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Athletic Trainer Services in the Secondary School Setting: The Athletic Training Locations and Services Project

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Context: Previous research from a sample of US secondary schools (n = 10 553) indicated that 67% of schools had access to an athletic trainer (AT; 35% full time [FT], 30% part time [PT], and 2% per diem). However, the population-based statistic in all secondary schools with athletic programs (n = approximately 20 000) is yet to be determined.

Objective: To determine the level of AT services and employment status in US secondary schools with athletics by National Athletic Trainers' Association district.

Design: Cross-sectional study.

Setting: Public and private secondary schools with athletics.

Patients or Other Participants: Data from all 20 272 US public and private secondary schools were obtained.

Main Outcome Measure(s): Data were collected from September 2015 to April 2018 by phone or e-mail communication with school administrators or ATs and by online surveys of secondary school ATs. Employment categories were school district, school district with teaching, medical or university facility, and independent contractor. Data are presented as total number and percentage of ATs. Descriptive statistics were calculated for FT, PT, and no AT services data for public, private, public + private, and employment type by state and by National Athletic Trainers' Association district.

Results: Of the 20 272 secondary schools, 66% (n = 13 473) had access to AT services, while 34% (n = 6799) had no access. Of those schools with AT services, 53% (n = 7119) received FT services, while 47% (n = 6354) received PT services. Public schools (n = 16 076) received 37%, 32%, and 31%, whereas private schools (n = 4196) received 27%, 28%, and 45%, for FT, PT, and no AT services, respectively. Most of the Athletic Training Locations and Services Survey participants (n = 6754, 57%) were employed by a medical or university facility, followed by a school district, school district with teaching, and independent contractor. Combined, 38% of AT employment was via the school district.

Conclusions: The percentages of US schools with AT access and FT and PT services were similar to those noted in previous research. One-third of secondary schools had no access to AT services. The majority of AT employment was via medical or university facilities. These data depict the largest and most updated representation of AT services in secondary schools.

Key Words: athletic training, high schools, health care

Key Points

- This is the first study to capture the level of athletic trainer (AT) services in every US high school with an athletics program.
- Sixty-six percent of secondary schools in the United States had access to AT services, and of those, 53% had access to full-time services.
- The majority of ATs in secondary schools (57%) were employed by medical or university facilities.

Athletic trainers (ATs) are the only allied health care practitioners specifically trained in injury prevention for the physically active[1] who also provide on-site emergent and nonemergent care, coordinate appropriate follow-up, conduct rehabilitation, and return individuals to safe participation in sport.[2] As such, ATs play a critical role in the promotion of safe physical activity and return to participation after injury. Furthermore, the National Athletic Trainers' Association (NATA) position statements and best-practice documents require ATs to be educated on, and assist

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in, preventing or otherwise managing orthopaedic injuries,[3–5] concussions,[6] eating disorders,[7] heat illnesses,[8] lightning injuries,[9] cardiac-related deaths,[10] diabetic episodes,[11] exertional sickling episodes,[12] early-onset osteoarthritis,[13] substance abuse,[14] disease transmission,[15] weight management,[16] and dental and oral injuries[17] in their scope of practice using evidence-based techniques. These prevention mechanisms are common practice for ATs and well within their scope of practice; however, many secondary schools that do not provide on-site AT services are left to implement these measures through other means. Although secondary school administrators understood the need for athlete health and safety measures, as well as the need to employ ATs as the most appropriate health care providers for this setting,[12] employment of ATs in secondary schools has lagged.[18–20]

Although research has demonstrated that providing proper medical care to secondary school athletes minimizes the risks associated with injury and sudden death,[1] that injuries are more likely to be identified and cared for by full-time (FT), school-employed ATs compared with outreach ATs,[21] and that schools with ATs are more likely to report injuries such as concussions,[22] nearly 34% of public and private secondary schools nationwide provided no AT services for their athletes.[18] Moreover, deaths continue to occur among high school athletes during sport participation.[23] For example, during the 2015–2016 season, the secondary school sport-related sudden death rate due to athletic participation increased 20% from the previous year.[23] Despite an increasing number of legal cases involving secondary school athletes that have been ruled in favor of the plaintiff, court-ordered overhauling of health and safety policies, and the awarding of large settlements,[24,25] school districts, school educational boards, state legislators, and state athletic associations continue to take reactive, rather than proactive, approaches to addressing these concerns. The fact remains that one-third of US secondary schools are without appropriate medical care for athletes participating in their sports. Various barriers and challenges to the hiring of ATs have been identified,[18] including budgetary constraints, school size, lack of awareness of the AT's role, and public schools in remote locations.[18]

Despite these data, the profession of athletic training lacks a prospective, comprehensive, and research-based approach to monitoring and tracking changes in on-site AT services provided to secondary schools in the United States. Second, state athletic training associations and ATs nationally need to be able to provide real-time AT employment statistics at the national, district, and state levels for the purposes of strategic growth (eg, AT job increases), legislative initiatives (eg, scope-of-practice modifications), and enhanced interschool communication for the delivery of higher-quality health care for secondary school athletes. In these secondary school settings is the greatest potential for athletic training job market growth, with an estimated 6000 schools lacking AT services. Lastly, high school sport-participation numbers have been on the rise in recent years, and we must have accurate and up-to-date information on the on-site AT services being provided to secondary schools. Therefore, the purpose of our study was to expand on previous findings related to on-site AT services and employment status in the public and private secondary school sectors and acquire a US population-based sample from which an ongoing database can be developed and maintained.

METHODS

Procedures

All public (n = 16 076) and private (n = 4196) secondary schools with school-sanctioned interscholastic athletics programs in the 50 US states and the District of Columbia were obtained from the Athletic Training Locations and Services (ATLAS) database. All school types (public, private alternative, charter, magnet, preparatory, technical and vocational schools) that offered at least 1 of grades 9 to 12 were included. If the athletics program was a co-op or conjoined with other local area schools, the primary school athletics program was used, and the secondary school was removed. In cases where both schools reported athletics programs, both were included.

The ATLAS database contains information from a variety of sources. A timeline of the process is depicted in Figure 1. First, previously acquired data from 10 553 schools obtained from the studies by Pryor et al[19] and Pike et al[18,20] via the Korey Stringer Institute served as the foundation. Then, all secondary schools listed in the US Department of Education's National Center for Education Statistics database were added, yielding a total of 44 258 US secondary schools. Duplicates were removed (n = 10 152) and each school was then mapped online (https://ksi.uconn.edu/nata-atlas/) using a Google-based platform (Zeemaps, Zee Source, Cupertino, CA). On each state map, we used markers to indicate schools with on-site AT services (green or teal markers), without on-site AT services (red markers), and those for which that level of on-site AT services was unknown (black markers). (Note: Throughout the manuscript, *AT services* are defined as on-site AT services so as not to be confused with services provided solely within a clinic). By mapping the unknown schools and making the maps public, each state and the ATs within that state were then able to assist us in categorizing the remaining schools.

Those schools identified and confirmed from the previous studies[18–20] as not having AT services remained as such unless it was determined that the school had added AT services since the initial data collection. The unknown schools were researched, confirmed, and categorized by consensus of the researchers, NATA staff, NATA Secondary School Athletic Trainers' Committee (SSATC) chairs, and each state association's secondary school committee. Additionally, each of the NATA SSATC district chairs and each state association's secondary school committee chairs were provided a list of schools with unknown AT status in their states. Equipped with these lists, leaders reached out to schools via e-mail, online open-access directories of state high school athletics association member schools, phone communication, and in some cases in-person communication. During all forms of communication, a formal set of questions was asked of the school representative (which may have included the AT or other secondary school administrator): (1) "Does the school have an athletics program?"; (2) "Does the school receive health care services from an AT?" If the school answered *yes* to AT services, then the next questions were (3) "How many ATs provide these services?" and (4) "Can you provide us with the AT's contact information or e-mail so that we may call or send them a survey recruitment e-mail?" If the school answered *no* to having athletics, it was removed from the

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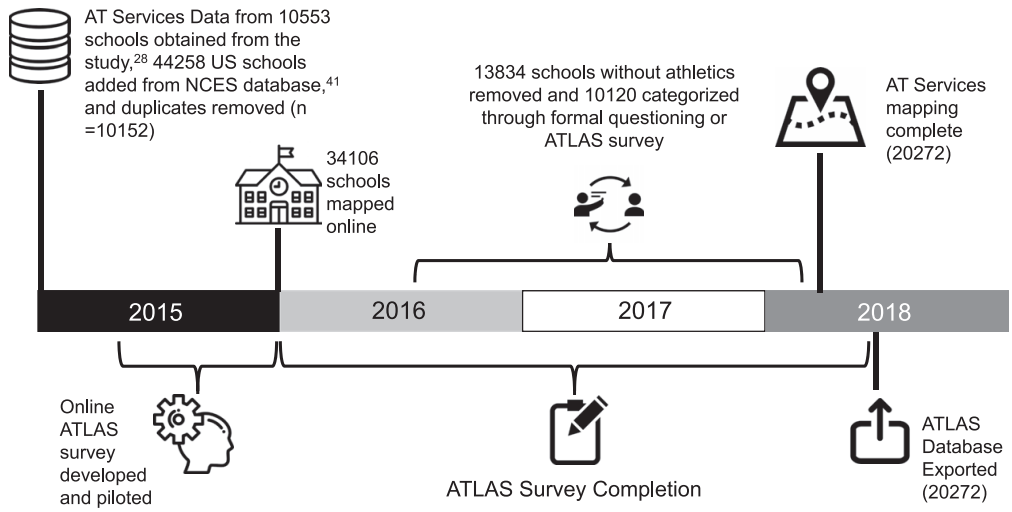

Figure 1. Timeline depicting data merging, acquisition, refinement, and mapping process for the Athletic Training Locations and Services (ATLAS) database. Also depicted is the survey development and validation, questionnaire availability and export. Abbreviations: AT, athletic trainer; NCES, National Center for Education Statistics.

database. If the school answered *yes* to having athletics but *no* regarding the provision of health care services in the form of an AT, the school was listed in the database as having no AT services and the questioning was complete. When a school representative provided the responses and in an effort to reduce the inaccuracy of reporting, we made every attempt to garner a response from the secondary school AT who provided care to that school's athletes. If no AT was identified, then responses to the questions were gathered from the athletic director, principal or assistant principal, sport coach, or school office assistant. If both a school representative and the AT answered the questions (via phone, e-mail, or online survey), the response of the AT superseded that of the school official. Throughout the categorization process, the state lists that were shared with the NATA SSATC chairs and each state association's secondary school committee were cross-referenced by the researchers and the online maps were updated to reflect the changes to help expedite and track the progress being made in each state. Furthermore, revised working lists of schools whose AT services remained unknown were then shared with each NATA SSATC chair or state leader or liaison actively working with the researchers until the national mapping was completed (February 21, 2018).

In addition to the previously described data-acquisition questions, we used a secondary means of data procurement: the ATLAS Project database and schools previously determined to have AT services, recruitment e-mails, social media communications, blog posts, advertisements, and articles from both the NATA and the researchers asking ATs to participate in the ATLAS Survey (Qualtrics, Provo, UT) were distributed.[26] Only schools that reported providing AT services were surveyed to obtain demographic information related to the level of AT services offered (eg, FT or part time [PT]), as well as the mode in which they were currently employed (eg, school district, school district with teaching, medical facility, hospital, clinic, university, or independent contractor).

We developed the ATLAS Survey with assistance from the NATA SSATC. Two content-area research experts, 1 with experience in secondary school athletic training research and 1 with leadership experience in the secondary school athletic training setting, and an AT graduate assistant researcher determined the content examined in the descriptive items of the questionnaire and judged the appropriateness of the items. After the questionnaire was completed and uploaded to the online platform, 4 content-area experts, 2 members of the NATA SSATC, and 2 content-area researchers with expertise in the development and administration of online surveys reviewed the questionnaire for face and content validity. After establishing face and content validity, we selected 1 state to pilot the survey and provide feedback. The responses were analyzed, and the multiple choice options were expanded to include all potential responses. Given that all items in this questionnaire are descriptive in nature, centered on a singular construct of the availability of AT services in secondary schools, the instrument did not necessitate criterion or construct validity. The questionnaire was then made publicly available via an open-access link. Annually in the month of August, additional questions were added to enhance the description of various items based on requests from the NATA and future research interests; however, the original questions remained unchanged. The additional items underwent the same face-validation and content-validation process previously described. If more than 1 AT from a school completed the questionnaire or an individual responded to the questionnaire more than once, the most recent and complete questionnaire was used. The research was reviewed and approved by the University of Connecticut Institutional Review Board.

Analyses

All files were managed using Microsoft Excel (version 16.14.1; Microsoft Corp, Redmond, WA). Questionnaire responses were exported to comma-separated values (.csv) files and merged using common identifiers: school name, city, state, and zip code. Descriptive statistics including counts, ranges, and percentages for FT, PT and no AT services for public, private, and public + private secondary schools combined by state, by employment, and by NATA

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district are outlined in the following section. *Full-time AT services* were operationally defined as a school that received AT services for ≥30 hours per week, ≥5 days per week, and ≥10 months per year. *Part-time AT services* were defined as anything less than FT, and *no AT services* meant that at no time did the school receive any services from an AT. The highest (top 5 with the highest relative percentages) and lowest (bottom 5 lowest percentages) percentages were also reported.

RESULTS

Athletic Trainer Services by State and by NATA District

Secondary schools with athletics programs and the type and amount of AT services provided in each of the 50 US states and the District of Columbia were categorized (n = 20 272) and, furthermore, 50% (n = 6754) of the schools with AT services (n = 13 473) completed the ATLAS Survey. Descriptive statistics regarding AT services by type in US secondary schools by state and district are presented in Tables 1 and 2. Access to AT services (FT and PT combined) by state and district are presented in Figure 2. In total, 66% (n = 13 473, N = 20 272) of US secondary schools with athletics programs received AT services, while 34% (n = 6799) did not. Of those secondary schools that provided AT services, 53% (n = 7119) received FT services and 47% (n = 6354) received PT services. The state-specific percentages of levels of AT services provided ranged from 1% to 80% for FT, 8% to 60% for PT, and 10% to 86% for no AT services. New Jersey, Hawaii, Connecticut, Pennsylvania, and Delaware had the highest percentages of access to AT services. New Jersey, Hawaii, Pennsylvania, South Carolina, and Indiana had the highest percentages of FT services, while Nebraska, Rhode Island, Alaska, Iowa, and Connecticut had the highest percentages of PT services. The states with the highest percentages of secondary schools without AT services were Alaska, Oklahoma, Idaho, Arkansas, and North Dakota.

Descriptive data of AT services in order of NATA district and the states within each district are available in Table 1. By NATA district, Districts 2, 9, and 6 had the highest percentages of secondary schools with access to AT services (78%, 75%, and 70%, respectively; Table 2). Districts 2 and 6 also had the highest percentages of FT services. Districts 10 and 5 had the highest percentages of secondary schools without access to AT services.

Athletic Trainer Services by School Type by State

On-site AT services in the United States by secondary school type (public and private), state, and NATA district are presented in Table 2. In the public school setting, 69% of secondary schools had access to AT services, while 31% were without. Of those public secondary schools with access to AT services (n = 11 171), 54% received FT (n = 5990) and 46% (n = 5181) received PT services. The ranges of AT access, FT, PT, and no AT services in the public setting were 13% to 100%, 1% to 91%, 4% to 59%, and 0% to 87%, respectively. Delaware, Georgia, Hawaii, New Jersey, and Pennsylvania had the highest percentages of public secondary schools with access to AT services, while Alaska, Oklahoma, North Dakota, Idaho, and Arkansas had the lowest percentages of public secondary schools with AT services. Compared with public secondary schools, private secondary schools had a 14% reduction in access to AT services, a 10% reduction in FT services, and a 4% reduction in PT services. Of those private secondary schools with access to AT services (n = 2302), 27% received FT services and, similarly, 28% received PT services. The states of Massachusetts, Nebraska, and Rhode Island, the District of Columbia, and Hawaii had the highest percentages of private secondary schools with access to AT services, while FT services were highest in the District of Columbia, Massachusetts, New Jersey, Delaware, and Hawaii. The states with the highest percentages of private secondary schools with PT services were Nebraska, Rhode Island, South Dakota, Mississippi, and Iowa. The states with the largest percentages of private secondary schools without AT services were Wyoming, Utah, New Hampshire, Idaho, and Alaska.

Athletic Trainer Services by School Type by NATA District

District data (Table 2) demonstrated that NATA districts 2, 3, and 6 had the highest percentages of public + private secondary schools with access to AT services; these same 3 districts also had the highest public school percentages of FT services. Districts 10, 5, and 8 had the highest percentages of secondary schools without AT services. Districts 2, 1, and 5 had the highest percentages of private secondary schools with AT access (67%, 61%, and 61%, respectively), while districts 2, 1, and 3 had the highest percentages of private secondary schools with FT services (43%, 38%, and 35%, respectively).

Athletic Trainer Employment Type

Of the 13 473 schools with access to AT services, 50% (n = 6754) of secondary schools completed the online ATLAS Survey (Table 3). Individual state response rates ranged from 26% to 100%. Eighty-four percent of ATLAS Survey respondents were from public secondary schools, while 16% were from private secondary schools. Fifty-seven percent of respondents were employed by a medical or university facility, 38% were employed by the school district (school district = 24%, school district with teaching = 14%), and 5% were independent contractors. Employment data by district revealed that Districts 3 and 10 had the highest percentages of ATLAS Survey completion (66% and 63%, respectively). Districts 6 and 8 had the highest percentages of respondents employed by the school district (80% and 63%, respectively), while district 4 had the lowest percentage (11%). Districts 4, 5, and 9 had the highest percentages of respondents employed by medical or university facilities (85%, 72%, and 72%, respectively), whereas Districts 6, 7, and 8 had the lowest percentages (18%, 40%, and 28%, respectively).

DISCUSSION

The primary results from our analyses were that 66% of US secondary schools (both public and private combined) with athletics programs had AT services. Of the 13 473 secondary schools with AT services, 53% (n = 7119) received FT services and the remaining 47% (n = 6354)

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Table 1. Athletic Trainer Services in US Secondary Schools[a]

State	District	Public and Private Schools Combined, No.				Public and Private Schools Combined, %[b]		
		Total Schools	Full Time	Part Time	None	Full Time	Part Time	None
Connecticut	1	213	78	109	26	37	51	12
Maine	1	148	55	41	52	37	28	35
Massachusetts	1	392	140	136	116	36	35	30
New Hampshire	1	175	44	27	104	25	15	59
Rhode Island	1	59	12	34	13	20	58	22
Vermont	1	85	24	29	32	28	34	38
District totals		1072	353	376	343	31	37	33
Delaware	2	55	30	18	7	55	33	13
New Jersey	2	446	355	48	43	80	11	10
New York	2	898	241	333	324	27	37	36
Pennsylvania	2	767	515	149	103	67	19	13
District totals		2166	1141	548	477	57	25	18
District of Columbia	3	51	27	4	20	53	8	39
Maryland	3	298	131	80	87	44	27	29
North Carolina	3	522	236	137	149	45	26	29
South Carolina	3	293	177	53	63	60	18	22
Virginia	3	461	230	82	149	50	18	32
West Virginia	3	131	14	41	76	11	31	58
District totals		1756	815	397	544	44	21	35
Illinois	4	832	284	221	327	34	27	39
Indiana	4	424	236	123	65	56	29	15
Michigan	4	789	139	271	379	18	34	48
Minnesota	4	440	123	175	142	28	40	32
Ohio	4	854	381	307	166	45	36	19
Wisconsin	4	506	152	210	144	30	42	28
District totals		3845	1315	1307	1223	35	35	30
Iowa	5	352	85	193	74	24	55	21
Kansas	5	365	72	157	136	20	43	37
Missouri	5	604	141	168	295	23	28	49
Nebraska	5	298	68	178	52	23	60	17
North Dakota	5	157	20	41	96	13	26	61
Oklahoma	5	497	77	84	336	15	17	68
South Dakota	5	164	31	67	66	19	41	40
District totals		2437	494	888	1055	20	38	42
Arkansas	6	243	72	23	148	30	9	61
Texas	6	1620	797	418	405	49	26	25
District totals		1863	869	441	553	39	18	43
Arizona	7	283	109	76	98	39	27	35
Colorado	7	336	112	116	108	33	35	32
New Mexico	7	150	44	21	85	29	14	57
Utah	7	182	51	34	97	28	19	53
Wyoming	7	73	25	14	34	34	19	47
District totals		1024	341	261	422	33	23	45
California	8	1558	312	582	664	20	37	43
Hawaii	8	75	56	11	8	75	15	11
Nevada	8	102	31	27	44	30	26	43
District totals		1735	399	620	716	42	26	32
Alabama	9	474	127	250	97	27	53	20
Florida	9	729	275	233	221	38	32	30
Georgia	9	535	211	246	78	39	46	15
Kentucky	9	289	122	68	99	42	24	34
Louisiana	9	396	159	102	135	40	26	34
Mississippi	9	329	100	162	67	30	49	20
Tennessee	9	424	168	159	97	40	38	23
District totals		3176	1162	1220	794	37	38	25
Alaska	10	157	1	21	135	1	13	86
Idaho	10	169	40	22	107	24	13	63
Montana	10	177	34	58	85	19	33	48
Oregon	10	295	57	73	165	19	25	56
Washington	10	400	98	122	180	25	31	45
District totals		1198	230	296	672	17	23	60
National totals		20272	7119	6354	6799	35	31	34

[a] The response rate in all states was 100%.

[b] Value represents the percentage of total schools with athletics.

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Table 2. Athletic Trainer Services in US Public and Private Secondary Schools by National Athletic Trainers' Association District

		Public Schools					Private Schools				
			Percentage[a]					Percentage[a]			
State	District	Total Schools, No.	Services	Full Time	Part Time	None	Total Schools, No.	Services	Full Time	Part Time	None
Connecticut	1	145	92	33	59	8	68	78	44	34	22
Maine	1	116	66	35	30	34	32	63	44	19	38
Massachusetts	1	329	65	32	34	35	63	97	57	40	3
New Hampshire	1	86	60	34	27	40	89	21	17	4	79
Rhode Island	1	43	74	16	58	26	16	88	31	56	13
Vermont	1	62	68	26	42	32	23	48	35	13	52
District totals		781	71	29	42	29	291	66	38	28	34
Delaware	2	30	100	57	43	0	25	72	52	20	28
New Jersey	2	355	96	86	9	4	91	69	53	16	31
New York	2	758	64	27	37	36	140	66	26	40	34
Pennsylvania	2	588	93	75	18	7	179	66	41	25	34
District totals		1731	88	61	27	12	435	68	43	25	32
District of Columbia	3	36	53	44	8	47	15	80	73	7	20
Maryland	3	186	76	44	32	24	112	63	45	18	38
North Carolina	3	416	76	50	25	24	106	55	25	29	45
South Carolina	3	203	89	71	18	11	90	54	36	19	46
Virginia	3	313	81	62	19	19	148	39	24	15	61
West Virginia	3	114	42	11	31	58	17	41	6	35	59
District totals		1268	69	47	22	31	488	55	35	20	45
Illinois	4	689	61	35	26	39	143	57	30	27	43
Indiana	4	349	90	60	30	10	75	61	36	25	39
Michigan	4	658	55	19	36	45	131	35	11	24	65
Minnesota	4	384	70	28	41	30	56	55	25	30	45
Ohio	4	709	83	46	37	17	145	67	36	31	33
Wisconsin	4	415	77	33	43	23	91	47	15	32	53
District totals		3204	73	37	36	27	641	54	26	28	46
Iowa	5	313	80	24	56	20	39	74	26	49	26
Kansas	5	326	64	20	44	36	39	49	18	31	51
Missouri	5	500	51	24	27	49	104	54	21	33	46
Nebraska	5	261	81	22	59	19	37	95	30	65	5
North Dakota	5	148	37	12	25	63	9	67	22	44	33
Oklahoma	5	460	32	15	17	68	37	41	22	19	59
South Dakota	5	150	59	19	40	41	14	71	21	50	29
District totals		2158	58	19	38	42	279	64	23	41	36
Arkansas	6	212	39	30	9	61	31	39	26	13	61
Texas	6	1340	80	55	25	20	280	50	21	30	50
District totals		1552	60	43	17	40	311	45	23	21	55
Arizona	7	233	71	43	28	29	50	38	16	22	62
Colorado	7	298	69	33	36	31	38	61	34	26	39
New Mexico	7	130	44	30	14	56	20	40	25	15	60
Utah	7	133	61	37	24	39	49	8	4	4	92
Wyoming	7	71	55	34	21	45	2	0	0	0	100
District totals		865	60	35	25	40	159	29	16	13	71
California	8	1087	59	21	38	41	471	55	18	37	45
Hawaii	8	45	96	91	4	4	30	80	50	30	20
Nevada	8	86	62	33	29	38	16	31	19	13	69
District totals		1218	72	48	24	28	517	55	29	26	45
Alabama	9	360	85	29	56	15	114	61	19	42	39
Florida	9	454	83	46	37	17	275	48	24	24	52
Georgia	9	369	98	44	54	2	166	57	29	28	43
Kentucky	9	232	69	45	24	31	57	51	30	21	49
Louisiana	9	288	70	41	30	30	108	54	38	16	46
Mississippi	9	243	84	34	49	16	86	69	20	49	31
Tennessee	9	321	81	42	39	19	103	66	32	34	34
District totals		2267	81	40	41	19	909	58	27	31	42
Alaska	10	147	13	1	12	87	10	30	0	30	70
Idaho	10	147	38	26	12	62	22	27	9	18	73
Montana	10	166	52	20	33	48	11	45	9	36	55
Oregon	10	247	47	20	27	53	48	29	17	13	71
Washington	10	325	58	26	32	42	75	40	17	23	60
District totals		1032	42	18	23	58	166	34	10	24	66
National totals		16 076	69	37	32	31	4196	55	27	28	45

[a] Value represents the percentage of total schools with athletics.

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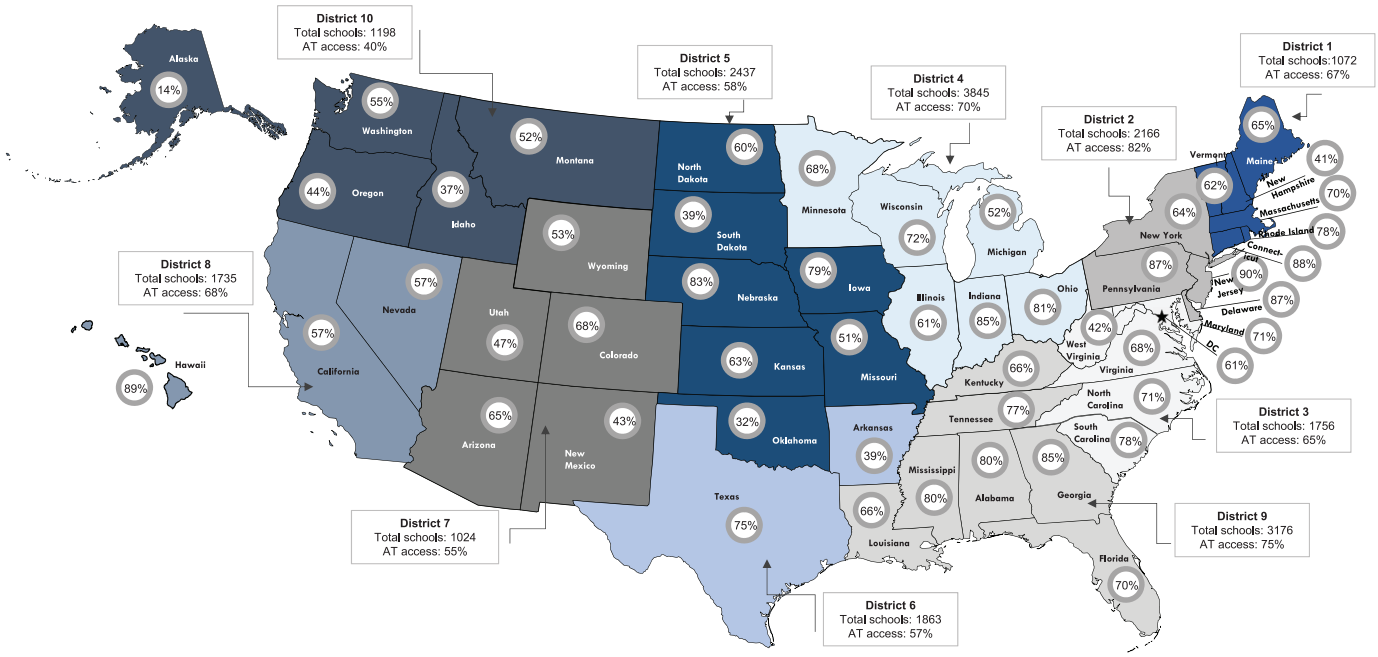

Figure 2. Percentages of schools by state and National Athletic Trainers' Association district with athletic trainer (AT) services.

received PT services. Although a majority of secondary schools had AT services, perhaps our most critical finding from a health and safety perspective was that 34% (n = 6799) of US secondary schools with athletics programs did not have access to AT services. Additionally, we determined that there were 14% more secondary schools with AT services, 10% more secondary schools with FT services, and 4% more secondary schools with PT services in the public versus the private sector. Lastly, in the 50% of US secondary schools with AT services that responded to the ATLAS Survey (n = 6754), 57% of ATs were employed by a medical or university facility, while 38% were employed directly through the school district (school district and school district with teaching responsibilities combined).

These key findings provide insights in several important areas. First, given the 6799 US schools without AT services, a large opportunity for growth for the athletic training profession in the secondary school setting remains. It is imperative that future researchers explore this opportunity and the factors associated with the current lack of AT services provided by these schools to their athletes. Studies in this area will enhance and confirm our understanding of the potential demographic,[27] socioeconomic,[28] financial,[29,30] geographic, and organizational barriers[20,29,30] and proximity to other medical facilities[30] highlighted by previous investigators in this area. Second, although our findings of reduced AT services in private versus public secondary schools are consistent with those of Pike et al,[18] why private schools, despite the similar barriers involving school size, budget, and lack of awareness reported, have fewer AT services remains unknown. Future authors should examine other factors specific to private schools such as boarding versus nonboarding, legal responsibility and liability, and the sense of independent governance as opposed to the policy compliance often required by state athletic associations for the public sector. Our understanding of the factors associated with medical or university employment versus school district employment must be enhanced. To that point, if the differences among these employment models can be established, perhaps linkages to the quality of medical care and value that the AT services provide from an outcomes-based perspective can be identified. It is by examining these key questions that we can better comprehend the market for and long-term growth of the athletic training profession in secondary schools.

Our findings were consistent with those of Pryor et al,[19] who demonstrated that 70% of public secondary schools had AT services, and those of Pike et al,[20] who showed that 58% of private secondary schools had AT services. Furthermore, when they combined the public and private school data, Pike et al[18] established that 67% of public and private secondary schools had AT services. This result was within 3% of our data (Table 4). Taken together, the consistency of these findings across all studies provides a high level of reliability regarding the percentage of secondary schools with AT services and the employment status of ATs. It is also important to note that although our definitions of FT and PT differed slightly from those used by previous researchers, the results were similar. Interestingly, if data from 1993 to 1994, first reported by Lyznicki et al[31] in 1999, as well as data from 2008 reported by Lowe and Pulice[32] in 2009, are taken in concert with the previous findings, the percentage of combined public + private secondary schools with AT services appears to have increased from 35% in 1993 to 67% in 2017. Based on these data, an increase in the percentage of secondary schools with AT services (32%) occurred while the number of secondary schools was simultaneously increasing. Although previous results[18–20] and ours suggest that the percentage of secondary schools with AT services has plateaued in the last 4 years, the percentage of growth observed from 1993 to 2017 would suggest the numbers are increasing. However, it is important to point out that these few data points are not enough to predict or suggest true

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Table 3. Employers of Athletic Trainers (ATs) in US Secondary Schools by National Athletic Trainers' Association District

State	District	Schools With AT Services, No.	Athletic Training and Locations Services Survey Response Rate, %[a]	AT Employer, No.				AT Employer, %[b]			
				School District	School District + Teaching	Hospital, Clinic, or University	Independent Contractor	School District	School District + Teaching	Hospital, Clinic, or University	Independent Contractor
Connecticut	1	187	44	29	4	46	4	35	5	55	5
Maine	1	96	99	26	10	52	7	27	11	55	7
Massachusetts	1	276	42	51	17	42	7	44	15	36	6
New Hampshire	1	71	70	17	4	26	3	34	8	52	6
Rhode Island	1	46	46	6	2	12	1	29	10	57	5
Vermont	1	53	100	18	3	27	5	34	6	51	9
District totals		729	57	147	40	205	27	35	10	49	6
Delaware	2	48	69	9	7	15	2	27	21	45	6
New Jersey	2	403	58	210	15	6	4	89	6	3	2
New York	2	574	40	79	15	122	14	34	7	53	6
Pennsylvania	2	664	61	92	21	274	16	23	5	68	4
District totals		1689	53	390	58	417	36	43	6	46	4
District of Columbia	3	31	97	26	2	0	2	87	7	0	7
Maryland	3	211	70	36	14	87	10	24	10	59	7
North Carolina	3	373	64	26	64	140	8	11	27	59	3
South Carolina	3	230	80	16	39	116	14	9	21	63	8
Virginia	3	312	59	72	53	55	3	39	29	30	2
West Virginia	3	55	27	4	2	8	1	27	13	53	7
District totals		1212	66	180	174	406	38	23	22	51	5
Illinois	4	505	39	30	18	138	11	15	9	70	6
Indiana	4	359	62	12	15	187	7	5	7	85	3
Michigan	4	410	54	23	6	176	17	10	3	79	8
Minnesota	4	298	58	2	1	165	5	1	1	95	3
Ohio	4	688	42	4	16	267	5	1	5	91	2
Wisconsin	4	362	29	3	0	99	3	3	0	94	3
District totals		2622	46	74	56	1032	48	6	5	85	4
Iowa	5	278	27	9	1	61	4	12	1	81	5
Kansas	5	229	34	9	3	57	8	12	4	74	10
Missouri	5	309	52	11	18	123	8	7	11	77	5
Nebraska	5	246	26	15	5	37	6	24	8	59	10
North Dakota	5	61	57	1	1	33	0	3	3	94	0
Oklahoma	5	161	76	31	17	67	8	25	14	54	7
South Dakota	5	98	67	0	0	56	10	0	0	85	15
District totals		1382	43	76	45	434	44	13	8	72	7
Arkansas	6	95	67	10	13	41	0	16	20	64	0
Texas	6	1215	46	290	190	71	10	52	34	13	2
District totals		1310	48	300	203	112	10	48	32	18	2
Arizona	7	185	58	37	41	25	5	34	38	23	5
Colorado	7	228	51	34	16	62	4	29	14	53	3
New Mexico	7	65	51	10	21	1	1	30	64	3	3
Utah	7	85	80	6	15	44	3	9	22	65	4
Wyoming	7	39	74	12	6	10	1	41	21	34	3
District totals		602	59	99	99	142	14	28	28	40	4
California	8	894	35	147	60	75	33	47	19	24	10
Hawaii	8	67	54	27	0	9	0	75	0	25	0
Nevada	8	58	69	5	6	25	4	13	15	63	10
District totals		1019	38	179	66	109	37	46	17	28	9
Alabama	9	377	30	0	16	87	11	0	14	77	10
Florida	9	508	51	59	43	135	23	23	17	52	9
Georgia	9	457	45	20	22	151	11	10	11	74	5
Kentucky	9	190	52	8	5	84	1	8	5	86	1
Louisiana	9	261	68	11	31	123	12	6	18	69	7
Mississippi	9	262	35	3	4	83	1	3	4	91	1
Tennessee	9	327	55	18	7	148	7	10	4	82	4
District totals		2382	47	119	128	811	66	11	11	72	6
Alaska	10	22	32	1	0	4	2	14	0	57	29
Idaho	10	62	60	4	9	24	0	11	24	65	0
Montana	10	92	64	5	4	45	5	8	7	76	8
Oregon	10	130	69	25	3	52	10	28	3	58	11
Washington	10	220	64	12	41	77	10	9	29	55	7
District totals		526	63	47	57	202	27	14	17	61	8
National totals		13 473	50	1611	926	3870	347	24	14	57	5

[a] Value represents the percentage of total schools with athletics.
[b] Value represents the percentage of total survey respondents.

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Table 4. Comparison of Research Examining Athletic Trainer (AT) Services in the United States

Study	Setting	Total Schools, No.	Access and Type of AT Services Reported				
			AT Services, % (No.)	FT, % (No.)	PT, % (No.)	No AT Services, % (No.)	Per Diem, % (No.)
Lyznicki et al (1999)[31]	Combined	7600	35 (2660)[a]	ND	ND	ND	ND
Lowe and Pulice (2009)[32]	Combined	10 957[a]	42 (4602)	ND	ND	ND	ND
Pryor et al (2015)[19]	Public	8509	70 (5930)	37 (3145)	31 (2619)	30 (2579)[a]	2 (199)
Pike et al (2016)[20]	Private	2044	58 (1176)	28 (574)	25 (501)	42 (868)[a]	4 (78)
Pike et al (2017)[18]	Combined	10 553	67 (7106)	35 (3719)	30 (3130)	33 (3447)[a]	3 (281)
Current study	Public	16 076	69 (11 171)	37 (5990)	32 (5181)	31 (4905)	ND
Current study	Private	4196	55 (2302)	27 (1129)	28 (1173)	45 (1894)	ND
Current Study	Combined	20 272	66 (13 473)	35 (7119)	31 (6354)	34 (6799)	ND

Abbreviations: FT, full time; ND, no data; PT, part time.

[a] Value calculated based on numbers reported in the study.

changes in the employment of ATs in this setting over time. Prospective analyses would allow for a greater understanding of the growth, decline, and saturation of AT services in this setting. Furthermore, we need continued monitoring and reporting of AT services data in the secondary school setting via projects and databases such as those described earlier.

The overall comparison of AT services in the public, private, and combined public + private secondary schools demonstrated nearly 4 times the number of public secondary schools versus private secondary schools with athletics in the United States. Additionally, public secondary schools had increased access (+14%) to AT services. This is largely explained by the greater percentage of public secondary schools with FT services (+10%). Forty-five percent of private secondary schools with athletics programs did not have AT services. When combined, 34% (n = 6799) of public and private secondary schools nationwide did not have AT services during school-sponsored athletics. These results leave many unanswered questions related to athletes' health and safety. Specific concerns surrounding proper injury and illness diagnosis, management, and appropriate referral; preventive measures such as emergency planning and care; environmental monitoring and, if required, cancellation of activities; injury-prevention mechanisms; and risk management are left to the secondary school administrators, coaches, and the nearest emergency medical services.[33] Although some secondary schools would consider these responsibilities unnecessary, in the event of a potential sudden death or catastrophic injury scenario when immediate treatment is necessary, the services of an onsite AT may be critical to the patient's survival. Also, we know from previous research[34] on administrators in secondary schools that coaching staffs often are not certified in cardiopulmonary resuscitation or first aid and that 88% of the essential event-coverage components outlined by the American Academy of Pediatrics as important were not addressed in secondary schools. Survival data related to the presence of an AT or other medical personnel remain unknown, but data from the Korey Stringer Institute and National Center for Catastrophic Sport Injury Research on sudden deaths from 2000 to 2013 indicated that 42% of respondents did not have medical services present at the time of death and an AT was not present or onsite for 62% of the deaths.[35] Not all deaths are preventable or treatable (eg, anatomical cardiac abnormality), yet this reported lack of any type of medical services at the time of death must be taken into consideration by secondary school administrators, education boards, parent advocacy groups, and state high school athletics associations when assessing the level of health and safety in their sports programs and determining the need for medical services.

Our findings related to overall access to AT services in secondary schools were similar to those of previous investigators. However, we demonstrated that Districts 2, 9, and 4 had the highest percentages of public secondary schools with access to AT services: 88%, 81%, and 73%, respectively. These results were similar to those of an earlier study[19] of public schools for 2 of the NATA Districts (2 and 4) but dissimilar for the next highest, District 3, which had 69% of secondary public schools with access to AT services, a 10% reduction in AT services compared with the previous findings. Of note, other large discrepancies occurred between the current study and the previous investigations. Districts 5, 6, and 8 displayed differences of −10%, −12%, and 14%, respectively. The differences observed were likely not due to actual changes in AT services provided to the secondary schools and more likely due to methodologic differences and overall response rates. For example, the observed response rates for these districts in the previous investigation were 47% (n = 150), 42% (n = 134), and 29% (n = 181), respectively, whereas our rates were 100% in all 3 districts and totals of 2158, 1552, and 1218 secondary public schools in Districts 5, 6, and 8, respectively. In any case, these values shed light on the need for accurate representations using population data rather than sampling. The same rationale is probably the case for the discrepancies in access to AT services in private schools between previous investigations and the current study. We determined that NATA Districts 2, 1, and 5 had the largest percentages of private secondary schools with AT services (68%, 66%, and 64%, respectively), whereas earlier authors showed that Districts 1, 2, and 3 were highest (76%, 62%, 61%, respectively). The largest observed difference in the access to AT services in private secondary schools was in NATA District 7: −29%. Again, this reduction was less likely due to actual reductions in AT services and more likely due to improved response rates. For example, in the earlier research, the rate for this district was 26% and a total of 46 private schools, whereas our rate was 100% and a total of 159 schools.

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LIMITATIONS

This study was not without limitations. Although all data from the previous studies[18–20] were updated and confirmed, data on AT services were collected from 2015 to 2018; thus, the services at a given secondary school may have changed during that time. Researchers continually updated data annually from publicly accessible information and from ATs who completed the ATLAS Survey annually for their school; still, we were not able to say with 100% certainty that the extent of AT services in this report reflects the present status of AT services and employment. However, given the magnitude of this research task, this is the best available information that can be produced in a timely manner. Furthermore, the responses provided by various types of school representatives regarding the presence of an AT may have resulted in inaccurate reporting. This would have occurred only in secondary schools that were identified as having an AT who did not complete the online ATLAS Survey.

Another limitation was that our data did not account for dual modes of AT employment. For example, we were unable to state how frequently multiple ATs in secondary schools were employed by different entities or when an AT was employed by a combination of employers (eg, 50% employed by the school district and 50% by a university). The most recent version of the ATLAS Survey (data not included in these results) has been modified with this limitation in mind so that we may be able to better address the needs of the profession and answer specific questions related to AT employment in future versions of the survey and subsequent publications.

CONCLUSIONS

This study provides the most comprehensive quantification to date of AT services provided by US secondary schools with athletics programs. Sixty-six percent of US secondary schools had AT services, and most ATs were employed via a medical or university facility, followed by employment through the school district. Large differences in the access to, type of, and employment model for AT services existed among NATA regions and individual states. These data provide an update to previous research examining AT services in this setting and allow future authors to address the factors that might explain or predict AT services related to school demographics (eg, socioeconomic status, number of athletes, number of students, school locale) via upkeep of the prospective ATLAS Project database. Furthermore, these data provide evidence on which strategic secondary school health and safety initiatives can be based.

The primary novelty of these data is that every US secondary school with athletics was contacted and information regarding the extent of health care in the form of AT services was obtained. To our knowledge, not only has this never been achieved before in athletic training, but this may be the first time in recent history that AT services in every high school have been examined outside of mandatory governmental reporting. Second, this manuscript and the data herein are intended to serve as the foundation for and the springboard to future research in the secondary school setting. The ATLAS Project database was developed to provide information to the profession for the purposes of improving the health and safety of athletes, advancing the profession, improving best practices and employment, and assisting with strategic legislative initiatives. Databases such as this are developed and maintained to allow for the tracking and advancement of the athletic training profession. These efforts have the potential to provide data comparing various employment models by locale, population density, socioeconomic status, and various other factors that could improve the delivery of health care and optimize the health and safety of hundreds of thousands of student-athletes.

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