head and cervical trauma, exertional sickling, and anaphylaxis). Furthermore, researchers have demonstrated that survival from these emergent situations requires rapid response. Two examples are exercise-related sudden cardiac arrest and exertional heat stroke, for which immediate on-site automated external defibrillator application before emergency medical system arrival[8] and on-site aggressive cooling, respectively, are associated with survival.[4,9]

The American Medical Association[10] recognized athletic trainers (ATs) as the most appropriate professionals to provide health care to secondary school student-athletes, supporting the value of AT employment in secondary schools. Athletic trainers are allied health care professionals who are trained and qualified to provide injury and illness prevention, examination, clinical diagnosis, treatment (including in emergency situations), and rehabilitation.[11] That being said, investigators[12] have identified barriers to appropriate care, including a small school size, limited budget, lack of awareness of an AT's role, and remote location. However, Wham et al[13] examined the medical care provided in secondary schools and concluded that regardless of the various factors (eg, school size, proximity to a medical center, public or private status, and socioeconomic status of students), secondary schools can improve their medical care to student-athletes by hiring an AT.[13]

Employment of ATs in secondary schools has increased in the past 2 decades, yet thousands of schools with athletics programs remain without medical care in the form of AT services. From 1993 to 1994, AT employment in secondary schools was estimated at 35%,[10] but it was not until 1998 that the American Medical Association recommended that all secondary schools provide AT services to their student-athletes.[10] Since then, the level of AT services in public and private secondary schools has increased, reaching 66% to 70%.[10,12,14,15] Despite this nearly 2-fold increase, 30% to 34% of public and private schools in the United States (approximately 7000) have no access to AT services.[12,14,15] Of those schools with AT services, only 37% reported employing a full-time AT.[12,14,15] Earlier authors[13] found that schools with a full-time AT employed directly by the school district provided improved quality of medical care to their student-athletes compared with schools with an AT (often part time) contracted from an outside source. In the absence of an AT or other health care professional, medical decisions during athletic activities are made by individuals (eg, coaches) who have little to no education and training in managing injuries.[16,18] Given the prevalence of athletic-related injuries and the current rate of AT services in secondary schools, further increases in AT employment are needed. To improve health care and develop a uniform standard in the United States, we need a better understanding of how AT services are distributed, the geographic locale in which they are most common, and student enrollment. Therefore, the purpose of our study was to describe and examine AT services by geographic locale and student enrollment.

METHODS

We used data collected through the Athletic Training Locations and Services (ATLAS) Project[19] developed by the Korey Stringer Institute at the University of Connecticut and the National Athletic Trainers' Association.

Data-Collection Procedure

All public and private secondary schools in the United States containing at least one grade 9 through 12 were included in this study, and school demographic information and AT employment status were obtained from the ATLAS database. Initially, schools were contacted via a phone call or email and asked if they offer a school-sanctioned interscholastic athletics program. Schools not offering interscholastic athletics program were removed from the database, while schools with an interscholastic athletics program were asked if they received full-time or part-time (or both) AT services and the number of ATs providing these services. Simultaneously, we distributed an online survey[19] to secondary school ATs throughout the country to obtain more detailed and accurate information about the AT services provided in secondary schools. This data-acquisition process and the methods were described by Huggins et al.[15] For the dataset used in this study (exported from the ATLAS database in October 2017), all schools were included independent of ATLAS survey completion status. Three main types of schools are in the database: schools with surveys completed within the previous 2 years, schools with verified AT services but no updated survey, and schools without reported AT services. In addition to biannual recruitment for the survey, the ATLAS Project takes steps to improve the accuracy and verify the employment data of those schools that have AT services with no survey and those with no AT services. These steps include annual repeat calling or email correspondence with the schools, cross-referencing of information from high school athletics association websites and directories and personal correspondence with the leadership or office, verification of employment with the state athletic training association leadership or state medical licensing board, and email or phone contact with other ATs in the area who have updated the survey recently and can help verify the level of AT services. Schools that could not be verified are listed as *unknown* in the database until verification is completed.

Open-access data provided by the US Department of Education and the National Center for Education Statistics (NCES) regarding geographic locale and student enrollment[20] were merged by zip code with the ATLAS database for each school with athletics. We exported the geographic locale and student enrollment data from the NCES database from August 2017 through October 2017. The NCES locale classifications categorize US territories into 4 types: city, suburban, town, or rural. Each locale type contains 3 subtypes, and each locale subtype has a corresponding 2-digit locale code (Table 1). We used NCES locales for this study because these were the only accessible geographic indicators that allowed us to assess the physical location of schools in relation to urbanized areas, which we expected to be an important factor for the recruitment and retention of ATs. The US Census Bureau defines *urbanized areas and urban clusters* as territory that is densely developed and encompasses residential, commercial, and nonresidential urban land uses and defines *principal cities* as places with a large population of residents and workers located within a *metropolitan and micropolitan statistical area* (a geograph-

Table 1. Geographic Locale Classifications and Criteria[20]

Basic Type-Subtype (Locale Code)	Criteria
City-large (11)	Territory inside urbanized area and inside principal city with population ≥250 000
City-midsize (12)	Territory inside urbanized area and inside principal city with population <250 000 and ≥100 000
City-small (13)	Territory inside urbanized area and inside principal city with population <100 000
Suburban-large (21)	Territory outside principal city and inside urbanized area with population ≥250 000
Suburban-midsize (22)	Territory outside principal city and inside urbanized area with population <250 000 and ≥100 000
Suburban-small (23)	Territory outside principal city and inside urbanized area with population <100 000
Town-fringe (31)	Territory inside urban cluster ≤10 miles from urbanized area
Town-distant (32)	Territory inside urban cluster >10 and ≤35 miles from urbanized area
Town-remote (33)	Territory inside urbanized cluster >35 miles from urbanized area
Rural-fringe (41)	Census-defined rural territory ≤5 miles from urbanized area and ≤2.5 miles from urban cluster
Rural-distant (42)	Census-defined rural territory >5 and ≤25 miles from urbanized area, and > 2.5 and ≤ 10 miles from urban cluster
Rural-remote (43)	Census-defined rural territory >25 miles from urbanized area, and >10 miles from urbanized cluster

ic entity associated with at least 1 population core of 10 000 or more, plus adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties).[21] Given the definitions, the *city locale* focuses on large, densely populated areas, while the *suburban locale* is just outside the territory with a city locale.[21] The town and rural locales are defined by the distance in relation to urbanized area or urban cluster, and towns are commonly located near urbanized areas, often with easy access to the larger population core.[21] We did not use the subtypes for our analyses because the population and distance thresholds for the subtype classification could have complicated the presentation of the results.

We examined the quartiles of those included in the dataset to classify levels of student enrollment. Quartiles were selected after we determined that the classification would capture the characteristic changes in AT employment, referring to the results of the benchmark study by Pryor et al.[14] School enrollments of *small* (first quartile; ≤293 students), *medium* (second quartile; >293 and ≤638 students), *moderate* (third quartile; >638 and ≤1319 students), and *large* (fourth quartile; >1319 students) were classified and coded. Because the student enrollment of private schools was unavailable in the NCES website at the time of export, this classification applies only to public schools in this study.

Data Analysis

The dataset exported from the ATLAS database contained 20 078 (15 992 public and 4086 private) secondary schools. Schools for which AT employment status was unknown (57 public and 35 private) were removed from the analyses. Of the remaining 19 986 schools, 68 public schools were removed because they were missing a valid NCES locale code, and 85 more public schools were removed for failing to report the number of students enrolled. Descriptive statistics were computed for all demographic variables. We used Mann-Whitney tests to examine the differences in the distribution of schools by geographic locale between public and private schools. Chi-square tests showed the relationships between AT employment status and geographic locale and between AT employment status and school size classification. To examine the odds of having AT access or a full-time AT among the categories, odds ratios (ORs) with 95% CIs were also computed, with statistical significance defined as the 95% CI not including 1.00. To investigate common and less common employment models (full-time AT, part-time AT, or no AT) among locale categories, χ^2 tests with residual analysis were used, and statistical significance was defined as adjusted residuals of 2.0 and −2.0. Additionally, the Somers D was calculated between locale and school size classification of public schools to examine the strength and direction of association between the variables. We chose the Somers D over a correlational analysis because it is thought to assess the association of 2 ordinal variables (eg, locale and school size classification) more accurately. To assess the ability of locale and school size variables to predict the AT employment status of public schools, binary logistic regression was performed. All data analyses were performed using IBM SPSS (version 22.0; IBM SPSS Inc).

Table 2. School Demographics by Geographic Locale, % (n)

By Locale Classification	Geographic Locale			
	City	Suburban	Town	Rural
Public (15 867)	16.4 (2608)	25.1 (3975)	15.3 (2420)	43.3 (6864)
Private (4051)	36.1 (1463)	34.7 (1404)	9.1 (369)	20.1 (815)
Total (19 918)	20.4 (4071)	27.0 (5379)	14.0 (2789)	38.6 (7679)

RESULTS

Secondary School Demographics

The distribution of schools by geographic locale is reported in Table 2. The Mann-Whitney tests revealed that the distributions of the 2 samples from public and private schools were different ($P < .001$). Most public schools (43.3%; n = 6864) were located in rural areas, and most private schools (36.1%; n = 1404) were located in city areas.

Athletic Training Employment by Locale Classification

A total of 19 918 public and private schools with AT employment status and locale code (city [n = 4701]; suburban [n = 5379]; town [n = 2789]; and rural [n = 7679]) were included in the analyses. More suburban schools received AT services (80.1%; n = 4306), compared with schools in cities, towns, or rural locales. Employment of ATs and geographic locale were associated ($x^2_3 = 1104.6$, $P < .01$), and the ORs indicated that schools within city, suburban, and town locales had increased odds of AT

Table 3. Athletic Trainer (AT) Employment Status for Public and Private Schools by Geographic Locale, % (No.)

Characteristic	City (n = 4071)	Suburban (n = 5379)	Town (n = 2789)	Rural (n = 7679)
No AT access	28.9[a] (1178)	19.9[a] (1072)	31.4[a] (876)	46.9[b] (3604)
AT access	71.1 (2893)	80.1 (4307)	68.6 (1913)	53.1 (4075)
Full-time ATs employed	37.4[b] (1523)	47.9[b] (2579)	31.7 (884)	19.2[a] (1477)
Full-time employment among schools with AT access	52.6	59.9	46.2	36.2
1	28.4 (1155)	36.9 (1983)	28.5 (795)	16.8 (1291)
2	7.9 (321)	9.3 (498)	2.6 (72)	2.1 (165)
3	0.9 (35)	1.5 (83)	0.5 (14)	0.2 (14)
4	0.2 (10)	0.2 (11)	0.1 (2)	0.1 (5)
5	0.0 (1)	0.1 (3)	0.0 (1)	0.0 (2)
6	0.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)
7	0.0 (0)	0.0 (1)	0.0 (0)	0.0 (0)
Only part-time ATs employed	33.7 (1370)	32.1[a] (1728)	36.9[b] (1029)	33.8 (2598)
Only part-time employment among schools with AT access	47.4	40.1	53.8	63.8
1	34.3 (1397)	35.5 (1909)	36.8 (1027)	33.1 (2542)
2	2.3 (92)	1.9 (104)	1.4 (38)	1.4 (104)
3	0.3 (12)	0.4 (20)	0.2 (6)	0.2 (18)
4	0.1 (4)	0.0 (1)	0.1 (2)	0.0 (2)
5	0.0 (1)	0.0 (0)	0.0 (0)	0.0 (3)
9	0.0 (0)	0.0 (0)	0.0 (1)	0.0 (0)

[a] Smaller than expected value using $\chi 2$ test with residual analysis.
[b] Greater than expected value using $\chi 2$ test with residual analysis.

services compared with schools in rural locales (OR = 2.17 [95% CI = 2.00, 2.36], 3.55 [95% CI = 3.28, 3.85], and 1.93 [95% CI = 1.76, 2.12]), respectively. Similarly, more suburban schools had full-time AT services (47.9%; n = 2579) than city, town, or rural locales. The ORs revealed that schools in city, suburban, and town locales had increased odds of a full-time AT compared with schools in rural locales, (OR = 2.51 [95% CI = 2.31, 2.73], 3.87 [95% CI = 3.58, 4.18], and 1.95 [95% CI = 1.77, 2.15]), respectively. A χ^2 test with residual analysis for employment model (full-time AT, part-time AT, or no AT) and locale was significant ($x^2_3 = 1586.6$, $P < .001$), and the adjusted residuals for full-time employed, part-time employed, and no AT employed were 7.6, –0.2, and –7.3 for city, 28.4, –3.0, and –25.2 for suburban, –0.9, 3.8, and –2.9 for town and –31.6, 0.2, and 31.1 for rural, respectively. The complete list of AT employment by locale is depicted in Table 3. Regarding the number of ATs employed, having 1 full-time or part-time AT employed was the most common observation in the secondary school setting (Table 3).

The AT employment status for public and private schools in each geographic locale by state can be found in Table 4. In the city locale, while 100% of secondary schools in Wyoming and Montana received AT services, Michigan (48.6%), New Hampshire (40.0%), and Illinois (35.8%) schools were below 50%. In the suburban locale, 100% of schools in Hawaii, Nebraska, South Dakota, and Vermont had access to AT services. No schools in the suburban area in Alaska had access to AT services. For schools located in towns, only New Jersey had 100% of schools with access to AT services, while Massachusetts had the lowest access to AT services (33.3%). The AT services provided to rural schools were highest in New Jersey (93.3%) and lowest in Alaska (2.5%). In Alaska, only 3 rural schools of 119 had access to AT services.

Athletic Training Employment by School Size Classifications

A total of 15 850 public schools (private schools removed as mentioned in the Methods section) with known AT employment status and student enrollment numbers were included in the analyses. Large schools had a higher percentage with AT services (92.1%; n = 3646) than moderate (84.2%; n = 3335), medium (62.6%; n = 2480), or small (38.6%; n = 1530) schools. A complete list of AT employment status by school size classification is in Table 5 and the Figure. The relationship between AT employment and student enrollment class was significant ($x^2_3 = 3220.3$, $P < .01$), and the OR showed that large, moderate, and medium schools had increased odds of AT services over small schools, (OR = 18.49 [95% CI = 16.20, 21.08], 8.45 [95% CI = 7.60, 9.40], and 2.66 [95% CI = 2.43, 2.92]), respectively. When we examined full-time AT services and school size, although 59.8% (n = 2369) of large schools reported having 1 or more full-time AT, only 6.9% (n = 275) of small schools had 1 or more full-time AT. Similarly, large, moderate, and medium schools had increased odds of full-time AT services compared with small schools (OR = 19.98 [95% CI = 17.40, 22.94], 12.45 [95% CI = 10.85, 14.28], and 4.15 [95% CI = 3.60, 4.79]), respectively. A detailed report of odds ratios is given in Table 6. All of the odds calculated were significant.

Regression Analysis

The Somers D was used to assess the strength and direction of the relationship between locale and school size classification for public schools. The values were 0.52 when locale was the dependent variable and 0.55 when school size was the dependent variable, which indicates moderate agreement between the variables, meaning that larger schools were more likely to be located in urbanized areas. The logistic model produced by a stepwise approach

Table 4. Athletic Training Employment Status by Geographic Locale in US Secondary Schools

National Athletic Trainers' Association District	State	Schools With Athletic Training Services, % (No./State Total)				
		Overall	City	Suburban	Town	Rural
1	Connecticut	87.8 (180/205)	84.1 (37/44)	90.1 (100/111)	71.4 (5/7)	88.4 (38/43)
	Maine	63.9 (92/144)	83.3 (10/12)	90.0 (18/20)	77.3 (17/22)	52.2 (47/90)
	Massachusetts	70.0 (271/387)	54.7 (35/64)	78.2 (201/257)	33.3 (3/9)	56.1 (32/57)
	New Hampshire	38.1 (72/189)	40.0 (8/20)	51.0 (25/49)	39.4 (13/33)	29.9 (26/87)
	Rhode Island	79.0 (49/62)	75.0 (12/16)	85.0 (34/40)	0.0 (0/0)	50.0 (3/6)
	Vermont	61.4 (51/83)	75.0 (3/4)	100.0 (2/2)	91.7 (21/23)	46.3 (25/54)
2	Delaware	86.3 (44/51)	85.7 (6/7)	88.5 (23/26)	80.0 (4/5)	84.6 (11/13)
	New Jersey	89.5 (402/449)	75.7 (28/37)	90.2 (323/358)	100.0 (9/9)	93.3 (42/45)
	New York	63.2 (562/889)	61.1 (113/185)	88.4 (268/303)	54.5 (54/99)	42.1 (127/302)
	Pennsylvania	85.3 (650/762)	82.5 (99/120)	91.3 (304/333)	83.9 (78/93)	78.2 (169/216)
3	District of Columbia	90.9 (30/33)	90.9 (30/33)	0.0 (0/0)	0.0 (0/0)	0.0 (0/0)
	Maryland	70.3 (206/293)	65.6 (42/64)	70.4 (107/152)	71.4 (10/14)	74.6 (47/63)
	North Carolina	69.7 (362/519)	82.0 (114/139)	80.6 (87/108)	63.3 (31/49)	58.3 (130/223)
	South Carolina	77.6 (228/294)	86.7 (39/45)	84.3 (70/83)	80.0 (32/40)	69/0 (87/126)
	Virginia	68.3 (310/454)	75.0 (72/96)	76.8 (109/142)	53.2 (25/47)	61.5 (104/169)
	West Virginia	41.2 (54/131)	66.7 (10/15)	47.1 (8/17)	41.4 (12/29)	34.3 (24/70)
4	Illinois	62.2 (495/796)	35.8 (72/201)	87.1 (195/224)	82.4 (117/142)	48.5 (111/229)
	Indiana	83.4 (351/421)	80.5 (70/87)	89.7 (70/78)	86.1 (68/79)	80.8 (143/177)
	Michigan	52.3 (404/773)	48.6 (71/146)	64.3 (151/235)	72.0 (67/93)	38.5 (115/299)
	Minnesota	67.0 (293/437)	69.0 (40/58)	83.3 (65/78)	78.9 (71/90)	55.5 (117/211)
	Ohio	79.6 (681/855)	73.2 (93/127)	88.7 (258/291)	77.9 (106/136)	74.4 (224/301)
	Wisconsin	70.1 (350/500)	64.4 (56/87)	82.7 (62/75)	82.5 (80/97)	63.3 (152/240)
5	Iowa	77.9 (271/348)	92.1 (35/38)	86.7 (13/15)	77.6 (66/85)	74.8 (157/210)
	Kansas	62.4 (227/364)	84.6 (33/39)	76.0 (19/25)	73.4 (58/79)	52.9 (117/221)
	Missouri	50.7 (306/603)	62.7 (47/75)	82.7 (91/110)	62.0 (62/100)	33.3 (106/318)
	Nebraska	83.2 (247/297)	97.1 (34/35)	100.0 (12/12)	87.2 (41/47)	78.8 (160/203)
	North Dakota	38.4 (61/159)	92.3 (12/13)	66.7 (2/3)	66.7 (10/15)	28.9 (37/128)
	Oklahoma	30.7 (154/501)	65.3 (32/49)	75.6 (31/41)	37.8 (31/82)	18.2 (60/329)
	South Dakota	58.4 (94/161)	85.7 (6/7)	100.0 (1/1)	84.0 (21/25)	51.6 (66/128)
6	Arkansas	38.6 (93/241)	76.5 (26/34)	68.4 (13/19)	39.0 (23/59)	24.6 (31/129)
	Texas	76.8 (1165/1517)	87.7 (349/398)	86.1 (242/281)	83.7 (170/203)	63.6 (404/635)
7	Arizona	64.9 (179/276)	78.6 (81/103)	82.8 (53/64)	48.8 (20/41)	36.8 (25/68)
	Colorado	67.6 (227/336)	79.3 (65/82)	88.6 (70/79)	77.5 (31/40)	45.2 (61/135)
	New Mexico	46.3 (68/147)	83.9 (26/31)	77.8 (7/9)	51.5 (17/33)	24.3 (18/74)
	Utah	46.6 (82/176)	56.7 (17/30)	67.2 (45/67)	43.3 (13/30)	14.3 (7/49)
	Wyoming	52.8 (38/72)	100.0 (6/6)	0.0 (0/0)	77.8 (14/18)	37.5 (18/48)
8	California	57.0 (875/1534)	58.8 (374/636)	64.7 (391/604)	41.7 (53/127)	34.1 (57/167)
	Hawaii	88.7 (63/71)	91.3 (21/23)	100.0 (19/19)	80.0 (16/20)	77.8 (7/9)
	Nevada	57.6 (57/99)	74.2 (23/31)	83.3 (20/24)	37.5 (6/16)	28.6 (8/28)
9	Alabama	80.0 (373/466)	77.4 (65/84)	84.6 (55/65)	84.9 (45/53)	78.8 (208/264)
	Florida	69.8 (492/705)	71.3 (134/188)	72.1 (264/366)	66.7 (26/39)	60.7 (68/112)
	Georgia	84.4 (442/524)	86.4 (76/88)	83.9 (156/186)	87.8 (65/74)	82.4 (145/176)
	Kentucky	66.1 (191/289)	86.0 (37/43)	91.4 (53/58)	65.8 (50/76)	45.5 (51/112)
	Louisiana	65.5 (252/385)	84.0 (68/81)	76.0 (57/75)	60.3 (44/73)	53.2 (83/156)
	Mississippi	79.1 (253/320)	65.0 (13/20)	91.7 (22/24)	82.4 (61/74)	77.7 (157/202)
	Tennessee	76.3 (316/414)	69.0 (89/129)	82.3 (51/62)	83.1 (49/59)	77.4 (127/164)
10	Alaska	13.4 (20/149)	75.0 (9/12)	0.0 (0/3)	53.3 (8/15)	2.5 (3/119)
	Idaho	36.3 (61/168)	56.5 (13/23)	66.7 (14/21)	40.0 (12/30)	23.4 (22/94)
	Montana	51.4 (91/177)	100.0 (13/13)	0.0 (0/0)	67.9 (19/28)	43.4 (59/136)
	Oregon	45.3 (134/296)	84.5 (49/58)	72.9 (35/48)	48.0 (36/75)	12.2 (14/115)
	Washington	55.2 (219/397)	84.2 (80/95)	78.4 (91/116)	40.4 (23/57)	19.4 (25/129)
Total		66.2 (13 188/19 918)	71.1 (2893/4071)	80.1 (4307/5379)	68.6 (1913/2789)	53.1 (4075/7679)

Table 5. Athletic Trainer (AT) Employment Status in Public Schools by Student Enrollment Class, % (No.)[a]

AT Employment Status	Small	Medium	Moderate	Large
AT services present	38.6 (1530)	62.6 (2480)	84.2 (3335)	92.1 (3646)
No AT present	61.4 (2435)	37.4 (1482)	15.8 (628)	7.9 (314)
Full-time AT employed	6.9 (275)	23.6 (936)	48.1 (1,907)	59.8 (2369)
Part-time AT employed	31.7 (1255)	39.0 (1544)	35.5 (1,427)	32.2 (1277)

[a] Values represent the percentage of the total number of schools in each school size category: enrolled students = ≤293, *small*; >293 and ≤638, *medium*; > 638 and ≤ 1319, *moderate*; >1319, *large*.

Table 6. Odds Ratios (95% CIs) by Geographic Locale and Student Enrollment Class[a]

Comparison	Access to Athletic Trainer Services	Full-Time Athletic Trainer
Geographic locale[b]		
City vs rural	2.17 (2.00, 2.36)	2.51 (2.31, 2.73)
Suburban vs rural	3.55 (3.28, 3.85)	3.87 (3.58, 4.18)
Town vs rural	1.93 (1.76, 2.12)	1.95 (1.77, 2.15)
City vs town	1.13 (1.01, 1.25)	1.29 (1.16, 1.43)
Suburban vs town	1.84 (1.66, 2.04)	1.99 (1.80, 2.19)
Suburban vs city	1.63 (1.49, 1.80)	1.54 (1.42, 1.68)
Student enrollment class[c]		
Large vs small	18.48 (16.20, 21.08)	19.98 (17.40, 22.94)
Moderate vs small	8.45 (7.60, 9.40)	12.45 (10.85, 14.28)
Medium vs small	2.66 (2.43, 2.92)	4.15 (3.60, 4.79)
Large vs medium	6.94 (6.08, 7.92)	8.05 (7.33, 8.84)
Moderate vs medium	3.17 (2.85, 3.53)	3.00 (2.72, 3.30)
Large vs moderate	2.19 (1.89, 2.52)	1.61 (1.47, 1.76)

[a] All of the odds ratios were statistically significant.
[b] Both public and private schools were included in the analyses.
[c] Only public schools were included in the analyses.

Table 7. Logistic Regression Models for Predicting Athletic Trainer Employment Status in Public Schools

Predictor	B	SE	Odds Ratio (95% CI)
Step 1 (Nagelkerke $R^2 = 26.8\%$)			
School size	1.011	0.020	2.749[a] (2.644, 2.858)
Step 2 (Nagelkerke $R^2 = 26.9\%$)			
Locale	–0.076	0.022	0.927[a] (0.889, 0.967)
School size	1.059	0.024	2.883[a] (2.749, 3.023)

[a] Statistically significant ($P < .01$).

is shown in Table 7. With this model, the percentage of correct predictions was 75.0%.

DISCUSSION

Athletic Training Employment Status and Geographic Locale

The purpose of our study was to describe and examine AT services by geographic locale and student enrollment. The percentage of schools with AT services was highest in the suburbs and lowest in rural locations. The same trend was observed for the full-time employment of ATs. As demonstrated by the increased odds, AT employment differed noticeably between rural locales (53.1%) and other locales (68.5% [town], 71.0% [city], and 80.0% [suburban]). These findings shed light on the idea that a secondary school with athletics located in a rural area was a limiting factor for AT employment, although the extent of the effect of locale status was much smaller than that of school size in public schools as we explain later. Based on our findings, the athletic training profession might opt to promote and enhance employment in rural areas, considering that 43.3% (n = 6864) of US public schools were located in rural territories. Although most private schools (36.1%, n = 1404) were located in city areas, when public and private schools were combined, more than one-third of secondary schools were in rural areas (n = 7757; 38.7%).

To enhance employment in these rural areas, strategies to overcome barriers to employment may need to be developed. One of the most common challenges for rural health care providers is too few continuing education (CE) opportunities.[22,23] Ramos et al[22] found that rural school nurses were less likely to have received recent CE on such health topics as asthma; anaphylaxis; healthy weight; and lesbian, gay, bisexual, and transgender health, which are relevant to schoolchildren. Other investigators[24] have also identified cultural difficulties in providing health care within a remote area, such as isolation, difficulty building community relationships, and increased rate of burnout. To overcome these challenges and concerns, increasing online CE opportunities,[22,24] building a network of consultants within the community,[24] and learning effective self-care practices[24] have been suggested for clinicians in rural areas. Telehealth and telemedicine integration and hiring incentives are also worth considering by employers and school districts.

Regarding employment type, full-time employment was observed more frequently in city and suburban locales than expected and less frequently in the rural locale. Full-time employment occurred most often in the suburban locale, where approximately half of schools (47.9%) had ATs in a full-time capacity; in contrast, only 19.2% of rural schools had a full-time AT. Part-time employment was more common in towns and less common in suburbs than expected. This was likely because the major employment types were part time in the town locale (part time [53.8%]

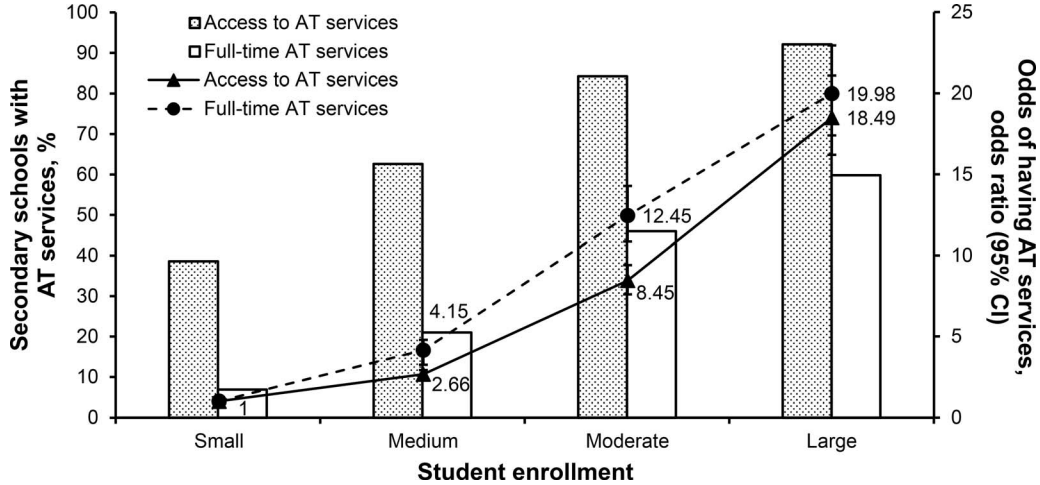

Figure. Athletic trainer (AT) employment status by student enrollment in the United States. Enrollment was classified as *small* (≤293 students), *medium* (>293 and ≤638 students), *moderate* (>638 and ≤1319 students), or *large* (>1319 students).

versus full time [46.2%]) and full time in the suburban locale (part time [40.1%] versus full time [59.9%]). Although part-time employment was most frequent in schools with AT access in the rural locale (part time [63.8%] versus full time [36.2%]), the residual analysis did not demonstrate statistical significance because the percentage of schools with only a part-time AT to the total number of schools in the rural locale fell in the expected range (33.8%). In the rural locale, approximately half (46.9%) of schools did not have access to an AT. To date, we believe we are the first to successfully quantify the precise number and percentage of schools with AT services by geographic locale.

Having 1 AT (either full time or part time) was the most common observation in secondary schools across all locales. This finding was consistent with a previous study[25] that indicated the median ratios of student-athletes to AT were 300:1 in public schools and 200:1 in private schools. Pryor et al[14] also examined AT employment in the secondary school setting and identified the need to hire multiple ATs because 1 AT may not be able to cover more than 200 student-athletes. Whereas hiring multiple full-time ATs might be unrealistic for many schools at the present time due to budgetary constraints, these findings justify the need for improved strategies and employment models for ATs in secondary schools to improve on-site medical services.

Athletic Training Employment Status and Public School Size

Large public schools received AT services more often overall and more often in a full-time capacity than moderate-, medium-, and small-sized schools. These results suggested that public schools with increased student enrollments were at increased odds of having AT services and offering employment in a full-time capacity, which is consistent with the findings of Pryor et al.[14] Considering that only 38.6% of small public schools received AT services and only 6.9% were in a full-time AT capacity, low student enrollment is a barrier to AT employment in public schools. We also showed that full-time employment largely differed from small schools (6.9%) to large schools (59.8%) in comparison with part-time employment (31.7% in small schools and 32.2% in large schools). Given that the increase in overall AT employment paralleled the increase in full-time AT employment, overall AT employment status was highly contingent on full-time AT employment status in secondary schools. The strategies for small schools to obtain access to AT services were discussed by Pike et al.[12] Although Wham et al[13] determined that hiring a full-time AT was best, sharing AT services among smaller schools may be a more viable option for schools that do not currently have access.[12] Another option is to form a cooperative athletic program with multiple neighboring small schools.[12] The health and safety of student-athletes should be the first priority in the athletic program. Thus, a small student enrollment does not justify failing to hire an AT.

Effect of School Size on Athletic Training Employment Status in Public Schools

Moderate strength of agreement in direction was present between locale and school size in public schools, which meant larger public schools were located in more urbanized areas. The binary logistic regression revealed that the locale and school size variables were significant in independently predicting AT employment status. However, the extent of the effect of school size on AT employment status was much larger than that of locale as the ORs indicated (2.883 versus 0.927) in the logistic regression model (Table 7). According to the model, the odds of access to AT services increased by 2.883 times when school size went up by 1 category, and it is safe to state that in public schools, school size is a more critical predictor of AT employment status than locale, although locale explains AT employment to a small extent.

Limitations

One limitation of our research was that we did not include the regulatory status (eg, certification, registration, or licensure) of the ATs in our database. This may leave the definition of AT and medical care provided by ATs unclear, especially in a state where minimal regulation is required (eg, California). To determine a more accurate extent of AT status and medical coverage by an AT, future authors should clarify the regulatory status of the ATs.

We were only able to confirm geographic settings (locale) and school size as variables for examining AT employment status; therefore, we are limited in our understanding of the role of other factors that may contribute to the provision of AT service by schools. Pike et al,[12] who examined barriers to AT employment in secondary schools, found that budgetary constraints, lack of awareness of the role of ATs, small school size, and rural location limited AT employment. Of those factors, budgetary constraints were identified most frequently during the interview process.[12] Thus, although we did not examine budget availability, it may be another important factor in AT employment status in secondary schools.

We made every effort annually to ensure the accuracy of the employment, enrollment and locale data, but we are unable to guarantee with 100% certainty that these data were from the same year in all cases for each school. Further, our data were limited in that NCES typically is 1 year behind the current calendar year in determining school enrollment and locale. Although NCES school enrollment sizes and locale do not typically change from year to year, employment status may have changed during that 1-year period. Considering all factors, these data are the most accurate that the ATLAS project was able to obtain and the most up-to-date data available from the NCES and the US Department of Education.

Future Directions

We successfully quantified and described factors pertaining to AT employment in secondary schools. However, to better understand the challenges and barriers for schools in hiring AT services, we must take other factors into account. Budgetary constraints were previously found to be an important factor limiting AT employment,[12] so ongoing efforts to understand the relationship between budgetary availability and AT employment should be explored. Examining socioeconomic status may reveal how the budget affects AT employment. At the time of the data export for our study, socioeconomic status from the American Census Survey (median family and household

income) was not available or included in the database. Certainly, NCES free and reduced-price lunch information was available. Nonetheless, we elected to not include this information because it was beyond the scope of our description of services by locale and school size. In our future work, we aim to bring these factors and possible confounders together and assess the effect of each with a regression-based approach.

CONCLUSIONS

Previous authors[15] determined that 66% of secondary schools in the United States had access to AT services providing full-time or part-time medical care. We found that AT employment was most limited in rural locales (53.1%) and public schools with small enrollments (38.6%). Public and private schools in city, suburban, and town locales had increased odds of AT services compared with schools in rural locales. Similarly, large, moderate-sized, and medium-sized public schools had increased odds of AT services compared with small schools. The size of public schools had a greater influence on AT employment status than locale, and the odds of access to AT services increased by 2.883 times as school size went up by 1 category. To ensure the health and safety of student-athletes in secondary schools nationwide, the athletic training profession should implement advanced strategies to improve AT employment, especially in schools with small enrollment, which are often located in rural areas.

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