Published in final edited form as:

J Sch Health. 2015 March ; 85(3): 141–148. doi:10.1111/josh.12233.

Physical Activity in Physical Education: Are Longer Lessons Better?

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Abstract

BACKGROUND—The purpose of this study was to compare physical activity (PA) outcomes in a sample of high school physical education (PE) lessons from schools that adopted *traditional* versus *modified block* schedule formats.

METHODS—We used the System for Observing Fitness Instruction Time (SOFIT) to conduct observations of 168 high school (HS) PE lessons delivered by 22 PE teachers in 4 schools. We used t-tests and multilevel models were used to explore variability in moderate PA and vigorous PA.

RESULTS—PA outcomes were significantly different between *modified block* and *traditional* schools. Students who attended *traditional* schools engaged in more vigorous PA in PE lessons. *Modified block* lessons lost more scheduled lesson time due to poor transition to and from the locker room. PA outcomes were positively associated with fitness and teacher promotion of PA and negatively associated with lost time, class size, management, and knowledge.

CONCLUSIONS—Though PE proponents widely advocate for more PE minutes, this study showed that greater time scheduled in PE does not necessarily result in more student accrual of MVPA minutes.

Keywords

SOFIT; MVPA; physical education; physical activity

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Human Subjects Approval Statement

The Institutional Review Board (IRB) at the PI's university approved this study.

Increasing moderate to vigorous physical activity (MVPA) is a public health priority.¹ Regular participation is associated with healthy growth and development and prevention of chronic health conditions.² Guidelines recommend children and adolescents engage in at least 60 minutes of MVPA every day including vigorous, muscle building, and bone strengthening activities 3 times per week.³ Unfortunately, by high school (HS), less than one-third meet guidelines every day.⁴

Schools can help by offering physical education (PE),^{5,6} the only program in the formalized K-12 curriculum whose primary goals include engaging in MVPA, developing motor skills, and teaching about the importance of leading an active lifestyle. PE is especially important for the least active students because it is the only place where they can experience PA at higher intensities.⁷ Additionally, PE is essential for students who do not play sports, who live in communities that do not offer programming, or whose families lack resources related to transportation, time, money.^{8,9}

Despite the nearly 2 decades of public health support, student PE enrollment requirements have diminished in the United States (US).⁹ No federal law requires PE and few schools offer it daily.¹⁰ Adding further compromise is that 65% of states allow students to substitute involvement in other extracurricular programs like athletics, band, cheerleading, debate, and ROTC to fulfill PE requirements.¹⁰ As a result, few receive PE daily.^{4,10} Therefore, optimizing PA accrual in PE is critical.

In a recent review, McKenzie and Lounsbery⁹ identified numerous barriers that prevent PE from playing a greater role in providing and promoting PA, including those associated with the structural delivery of PE: PE facilities (amenities, size, and location), teacher credentials, class size, equipment to student ratio, scheduled lesson length and the number of lessons provided per week. There is a paucity of evidence that guides any aspect of PE's structural delivery in schools. Even the National Association for Sport and Physical Education's (NASPE) recommended minutes for PE are not based on evidence, but instead are an artifact of advocating for daily PE based on traditional lesson schedule structures in elementary (30 minutes X 5 days = 150 minutes of recommended PE) and secondary (50 minutes X 5 = 225 minutes of recommended PE per week) school settings.

In California, the site of this study, all schools offering grades 7–12 are mandated to provide at least 400 minutes of PE instruction every 10 days.¹¹ School administrators have the ability to control how instructional minutes are scheduled from day-to-day. Most adopt a *traditional schedule*, meaning students attend all classes Monday-Friday. However, some administrators elect to employ a *modified block schedule* wherein students spend a longer period of time in classes on some days of the week. To date, no study has examined associations between *modified block* versus *traditional* schedules and PA related outcomes in PE. Understanding associations between schedule type and PA outcomes in PE has important implications for guiding school leader's decision making. Specifically, it would be helpful to understand if offering a *modified block* schedule leads to greater MVPA accrual in PE. Therefore, the purpose of this study was to compare PA related outcomes in PE lessons from schools using a *traditional* versus *modified block* schedule.

METHODS

Participants

California public schools offering grades 9–12 within a 35-mile radius of the principal investigator (PI) were identified using the National Center for Educational Statistics (NCES) website.¹² Eligible schools were randomized and the first 2 traditional schedule and modified-block schedule schools who agreed to participate were selected.

Selected schools were from 3 school districts and varied according to enrollment, ethnicity, SES, and the scheduled length of classes. Average student enrollment was 2055 (Range = 466). There were an average of 1870 students in *traditional* schools compared to 2241 students in *modified block* schools. The percentage of non-white students ranged from 28.6% to 97.1% (range = 68.5%). The average percentage of non-white students was 47% and 90% in *traditional* schools and *modified block* schools respectively. The percentage of students eligible to receive free and reduced meals was between 24% and 96% (range = 72%) and averaged 35% and 71% in *traditional* and *modified block* schools respectively.

All teachers were licensed specialists, employed full time to teach PE, and averaged 11.5 years of experience. Students in *traditional* schools attended PE every day for 52–58 minutes per class or between 260–290 minutes per week. In comparison, students in *modified block* schools attended PE 4 days per week for 57–58 minutes on 3 days per week and for 110–130 minutes on the other 2 days or between 281–304 minutes per week. We estimate that students in block schools spent 5%–8% longer in PE per week.

Instrument

The System for Observing Fitness Instruction Time (SOFIT) was used to observe a total of 168 PE lessons between fall 2010 and spring 2011.¹³ SOFIT is a direct observation instrument that enables observers to simultaneously record *physical activity* (lying down, sitting, standing, moderate, and vigorous), *lesson context* (management, knowledge, fitness, skill practice, game play, and other), and *teacher promotion of PA* (“in” and “out” of PE). Direct observation is widely considered the “gold-standard” for simultaneously assessing PA and contextual influences.¹⁴ Importantly, SOFIT is used most frequently in direct observation studies in PE.¹³

We followed the standard protocol and coding conventions provided by the SOFIT manual and available online.¹³ Data collectors were instructed to arrive at least 15 minutes prior to the start of class. Four target students were selected prior to the start of the lesson (2 boys and 2 girls). Data recording began when 50% of the students arrived for roll call. The pace for momentary time sampling was set at 10 seconds to observe and 10 seconds to record. The pace was established and maintained by a pre-recorded audio recording, which prompted observers to observe and record data. Each target student was observed for 12 consecutive intervals. When prompted, observers recorded the PA level of the target student, the lesson context influencing the majority of the class, and teacher interaction.

SOFIT PA codes have been validated for use in HS PE using heart rate monitors and oxygen uptake.¹⁵ SOFIT PA codes allow researchers to draw conclusions about the number of

minutes and percentage of lesson time spent in moderate to vigorous PA (MVPA) and to estimate energy expenditure (kcal/kg) and estimated energy expenditure rate per lesson (kcal/kg/min). Walking is moderate PA and vigorous is coded when energy expenditure is greater than an ordinary walk.

When prompted, observers also coded the lesson context that was influencing the majority of the class. Management was identified when tasks were related to organizing people or equipment. Knowledge was associated with students receiving information related to the task such as directions or performance feedback. Fitness activity was related to activities to develop one or more components of skill-related or health-related fitness. Skill practice involved learning, developing, or reinforcing fundamentals essential to performance. Game play was identified when students kept score during an activity and the object was to win. Other was coded when students were not given any expectations or direction from the teacher and the activity resembled free time.

Observers also recorded the nature of teacher interactions that were observed during the observation interval. Promotion of PA “in” PE was identified when teachers gave any direction to a student that was viewed as encouragement to move. Promotion of physical activity “out” of PE was recorded when teachers explicitly directed students to engage in PA outside of PE.

Procedure

Training for data collection was provided by the PI. Data collectors included one post-doctoral researcher, one Kinesiology graduate student, and several undergraduate students who all had background in physical education teacher education. Data collectors participated in 15–20 hours of training including direct instruction, video practice, and field observations to learn how to conduct observations and to reliably code PA levels, lesson contexts, and teacher interactions. Intra-rater and inter-rater reliabilities ($\geq 80\%$) were established prior to the start of data collection. Inter-rater reliability checks were conducted on 17% of lessons. Percent agreement ranged from 88%–95% for PA, 82%–100% for lesson context, and 85%–100% for teacher promotion of PA.

The unit of analysis was the PE lesson. After listwise deletion the sample included 153 lessons nested within 21 teachers and 1 to 13 lessons observed per teacher. Converting minutes to percentage of time controlled differences in lesson length. Independent samples t-tests revealed no significant differences in any variables of interest between lessons with versus without missing information.

Data Analyses

Outcome variables—Potential lesson-level outcomes for this study included the percentage of observed lesson time that students spent engaged in MVPA, moderate PA, vigorous PA, and sedentary behavior observed in the lesson. According to bivariate and multivariate analyses, type of school schedule was most strongly related to moderate PA and vigorous PA, and therefore, we present the results from those 2 analyses here.

Independent variables—The primary independent variable of interest was type of school schedule – *traditional* versus *modified block*. In total, we observed 73 lessons in *traditional schools*, and 80 lessons in *modified block* schools.

We also examined the extent to which lesson context (percentage of observed lesson time spent in management, knowledge, fitness, skill, game play, and other), percentage of lesson time lost to transition between classes, and teacher promotion of PA “in” PE mediated the relationship between schedule type and percentage of lesson spent in moderate PA and vigorous PA. Transition time was the proportion of scheduled lesson time students spent not engaged in PE content due to changing clothes and going to and from the locker room and the lesson location at the start and end of class [$((\text{scheduled lesson time} - \text{observed lesson time}) / \text{scheduled lesson time}) * 100$].

Covariates—We controlled for variables at the lesson and teacher levels as indicated in the SOFIT manual and in other published studies.^{13, 16–18} Covariates included lesson location: indoors (reference), outdoors, and indoors and outdoors, number of students in the lesson, student sex ratio (percentage girls), and teacher sex (male teacher=reference).

We used t-tests to identify significant differences in outcome and independent variables between *traditional* and *modified block* schools. Due to the hierarchical nature of the data (lessons at level 1 nested within teachers at level 2), we controlled for spatial autocorrelation by using hierarchical linear random intercept models. Both dependent variables are continuous and normally distributed. For both dependent variables, the first model included no independent variables or covariates in order to serve as a base model to assess the percentage of variation in each outcome that was explained by characteristics of teachers versus characteristics of the lessons themselves using the intraclass correlation coefficient (ICC). The second model included only type of schedule with *traditional* class scheduling serving as the reference category. The third model adjusted for potential mediators: lesson context, percentage of lesson time lost in transition, and teacher promotion of PA “in” PE. In the final model, we controlled for lesson size, the student sex ratio, lesson location (inside vs. outside), and teacher sex. All analyses were conducted using SAS version 9.2.

RESULTS

Overall Description of Lessons

There were 36 students per lesson on average (51% girls). Most lessons (58%) were held outdoors. Over half (54%) of teachers were women. Overall, an average of about 44% of lesson time was spent engaged in moderate PA, and nearly 17% was spent engaged in vigorous PA. In terms of lesson context, an average of 30% of lesson time was spent in game play, 29% in fitness, 20% in classroom management, 9% in knowledge, 5% in skill, and the remaining 7% of time students engaged in ‘other’ or free time resembling recess. An average of 36% of scheduled lesson time was lost in transition at the start and end of class due to time spent changing clothes and transitioning to and from the locker room. PE teachers promoted PA only 15% of the time.

Traditional versus Modified Block Differences

Table 1 presents differences in outcomes and independent variables between lessons in schools with *traditional* versus *modified block* schedules. Percentage of scheduled time spent in moderate PA was significantly higher in *modified block* schools (40% in *traditional* versus 47% in *modified block*), but percentage of scheduled time spent in vigorous PA was significantly higher in *traditional* schools (20% in *traditional* versus 14% in *modified block*). In the lessons we observed, students in *modified block* schools accumulated more moderate PA minutes (17.4 minutes in *modified block* versus 15.6 minutes in *traditional*) whereas students in *traditional* schools accumulated significantly more vigorous PA minutes (7.7 minutes in *traditional* versus 5.1 minutes in *modified block*). Overall, teachers spent a greater percentage of lesson time on classroom management and knowledge-based material in *modified block* schools. In addition, although PE was scheduled for more minutes in *modified block* schools (62.5 minutes versus 55.8 minutes), *modified block* schedule schools spent significantly more time in transition and as a result, actual lesson length was 1.6 minutes shorter, although this difference was not statistically significant. In terms of covariates, lessons observed in *modified block schools* had significantly more students (38 versus 34).

Multilevel Results

The results of multilevel models predicting percentage of lesson time spent in moderate PA are presented in Table 2. Results of the null model (Model 1) indicate significant teacher and lesson level variation in percentage of lesson time spent in moderate PA. About 19% of the variation in percentage of scheduled lesson time spent in moderate PA is attributed to teacher-level characteristics ($ICC = .188$) whereas the remaining 81% is explained by lesson level characteristics. The introduction of the schedule type independent variable in Model 2 eliminates the significant teacher-level variance in percentage of time spent in moderate PA. The positive coefficient for *modified block* schedule indicates that students in *modified block* schools spent a significantly greater percentage of lesson time engaged in moderate PA than students in *traditional* schools. Because the 6-lesson curriculum contexts variables (percentage of lesson spent in game play, fitness, management, knowledge, skill, and other topics) sum to 100%, we could not include all 6 items in the same model. Accordingly, we selected the variables that demonstrated the strongest associations with schedule type and PA in the bivariate analyses (percent of lesson spent in fitness, management, and knowledge). The introduction of lesson context variables in Model 3 does not explain the relationship between schedule type and percentage of time spent in moderate PA. In fact, the coefficient for schedule type actually increases, suggesting that, net of lesson context, students engage in a higher percentage of moderate PA in *modified block* than in *traditional* schools. Adjusting for additional control variables in Model 4 further increases the magnitude of the schedule type coefficient. In addition to schedule type, lessons that are conducted outdoors only result in a significantly greater percentage of lesson time spent on moderate PA, whereas percent of lesson time spent on knowledge topics is inversely associated with percentage of time spent engaged in moderate PA.

Results of multilevel models predicting percent of lesson time engaged in vigorous PA are presented in Table 4. Results of the null model (Model 1) indicate that 21.3% of the

variation in percentage of lesson time spent engaged in vigorous PA can be attributed to teacher-level differences. The significant teacher-level effect remains even after introducing schedule type into Model 2. The negative coefficient for schedule type indicates that a significantly lower percentage of lesson time is spent with students engaged in vigorous PA in *modified block* schools than in *traditional* schools. The significant teacher-level variation in percentage of time spent engaged in vigorous PA disappears with the introduction of lesson context variables in Model 3. Lesson context partially mediates the association between schedule type and percentage of time spent in vigorous PA (about 11% from Model 2 to Model 3), but schedule type remains a robust predictor of percentage of time spent in vigorous PA even after adjusting for lesson context. The introduction of control variables in Model 4 further mediates some of the effect of schedule type, but the coefficient remains substantial and significant. In addition to schedule type, percent of lesson time spent on fitness and teacher promotion of PA are positively associated with percentage of time spent engaged in vigorous PA.

DISCUSSION

Our study reveals a number of important findings related to differences in moderate and vigorous physical activity between schools with traditional versus modified block scheduling. Accrual of MVPA minutes was similar between groups; however, students spent a significantly greater percentage of time and accumulated more vigorous PA minutes essential for fitness development in *traditional* schools. Meanwhile students in *modified block* schools spent a greater percentage of time walking around and accumulated only slightly more moderate PA minutes (Table 1).

The results of the multi-level analysis illustrated that 19%–21% of the variability in PA outcomes was explained by teacher characteristics. The remaining variability was explained mostly by other lesson-level pedagogical factors largely controlled by the teacher including the percentage of time spent changing clothes at the start and end of class, how time was spent in lesson contexts, teacher promotion of PA, and lesson location. Importantly, most of these factors were associated with teacher classroom management.

The most significant finding associated with classroom management was related to transition time. Although lessons were scheduled to last an average of 6.7 minutes longer in *modified block* schools, the length of the lesson we observed was actually 1.6 minutes shorter than lessons in *traditional* schools. It is common for secondary PE classes to lose a portion of the scheduled class time for routines related to changing clothes at the start and end of class.^{16–18} However, it was surprising that students in *modified block* schools took 11% longer, contradicting previous studies.^{19–22} In this study, it is apparent that the PE teachers in *modified block* schools had significant difficulty maintaining consistent routines and pace. Inconsistency in transition time may be attributable to the layout of facilities and differences in locker room routines that naturally occur between teachers and PE departments.¹⁶ Therefore, we cannot rule out that there may have been substantial unobserved differences between the schools that influenced differences in percentage of scheduled time that was actually spent engaged in moderate and vigorous PA.

Similar to a previous study, *modified block* schools also spent a significantly greater percentage of lesson time in management.²² Differences may be attributed to significantly larger class sizes, increased lesson length, increased opportunities for teachable moments, and increased number of transitions within a lesson between lesson activities such as dynamic warm-up, demonstration, practice, game play, and closure. It is unclear why class sizes were significantly larger in *modified block* schools.

The findings also raise concern about PA levels during game play and the lack of PA promotion. Game play was negatively associated with vigorous PA. Teacher promotion of PA was only observed 15% of the time, although it was positively associated with vigorous PA. These findings help validate a recent study of HS PE in the U.S. which found students mostly walked during game play and teachers rarely promoted PA.¹⁸ It appears that curricula that focus on game play may fall short of fitness-related goals. More emphasis on teacher promotion of PA is needed.

Limitations

The results of this cross-sectional study do not infer cause and are not nationally or state generalizable. We were unable to include school fixed effects in our analysis to control for the potential confounding of differences across schools because 2 schools had modified block schedules and 2 schools had regular schedules. Therefore, there were not enough degrees of freedom to also control for the independent school effects. Future research should collect data from more schools to be able to examine the confounding effect of differences in characteristics of students across schools.

The limitations of SOFIT data can be found in the SOFIT protocol and are related to instructional goals, instructional content, class characteristics, and environmental conditions.¹³ These data were limited to PA levels, lesson contexts, and teacher interactions in the lessons observed. We did not observe classes every day; therefore, our ability to infer whether or not respective schools met national and state recommendations for weekly minutes in PE is limited. This study did not include an investigation of teachers' subjective warrant or factors that influenced the delivery of the lessons we observed.

Conclusion

These findings contribute to a limited evidence base on the structural delivery of PE for the purpose of improving public health outcomes. More studies are needed to better understand the influence of teacher and school characteristics on student accrual of MVPA in high school PE. These characteristics include, but are not limited to the subjective warrant of teachers, school facilities, infrastructure, and PE policies. Policies requiring PE program evaluation and class size limitations would likely yield different results as these policies would potentially inspire improved hiring practices, adoption of different curricula, more efficient use of time, and increased accountability for consistent routines in PE.

IMPLICATIONS FOR SCHOOL HEALTH

PA is important for children's current and future health.^{23,24} Although numerous public health agencies have identified that schools are important places to promote and provide

PA,²⁵ schools have not prioritized more curricular time for PE or other before, during, and after school physical activity programs.^{26,27} Therefore, it is important to examine the structural delivery of PA programs to understand how to optimize MVPA accrual within existing time allocations. In this vein, our study compared PA outcomes in high school PE lessons from schools that adopted *traditional* versus *modified block* schedule formats. Our findings suggest that longer lessons do not necessarily yield more moderate or vigorous PA and may promote longer bouts of managerial and transition time – both of which compromise learning outcomes.

The results have important implications for school health efforts. Foremost, PE teachers play a critical role in maximizing MVPA outcomes in PE. It is essential for administrators to ensure that PE teachers are highly qualified and accountable for establishing and maintaining consistent routines. Teachers can benefit from professional development on best practices for locker room routines and how to manage time spent in lesson contexts. Objective monitoring of transition time to and from the locker room is warranted. School administrators can also help by protecting PE scheduled time so that routines are not interrupted for other school priorities. It is also important to increase teacher awareness about the association between time spent in lesson contexts, promotion of PA, and student engagement in moderate and vigorous PA, which is essential for fitness development.

More emphasis on PA recommendations is needed. It is clear that student MVPA accrual in the lessons observed fell short of national recommendations for participation in 60 minutes daily.³ It is important for school leaders to consider the importance of offering other non-competitive extra-curricular programs which also have potential to increase MVPA minutes accumulated during the school day. These opportunities can provide an option for students who are not involved in high school athletics and who may need the PA opportunity the most.⁸

Finally, this study underscores the need to understand that reports of PE *scheduled* time are not reports of *actual* time and that longer lesson lengths do not mean that students are receiving more PA. School administrators should consider the potential benefits of modifying scheduling practices. There may be a scheduled PE time threshold that optimizes PA accrual. PE and other subject matter areas like it may need to be alternatively scheduled (30 minutes, 4 days per week versus 60 minutes, 2 days per week) to maximize weekly PA minutes.

Acknowledgments

This study was funded by a grant from the San Diego State University Research Foundation. Dr. Monnat would like to acknowledge support from the Population Research Institute at Penn State, which receives core funding from the National Institute of Child Health and Human Development (Grant R24-HD041025).

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Table 1

Sample Descriptive Statistics by Type of Class Schedule

	Traditional (N = 73)	Modified Block (N = 80)	T
Outcomes			
Percent Moderate	40.0 (11.68)	46.77 (17.08)	-2.88**
Percent Vigorous	19.8 (10.02)	14.0 (9.74)	3.62***
Moderate PA Minutes	15.6 (4.77)	17.4 (9.23)	0.67
Vigorous PA Minutes	7.7 (3.96)	5.1 (3.65)	4.28***
MVPA Minutes	23.3 (4.89)	22.5 (10.30)	0.14
Independent Variables			
Percent Game Play	36.3 (28.90)	24.8 (28.60)	2.46
Percent Fitness	29.1 (26.10)	28.6 (27.91)	0.12
Percent Management	16.9 (8.32)	22.6 (9.55)	-3.95***
Percent Knowledge	6.2 (7.59)	11.8 (16.77)	-2.72**
Percent Skill	4.9 (11.27)	5.0 (13.64)	-0.05
Percent Other	6.7 (11.73)	7.2 (13.07)	-0.28
Percent Time Lost	29.8 (6.61)	40.9 (9.19)	-8.64***
<i>Scheduled length of lesson (mins.)</i>	55.8 (2.92)	62.5 (18.37)	-3.22**
<i>Actual length of lesson (mins.)</i>	39.1 (3.20)	37.5 (15.21)	0.93
Percent Promotion of PA in PE	16.3 (11.50)	14.1 (10.23)	1.25
Covariates			
Lesson location			
<i>Indoors only</i>	16.4	21.3	-0.75
<i>Outdoors only</i>	64.4	52.5	1.49
<i>Indoors and outdoors</i>	19.2	26.3	-1.04
Lesson size	34.2 (9.90)	38.3 (9.18)	-2.62**
Student sex ratio (percent girls)	51.2 (21.00)	51.2 (9.84)	-0.00
Teacher sex (female teacher)	61.6	47.5	1.76

Note: 2-tailed independent samples t-tests; means and standard deviations (in parentheses) presented for interval-ratio variables and percentages presented for categorical variables

*
p < .05;

**
p < .01;

p < .001

Table 2
Hierarchical Linear Models Predicting Percentage of Lesson Time Spent Engaged in Moderate Physical Activity

	Model 1	Model 2	Model 3	Model 4
Intercept	44.404 (1.866) ***	40.169 (2.538) ***	42.619 (5.220) ***	39.743 (8.016) ***
Modified block schedule (ref = traditional)		7.711 (3.471) *	8.963 (3.044) **	9.855 (3.00) **
<i>Lesson Context</i>				
Percent of lesson spent in fitness			0.001 (.040)	-0.007 (.039)
Percent of lesson spent in management			0.279 (.121) *	0.159 (.126)
Percent of lesson spent on knowledge			-0.646 (.076) ***	-0.582 (.079) ***
Percent of time lost in transition			-0.008 (.122)	-0.064 (.121)
Percent of lesson spent promoting PA			-0.184 (.095)	-0.164 (.094)
<i>Control Variables</i>				
Lesson class size				-0.049 (.118)
Percent of girls in lesson				0.095 (.066)
Lesson conducted indoors only (ref)				-----
Lesson conducted outdoors only				6.987 (2.773) *
Lesson conducted indoors and outdoors				4.289 (2.968)
Teacher sex – female teacher (ref= male teacher)				-4.080 (2.519)
Teacher Level Error Variance	43.584 (24.711) *	34.121 (21.115)	14.962 (11.031)	11.169 (10.329)
Lesson Level Error Variance	188.33 (23.358) ***	187.060 (23.063) ***	131.450 (16.310) ***	127.330 (16.022) ***
Intraclass Correlation Coefficient (ICC)	0.188	0.154	0.102	0.080

Note: N = 153 lessons nested with 21 teachers; 2-tailed tests

* p < .05,

** p < .01,

*** p < .001

Table 3
Hierarchical Linear Models Predicting Percentage of Lesson Time Spent Engaged in Vigorous Physical Activity

	Model 1	Model 2	Model 3	Model 4
Intercept	16.380 (1.315)***	19.971 (1.685)***	15.052 (3.732)***	20.039 (5.60)***
Modified block schedule (ref = traditional)		-6.541 (2.305)*	-5.792 (2.431)*	-5.325 (2.25)*
<i>Lesson Context</i>				
Percent of lesson spent in fitness			0.123 (.028)***	0.127 (.027)***
Percent of lesson spent in management			-0.228 (.084)**	-0.167 (.087)
Percent of lesson spent on knowledge			-0.075 (.052)	-0.101 (.054)
Percent of time lost in transition			0.088 (.084)	0.106 (.084)
Teacher promotion of PA			0.192 (.067)**	0.179 (.066)**
<i>Control Variables</i>				
Lesson class size				-0.050 (.084)
Percent of girls in lesson				-0.080 (.047)
Lesson conducted indoors only (ref)				-----
Lesson conducted outdoors only				-3.757 (1.913)
Lesson conducted indoors and outdoors				-2.500 (2.033)
Teacher sex - female teacher (ref=male teacher)				3.963 (1.941)
Teacher Level Error Variance	22.893 (11.880)*	14.865 (8.861)*	14.641 (9.078)	9.058 (7.24)
Lesson Level Error Variance	84.621 (10.448)***	83.823 (10.269)***	59.507 (7.588)***	58.891 (7.58)***
Intraclass Correlation Coefficient (ICC)	0.213	0.151	0.197	0.133

Note: N = 153 lessons nested with 21 teachers; 2-tailed tests

*
p < .05,
**
p < .01,

p < .001