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# Whole-of-School Physical Activity Promotion: Findings From Elementary Schools in the United States

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## Abstract

**Introduction:** Schools can support students' participation in physical activity by offering opportunities consistent with a Whole-of-School (WOS) approach; however, the extent to which physical activity opportunities are provided and how school-level characteristics associate with their use remains unclear. This study examined how elementary schools' use a WOS approach to promote physical activity, as well as associations between school-level characteristics and physical activity opportunities provided.

**Methods:** Survey data was collected from 162 elementary schools participating in the NFL PLAY 60 FitnessGram Project during the 2022–2023 school year. A WOS index (ranging from 0 to 12) was created from responses by school staff on questions about 6 physical activity practices (physical education, recess, before- and after-school programs, classroom-based approaches, active transport). Multivariable regression models examined associations between school characteristics and WOS index scores. Analyses were completed in Spring 2024.

**Results:** Fully adjusted models indicated a statistically significant difference between the percentage of economically disadvantaged students served and WOS index score. Schools serving

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CREDIT AUTHOR STATEMENT

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SUPPLEMENTAL MATERIAL

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between 20% and 39% ($p<0.001$), 40%–59% ($p<0.01$), 60%–79% ($p<0.01$) and ≥80% ($p<0.001$) economically disadvantaged students scored significantly lower on the WOS index compared to schools with 0%–19% economically disadvantaged students.

**Conclusions:** Studies are needed to examine disparities in physical activity practices consistent with a WOS approach to understand the implications on health, academic performance, and other key outcomes. This information can inform the development of strategies to address disparities and ensure youth have equitable access to school-based physical activity opportunities.

## INTRODUCTION

Three out of 4 school-aged children in the United States (U.S.) are not meeting the national physical activity guidelines.[1–3] Schools are important to physical activity promotion because they serve millions of students nationwide across various socioeconomic backgrounds, racial/ethnic groups, and geographic areas. Thus, school-based efforts can help ensure children achieve the benefits of physical activity in an equitable way. Additionally, school-based physical activity can improve health outcomes such as physical fitness and healthy body weight[4,5] and education-related outcomes including time on-task, academic achievement, and classroom camaraderie.[6–11]

The National Academy of Medicine recommends schools provide at least 30 minutes of daily physical activity through a Whole-of-School (WOS) approach,[12] which calls for holistically promoting physical activity through physical education (PE), recess, before- and after-school programs, classroom-based approaches, and active transportation. Frameworks such as the Comprehensive School Physical Activity Program[13,14] and Creating Active Schools[15] provide further insight for how schools can support activity through a WOS approach. Despite standing recommendations for the WOS approach, the extent to which schools support physical activity through a WOS approach is not well understood.

Research suggests many schools fall short of providing physical activity opportunities across the full WOS spectrum.[16] Traditionally, state and district policies require elementary schools to provide PE and recess, although the duration and frequency of these opportunities vary.[17,18] Other WOS components including classroom-based approaches, before- and after-school programs, and active transportation have been inconsistently implemented at the elementary level.[17,18] Furthermore, schools serving higher percentages of students from minoritized racial/ethnic groups and economically disadvantaged backgrounds tend to provide fewer physical activity opportunities compared with schools serving majority non-Hispanic White and affluent students.[17,19,20] Geographic differences also exist with rural schools providing fewer opportunities and resources compared with urban schools.[21,22]

Studies examining school-based physical activity opportunities have been partially limited due to sampling restrictions (e.g., schools from only 1 state), focusing on a single WOS component (e.g., recess), and/or assessing a limited number of school-level characteristics (e.g., student composition). Therefore, this study aims to determine the extent to which a sample of U.S. elementary schools provide physical activity opportunities consistent with the WOS approach. Additionally, a WOS index was developed to examine associations between physical activity opportunities provided and key school-level characteristics: (1)

the percentage of economically disadvantaged students served, (2) the percentage of students served from minoritized racial/ethnic groups, and (3) school locale. This research provides an in-depth understanding of how a national sample of elementary schools uses opportunities outlined in the WOS approach to increase student's physical activity, as well as insights into disparities in school-based physical activity promotion. These results are essential to inform public health efforts that address disparities through targeted programming and to ensure opportunities are offered equitably across contexts.

## METHODS

### Study Sample

A secondary analysis of cross-sectional data from the NFL PLAY 60 FitnessGram® Project[23] was conducted. The project is an ongoing school-based initiative that began in the U.S. in 2009 and encourages students to be active for 60 minutes each day and engage in a healthy lifestyle. Schools located within the 32 National Football League (NFL) team markets are eligible to participate. Together, staff from The Cooper Institute (Dallas, Texas, USA) and the NFL Foundation select schools based on health-related needs and NFL club priorities. Participating schools receive incentives and a variety of health- and fitness-related resources including access to the NFL PLAY 60 app, FitnessGram software and resource packs, materials for PE classes (e.g., flag football kit, fitness equipment), and tools for social-emotional wellbeing (EVERFI Character Playbook and the Compassion Project) to boost student's activity levels and improve overall health. A new cohort of up to 160 schools are enrolled annually and are eligible to continue participating each year based on the availability of grant funding.

Schools designate a staff member to complete 2 surveys: (1) a one-time initiation survey that broadly assesses the school environment, health-related school policies, and exposure to programming, and (2) an annual end-of-year survey that monitors program-related progress. Both surveys are administered through Qualtrics (Provo, UT, USA). Herein, the focus was solely on cross-sectional data collected from a convenience sample of elementary schools geographically spread across the U.S. who completed the annual NFL PLAY 60 FitnessGram Project end-of-year survey between February and May 2023. This study was approved by the Institutional Ethics Review Board at The Cooper Institute and the Committee for the Protection of Human Subjects at the University of Texas Health Science Center at Houston School of Public Health (HSC-SPH-23-0098). All respondents provided consent before completing the survey.

### Measures

The end-of-year survey contains a series of questions about physical activity opportunities offered by schools (Appendix Table 1). Responses were used to create and report school-level values for each of the six WOS components (1-PE, 2-Recess, 3-classroom physical activity approaches, 4-active transportation, 5-before-, and 6-after-school programs) and an overall WOS index score. For PE, 2 questions asked about the number of days per week and minutes per class that schools offered PE. This information was used to calculate the total weekly minutes of PE offered. For schools that used an alternating PE schedule (e.g., 2 days

1 week, 3 days another), the average minutes of PE per week was calculated. Schools were then categorized into 3 groups based on their fulfillment of SHAPE America's PE standards, which recommend elementary schools offer a minimum of 150 minutes of PE per week.[24] Thus, the PE categories were low (<75 minutes per week), medium (75–149 minutes per week), and high (≥150 minutes per week). For recess, 3 questions were used to assess the number of days per week, number of sessions per day, and minutes per session that recess was offered to calculate total weekly minutes. The WOS index categories created for recess were: low (<100 minutes per week), medium (100–149 minutes per week), and high (≥150 minutes per week). These groupings were based on recommendations that schools provide at least 20 minutes of recess daily.[25–27]

For the remaining 4 WOS components, school-level scores were generated using a series of questions measured on a 5-point Likert scale (Appendix Table 1). One question assessed the extent to which schools used classroom-based physical activity approaches. The accessibility of before- and after-school programs was evaluated using 1 question each. An additional 2 questions assessed the accessibility and promotion of active transportation. Responses were used to assign schools into low (<3), medium (3–3.9), or high (≥4) categories. These thresholds were based on the 5-point Likert scale, where a score <3 represents a respondent disagreeing with a respective question, a score of 3 is neutral, and a score ≥4 represents agreement. For the classroom-based physical activity approaches and before- and after-school components (Q=1), scores were assigned using the corresponding Likert scale value (e.g., strongly agree = 5). For active transportation (Q=2), a mean score was calculated based on the 2 responses.

Scores were summed across the 6 components to create an overall WOS index score, giving each component equal weight. Each component contributes up to 2 points, thus, possible index scores could range from 0 to 12. Schools that did not respond to each question relating to physical activity opportunities offered were assigned a missing value for the WOS index variable.

Publicly available data was accessed for each school within the sample from the National Center for Education Statistics.[28] Data on school locale (city, suburban, town, rural), the percentage of students served by race/ethnicity, the percentage of economically disadvantaged students, and total student enrollment was obtained. The economically disadvantaged variable was characterized into quintiles (0%–19%, 20%–39%, 40%–59%, 60%–79%, ≥80%). A variable was created to represent each school's student racial/ethnic composition by categorizing them into one of 5 mutually exclusive groups: majority non-Hispanic White (>50%), majority non-Hispanic Black (>50%), majority Hispanic (>50%), majority another race/ethnicity (i.e., American Indian, Asian, 2 or more races) (>50%), and diverse (no single race/ethnicity group >50%).

## Statistical Analysis

Descriptive statistics and distributions of relevant survey variables (e.g., respondent job type, cohort), school-level demographic variables, and scores among the individual WOS components and WOS index were assessed. During this process, any unrealistic values from the dataset (e.g., reporting 7 days/week of PE) as well as duplicate survey responses from

schools (e.g., sometimes more than one school representative completed the survey) were removed. To remove duplicate responses, responses were assessed for completeness, and if still unresolved, the first recorded response was retained. Descriptive statistics (means, standard deviations, ranges) for school-level variables (i.e., student enrollment, percentage of economically disadvantaged students, locale), WOS component scores, and the WOS index were calculated.

A series of linear regression models were used to examine associations between independent variables and WOS index scores. Final models adjusted for total student enrollment, cohort (i.e., years of program participation), and state-level clustering. All analyses were completed during Spring 2024 using Stata 17 (College Station, TX, USA) and $p<0.05$ represented statistical significance.

## RESULTS

The NFL PLAY 60 FitnessGram Project survey was sent to 220 elementary schools. A total of 162 responses were received from schools across 19 states (response rate = 73.6%). Most surveys were completed by PE teachers (n=160, 98.8%). The percentage of economically disadvantaged students served by schools ranged from 1.3% to 100% (Table 1). Most schools in the sample (n=131, 80.9%) were eligible for Title 1 status, meaning that ≥ 40% of students enrolled were characterized as economically disadvantaged. Roughly one-third (n=52, 32.1%) of the schools in the sample served pre-dominantly Hispanic student populations, followed by diverse, no majority (n=47, 29.0%) and majority non-Hispanic White (n=32, 19.8%) student populations, respectively. Consistent with the location of NFL team markets, the majority of schools were located in cities (n=91, 56.2%) and suburbs (n=54, 33.3%).

Schools offered PE approximately 2 times per week and averaged 78 minutes of PE weekly (Table 2). Schools averaged about 137 minutes of recess per week with most schools offering recess daily (n=129, 82.7%). Many schools reported providing accessible after-school programs focused on physical activity (n=113, 69.8%), whereas access to before-school programs was reported less frequently (n=51, 31.5%). Classroom physical activity approaches and active transportation opportunities were provided inconsistently across the sample. The WOS index was normally distributed with a mean index score of 6.2 (n=150, range=1–11, SD=2.3).

Bivariate regression models revealed that the percentage of economically disadvantaged students served and school locale were significantly associated with WOS index scores (Table 3). Schools serving 20%–39% ($B=-2.64$, $p<0.01$), 40%–59% ($B=-2.23$, $p<0.01$), 60%–79% ($B=-2.06$, $p<0.01$), and ≥80% ($B=-2.08$, $p<0.01$) economically disadvantaged students had significantly lower WOS index scores compared with schools serving 0%–19% economically disadvantaged students. Compared with schools with majority non-Hispanic White student populations, there were no statistically significant differences in WOS index scores among schools with majority non-Hispanic Black, Hispanic, another race, or diverse student populations. However, suburban schools were found to have significantly higher WOS index scores than schools located in cities ($B=1.00$, $p=0.02$).

Fully adjusted multivariable regression models revealed statistically significant differences between the percentage of economically disadvantaged students served and the WOS index (Table 3). Specifically, schools serving 20%–39% ($B$=−2.49, $p$<0.001), 40%–59% ($B$=−2.49, $p$<0.01), 60%–79% ($B$=−2.30, $p$<0.01) and ≥80% ($B$=−2.28, $p$<0.001) scored significantly lower on the WOS index compared with the 0-19% referent group. In addition, schools with student populations that were a majority of another race/ethnicity were found to have scored significantly lower on the WOS index compared to schools with majority non-Hispanic White student populations ($B$=−1.69, $p$ < 0.01). There were no statistically significant differences found between school locale and WOS index scores. Additional linear regression models for each respective WOS component can be found in Appendix Table 2.

## DISCUSSION

Trends in physical activity opportunities offered by 162 elementary schools across the U.S. participating in the NFL PLAY 60 FitnessGram Project during the 2022–2023 school year were assessed. Additionally, WOS index scores and individual WOS components were compared across key school-level characteristics. Results revealed that schools serving <20% economically disadvantaged students provided significantly more physical activity opportunities compared with schools serving higher percentages of economically disadvantaged students. Furthermore, results also indicated that schools serving a majority of students from minoritized racial/ethnic groups (e.g., American Indian, Asian, Pacific Islander) provided significantly fewer physical activity opportunities than schools serving majority non-Hispanic White student populations.

Evidence continues to accumulate demonstrating a negative association between SES and school-based physical activity opportunities. Studies examining the full spectrum of the WOS approach suggest that high-SES schools provide more physical activity opportunities than low-SES schools.[16,19,29] SES differences have also been noted in studies assessing individual components of the WOS approach. Specifically, previous work indicates that high-SES schools tend to provide more PE,[20] recess,[17] and classroom-based activity[30] compared to low-SES schools. In contrast, low-SES schools are more likely to offer after-school programs focused on physical activity than high-SES schools.[19,20,29] One potential reason for fewer physical activity opportunities provided during the school day in low-SES schools is that these schools tend to have lower academic performance scores.[31–33] Thus, low-SES schools may be allocating more time and resources to core academic subjects compared to high-SES schools. As a result, students at low-SES schools have fewer opportunities for physical activity,[34] despite research suggesting that physical activity can have a positive effect on academic performance,[10,35] which may be further contributing to health- and academic-related disparities.[36]

Past studies have found that physical activity opportunities at elementary schools also differ between the racial/ethnic makeup of students served. Specifically, studies suggest that elementary schools serving a majority non-Hispanic Black and Hispanic students are less likely to meet daily recess recommendations.[19,22,37] Similar differences in weekly minutes of recess were observed in the present study with schools serving a majority White student populations offering significantly more than schools with majority non-Hispanic Black and

Hispanic student populations. Elementary schools serving a majority Hispanic students have also been shown to have lower uptake of classroom-based physical activity approaches compared to those serving majority non-Hispanic White student populations.[30] Although no differences among classroom-based approaches were found within the sample, schools serving majority non-Hispanic Black students offered more weekly minutes of PE than schools with majority Hispanic student populations. However, when examining the WOS approach, only schools serving a majority of students from another race were found to score significantly lower than majority non-Hispanic White students.

School-based physical activity opportunities have also been shown to vary between urban and rural locales. For example, rural elementary schools tend to have wider catchment areas than urban schools, meaning children attending rural schools may have greater distances to travel and thus spend more time passively commuting to and from school.[38,39] Although study results indicate no differences between locales, this likely contributes to limited opportunities for active commuting[40,41] and may also limit access to before-and-after school programs and sports.[42] Nonetheless, rural schools, on average, offered more minutes of PE and recess, although these values were not statistically significantly different from other locales. However, the sample of town and rural schools in the current study was disproportionately low compared to the number of schools in urban and suburban locations, therefore studies examining the extent to which rural schools adopt a WOS approach is needed.

### Limitations

This study has several limitations. Despite the sample consisting of elementary schools from across the United States, >50% of schools were located in cities since the NFL team markets are situated within largely populated areas. Therefore, the sample should not be considered nationally representative which limits the ability to compare differences between locales. Second, the NFL PLAY 60 FitnessGram Project survey is self-report, which may introduce response biases. Furthermore, >95% of respondents were PE teachers. Although these individuals likely possess a good understanding of ongoing physical activity opportunities, they may not be fully aware of all opportunities being provided. Third, although the measures used to assess each WOS component have been used previously,[18] they are still in development and lack psychometric testing. Future work should aim to assess the validity and reliability of these measures in larger, nationally representative samples. Last, the school sample is drawn from an ongoing health promotion program. Compared with the general population of schools, those participating in the program likely have a greater interest in improving physical activity opportunities and also receive additional resources that allow them to enhance their physical activity offerings.

## CONCLUSIONS

A novel WOS index was used to assess physical activity opportunities offered by a sample of U.S. elementary schools. Findings suggest that schools serving higher percentages of economically disadvantaged students provide fewer opportunities for students to be active throughout the day. This information is essential for understanding the potential

implications of disparities in school-based physical activity opportunities. Additional work with nationally representative samples is needed to further examine disparities in physical activity opportunities to understand the implications on health, academic performance, and other key outcomes. Additionally, organizations and decision makers within the education and public health sectors need to be aware of these potential disparities in order to allocate resources to develop strategies that address disparities and ensure youth have equitable access to physical activity opportunities at school.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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**Table 1.**

School-level Demographic Characteristics

| Variable | Total Sample (n=162) |
|---|---|
| Student enrollment (*M*, SD) | 471.0(200.7) |
| Percentage of economically disadvantaged students (n, %) | |
| 0%–19% | 19(11.7) |
| 20%–39% | 12(7.4) |
| 40%–59% | 18(11.1) |
| 60%–79% | 45(27.8) |
| ≥80% | 68(242.0) |
| Eligible for title I (n, %) | 131(80.9) |
| School-level race/ethnicity (n, %) | |
| Majority non-Hispanic Black (≥50%) | 26 (16.1) |
| Majority Hispanic (≥50%) | 52(32.1) |
| Majority non-Hispanic White (≥50%) | 32(19.8) |
| Majority another race/ethnicity (≥50%) | 5 (3.1) |
| Diverse (no single racial/ethnic group ≥50%) | 47(29.0) |
| School locale (n, %) | |
| City | 91(56.2) |
| Suburban | 54(33.3) |
| Town | 9(5.6) |
| Rural | 8(4.9) |
| NFL PLAY 60 FitnessGram Project Cohort (n, %) | |
| Cohort#1 | 31(19.1) |
| Cohort#2 | 34(20.0) |
| Cohort#3 | 50(30.9) |
| Cohort#4 | 47(29.0) |

**Table 2.**

Trends Among Whole-of-School (WOS) Physical Activity Opportunities by School-Level Characteristics

| School-level Variables | PE mins/week *M*, SD (n=160) | Recess mins/week *M*, SD (n=152) | Before-school programs *M*, SD (n=162) | After-school programs *M*, SD (n=162) | Classroom-based approaches *M*, SD (n=162) | Active transport *M*, SD (n=162) | WOS Index *M*, SD (n=150) |
|---|---|---|---|---|---|---|---|
| Economically Disadvantaged Students Served | | | | | | | |
| 0%–19% | 90.9(27.0) | 192.6(111.0) | 3.4(1.7) | 3.8(1.4) | 3.5(1.2) | 3.9(1.0) | 8.1(2.2) |
| 20%–39% | 70.8(50.1) | 126.0(35.5) | 2.5(1.4) | 3.3(1.6) | 2.6(1.1) | 3.1(0.9) | 5.4(2.5) |
| 40%–59% | 70.1(51.3) | 156.5(71.9) | 2.1(1.4) | 3.6(1.5) | 3.2(1.0) | 3.2(1.0) | 5.8(2.5) |
| 60%–79% | 77.7(36.8) | 122.5(57.4) | 2.2(1.4) | 3.6(1.5) | 3.0(1.1) | 3.3(1.0) | 6.0(2.3) |
| ≥80% | 77.3(48.4) | 127.2(71.6) | 2.6(1.6) | 4.0(1.2) | 2.8(1.0) | 3.3(1.0) | 6.0(2.0) |
| Students served by race/ethnicity | | | | | | | |
| Majority non-Hispanic Black(≥50%) | 104.3(70.2) | 107.0(46.4) | 2.7(1.7) | 3.9(1.3) | 3.2(1.2) | 3.4(0.9) | 6.2(1.7) |
| Majority Hispanic (≥50%) | 64.3(28.3) | 122.4(68.1) | 2.7(1.4) | 3.4(1.4) | 3.0(1.1) | 3.3(1.1) | 5.5(2.2) |
| Majority non-Hispanic White (≥50%) | 78.8(48.3) | 168.3(84.0) | 2.4(1.7) | 4.4(1.1) | 3.0(1.0) | 3.4(1.2) | 6.3(2.7) |
| Majority another race/ethnicity (≥50%) | 90.0(31.7) | 212.5(160.1) | 3.4(1.8) | 2.8(1.8) | 3.6(1.5) | 3.8(0.6) | 7.0(2.4) |
| Diverse | 75.3(27.8) | 139.1(65.6) | 2.2(1.3) | 3.7(1.4) | 2.8(1.0) | 3.2(1.0) | 6.7(2.3) |
| School locale | | | | | | | |
| City | 75.0(40.9) | 119.8(57.8) | 2.3(1.5) | 3.9(1.4) | 2.9(1.0) | 3.4(1.0) | 5.8(2.2) |
| Suburban | 73.1(41.1) | 159.8(91.0) | 3.0(1.5) | 3.6(1.3) | 3.0(1.2) | 3.3(1.0) | 6.8(2.2) |
| Town | 98.7(45.0) | 160.9(56.1) | 2.7(1.6) | 3.3(1.6) | 3.6(1.1) | 3.2(0.7) | 6.5(3.0) |
| Rural | 115.1(68.5) | 151.4(50.5) | 2.3(1.8) | 3.3(1.6) | 3.0(1.1) | 2.7(1.5) | 6.0(2.5) |

**Table 3.**

Associations Between School-Level Characteristics and Whole-of-School (WOS) Index

| | WOS Index | |
|---|---|---|
| **Model Variables (n=150)** | **Unadjusted[a] *B* (95% CI)** | **Adjusted[b] *B* (95% CI)** |
| Economically Disadvantaged Students Served (ref: 0%–19%) | | |
| 20%–39% | **−2.64** ** (−4.29, −0.99) | **−2.49** *** (−3.61, −1.37) |
| 40%–59% | **−2.23** ** (−3.71,−0.74) | **−2.49** ** (−3.97,−1.01) |
| 60% – 79% | **−2.06** ** (−3.32, −0.80) | **−2.30** ** (−3.49, −1.10) |
| ≥ 80% | **−2.08** ** (−3.28, −0.87) | **−2.28** *** (−3.26, −1.31) |
| Students Served by Race/Ethnicity (ref: Majority non-Hispanic White) | | |
| Majority non-Hispanic Black | −0.10(−1.33,1.13) | 0.11(−1.50,1.72) |
| Majority Hispanic | −0.77(−1.84,0.28) | −0.64(−2.17,0.88) |
| Majority another race/ethnicity | 0.73(−1.66,3.12) | **−1.69** ** (−2.65,−0.74) |
| Diverse | 0.39(−0.66,1.44) | 0.21(−1.00,1.42) |
| School locale (ref: City) | | |
| Suburban | **1.00** * (0.19,1.81) | 0.62(−0.30,1.54) |
| Town | 0.71(−0.95,2.36) | 0.66(−1.13,2.45) |
| Rural | 0.21(−1.56,1.97) | −0.55(−1.92,0.83) |

Note: Boldface indicates statistical significance ($p<0.05$).

* $p<0.05$;

** $p<0.01$;

*** $p<0.001$.

[a] Unadjusted results are based on bivariate models.

[b] Final multivariable models adjusted for total student enrollment, NFL PLAY60 FitnessGram Project cohort, and state-level clustering.