



Joint use policies: Are they related to adolescent behavior?



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ABSTRACT

Objective. Joint use policies (JUP) encourage shared facility use, usually between schools and a city or private organization, for both physical activity-related and non-physical activity-related programs. Little is known about JUP's impact on physical activity (PA). This study examined whether more specific JUPs were associated with increased PA and decreased sedentary behavior (SB) in adolescents.

Methods. Data on PA, sports participation, and SB were taken from annual cross-sectional nationally representative samples of 51,269 8th, 10th and 12th grade public school students nested in 461 school districts in the US from 2009–2011. JUP measures were constructed using information obtained from corresponding school district JU policies. Multivariable analyses were conducted, controlling for individual demographic and socioeconomic characteristics and clustering at the district level.

Results. Results showed small associations between more specific JUPs and increased PA (IRR 1.01, 95% CI: 1.00, 1.02). Closer examination of specific JUP provisions indicates that specifying what times facilities are available for use was associated with vigorous exercise and prioritizing school or affiliated organizations' use and which spaces were available for use were associated with vigorous exercise and more frequent PA participation, which includes participation in sports or athletics. No associations were found between more specific JUPs and SB.

Conclusions. JUPS may have small influences on adolescent physical activity behavior. Future longitudinal studies should be conducted to examine the impact of JUPS in conjunction with other physical activity-related policies and environmental changes to determine what impact they have on overall adolescent physical activity and sedentary behavior.

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Introduction

Increased physical activity and reduced sedentary behavior have been identified as two preventative strategies to combat adolescent obesity prevalence (Expert Panel on Integrated Guidelines for Cardiovascular Health and Risk Reduction in Children and Adolescents, 2011), yet youth experience declines in physical activity (Troiano et al., 2008) and increased screen-related sedentary behavior (Rideout et al., 2010) as they move into adolescence. Two recent Institute of Medicine reports (National Research Council, 2012; Institute of Medicine, 2013) recommended making schools a focal point for obesity prevention efforts and the primary setting where youth should acquire the recommended 60 min of daily, moderate-to-vigorous physical activity (MVPA), which includes increasing physical activity opportunities before, during, and after school hours. As part of this strategy, there has been a call to increase joint use or shared use policies between

local communities and school districts (USDHHS, 2010; AAP, 2006; NPLAN, 2010; Leadership for Healthy Communities, 2010; White House Task Force on Childhood Obesity, 2010; Khan et al., 2009).

Implementation of joint use policies (JUP) is one possible policy solution that can increase the utilization of existing recreational space in facility- and park-poor neighborhoods to improve access and availability to physical activity opportunities. This use of existing facilities is cost-effective and allows for the provision of free, safe play spaces, as well as the potential to offer structured/formal physical activity programs at a reduced cost. Building support with school principals and teachers is also important when facilitating the implementation of a JUP (Vincent, 2010).

Some studies have found that children with access to existing and renovated school recreational facilities outside of regular school hours were more likely to be active (Farley et al., 2007; Brink et al., 2010; Colabianchi et al., 2009; Durant et al., 2009). However, research examining JUP implementation consistently found lack of staffing, insufficient funding, risk of vandalism, safety, and insurance liability concerns were often cited by school personnel as barriers to opening school grounds outside of school hours (Cox et al., 2011; Evenson et al., 2009;

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Filardo et al., 2010; Spengler et al., 2011). Despite the promise of this policy strategy, and the significant attention and promotion JUPs have received at the national level, little is known about its effectiveness in increasing physical activity and reducing sedentary behavior. Currently, to our knowledge, only two published studies have examined the association between JUPs and physical activity (Choy et al., 2008; LaFleur et al., 2013). Both studies involved examining the initial impact of a newly enacted JUP that resulted from newly formed local partnerships and targeted relatively small geographic areas.

Recent research documented that 93% of school districts surrounding secondary schools where a national sample of secondary school students were enrolled had a JUP and 81% of those agreements addressed recreational use of school facilities, but most of the JUPs contained vague language or they limited the types of shared use and facilities that are available to the public during non-school hours (Chriqui et al., 2012). Therefore, through this research study, we sought to examine whether more specific JUPs—defined as those policies that included provisions on when and what school facilities/features could be used by specific groups—are associated with increased physical activity and decreased sedentary behavior in adolescents. To our knowledge, this will be the first national study to examine the association between more specific JUPs and adolescent physical activity and sedentary behavior.

Methods

This study combined cross-sectional individual-level data on physical activity and sedentary behavior collected in Spring 2009 through 2011 from 8th, 10th and 12th grade public school students participating in the Monitoring the Future (MTF) Survey. JUP data were collected from all school districts containing the MTF schools through the Bridging the Gap Community Obesity Measures Project (BTG-COMP), an ongoing, large-scale study that identifies local policy and environmental factors that are likely to be important determinants of healthy eating, physical activity and obesity among children and adolescents. Study procedures were approved by the Institutional Review Boards at the University of Michigan and the University of Illinois at Chicago.

Individual-level measures

The MTF study—conducted at the University of Michigan's Institute for Social Research (ISR) and funded by the National Institute on Drug Abuse (NIDA)—began in 1975 using national samples of high school seniors in the coterminous United States, is the nation's longest running survey of youth substance use and abuse, and related health behavior. Since 1991, the MTF surveys have also included 8th and 10th grade students annually. Schools are selected annually based on a three-stage sampling procedure (Johnston et al., 2013). Stage 1 involves geographic area selection. Stage 2 involves selection of one or more schools in each area based on establishing the probability for inclusion proportionate to the size of the respective grade to be sampled. Stage 3 focuses on selection of students within each selected grade. Within each school, up to 350 students per grade are selected for the study. For those schools with a smaller student body for the respective grade, all students are selected. If a school has more than 350 students then a random sample of classrooms or other random method is used to choose the final sample.

Questionnaires were administered by an ISR representative in classrooms during normal class periods whenever possible. In order to cover the range of topic areas in the study, 8th and 10th graders were administered four different forms, and 12th graders, six different forms of the questionnaire. This occurs in an ordered sequence to ensure virtually identical sub-samples for each form. Approximately one-third of the questions on each form are common to all 10 forms, including the demographic variables. This study uses a mix of core and form-specific questions, resulting in variation in model-specific sample sizes.

MTF student measures

Physical activity outcome measures were based on self-reported responses to the following five questions: (1) "To what extent have you participated in school athletic teams this school year?" (school-based sports participation); (2) "In which competitive sports (if any) did you participate during the LAST 12 MONTHS (include school, community, and other organized sports)?" (competitive sports participation); (3) "How often do you do actively

participate in sports, athletics or exercising?" (PA participation); (4) "During the LAST 7 DAYS, on how many days were you physically active for a total of at least 60 minutes per day?" (PA/60 min. daily); and (5) "How often do you exercise vigorously (i.e., jogging, swimming, calisthenics, or any other active sports)?" (vigorous exercise).

Sedentary behavior outcome measures were based on self-reported responses to the following three questions: (1) "Not counting work for school or a job, about how many hours a week do you spend on the Internet e-mailing, instant messaging, gaming, shopping, searching, downloading music, etc.?"; (2) "Not counting work for school or a job, about how many hours a week do you spend using a computer doing other things?"; and (3) "How many hours a day do you spend watching T.V. (separate questions for weekday vs. weekend)?" All behavioral outcome measures were dichotomized in order to conduct analyses with the full JUP indices (described in detail below) due to low and/or zero numbers in numerous cells in cross tabulations between the categorical physical activity and sedentary behavior measures and the JUP indices. Variable dichotomization was determined by examining cross tabulation distributions and conducting sensitivity analyses between outcome and JUP predictor variables. Based on the results of these analyses, occasional physical activity (e.g., "at least once a week" and "once or twice a month" for PA Participation) was coded as 1 = yes in the final dichotomized physical activity variables.

An aggregate school-level measure of perceived safety was constructed using individual responses to a form specific question in which students were asked, "How often do you feel unsafe going to or from school?" The measure represents the proportion of students from each school who responded some days, most days, and every day.

For all MTF schools, principals were asked to complete a survey on school health policies and practices. Using information provided by school principals through this survey, principal-reported measures on the percent of male and female students participating in interscholastic or varsity sports and intramural sports or physical activity clubs were constructed.

JUP policy measures

Hard copies of on-the-books joint/shared use policies were collected from all school districts containing the MTF schools via Internet research with telephone follow-up and verification.

Joint use "policy" reflected the school board-approved policy, typically codified in the School Board Policy Manual, related to joint, shared, or community use of facilities outside of school hours. In two instances, the school board had not adopted a formal policy but had included specific joint use provisions in the district's student handbook—this information was captured as a proxy for these two districts. Ninety-six percent of the districts' policies were referred to as "community use" policies; the remaining districts' policies were referred to as "joint" or "shared" use policies. Policy collection rates were >92% across all school years (SY): 92.3% (SY08-09), 96.8% (SY09-10), and 93.3% (SY10-11). All policies were coded using a 95-item coding tool developed by BTG researchers, categories included: "Type of policy" (9 items); "Which groups" were authorized to use and their relative priority/rank for use (42 items); "What" they were authorized to use (13 items), "When" they were authorized to use it (8 items), and for provisions related to "Maintenance, liability, repairs, supervision, and parking" (23 items). All policies were reviewed and independently coded by two trained, master's level coders. A consensus coding meeting was held between the coders to develop a final coding for each school district.

Using these policy data, six JUP indices, comprised of all possible time and physical activity-related space provisions, were constructed (see Table 1 for the maximum scores for each index). The indices, comprised of multiple JUP provisions, were developed to capture variations in physical activity-relevant JUP provisions, rather than limiting analyses to whether or not a JUP exists. The first index gives priority for use of (a) school-sponsored or school affiliated groups. The second index gives priority use to (b) school facilities to specific community groups, such as park and recreation departments, YMCA, and Boys and Girls Clubs. The indices then include the following additional joint/shared use "time" provisions that specify whether school facilities are allowed to be used: (1) in the evenings; (2) on weekends; (3) during holidays; (4) after school; (5) during vacation break; and (6) before school. The index also includes physical activity-related "space" provisions that specify the use of (7) indoor facilities, which included multi-purpose rooms, gyms, weight rooms and pools, and (8) outdoor facilities, which included fields, basketball courts, tennis courts, track, and playgrounds. The full school JUP index includes provision "A" plus 1 through 8, and the full community JUP index includes provision "B" plus 1

Table 1
Summary descriptives.

	Sample N	Mean	Std. dev.	Range
<i>Outcome variables</i>				
School-based sports participation	21,403	0.52	0.49	0–1
Competitive sports participation	14,317	0.78	0.41	0–1
PA participation	41,762	0.82	0.38	0–1
Vigorous exercise	15,425	0.64	0.48	0–1
>2 h T.V./daily	39,290	0.39	0.48	0–1
Other computer use	13,180	0.22	0.42	0–1
Internet use	13,193	0.22	0.42	0–1
<i>Explanatory JUP policy variables</i>				
Full school JUP scale	461	3.52	2.54	0–10
School time JUP scale	461	2.95	2.01	0–8
School spaces JUP scale	461	2.63	1.33	0–4
Full community JUP scale	461	2.89	2.37	0–9
Community time JUP scale	461	1.68	1.79	0–7
Community spaces JUP scale	461	1.36	1.04	0–4
Liability index	461	2.30	1.21	0–3
No interference with school activities	461	0.77	0.42	0–1
<i>Control variables</i>				
% Male interscholastic/varsity sports	40,672	33.51	19.75	0–100
% Female interscholastic/varsity sports	40,435	28.33	18.77	0–100
% Male intramural sports	40,204	15.95	20.98	0–100
% Female intramural sports	40,204	14.06	19.55	0–100
Grade 8	51,269	0.36	0.48	0–1
Grade 10	51,269	0.036	0.48	0–1
Grade 12	51,269	0.028	0.45	0–1
Student perception of safety	51,269	0.11	0.07	0–1
White	51,269	0.59	0.49	0–1
African American	51,269	0.13	0.33	0–1
Latino	51,269	0.15	0.36	0–1
Other race	51,269	0.13	0.34	0–1
Male	51,269	0.48	0.49	0–1
Parental education	51,269	0.71	0.45	0–1
Student lives in rural area	51,269	0.18	0.38	0–1

Data were collected in 2009, 2010, and 2011 from nationally representative samples of 8th, 10th and 12th grade public schools students.

though 8. To more fully explore which provisions are important for increasing physical activity and decreasing sedentary behavior, four additional indices were constructed for the community and school groups identifying when (time, 1–6) facilities could be used by specific groups, and what facilities/features (space, 7–8) could be used by specific groups. Models also include a measure indicating whether policies specified if facilities are accessible during times that do not interfere with school business or activities. Finally, a liability index was constructed that includes the following provisions: (1) the policy identifies who is responsible for property repair; (2) the policy identifies a method for property repair; (3) the policy includes a school board liability clause (e.g., proof of liability insurance is required for the use or lease of school property); and (4) the policy includes a risk of loss section (i.e., freeing the district of responsibility/liability of loss or damage while the user occupies the property). Liability provisions help to protect schools legally if personal injury or property damage occurs as a result of opening schools grounds through a JUP (<http://changelabsolutions.org/common-barrier-liability>; Zimmerman et al., 2013).

Data analysis

Cross-sectional, multivariable Poisson regression analyses (Schmidt and Kohlmann, 2008; Deddens and Petersen, 2008; Cummings, 2009) were conducted and the exponentiated coefficients or incidence rate ratios (IRR), which are equivalent to prevalence ratios, were calculated using survey commands in Stata 13.0 (StataCorp, 2012) after applying sampling weights to adjust for differential selection probabilities and computing robust standard errors by adjusting for student clustering within school districts. Models were run separately for the six “full,” “time” and “space” JUP indices” described in detail above. These models also included the measure identifying if facilities are accessible during times that do not interfere with school business or activities and the liability index as independent predictor variables. To explore the relative magnitude of the JUP indices on the outcome variables of interest, marginal effects were calculated to examine expected changes in the physical activity-related outcome measures using the coefficients in the models and testing varying

mid and upper ranges of the joint use indices while keeping all other independent variables at their mean. Full models controlled for gender, race, ethnicity, grade, highest level of schooling completed by father and mother, students’ perceptions of feeling unsafe going to and from school, urbanization, the percent of male and female students participating in extramural and intramural sports, and year of data collection.

Results

Table 1 shows summary statistics for all variables included in the models. Sixty-four percent of students report that they have exercised vigorously on most days, nearly every day, or every day. Thirty-nine percent of students also report they watched more than 3 h of television daily. The average school and community JUP indices have mean scores of 3.51 and 2.89, respectively, suggesting that most school district policies lack specificity in designating what times and which facility features can be used by designated organizations or groups.

Tables 2 and 3 present results for the associations between the six JUP indices and the four physical activity outcome measures. Results are consistent regardless of whether recreational-oriented community organizations or schools had designated priority use, with the exception of the school space JUP scale which showed that for each additional facility that the JUP specifically indicated could be used by school affiliated groups, prevalence of PA participation increased by 1% (IRR 1.01, 95% CI: 1.00, 1.02). The estimated marginal effects show only a modest change of one percentage point in prevalence of PA participation—82 versus 83%—if the JUP “space” index were to include all four provisions, the highest score possible, rather than the mean score of 2.6). Finally, students in school districts with more specific full, time and space-related JUP scales were one percent more likely to engage in vigorous exercise on most, nearly every day, or every day, with estimates showing an increase from 64% to 67 or 68% depending on which organizations have specified priority use of school facilities with varying levels of either the time or space JUP scale.

Tables 4 and 5 present results of the associations between the JUP indices and the three sedentary behavior outcomes. We found no statistically significant relationships between the six JUP full, time, and space-related scales and the three sedentary behavior outcomes. The estimates do indicate that students attending schools in school districts with JUPs specifying that facilities are only accessible during times that do not interfere with school business or activities were 14% (IRR 0.86, 95% CI: 0.77, 0.96) and 13% (IRR 0.87, 95% CI: 0.77, 0.98) less likely to spend more than 10 h a week using the computer and internet for non-school-related activities respectively. Finally, the joint use liability index was insignificant in all models.

Discussion

The purpose of this analysis was to examine the associations between specific JUP policy provisions and adolescent physical activity and sedentary behavior. Consistent with previous research (LaFleur et al., 2013) study results provided some supporting evidence that more specific JUPs were modestly associated with more frequent engagement in vigorous exercise. Closer examination of specific JUP provisions indicates that specifying what times and facilities are available for use was associated with vigorous exercise. Previous research showed significant variations in access to school facilities during out of school time (Lee et al., 2007), suggesting that time-related provisions may be important for increasing overall physical activity. Recent research showed that schools with policies that permitted the use of school facilities for community-sponsored programs led to increased participation in after school physical activity programs (Kanters et al., 2014). Similarly, this study showed that prioritizing school or affiliated organizations’ use and which spaces were available for use was associated with vigorous exercise and more frequent PA participation, which includes participation in sports or athletics, suggesting that which spaces are

Table 2
JUP school priority indices and adolescent physical activity.

	School-based sports participation ^a			Competitive sports participation ^b			PA participation ^c			Vigorous exercise ^d		
	IRR	95% CI	P	IRR	95% CI	P	IRR	95% CI	P	IRR	95% CI	P
Model 1												
Full school JUP scale	0.99	0.98, 1.01	0.96	1.00	0.99, 1.01	0.19	1.00	0.99, 1.01	0.34	1.01	1.003, 1.02	0.01
No interference w/ school	1.03	0.97, 1.10	0.28	0.99	0.96, 1.03	0.91	1.01	0.98, 1.03	0.33	1.03	0.98, 1.07	0.31
Liability index	0.98	0.96, 1.01	0.11	0.99	0.98, 1.01	0.64	0.99	0.99, 1.01	0.83	0.99	0.97, 1.01	0.36
^e MEs for prevalence of vigorous exercise with full school JUP scale, mean score = 3.75										0.64 (0.006)		
^e MEs for prevalence of vigorous exercise where full school JUP scale = 6										0.65 (0.007)		
^e MEs for prevalence of vigorous exercise where full school JUP scale = 11										0.68 (0.019)		
Model 2												
School time JUP scale	0.99	0.98, 1.01	0.48	1.00	0.99, 1.01	0.64	1.00	0.99, 1.01	0.50	1.01	1.002, 1.02	0.02
No interference w/ school	1.03	0.98, 1.11	0.23	0.99	0.96, 1.03	0.92	1.01	0.99, 1.04	0.31	1.03	0.98, 1.07	0.26
Liability index	0.98	0.96, 1.01	0.14	0.99	0.98, 1.01	0.74	0.99	0.99, 1.01	0.92	0.99	0.97, 1.01	0.43
^e MEs for Prevalence of Vigorous Exercise with School Time JUP Scale, mean score = 2.91										0.64 (0.006)		
^e MEs for prevalence of vigorous exercise where school time JUP scale = 4										0.64 (0.006)		
^e MEs for prevalence of vigorous exercise where school time JUP scale = 7										0.67 (0.019)		
Model 3												
School space JUP scale	0.99	0.98, 1.02	0.91	1.00	0.99, 1.01	0.61	1.01	1.00, 1.011	0.05	1.01	0.99, 1.03	0.09
No interference w/ school	1.04	0.97, 1.02	0.25	0.99	0.97, 1.03	0.98	1.01	0.98, 1.03	0.37	1.03	0.98, 1.08	0.26
Liability index	0.98	0.96, 1.01	0.56	0.99	0.98, 1.01	0.98	0.99	0.98, 1.01	0.59	0.99	0.97, 1.01	0.47
^e MEs for prevalence of PA participation, school space JUP scale, mean score = 2.6										0.82 (0.004)		
^e MEs for prevalence of PA participation, school space JUP scale = 4										0.83 (0.006)		

Model 1 shows results with full scale. Model 2 shows results with specified time scale. Model 3 shows results with specified spaces scale.

All models controlled for grade, gender, race, ethnicity, year, participation in interscholastic and intramural sports, perceived neighborhood safety to/from school, parental education, and urbanization. Data were collected in 2009, 2010, and 2011 from nationally representative samples of 8th, 10th and 12th grade public schools students.

^a School-based sports participation (1 = to a great extent/considerable/moderate, 0 = slight/not at all).

^b Competitive sports participation (1 = yes if participated in a competitive sports during the last 12 months, 0 = no).

^c PA participation (1 = almost every day, at least once a week, once or twice a month, 0 = a few times a year, never).

^d Vigorous exercise (1 = every day/nearly every day/most days, 0 = sometimes/seldom/never).

^e Results of predicted probability models are expressed as marginal effects (MEs) with SEs in parentheses, i.e., the expected changes in PA outcomes with varying ranges of the JU scales.

Table 3
JUP community group priority indices and adolescent physical activity.

	School-based sports participation ^a			Competitive sports participation ^b			PA participation ^c			Vigorous exercise ^d		
	IRR	95% CI	P	IRR	95% CI	P	IRR	95% CI	P	IRR	95% CI	P
Model 1												
Full community JUP scale	0.99	0.98, 1.01	0.76	1.00	0.99, 1.01	0.16	1.00	0.99, 1.01	0.28	1.01	1.002, 1.02	0.02
No interference w/ school	1.03	0.97, 1.10	0.24	0.99	0.96, 1.02	0.90	1.01	0.99, 1.03	0.32	1.03	0.98, 1.07	0.26
Liability index	0.98	0.96, 1.01	0.13	0.99	0.98, 1.01	0.61	0.99	0.98, 1.00	0.81	0.99	0.97, 1.01	0.42
^e MEs for prevalence of vigorous exercise with full community JUP scale, mean score = 3.17										0.64 (0.006)		
^e MEs for prevalence of vigorous exercise where full community JUP scale = 5										0.65 (0.008)		
^e MEs for prevalence of vigorous exercise where full community JUP scale = 10										0.68 (0.018)		
Model 2												
Community time JU scale	0.99	0.98, 1.01	0.63	1.00	0.99, 1.01	0.16	1.00	0.99, 1.01	0.65	1.01	1.003, 1.02	0.01
No interference w/ school	1.03	0.97, 1.10	0.24	0.99	0.96, 1.03	0.91	1.01	0.99, 1.03	0.29	1.03	0.98, 1.08	0.24
Liability index	0.98	0.96, 1.01	0.13	0.99	0.98, 1.01	0.64	0.99	0.99, 1.01	0.99	0.99	0.97, 1.01	0.48
^e MEs for prevalence of vigorous exercise with community time JUP scale, mean score = 1.64										0.64 (0.006)		
^e MEs for prevalence of vigorous exercise where community time JUP scale = 4										0.66 (0.009)		
^e MEs for prevalence of vigorous exercise where community time JUP scale = 7										0.68 (0.019)		
Model 3												
Community space JU scale	0.99	0.98, 1.02	0.94	1.00	0.99, 1.01	0.54	1.01	0.99, 1.01	0.08	1.02	1.001, 1.04	0.04
No interference w/ school	1.04	0.97, 1.10	0.25	0.99	0.96, 1.03	0.91	1.01	0.99, 1.03	0.34	1.02	0.98, 1.08	0.25
Liability index	0.98	0.96, 1.00	0.12	0.99	0.98, 1.01	0.72	0.75	0.98, 1.01	0.72	0.99	0.97, 1.01	0.45
^e MEs for prevalence of vigorous exercise with community space JUP scale, mean score = 1.36										0.64 (0.006)		
^e MEs for prevalence of vigorous exercise where community Space JUP scale = 3										0.66 (0.011)		
^e MEs for prevalence of vigorous exercise where community space JUP scale = 4										0.67 (0.017)		

Model 1 shows results with full scale. Model 2 shows results with specified time scale. Model 3 shows results with specified spaces scale.

All models controlled for grade, gender, race, ethnicity, year, participation in interscholastic and intramural sports, perceived neighborhood safety to/from school, parental education, and urbanization. Data were collected in 2009, 2010, and 2011 from nationally representative samples of 8th, 10th and 12th grade public schools students.

^a School-based sports participation (1 = to a great extent/considerable/moderate, 0 = slight/not at all).

^b Competitive sports participation (1 = yes if participated in a competitive sports during the Last 12 Months, 0 = no).

^c PA participation (1 = almost every day, at least once a week, once or twice a month, 0 = a few times a year, never).

^d Vigorous exercise (1 = every day/nearly every day/most days, 0 = sometimes/seldom/never).

^e Results of predicted probability models are expressed as marginal effects (MEs) with SEs in parentheses, i.e., the expected changes in PA outcomes with varying ranges of the JU scales.

Table 4
JUP school priority indices and adolescent sedentary behavior.

	Daily hours T.V. ^a			Weekly hours computer ^b			Weekly hours internet ^c		
	IRR	95% CI	P	IRR	95% CI	P	IRR	95% CI	P
<i>Model 1</i>									
Full school JU scale	0.99	0.98, 1.01	0.54	1.01	0.98, 1.03	0.51	1.01	0.99, 1.03	0.38
No interference w/ school	0.98	0.91, 1.05	0.57	0.86	0.77, 0.96	0.01	0.87	0.77, 0.98	0.02
Liability index	0.98	0.96, 1.02	0.47	1.01	0.96, 1.05	0.75	1.01	0.96, 1.05	0.89
<i>Model 2</i>									
School time JU scale	0.99	0.98, 1.01	0.29	1.02	0.99, 1.04	0.10	1.02	0.99, 1.05	0.11
No interference w/ school	0.98	0.92, 1.05	0.57	0.86	0.77, 0.96	0.01	0.87	0.77, 0.97	0.02
Liability index	0.99	0.96, 1.02	0.54	1.00	0.96, 1.05	0.94	0.99	0.95, 1.04	0.97
<i>Model 3</i>									
School space JU scale	0.98	0.96, 1.01	0.13	1.00	0.97, 1.03	0.92	1.00	0.96, 1.03	0.69
No interference w/ school	0.98	0.92, 1.05	0.62	0.86	0.77, 0.96	0.01	0.87	0.77, 0.98	0.02
Liability index	0.99	0.96, 1.02	0.70	1.01	0.96, 1.05	0.48	1.01	0.97, 1.06	0.53

Model 1 shows results with full scale. Model 2 shows results with specified time scale. Model 3 shows results with specified spaces scale.

All models controlled for grade, gender, race, ethnicity, year, participation in interscholastic and intramural sports, perceived neighborhood safety to/from school, parental education, and urbanization. Data were collected in 2009, 2010, and 2011 from nationally representative samples of 8th, 10th and 12th grade public schools students.

^a Daily weekday T.V. (1 = >3 h a day, 0 = <3 h a day).

^b Weekly computer use (1 = >10 h a week, 0 < 10 h a week).

^c Weekly internet use (1 = >10 h a week, 0 < 10 h a week).

designated for use under the JUP may be more important for increasing participation in more formal or structured physical activity programs.

It is important to note that this study examined the association between established rather than newly enacted JUPs and physical activity and sedentary behavior. Previous research showing a relationship between JUPs and physical activity (LaFleur et al., 2013) or increased use of physical activity programs (Choy et al., 2008) could have resulted from a number of factors, such as an initial increase in physical activity due to the enactment and implementation of a new/modified policy, the provision of formal, structured programs, and advertising or marketing of the availability of both shared space and programmatic offerings. The study also did not include surveys of community members, who could be involved with promoting JUPs at the local level, nor did it specifically assess whether community members are more physically active when JUPs are in place in their communities.

Study results provide little evidence that specific JUP provisions were associated with reduced sedentary behavior. One possible explanation for this could be that students may be using school facilities after hours to participate in study hall or other similar after school

activities. The only statistically significant association we found was between reduced computer-related activities and JUPs specifying that school facilities can only be used by outside organizations if their planned activities do not interfere with school-related activities. It is possible that school districts with this provision explicitly written in their policies may have increased demand for use of school facilities by outside organizations, thus, these same school districts might inadvertently offer more formal and informal programs leading to reduced sedentary behavior. In order to better understand the association between JUPs and sedentary behavior, future research should collect and examine adolescents' specific reasons for using school facilities outside of school hours.

Previous research has shown a significant barrier to JUP implementation is concern about liability (Cox et al., 2011; Evenson et al., 2009; Filardo et al., 2010; Spengler et al., 2011). However, no association was found between JUP liability provisions and adolescent physical activity and sedentary behavior. This discrepancy in findings may be because our analysis used measures based on information contained in the existing policies, whereas these previous studies used information

Table 5
JUP community group priority indices and adolescent sedentary behavior.

	Daily hours T.V. ^a			Weekly hours computer ^b			Weekly hours internet ^c		
	IRR	95% CI	P	IRR	95% CI	P	IRR	95% CI	P
<i>Model 1</i>									
Full community JU scale	0.99	0.98, 1.01	0.77	1.01	0.98, 1.03	0.49	1.01	0.99, 1.03	0.42
No interference w/ school	0.98	0.91, 1.05	0.55	0.86	0.77, 0.96	0.01	0.87	0.77, 0.98	0.02
Liability index	0.98	0.96, 1.02	0.41	1.01	0.96, 1.05	0.75	1.01	0.96, 1.05	0.86
<i>Model 2</i>									
Community time JU scale	0.99	0.98, 1.01	0.29	1.02	0.98, 1.04	0.24	1.02	0.99, 1.05	0.17
No interference w/ school	0.98	0.92, 1.05	0.57	0.86	0.77, 0.96	0.01	0.87	0.77, 0.98	0.02
Liability index	0.99	0.96, 1.02	0.54	1.01	0.96, 1.04	0.79	1.00	0.95, 1.04	0.90
<i>Model 3</i>									
Community space JU scale	1.00	0.97, 1.03	0.97	0.98	0.94, 1.02	0.34	0.98	0.94, 1.03	0.49
No interference w/ school	0.98	0.91, 1.05	0.54	0.86	0.77, 0.96	0.01	0.87	0.77, 0.98	0.02
Liability index	0.98	0.96, 1.02	0.38	1.02	0.97, 1.06	0.45	1.01	0.97, 1.06	0.55

Model 1 shows results with full scale. Model 2 shows results with specified time scale. Model 3 shows results with specified spaces scale.

All models controlled for grade, gender, race, ethnicity, year, participation in interscholastic and intramural sports, perceived neighborhood safety to/from school, parental education, and urbanization. Data were collected in 2009, 2010, and 2011 from nationally representative samples of 8th, 10th and 12th grade public schools students.

^a Daily weekday T.V. (1 = >3 h a day, 0 = <3 h a day).

^b Weekly computer use (1 = >10 h a week, 0 < 10 h a week).

^c Weekly internet use (1 = >10 h a week, 0 < 10 h a week).

collected from surveys conducted with school principals and/or administrators. Our data do not capture information on policy implementation; it only includes information on the existence of policies. The liability provisions may inform whether school principals allow use of their facilities by outside organizations; however, our results suggest that just having these provisions as part of the overall JUP policy does not differentially affect rates of physical activity or sedentary behavior in adolescents. Future research should examine the existence of JUP policies in conjunction with measures of implementation within schools/communities and their collective influence on physical activity and sedentary behaviors.

This study was subject to several limitations. First, data were cross-sectional, preventing direct causal inferences about whether the JUPs directly influenced changes in adolescent physical activity and sedentary behavior. Adolescent outcome measures are self-reported and subject to over/under-reporting and recall bias. The study was also missing information on the number, types, and cost of both organized and unorganized physical activity programs offered as a result of the JUPs. Finally, as previously mentioned this study only included information on the existence of JUP policy provisions and did not include measures of implementation within schools/communities. This study also had a number of strengths. First, the JUP measures were constructed from documentation of local, school district policies rather than self-report interview data similar to other studies, which would be subject to measurement error due to respondents lacking knowledge of all policy provisions. Second, the study included a nationally representative sample of 8th, 10th and 12th grade students and their school districts. Finally, the study examined the influence of existing, rather than model or modified, JUPs providing the first evidence of what influence these policies have on adolescent physical activity and sedentary behavior at the population level.

In conclusion, results from this study provide some evidence supporting the need to consider which specific provisions should be included in future JUPs. Implementing JUP policies as a means to increase access to available community-based school physical activity settings is an emerging and promising strategy to improve physical activity behavior, but further research is needed on the utilization of opening up school grounds outside of school hours to fully determine the utility and impact of JUPs on physical activity. Finally, additional research is needed to determine whether just opening the school grounds is effective at increasing adolescent physical activity and reducing sedentary behavior, or are more structured/formal programs or supervision needed to really see increased physical activity benefits in youth from JUPs.

Given the modest associations consistently found in this study, results suggest that JUPs may have small influences on adolescent physical activity behavior. Yet JUPs are receiving wide promotion as an important physical activity strategy from numerous organizations (USDHHS, 2010; AAP, 2006; NPLAN, 2010; Leadership for Healthy Communities, 2010; White House Task Force on Childhood Obesity, 2010; Khan et al., 2009). JUPs represent just one strategy of many that should be considered to increase adolescent physical activity. It is possible that JUPs are more effective at raising awareness of local physical activity opportunities rather than having an effect on physical activity behavior. Furthermore, results showed that specific JUP provisions were associated with increased occasional (e.g., once or twice a month), as well as more regular, physical activity. This suggests that JUPs may be a useful tool to encourage relatively inactive youth to participate in some physical activity, but may not be effective, as a stand-alone tool, at influencing adolescents to meet daily or weekly recommended physical activity levels. Future longitudinal studies should be conducted to examine the impact of JUPs in conjunction with other physical activity-related policies and environmental changes to determine what impact they have on the overall adolescent physical activity and sedentary behavior.

Conflict of Interest Statement

The authors declare that there are no conflicts of interests.

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