Adolescent Physical Education Class Participation as a Predictor for Adult Physical Activity

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Abstract

Background: The aim of this study was to determine whether engagement in more physical education (PE) classes during one high school year is associated with change in physical activity (PA) from adolescence to young adulthood.

Methods: Data were from 1774 participants in Waves 2 (high school, 1996) and 4 (young adulthood, 2008) of the National Longitudinal Study of Adolescent to Adult Health. The predictor was number of PE classes/week in high school (daily, some, or none). The outcome was change in moderate-to-vigorous physical activity (Δ MVPA) over the 12-year period. Δ MVPA was based on differences in MVPA scores derived at each wave from responses to a physical activity behavior recall (range, -9 to 9 scale score or -15 to 15 MVPA episodes/week). Multivariable generalized linear models examined the association between PE participation and Δ MVPA, adjusting for sociodemographics, weight status, and school clustering.

Results: In high school, 34.7% participated in daily PE, whereas 50.1% participated in none. Participation in more PE classes was associated with greater MVPA in high school (mean $MVPA_{2\text{none}} = 3.11$, standard deviation [SD] = 1.99; mean $MVPA_{2\text{some}} = 3.70$, SD = 2.00; mean $MVPA_{2\text{daily}} = 4.31$, SD = 1.95; $p < 0.0001$). Overall, MVPA decreased over the 12 years (median Δ MVPA = -1.0, or 1-2 MVPA episodes/week). MVPA decreased more for males (median Δ MVPA_{male} = -1.0, interquartile range [IQR] = -3.0 $\pm$ 1.0; median Δ MVPA_{female} = 0.0, IQR = -2.0 $\pm$ 2.0; $p < 0.0001$) and those who had participated in some/daily PE (median Δ MVPA_{some} = -1.0, IQR = -3.0 $\pm$ 1.0; median Δ MVPA_{daily} = -1.0, IQR = -3.0 $\pm$ 1.0) than those not in PE (median Δ MVPA_{none} = 0.0, IQR = -2.0 $\pm$ 2.0; $p < 0.0001$). The relationship between PE and Δ MVPA was maintained in multivariable analyses ($\beta_{\text{some}} = -0.58$, standard error [SE] = 0.18; $p = 0.002$; $\beta_{\text{daily}} = -0.93$, SE = 0.16; $p < 0.001$).

Conclusions: High school PE participation did not prevent declining PA from adolescence to young adulthood.

Introduction

Obesity is a pressing public health issue affecting all age groups. As of 2012, 20.5% of 12- to 19-year-olds and 34.9% of adults were obese in the United States.¹ Although obesity is less prevalent among adolescents than adults, over 70% of obese adolescents become obese adults, leading to a greater cumulative burden of cardiometabolic sequelae among those who become obese early in the life course.^{2,3} Physical activity (PA) is an important behavioral determinant of obesity risk. National recommendations for PA have been promulgated to mitigate obesity risk and improve cardiovascular health across all age groups.^{4,5} The CDC, the American Heart Association

(AHA), and the American Academy of Pediatrics (AAP) all recommend that adolescents participate in at least 60 minutes of daily, moderate-to-vigorous physical activity (MVPA) and that adults participate in 150 minutes of moderate or 75 minutes of vigorous PA per week.⁶⁻⁸ Despite these recommendations, only 8% of adolescents and 9.6% of adults in the United States engage in the recommended amount of PA based on accelerometer measurements.^{9,10}

School physical education (PE) classes provide an opportunity to enable youth to achieve the recommended PA levels, as well as teach the necessary skills and knowledge for students to remain physically active through adulthood.¹¹ Numerous studies have shown that PE classes

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increase the amount of time children and adolescents engage in PA.^{12–14} As such, the Institute of Medicine, US Department of Health and Human Services, and the AAP all recommend daily school PE classes,¹⁵ and most states and school districts have adopted policies recommending PE classes in school.¹⁶ Despite these recommendations, only 2.1% of high schools in the United States provide daily PE classes throughout the year.¹⁶

Although providing daily PE classes has been shown to increase PA in childhood, while children are in school, it is unknown whether the increased PA is maintained into adulthood, when individuals must structure their own activity. The Trois-Rivières Growth and Development study found that first through sixth graders who engaged in 1 hour of PE classes per day had more favorable attitudes toward PA and more positive intentions to engage in PA in adulthood, but only females were more likely to engage in increased PA upon reaching adulthood.^{17,18} This Canadian study has limited generalizability because they examined an intensive PA program that is not representative of PE classes in US schools.

In the current study, we used a nationally representative cohort and sought to determine the effect of PE class participation in high school on change in PA over a 12-year period, as adolescents transition to young adulthood. Our aim was to determine whether PE classes help youth remain physically active through to adulthood, in order to inform future policy decisions aimed at improving PA across the life span.

Methods

Study Population

We analyzed data from the public use data set of the National Longitudinal Study of Adolescent to Adult Health (Add Health), a nationally representative longitudinal cohort following US adolescents into adulthood, beginning in the 1994–1995 school year.¹⁹ Add Health employs complex, multistage probability sampling, with high schools as the primary sampling unit. The 80 selected high schools helped to identify 52 feeder middle schools. Student study participants were chosen from those schools to ensure a representative sample with regard to region of the country, urbanicity, school size, school type, race, and ethnicity. There have been four waves of data collection to date, and we analyzed data from Waves 2 and 4. Wave 2 data were collected in 1996 and included students who were in eighth through twelfth grade at the time. We used Wave 2 rather than Wave 1 as our baseline because Wave 2 was the first time measured heights and weights were collected. Because we were interested in the effect of exposure to PE classes during high school, we only included Wave 2 participants who were in ninth to twelfth grade ($N=3509$), of whom 68.5% ($N=2404$) provided information on PE classes in school and PA. Of these 2404, 81.4% ($N=1957$) were also seen in Wave 4, which was conducted 12 years after Wave 2, when participants were 24 to 32 years old.

We further excluded 183 participants who were pregnant or disabled at either time point ($N=155$), as well as those who did not have height and weight data available ($N=28$). This left 1774 participants for inclusion in this analysis. Excluded Wave 2 participants were more likely to be African American and be in a higher grade. There were no statistically significant differences between gender and sedentary behavior between included and excluded participants.

Measures

Participation in high school physical education classes. PE class participation was assessed by asking how many days participants attended PE classes in an average week at school. Participants were only asked this question if the study interview occurred during the school year to lessen the chance of recall bias (1104 students were not interviewed during the school year and not included in our study). They were not queried about PE participation in previous years of high school. Because only a small percentage of participants attended PE classes between 1 and 4 days per week, we categorized the responses into three categories: none (0 days/week); some days (1–4 days/week); or daily (5 days/week). Participants were also asked how many minutes they exercised or played sports during an average class, which we included as an indicator of the strength of PE classes. Categories included less than 10 minutes, 10–20 minutes, 21–30 minutes, and more than 30 minutes.

Moderate-to-vigorous physical activity. Eleven questions measured activity level at Wave 2. Many of these questions were Likert-type scales assessing times engaged in the listed activities in the past week; responses included 0 (not at all), 1 (one or two times a week), 2 (three or four times a week), or 3 (five or more times a week). For example, questions asked included, “During the past week, how many times did you go roller-blading, roller-skating, skate-boarding, or bicycling?”. The questions did not distinguish whether activities occurred outside of PE. We used the Compendium of Physical Activities to determine which activity recall questions included only MVPA, defined as 5–8 metabolic equivalents.²⁰ Of the 11 questions, three met this inclusion criterion. The responses to these three questions were summed to create a Wave 2 MVPA scale with a possible range from 0 to 9, which is equivalent to 0–15 episodes of MVPA/week. In Wave 4, participants were asked the same activity questions as Wave 2, as well as additional questions regarding physical activities that are more common in adulthood (Supplementary Table 1) (see online supplementary material at <http://www.liebertpub.com>). The initial responses to Wave 4 PA questions ranged from 0 to 7 or more times per week. Because of the differences in questionnaires across waves, Wave 4 PA questions were condensed into three items that mirrored those in the Wave 2 scale items. These items were summed to create a Wave 4

MVPA scale equivalent to Wave 2. Change in MVPA (Δ MVPA) was determined by subtracting the Wave 2 MVPA scale score from the Wave 4 MVPA scale score. Thus, the Δ MVPA score had a possible range of -9 to $+9$, which is equivalent to -15 to $+15$ episodes of MVPA/week (Supplementary Table 2) (see online supplementary material at <http://www.liebertpub.com>). Participants were not asked about the duration, intensity, or location of PA.

Covariates. We included the following demographic covariates from Wave 2: gender, grade level, and race/ethnicity. Gender and grade level were self-reported at the time of the initial Wave 2 interview. Participants were also asked their racial/ethnic identity (white non-Hispanic, black non-Hispanic, Hispanic, American Indian/Native American, Asian/Pacific Islander, or other) and which category they predominantly identified with, if more than one group was selected. In Wave 4, participants reported the highest level of education achieved and was included as a measure of educational achievement in young adulthood.

We included sedentary behavior in both adolescence and adulthood. In adolescence, sedentary behavior was measured in the Wave 2 in-home questionnaire by asking subjects how many times they watched television (TV) or videos or played video games during the past week. Responses included not at all, one or two times, three or four times, or five or more episodes per week. For adulthood, participants were asked in Wave 4 how many hours they watched TV or videos or played video games during the past week.

We calculated BMI (kg/m^2) based on the measured height and weight for each participant at Wave 2. BMI and weight categories were provided in the Add Health data set for Wave 4. Participants were weighed and measured by the interviewer for both Waves 2 and 4. We constructed weight categories from Wave 2 data based on age at the time of the interview, gender, and measured height and weight, using the CDC pediatric growth curves.²¹ We used standard weight categories based on percentiles, including underweight (<5 th percentile), healthy weight (≥ 5 th to <85 th percentile), overweight (≥ 85 th to <95 th percentile), and obese (≥ 95 th percentile).

Statistical Analysis

All statistical analyses accounted for the complex survey design of Add Health by including cluster design. We did not use sampling weights because of the potential to bias our results given the large number of excluded participants and because our goal was not to determine national estimates. Because Δ MVPA was not normally distributed, we performed nonparametric tests (Wilcoxon and Kruskal-Wallis) to assess associations between Δ MVPA and PE class participation, activity time in PE class, gender, race/ethnicity, sedentary behaviors, and weight status. Spearman's rho was used to test the association between Δ MVPA and grade and Δ MVPA and educational achievement. Generalized linear models (GLMs) were run to test the association between PE

class participation and Δ MVPA adjusting for covariates. To account for schools as the primary sampling unit, we included the Add Health cluster variable in GLM using the survey set (svyset) command in Stata software (StataCorp LP, College Station, TX). Minutes exercising in PE class, sedentary behavior in adulthood, and Wave 4 weight status were not significantly associated with MVPA in bivariate analyses and not included in multivariable analyses. We also tested for interactions between PE classes and all variables included in the final model. Because the Δ MVPA was not normally distributed, medians and interquartile ranges (IQRs) are reported. Analyses were conducted using Stata software (13.0; StataCorp) with a p value of <0.05 used to define statistical significance.

Results

A description of the study population is found in Table 1. There was a bimodal distribution of participation in PE classes, with 34.7% of participants reporting daily PE classes and 50.1% reporting no days of PE class at baseline when in high school (Wave 2). At baseline, 17.1% were overweight and 14.8% obese, whereas in adulthood 30.8% were overweight and 37.3% obese. The median MVPA scale score in high school was 3.0, or five episodes of MVPA/week.

Males had higher MVPA in high school, compared to females (mean $\text{MVPAW2}_{\text{males}} = 4.11$, standard deviation [SD] = 2.06; mean $\text{MVPAW2}_{\text{females}} = 3.14$, SD = 1.92; $p < 0.0001$). As shown in Figure 1, participants who engaged in more PE classes also had increased PA in high school (mean $\text{MVPAW2}_{\text{no PE}} = 3.11$, SD = 1.99; mean $\text{MVPAW2}_{\text{some PE}} = 3.70$, SD = 2.00; mean $\text{MVPAW2}_{\text{daily PE}} = 4.31$, SD = 1.95; $p < 0.0001$). In young adulthood, there was no significant difference in MVPA between those who participated in more PE classes in high school and those who did not (mean $\text{MVPAW4}_{\text{no PE}} = 2.93$, SD = 2.00; mean $\text{MVPAW4}_{\text{some PE}} = 2.79$, SD = 2.01; mean $\text{MVPAW4}_{\text{daily PE}} = 3.02$, SD = 2.20; $p = 0.40$).

Δ MVPA between high school (Wave 2) and young adulthood (Wave 4) varied widely from -9 to $+9$, with a median of -1.0 , reflecting a decrease of one to two episodes of MVPA per week. Bivariate associations between PE class participation and covariates to Δ MVPA are shown in Table 2. Those who participated in some or daily PE classes in high school had larger decreases in episodes of MVPA over time, compared to subjects who did not participate in any PE classes ($p < 0.0001$). In addition, males ($p < 0.0001$) and those who were more sedentary during Wave 2 ($p < 0.0001$) also had larger decreases in MVPA over time. In bivariate analysis, higher grade in high school (Spearman's rho = 0.13; $p < 0.0001$) and higher educational achievement in adulthood (Spearman's rho = 0.058; $p = 0.01$) were also found to be significantly associated with increased Δ MVPA. There were no significant associations between race or baseline weight status and Δ MVPA. In multivariable analyses, the association of

Table 1. Characteristics of Study Participants (N = 1774)

Characteristics	N	%
Sex		
Male	875	49.3
Female	899	50.7
Race/ethnicity		
White	1081	60.9
Black/African American	360	20.3
Hispanic	202	11.4
American Indian/Native American	56	3.2
Asian/Pacific Islander	56	3.2
Other	19	1.1
Grade in high school		
Ninth	458	25.8
Tenth	476	26.8
Eleventh	459	25.9
Twelfth	381	21.5
Physical education classes, no. of classes/week		
0	889	50.1
1–4	270	15.2
5	615	34.7
Weight status in high school		
Underweight	51	2.9
Healthy weight	1158	65.3
Overweight	303	17.1
Obese	262	14.8
Sedentary behavior in high school		
0 times	71	4.0
1 or 2 times	340	19.2
3 or 4 times	467	26.3
5 or more times	896	50.5
Educational achievement		
Did not complete high school	103	5.8
Completed high school	277	15.6
Some college or trade school	765	43.1
Completed college	383	21.6
More than college	246	13.9
	Median	Range
MVPA scale scores		
Adolescence	3.00	0 to 9
Adult	3.00	0 to 9
Change over time	–1.00	–9 to 9
MVPA, moderate-to-vigorous physical activity.

Figure 1. Moderate-to-vigorous physical activity scale scores in Wave 2 and Wave 4 stratified by PE class. Differences in mean MVPA scale scores in Wave 2 (mean MVPAW2_{no PE} = 3.11, standard deviation [SD] = 1.99; mean MVPAW2_{some PE} = 3.70, SD = 2.00; mean MVPAW2_{daily PE} = 4.31, SD = 1.95; $p < 0.0001$) and Wave 4 (mean MVPAW4_{no PE} = 2.93, SD = 2.00; mean MVPAW4_{some PE} = 2.79, SD = 2.01; mean MVPAW4_{daily PE} = 3.02, SD = 2.20; $p = 0.40$) by PE class frequency. At Wave 2, those who participated in some or daily PE had significantly higher episodes of MVPA, but at Wave 4 there was no significant difference in MVPA by PE participation. MVPA, moderate-to-vigorous physical activity; PE, physical education.

more PE classes in high school with greater decrease in MVPA in the transition to adulthood was maintained (Table 3). Decreases in MPVA were greater for subjects who participated in some ($\beta = -0.58$, standard error [SE] = 0.18; $p = 0.002$) or daily ($\beta = -0.93$, SE = 0.16; $p < 0.001$) PE classes, compared to students who did not participate in any PE classes.

There was a significant interaction between PE class participation and gender ($p = 0.001$), so stratified analyses by gender were also performed (Table 4). In stratified analyses, those who had participated in daily PE classes in high school had the greatest decrement in MVPA, regardless of gender ($\beta_{\text{males}} = -0.52$, SE = 0.22, $p = 0.02$; $\beta_{\text{females}} = -1.37$, SE = 0.21, $p < 0.001$). However, among those who did not participate in PE class in high school, females, on average, saw their MVPA rise over the 12-year period, whereas MVPA fell, on average, for males in the same PE class category over the same period (Fig. 2).

Discussion and Conclusions

This longitudinal cohort study following high school students over a 12-year period found that participation in more PE classes in 1 year of high school was associated with change in PA during the transition to adulthood, but not in the expected direction. Compared to those who did not participate in PE, those who participated in some or daily PE classes for at least 1 year in high school had greater declines in MVPA over the 12-year follow-up period. Although declines in PA as adolescents transition to adulthood have been well documented^{22–24}, to our knowledge, this is the first study to evaluate the long-term effects of PE classes on this change in the United States.

Table 2. Change in Moderate-to-Vigorous Physical Activity by Selected Characteristics

	Median change in MVPA scale score	IQR	p value
Total	−1.0	−2.0 to 1.0	
Sex			<0.0001
Male	−1.0	−3.0 to 1.0	
Female	0.0	−2.0 to 1.0	
Race			0.780
White	−1.0	−2.0 to 1.0	
Black/African American	−1.0	−2.0 to 1.0	
Hispanic	−0.5	−2.0 to 1.0	
American Indian/Native American	−1.0	−2.5 to 1.0	
Asian/Pacific Islander	0.0	−2.0 to 2.0	
Other	−2.0	−3.0 to 1.0	
Weight status in high school			0.400
Underweight	0.0	−2.0 to 3.0	
Healthy weight	−1.0	−3.0 to 1.0	
Overweight	−1.0	−2.0 to 1.0	
Obese	−1.0	−2.0 to 1.0	
Sedentary behaviors in high school			<0.0001
0 times	0.0	−2.0 to 2.0	
1 or 2 times	0.0	−2.0 to 2.0	
3 or 4 times	0.0	−2.0 to 1.0	
5 or more times	−1.0	−3.0 to 1.0	
Physical education classes in high school, no. of classes/week			<0.0001
0	0.0	−2.0 to 2.0	
1–4	−1.0	−3.0 to 1.0	
5	−1.0	−3.0 to 1.0	
	Spearman's rho		p value
Grade	0.13		<0.0001
Educational achievement	0.058		0.01

MVPA, moderate to vigorous physical activity. IQR, interquartile range. Bold values represent $p < 0.05$.

Table 3. Multivariable Analysis of Determinants of Change in Moderate-to-Vigorous Physical Activity

	β	SE	p value
Sex			
Female	Ref		
Male	−0.50	0.13	<0.001
Race			
White	Ref		
Black/African American	0.33	0.16	0.04
Hispanic	−0.02	0.22	0.92
American Indian/Native American	−0.02	0.35	0.96
Asian	0.31	0.38	0.41
Other	−0.47	0.55	0.40
Grade	0.20	0.07	0.004
Educational achievement	0.01	0.03	0.69
Weight status in high school			
Healthy weight	Ref		
Underweight	0.49	0.45	0.28
Overweight	0.28	0.18	0.12
Obese	0.11	0.15	0.46
Sedentary behaviors in high school			
0	0.36	0.24	0.13
1 or 2 times	0.64	0.19	0.001
3 or 4 times	0.40	0.15	0.01
5 or more	Ref		
Physical education classes in high school, no. of classes/week			
0	Ref		
1–4	−0.58	0.18	0.002
5	−0.93	0.16	<0.001

SE, standard error.

Bold values represent $p < 0.05$.

Numerous organizations, including the American Cancer Society, the American Diabetes Association, and the AHA, have recommended PE classes as a means to foster a long-term commitment to PA and teach youth the skills and knowledge necessary for lifelong PA.²⁵ This study sug-

gests that more work is needed to determine how high school PE can positively impact PA as adolescents grow into young adults, and what strategies are important in supporting PA through the life course.

There are many potential reasons why we did not see a long-term benefit of PE classes. After secondary school, individuals become responsible for structuring their own PA. Individual competency and enjoyment of PA are two factors that have been shown to explain why some individuals remain physically active during the transition to young adulthood.^{26,27} Addressing these factors in PE by providing adolescents with greater choice and exposing them to a range of lifelong physical activities may improve

Table 4. Multivariable Analysis of Determinants of Change in Moderate-to-Vigorous Physical Activity Stratified by Gender

	Males		Females	
	β (SE)	p value	β (SE)	p value
Race				
White	Ref		Ref	
Black/African American	0.35 (0.25)	0.16	0.31 (0.22)	0.16
Hispanic	-0.07 (0.28)	0.81	0.03 (0.31)	0.91
American Indian/Native American	-0.32 (0.45)	0.48	0.40 (0.47)	0.41
Asian	0.32 (0.42)	0.45	0.33 (0.51)	0.52
Other	-0.40 (0.91)	0.66	-0.38 (0.68)	0.58
Grade	0.19 (0.09)	0.04	0.19 (0.09)	0.04
Educational achievement	0.03 (0.04)	0.46	-0.01 (0.04)	0.87
Weight status in high school				
Healthy weight	Ref		Ref	
Underweight	0.42 (0.63)	0.51	0.58 (0.50)	0.25
Overweight	0.26 (0.25)	0.29	0.31 (0.23)	0.18
Obese	0.13 (0.24)	0.58	0.03 (0.23)	0.90
Sedentary behaviors in high school				
0	0.44 (0.38)	0.25	0.31 (0.33)	0.35
1 or 2 times	0.74 (0.24)	0.003	0.55 (0.28)	0.05
3 or 4 times	0.28 (0.20)	0.16	0.51 (0.23)	0.03
5 or more	Ref		Ref	
Physical education classes in high school, no. of classes/week				
0	Ref		Ref	
1-4	-0.43 (0.24)	0.08	-0.72 (0.24)	0.003
5	-0.52 (0.22)	0.02	-1.37 (0.21)	<0.001

SE, standard error.
Bold values represent $p < 0.05$.

Figure 2. Gender differences on the effect of PE classes on change in moderate-to-vigorous physical activity. The Y-axis represents estimated marginal means (95% confidence interval) from sex-stratified multivariable models. MVPA, moderate-to-vigorous physical activity.

Interestingly, females who did not participate in PE classes in high school were the only group for whom MVPA rose during the transition to adulthood. Previous studies have shown that females have larger declines in PA in early adolescence compared to males, and the gender differences found in change in MVPA in this study may reflect this earlier decrease in PA among adolescent females.³⁴⁻³⁶ Indeed, the declines we demonstrated for males during the transition to young adulthood are similar to those found for females before high school.³⁷ Alternatively, the increase in MVPA found among females who did not participate in PE classes in high school could be owing to having a greater choice in the activities they are able to participate in as adults.³⁷ Females who chose not to participate in PE in high school may have found increased enjoyment and engagement in activities that were available as adults.

There are several limitations to our study that should be acknowledged. First, information about PA was self-reported, so participants could have either under- or over-estimated the number of episodes of MVPA. Also, the PA questions in the behavior recall only asked participants about number, not the duration, of episodes of MVPA in the last week; further, there is no specification as to whether the last week was representative of participants' usual activity. The PA questions also specifically addressed volitional exercise and did not ask about active transport to work or school. Whereas the physical activity behavior recall used in Add Health has not undergone reliability or validity testing, the recall has been used in several published studies.^{24,38,39} Second, information regarding the intensity or types of activities that were performed during PE classes was not available. Third, participants were asked about PE class in an average week, which may not be representative of the entire school year, and data are not available to determine whether the participant was taking a mandatory or elective PE class or whether participants attended similar numbers of PE classes during other years of high school. Fourth, attrition over the 12-year follow-up period for Add Health and our few exclusion criteria may have led to selection bias, which would limit generalizability.

the long-term benefit.²⁸ It is also possible that 1 year or term of PE classes is not adequate to impact PA during adulthood. Perhaps a higher dose of PE, for instance, daily PE for all 4 years of high school, is needed to confer a long-term benefit. Another possibility is that the benefits of PE disappear because of psychosocial and environmental factors adolescents encounter as they transition to young adulthood.²⁹⁻³³ These factors, such as the built environment and how individuals interact with their built environment as their social roles change, may need to be considered to influence lifelong PA.

Despite these limitations, our study raises important points for both policy and practice. Studies with shorter follow-up periods have shown that PE classes are linked to numerous benefits for adolescents, including increased PA, positive influences on concentration, memory, and classroom behavior,⁴⁰ and improved academic achievement.^{41,42} However, this study suggests that the benefits of PE do not appear to extend into continued PA in young adulthood. This study highlights the need to determine the reasons for this lack of sustained impact. One possible explanation is that the manner in which PE classes have been taught may not be conducive to promoting PA across the life span. Another explanation is the fact that 1 year or term of PE may not be sufficient to impact adult PA. The loss of structured activity in young adulthood likely also plays a part. These findings highlight the continued need for practitioners to address, with adolescent and young adult patients, the importance of incorporating PA into their lifestyles. Further, changes in young people's physical (built) and social environments as they leave school and transition to work should be examined when considering how to construct PE to impact lifelong health.

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Author Disclosure Statement

No competing financial interests exist.

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