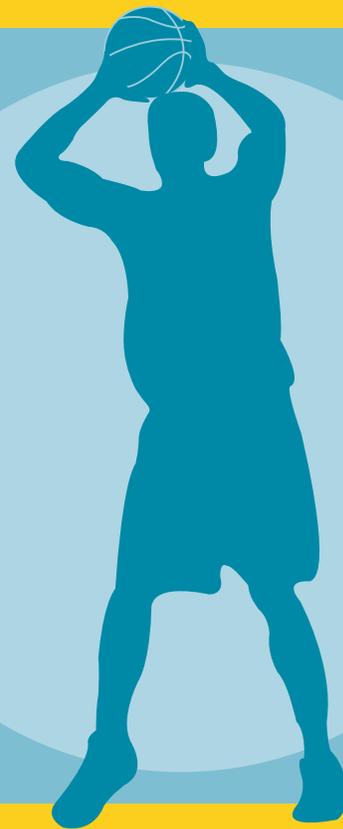




SECULAR CHANGES IN PHYSICAL EDUCATION ATTENDANCE AMONG U.S. HIGH SCHOOL STUDENTS

YRBS 1991–2013



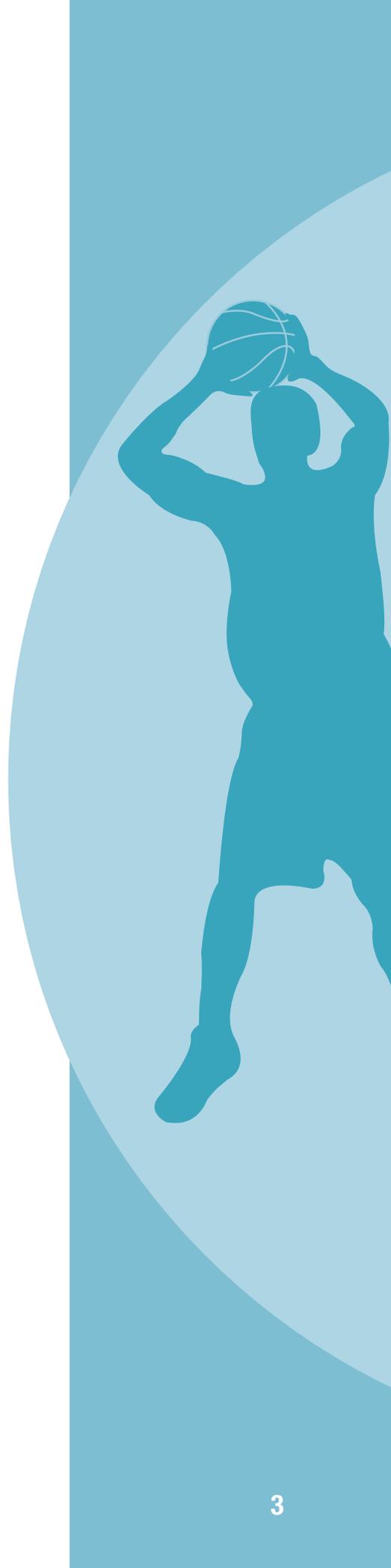
National Physical Activity Plan Alliance
Secular Changes in Physical Education Exposure
Ad Hoc Committee
Fall 2016



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Disclaimer: The findings and conclusions in this article are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.



About the National Physical Activity Plan Alliance

The NPAPA is a not-for-profit 501-c3 organization committed to ensuring the long-term success of the National Physical Activity Plan (NPAP). The NPAPA is a coalition of national organizations that have come together to ensure that efforts to promote physical activity in the American population will be guided by a comprehensive, evidence-based strategic plan. The NPAPA is governed by a Board of Directors composed of representatives of organizational partners and at-large experts on physical activity and public health (see the NPAP's website below for a complete list of partners). Ultimately, the NPAPA aims to create a national culture that supports physically active lifestyles for all.

The NPAPA has established the following key goals:

- Support implementation of the NPAP's strategies and tactics
- Expand awareness of the NPAP among policy makers and key stakeholders
- Evaluate the NPAP on an ongoing basis
- Periodically revise the NPAP to ensure its effective linkage to the current evidence base

The Secular Changes in Physical Education Exposure Committee responsible for developing this report is an ad hoc committee of the National Physical Activity Plan Alliance (NPAPA).

About the National Physical Activity Plan

The National Physical Activity Plan (NPAP) is a comprehensive set of policies, programs, and initiatives that aim to increase physical activity in all segments of the American population. It is the product of a private-public sector collaborative. Hundreds of organizations are working together to change our communities in ways that will enable every American to be sufficiently physically active. The NPAP's ultimate purpose is to improve health, prevent disease and disability, and enhance quality of life.

To accomplish this goal, the NPAP calls for a national and multi-pronged approach across nine societal sectors:

- Business and Industry
- Community Recreation, Fitness, and Parks
- Education
- Faith-Based Settings
- Healthcare
- Mass Media
- Public Health
- Sport
- Transportation, Land Use, and Community Design

Within each of these nine societal sectors, strategies aimed at promoting physical activity in the corresponding sector are presented. Each strategy is supported by underlying tactics that communities, organizations, agencies, and individuals can use to accomplish the strategy. Recognizing that some priorities encompass multiple sectors, the NPAP also has several overarching priorities focusing on initiatives that aim to increase physical activity. For more information on the NPAP or the NPAPA, visit: <http://www.physicalactivityplan.org>.



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Executive Summary

Secular Changes in Physical Education Attendance Among U.S. High School Students, YRBS 1991–2013

Objective

This project was designed to examine secular changes in physical education attendance among U.S. high school students over the past two decades.

Methodology

To examine changes in physical education attendance over time, this report analyzed data from 12 biennial cycles of the national Youth Risk Behavior Survey (YRBS). The YRBS assessed the percent of high school students reporting 1) individual days per week of physical education attendance, 2) any physical education attendance, and 3) daily physical education attendance as well as 4) the average number of physical education days per week from 1991–2013. Trends in physical education attendance were analyzed among all students and by grade level, sex, and race/ethnicity subgroups.

Results

The findings from the YRBS analysis showed that among U.S. high school students, attendance in any physical education (i.e., at least 1 day per week) did not change from 1991–2013, with approximately half of students reporting any physical education attendance across the time period. However, the percentage of high school students reporting daily physical education attendance was observed to decrease significantly from 41.6% in 1991 to 25.4% in 1995 and then did not change through 2013. Notable differences in daily physical education attendance trends emerged across grade level, sex, and race/ethnicity subgroups. Similarly, among students attending at least 1 day per week of physical education, the average number of physical education days per week decreased significantly from 4.64 days in 1991 to 3.64 days in 1995 and then remained stable through 2013.

Conclusions

Results from the present report indicate physical education attendance among U.S. high school students is well below the recommended guidelines calling for daily physical education attendance and has been so for the past two decades. Since 1991, the overall percentage of U.S. high school students reporting any physical education attendance remained stable. However, daily physical education attendance and the average number of physical education days among those with any physical education decreased from 1991 to 1995. Despite claims of declining physical education, the results suggest no significant change in physical education attendance from 1995 to 2013 among U.S. high school students. In order to maximize the benefits of physical education, the adoption of policies and programs aimed at increasing participation in physical education among all U.S. students should be prioritized. The U.S. National Physical Activity Plan provides evidence-based strategies and tactics that, if fully implemented, have the potential to substantially increase student participation in school-based physical education programs.



Secular Changes in Physical Education Attendance Among U.S. High School Students, YRBS 1991–2013

Objective of the Committee

At the request of the President’s Council on Fitness, Sport, and Nutrition, the National Physical Activity Plan Alliance (NPAPA) formed a committee to review the available evidence regarding secular changes in exposure to school-based physical education among U.S. students. The Secular Changes in Physical Education Exposure Ad Hoc Committee (the Committee) is comprised of experts in physical activity and physical education from academic institutions as well as government and private organizations with a vested interest in school-based physical education (see page 5). The Committee was charged with the tasks of: 1) identifying the best existing surveys or studies with measures of physical education exposure (e.g., amount of time students spend in physical education class), 2) identifying and developing measures from these existing surveys or studies to assess physical education exposure over time, and 3) drawing conclusions based on the best available evidence.

While several claims regarding the decline in physical education exposure among U.S. students have been made, few large-scale studies have examined such changes.¹ As such, it remains unclear to what extent these changes have occurred. Further, it is unknown whether changes in physical education exposure, if any, are uniform across grade, school level (i.e., elementary, middle, and high school), and student demographics (i.e., grade level, sex, and ethnic/racial subgroups). Therefore, the primary goal of this report is to better understand physical education exposure over time to inform national recommendations and strategies for physical education.

Methodology

The Committee elected to focus on the quantity of physical education exposure (e.g., number of days per week attended physical education) instead of factors related to quality physical education (e.g., quality of instruction, teacher certification, class time spent being physically active). To assess secular changes in quantity of physical education exposure, the Committee selected two broad measures:

1. Student physical education attendance (e.g., percentage attending any physical education)
2. Level of school-provided instructional physical education (e.g., physical education time)

With these constructs in mind, the Committee identified available data that would allow them to examine secular changes in physical education. A total of 16 surveillance systems, studies, and other datasets were identified (Appendix A). After careful consideration, the best available data sources were selected.

The national Youth Risk Behavior Survey (YRBS) was selected to assess the percent of high school students attending physical education class and the number of days during an average week that high school students reported attending physical education. The School Health Policies and Practices Study (SHPPS), previously known as the School Health Policies and Programs Study, was selected to assess secular changes in the amount of time allocated for physical education at the



elementary, middle, and high school levels. This report presents data from YRBS. A subsequent report will detail secular changes in physical education time during 2000–2014 using SHPPS data.

Measures

Data were obtained from 12 biennial cycles (1991–2013) of the national YRBS, a nationally representative, cross-sectional, school-based survey that monitors 6 categories of priority health risk behaviors, obesity, and asthma among U.S. students in grades 9–12. A weighting factor was applied to each record to adjust for school and student nonresponse and oversampling of black and Hispanic students. Additional details regarding study design, sampling, data collection, and psychometric properties of the questionnaires are described elsewhere.^{2–5}

The YRBS questionnaire assessed high school students' physical education attendance with the following single question: "In an average week when you are in school, on how many days do you go to physical education (PE) classes?" Response options ranged from 0 to 5 days. The following variables were derived from this YRBS question:

Individual Number of Physical Education Days per Week

The individual number of physical education days per week was assessed by separately examining the number of days (0–5) of physical education attendance during an average school week.

Any Physical Education Attendance

Attendance in physical education was defined as students reporting any physical education attendance (i.e., 1 or more days per week) during an average school week.

Daily Physical Education Attendance

Daily physical education attendance was defined as students reporting attendance to physical education classes on 5 days during an average school week.

Average Number of Physical Education Days per Week

The average number of physical education days per week was calculated by taking the mean number of days of physical education attended during an average school week among students reporting at least 1 day per week of physical education attendance.

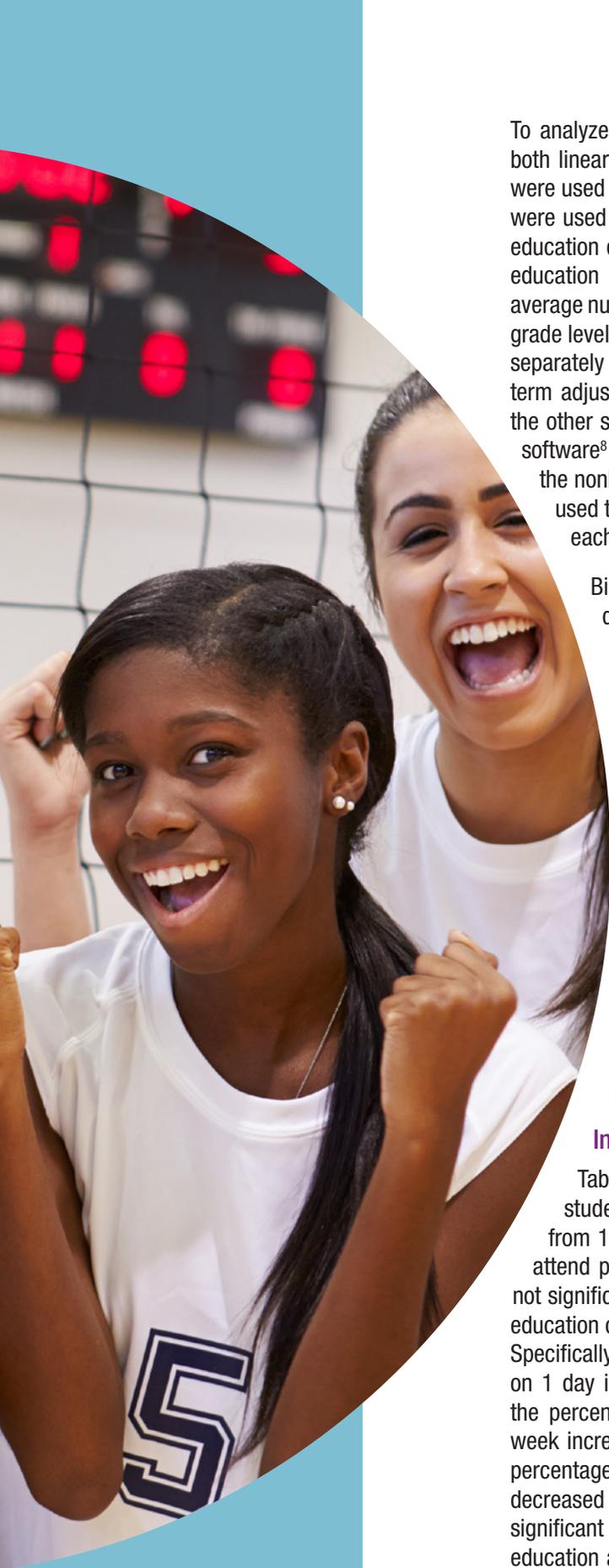
Student Demographic Characteristics

Demographic variables (grade level, sex, and race/ethnicity subgroups) were self-reported by high school students via the YRBS questionnaire.

Data Analysis

All analyses were conducted using SAS-callable SUDAAN, a statistical software package accounting for the complex sampling design.^{6,7} Trends in physical education attendance were analyzed among all students and by demographic subgroups (grade level, sex, and race/ethnicity subgroups). Analysis of individual days per week of physical education attendance was performed in the overall sample only. For all other physical education attendance variables, trend analyses were conducted among all students and by subgroups.





To analyze trends over time, time was modeled as a continuous variable with both linear and non-linear (quadratic) components. Separate regression models were used to assess linear and quadratic time trends. Logistic regression models were used for trends in the percentage of students reporting individual physical education days per week, any physical education attendance, and daily physical education attendance. Linear regression models were used for trends in the average number of physical education days per week. All models were adjusted for grade level, sex, and race/ethnicity subgroups. Subgroup models tested for trends separately for male and female students in a single model using an interaction term adjusting for the other demographic variables, and likewise was done for the other subgroups. When a significant quadratic trend was detected, Joinpoint software⁸ was used to automate identification of the year or “joinpoint” where the nonlinear (i.e., quadratic) trend changed and then regression models were used to assess linear trends occurring in each segment (i.e., before and after each joinpoint).

Biennial prevalence estimates were unadjusted. The linear and quadratic time effects were considered statistically significant when the regression coefficient (β) for the trend had a p-value of less than 0.05. A significant linear β in absence of a significant quadratic β indicated there was an overall linear increase or decrease in the variable during 1991–2013. A significant quadratic β in absence of a significant linear β indicated there was a non-linear change (i.e., an acceleration, leveling off, or change in direction) during 1991–2013. Significant linear and quadratic β s indicated a non-linear change in addition to an overall increase or decrease during 1991–2013 and are described by the quadratic trend. Non-significant linear and quadratic β s indicated no significant variation in the prevalence over time.

All trend analyses examine significant changes in physical education attendance over time within subgroups only (i.e., across time not across subgroups).

Results

Individual Number of Physical Education Days per Week

Table 1 depicts the secular trends in the percentage of U.S. high school students reporting their number of physical education days per week from 1991–2013. From 1991–2013, the percentage of students that did not attend physical education class during an average school week (0 days) did not significantly change. However, the percentage of students attending physical education on 1, 3, and 5 days per week changed significantly during 1991–2013. Specifically, the percentage of students who reported attending physical education on 1 day increased significantly from 0.9% in 1991 to 1.8% in 2013. Further, the percentage of students attending physical education class on 3 days per week increased significantly from 1.5% to 19.0% during 1991–1995, while the percentage of students participating in daily physical education (5 days per week) decreased significantly from 41.6% to 25.4% during this same time frame. No significant changes in the percentage of students reporting 3 or 5 days of physical education attendance were observed during 1995–2013. Finally, the percentage of students reporting physical education attendance on 2 or 4 days per week did not change significantly during 1991–2013.

Any Physical Education Attendance

Across the observation period, approximately half of U.S. high school students reported attending at least 1 day of physical education during an average week (range: 48.0%–59.6%) (Table 2). During 1991–2013, the percentage of U.S. high school students self-reporting any physical education attendance did not significantly change overall or across sex and race/ethnicity subgroups. However, the percentage of 9th grade students reporting at least 1 day per week of physical education attendance decreased significantly from 75.8% in 1991 to 64.3% in 2013. While not significant ($p=0.06$), a similar trend was observed among 10th grade students. No significant changes were observed among the remaining grade levels.

Daily Physical Education Attendance

A majority of students reported daily physical education attendance (5 days per week) during an average school week (Table 1). Table 3 presents the secular trends in the percentage of U.S. high school students reporting daily physical education attendance during 1991–2013 overall and by grade level, sex, and race/ethnicity subgroups. As mentioned above, the percentage of students reporting daily physical education attendance was observed to decrease significantly during 1991–1995, and then did not change through 2013. Similar trends were observed among the following demographic subgroups: 9th grade students; male students; and white, non-Hispanic students. A significant quadratic trend was also observed among 10th grade students; however, the linear changes in daily physical education attendance for 1991–1995 and 1995–2013 were both non-significant. In contrast, the percentage of female students; black, non-Hispanic students; and Hispanic students reporting daily physical education attendance was observed to decrease significantly over the entire period from 1991–2013. No significant changes in daily physical education attendance were observed among 11th and 12th grade students.

Average Number of Physical Education Days per Week

Table 4 presents overall and demographic subgroup secular trends in the average number of physical education days per week among U.S. high school students that reported at least 1 day per week of physical education attendance during 1991–2013. Overall, among U.S. high school students attending at least 1 day per week of physical education, the mean number of days per week that students reported attending physical education decreased significantly from 4.64 days in 1991 to 3.64 days in 1995 and then did not change through 2013. This same trend was observed across all grade levels, sex, and race/ethnicity subgroups.

Demographic Subgroups

When examining demographic subgroup secular trends in physical education, differences in subgroup trends emerge. While subgroup trend differences have not yet been analyzed, the percentage of high school students reporting any physical education attendance and daily physical education attendance was generally higher among males compared to females and decreased from 9th to 12th grade for each YRBS cycle. No clear pattern was observed by race/ethnicity subgroups.



Summary

The primary goal of this study was to determine the extent to which school-based physical education attendance has changed among U.S. high school students over the past two decades. To examine these changes over time, this report analyzed YRBS data from 1991 to 2013.

The YRBS was used to assess changes in the percentage of U.S. high school students reporting individual days per week of physical education attendance, any physical education attendance (1 or more days per week), daily physical education attendance, and the mean number of days of physical education attendance during an average school week from 1991 to 2013.

Main findings from the YRBS analyses are summarized below:

- In the overall sample of U.S. high school students, the percentage of students reporting any physical education attendance did not significantly change from 1991 to 2013.
 - However, the percentage of 9th grade students reporting any physical education attendance decreased significantly from 1991 (75.8%) to 2013 (64.3%); no significant changes were observed among other grade levels, sex, or race/ethnicity subgroups.
- The overall percentage of high school students reporting daily physical education attendance and the average number of days per week of physical education attendance were both observed to decrease significantly from 1991 to 1995.
 - Specifically, daily physical education attendance decreased from 41.6% in 1991 to 25.4% in 1995, and then remained stable through 2013. Significant trends in daily physical education attendance were also observed in certain grade levels, sex, and race/ethnicity subgroups.
 - The average number of days per week of physical education attendance decreased from 4.64 days in 1991 to 3.64 days in 1995, with no further significant changes through 2013. All grade level, sex, and race/ethnicity subgroups followed similar trends.

Limitations

While this is one of the few publications to examine the secular trends in physical education attendance using nationally representative data over an extended time period, several limitations should be noted.

- First, this report focused solely on student physical education attendance as reported by high school students.
 - The use of a single YRBS question to assess physical education attendance precluded our ability to distinguish between low student physical education attendance due to absenteeism versus low student physical education attendance due to limited course offerings.
 - Physical education-related policies and guidelines at the federal-, state-, district-, and school-level, all of which may impact physical education attendance, were not assessed.

- Additionally, other aspects of physical education (e.g., time spent in physical activity, quality of instruction) known to impact the effectiveness of the setting in promoting physical activity were not addressed.
- Second, although the best available data sources were selected to address the research objective, this report highlights the gaps in the current evidence.
 - The YRBS data used to examine student attendance in physical education were limited to high school students. As such, the Committee was unable to assess secular trends in student-reported physical education exposure among elementary and middle school students.

Conclusions

The findings of the present study suggest no significant change in the overall percentage of U.S. high school students reporting any physical education attendance since 1991. Significant declines in daily physical education attendance and the average days per week of physical education attendance were observed from the early to mid-1990s, but no significant changes were observed from 1995 to 2013. Additionally, from 1991 to 2013 approximately half of all U.S. high school students reported not attending any physical education during an average school week. Strong evidence supports the effectiveness of physical education in promoting students' physical activity.^{9,10} From the present findings the Committee concludes that U.S. high school students' physical education attendance is currently below the recommended guidelines calling all students to attend physical education daily and has been so since at least the early 1990s.¹⁰⁻¹³ As such, the adoption of policies and programs aimed at increasing participation in physical education among all U.S. high school students should be prioritized. The U.S. NPAP provides evidence-based strategies and tactics that, if fully implemented, have the potential to substantially increase student participation in school-based physical education programs.



Table 1. Secular trends in the percentage of U.S. high school students reporting individual number of physical education (PE) days per week, YRBS 1991–2013.^a

	Year												Trend: Beta (p-value) ^b
	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009	2011	2013	
Level of PE attendance, days per week^c (%)													
0 Days	51.1	47.9	40.4	51.2	43.9	48.3	44.3	45.8	46.4	43.6	48.2	52.0	L: 0.11034 (0.47) Q: 0.19252 (0.15)
1 Day	0.9	1.9	1.3	1.3	1.5	1.6	2.3	1.9	2.3	3.2	2.0	1.8	L: 0.53566 (0.04) Q: -0.27368 (0.20)
2 Days	3.0	5.7	12.0	5.3	5.4	4.0	5.2	3.5	5.5	4.7	4.1	4.8	L: -0.35830 (0.36) Q: -0.13535 (0.67)
3 Days	1.5	6.9	19.0	12.2	13.9	11.3	17.6	12.4	12.0	12.8	11.3	7.5	L: 0.29500 (0.33) Q: -1.16476 (0.00002)
4 Days	2.0	3.3	1.8	2.5	6.1	2.5	2.1	3.3	3.4	2.5	2.9	4.5	L: 0.20579 (0.60) Q: -0.02904 (0.94)
5 Days ^d	41.6	34.3	25.4	27.4	29.1	32.2	28.4	33.0	30.3	33.3	31.5	29.4	L: -0.26272 (0.06) Q: 0.35055 (0.01)

^a All logistic regression models adjusted for grade, sex, and race/ethnicity.

^b Linear (L) and quadratic (Q) time effects were considered statistically significant when the regression coefficient (β) had a p-value of <0.05.

^c Percentage of U.S. high school students reporting the number of days they go to PE classes during an average school week.

^d Daily PE attendance.

Table 2. Secular trends in the percentage of U.S. high school students reporting any (at least 1 day per week) of physical education (PE) attendance, YRBS 1991–2013.

Attended PE ^a (%)	Year												Trend: Beta (p-value) ^b
	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009	2011	2013	
Overall ^c	48.9	52.1	59.6	48.8	56.1	51.7	55.7	54.2	53.6	56.4	51.8	48.0	L: -0.11034 (0.47) Q: -0.19252 (0.15)
Grade													
9th grade	75.8	77.2	80.7	69.2	78.9	73.7	71.0	71.5	66.8	72.4	68.1	64.3	L: -0.66006 (0.00003) Q: -0.09399 (0.54)
10th grade	59.9	57.3	72.0	53.3	60.9	54.1	60.7	59.2	56.8	57.6	54.6	50.5	L: -0.34770 (0.06) Q: -0.15198 (0.39)
11th grade	32.4	40.9	46.5	39.3	40.7	39.1	45.7	41.8	45.1	48.2	42.9	39.6	L: 0.23393 (0.24) Q: -0.23494 (0.18)
12th grade	27.4	35.6	42.2	36.1	36.6	31.3	39.5	38.8	41.5	43.8	38.5	35.2	L: 0.27990 (0.18) Q: -0.24712 (0.18)
Sex													
Males	52.8	55.2	62.2	52.0	60.7	55.6	58.5	60.0	57.7	57.7	56.7	53.3	L: -0.07113 (0.64) Q: -0.17715 (0.19)
Females	45.0	48.8	56.9	44.9	51.5	48.0	52.8	48.3	49.4	55.0	46.7	42.8	L: -0.15074 (0.36) Q: -0.20757 (0.16)
Race/Ethnicity													
White, non-Hispanic	45.5	50.6	62.9	49.5	56.1	48.3	53.7	52.1	50.4	56.4	51.9	43.1	L: -0.10983 (0.57) Q: -0.28244 (0.09)
Black, non-Hispanic	60.7	55.7	50.2	46.3	52.9	60.5	56.0	55.8	55.9	54.4	49.3	50.7	L: -0.27002 (0.08) Q: 0.09804 (0.59)
Hispanic	54.3	53.9	51.0	51.6	59.3	58.4	58.8	61.5	61.0	60.5	53.5	57.5	L: 0.11185 (0.45) Q: -0.15934 (0.31)

^a Percentage of students reporting at least 1 day per week of PE attendance during an average school week.

^b Linear (L) and quadratic (Q) time effects were considered statistically significant when the regression coefficient (β) had a p-value of <0.05.

^c All models adjusted for grade, sex, and race/ethnicity.

Table 3. Secular trends in the percentage of U.S. high school students reporting daily physical education (PE) attendance, YRBS 1991–2013.

Daily PE attendance ^a (%)	Year												Trend: Beta (p-value) ^b
	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009	2011	2013	
Overall ^c	41.6	34.3	25.4	27.4	29.1	32.2	28.4	33.0	30.3	33.3	31.5	29.4	L: -0.26272 (0.06) Q: 0.35055 (0.01)
Grade													
9th grade	65.8	52.7	41.2	42.6	42.1	48.7	37.9	44.8	40.1	46.7	41.3	42.2	L: -0.60158 (0.0004) Q: 0.49859 (0.002)
10th grade	51.8	40.1	34.4	30.6	30.4	31.6	31.3	35.3	30.9	33.7	33.1	31.1	L: -0.53480 (0.002) Q: 0.49926 (0.003)
11th grade	27.4	23.8	15.0	19.3	20.0	22.8	22.6	26.3	23.9	27.6	25.1	22.3	L: 0.17898 (0.31) Q: 0.16408 (0.35)
12th grade	21.2	22.8	12.9	19.1	20.1	20.3	18.2	22.4	23.8	22.4	24.2	20.2	L: 0.17666 (0.33) Q: 0.11171 (0.54)
Sex													
Males	45.6	37.3	27.0	29.8	31.9	36.3	30.5	37.1	33.2	34.6	35.5	34.9	L: -0.21894 (0.12) Q: 0.43285 (0.002)
Females	37.4	31.1	23.5	24.6	26.3	28.4	26.4	29.0	27.3	31.9	27.2	24.0	L: -0.31352 (0.04) Q: 0.25868 (0.08)
Race/Ethnicity													
White, non-Hispanic	38.6	32.1	21.7	23.8	28.3	29.5	24.9	31.7	28.9	30.6	33.0	27.1	L: -0.10225 (0.55) Q: 0.40361 (0.02)
Black, non-Hispanic	51.9	43.0	33.8	32.5	29.2	40.8	33.0	34.4	31.9	37.0	27.6	26.6	L: -0.82663 (0.00000) Q: 0.36732 (0.07)
Hispanic	46.6	39.7	33.1	38.4	40.4	38.7	36.7	38.3	36.0	40.5	30.0	37.7	L: -0.35239 (0.02) Q: 0.16038 (0.34)

^a Daily PE attendance defined as students reporting 5 days of PE attendance during an average school week.

^b Linear (L) and quadratic (Q) time effects were considered statistically significant when the regression coefficient (β) had a p-value of <0.05.

^c All models adjusted for grade, sex, and race/ethnicity.

Table 4. Secular trends in the average number of physical education (PE) days per week among of U.S. high school students reporting any physical education attendance (1 or more PE days per week), YRBS 1991–2013.

Average PE days per week ^a (Mean, Standard Error)	Year												Trend: Beta (p-value) ^b
	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009	2011	2013	
Overall ^c	4.64 (0.09)	4.20 (0.12)	3.64 (0.28)	4.01 (0.22)	4.00 (0.23)	4.16 (0.11)	3.88 (0.14)	4.14 (0.10)	4.01 (0.13)	4.03 (0.16)	4.11 (0.11)	4.15 (0.09)	L: -0.13471 (0.38) Q: 0.39131 (0.002)
Grade													
9th grade	4.64 (0.10)	4.24 (0.10)	3.86 (0.30)	4.17 (0.19)	4.02 (0.22)	4.25 (0.11)	3.92 (0.15)	4.18 (0.11)	4.07 (0.14)	4.17 (0.13)	4.14 (0.10)	4.24 (0.08)	L: -0.17310 (0.20) Q: 0.36515 (0.004)
10th grade	4.68 (0.07)	4.31 (0.15)	3.81 (0.28)	4.07 (0.20)	3.95 (0.21)	4.07 (0.13)	3.91 (0.15)	4.14 (0.12)	3.97 (0.14)	4.05 (0.17)	4.10 (0.12)	4.17 (0.11)	L: -0.27186 (0.08) Q: 0.48700 (0.0002)
11th grade	4.68 (0.07)	4.02 (0.20)	3.34 (0.28)	3.81 (0.27)	4.02 (0.21)	4.05 (0.16)	3.86 (0.14)	4.17 (0.11)	3.95 (0.16)	4.00 (0.17)	4.06 (0.14)	4.05 (0.12)	L: 0.04942 (0.81) Q: 0.31872 (0.04)
12th grade	4.52 (0.15)	4.17 (0.12)	3.28 (0.22)	3.89 (0.28)	3.99 (0.34)	4.18 (0.15)	3.78 (0.15)	4.06 (0.11)	4.00 (0.18)	3.77 (0.23)	4.15 (0.12)	4.03 (0.14)	L: -0.03729 (0.86) Q: 0.34816 (0.04)
Sex													
Males	4.69 (0.05)	4.23 (0.11)	3.64 (0.28)	4.04 (0.23)	4.01 (0.22)	4.20 (0.11)	3.90 (0.14)	4.17 (0.10)	4.01 (0.14)	4.05 (0.16)	4.14 (0.10)	4.22 (0.08)	L: -0.13051 (0.38) Q: 0.43448 (0.0003)
Females	4.59 (0.14)	4.15 (0.14)	3.62 (0.28)	3.98 (0.22)	3.99 (0.24)	4.10 (0.13)	3.87 (0.15)	4.11 (0.10)	4.01 (0.14)	4.00 (0.17)	4.09 (0.14)	4.05 (0.11)	L: -0.13983 (0.41) Q: 0.33963 (0.02)
Race/Ethnicity													
White, non-Hispanic	4.64 (0.12)	4.15 (0.15)	3.43 (0.31)	3.84 (0.27)	3.98 (0.29)	4.14 (0.12)	3.82 (0.17)	4.17 (0.11)	4.06 (0.16)	3.92 (0.22)	4.19 (0.15)	4.17 (0.11)	L: 0.02111 (0.92) Q: 0.47289 (0.004)
Black, non-Hispanic	4.64 (0.03)	4.43 (0.11)	4.25 (0.12)	4.31 (0.10)	4.01 (0.16)	4.19 (0.19)	3.93 (0.19)	4.08 (0.15)	3.97 (0.19)	4.13 (0.12)	3.96 (0.12)	3.91 (0.17)	L: -0.62048 (0.00000) Q: 0.29615 (0.05)
Hispanic	4.64 (0.11)	4.39 (0.09)	4.19 (0.17)	4.41 (0.11)	4.25 (0.15)	4.22 (0.09)	4.11 (0.14)	4.15 (0.17)	4.02 (0.19)	4.26 (0.11)	4.02 (0.09)	4.30 (0.10)	L: -0.29281 (0.01) Q: 0.31579 (0.01)

^a Among students reporting at least 1 day per week of PE attendance, the average number of days during typical school week that students reported attending PE classes.

^b Linear (L) and quadratic (Q) time effects were considered statistically significant when the regression coefficient (β) had a p-value of <0.05.

^c All models adjusted for grade, sex, and race/ethnicity.



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Appendix A. Data Source Selection Methodology

An interdisciplinary team of academic researchers and public health professionals compiled a list of available resources to examine the secular changes in physical education exposure. Specifically, the committee identified databases that would allow them to examine secular changes in physical education attendance. Data sources that most appropriately addressed student attendance to physical education classes among a nationally representative sample over time were prioritized.

A total of 16 data sources with the potential to inform the research agenda were identified. An alphabetical list of resources follows.

- The National Longitudinal Study of Adolescent to Adult Health
- Bridging the Gap State Law Dataset
- Bridging the Gap District Policy Dataset
- Bridging the Gap Food and Fitness Survey
- Bridging the Gap Youth Education and Society Survey
- Healthy Passages
- National Health and Nutrition Examination Survey
- National Youth Physical Activity and Nutrition Study
- Physical Education Profiles
- School Health Policies and Practices Study
- School Health Policy Matrix
- School Health Profiles
- School Nutrition Dietary Assessment Study
- Shape of the Nation
- National Youth Risk Behavior Survey

Of the identified sources, the sample was diverse and provided varying degrees of information regarding physical education exposure (i.e., level of measurement, sample size, representative samples, data collection time frame, etc.). The committee member with the most familiarity and access to a given data source was asked to report on the resource's ability to inform the research agenda. Each resource was presented to the committee and based on the information presented, the committee reached consensus on the usefulness of the resource in addressing the committee's objective. After careful consideration, it was concluded that not all of the data sources adequately addressed the research objective. Those resources failing to address the research objective were excluded from further review. The following data source was selected as the best available evidence to examine secular changes in physical education attendance among U.S. adolescents:

- National Youth Risk Behavior Surveillance Survey (YRBS)



Appendix B. Abbreviations

ABBREVIATION	DEFINITION
Committee	Secular Changes in Physical Education Exposure Ad Hoc Committee
CDC	Centers for Disease Control and Prevention
NPAP	National Physical Activity Plan
NPAPA	National Physical Activity Plan Alliance
PE	Physical Education
YRBS	National Youth Risk Behavior Survey

