PAAH
PHYSICAL ACTIVITY AND HEALTH

Khorana, P., et al. (2019). The Effects of Wellness In The Schools (WITS) on Physical Activity During Recess in New York City Public Schools. *Physical Activity and Health,* 3(1), pp. 117–126. DOI: https://doi.org/10.5334/paah.44

RESEARCH

The Effects of Wellness In The Schools (WITS) on Physical Activity During Recess in New York City Public Schools

Priya Khorana[1], Pamela A. Koch[1], Raynika Trent[1], Heewon L. Gray[2], Randi L. Wolf[1] and Isobel R. Contento[1]

[1] Department of Health and Behavior Studies, Teachers College, Columbia University, New York, NY, US

[2] Department of Community and Family Health, College of Public Health, University of South Florida, Tampa, FL, US

Corresponding author: Priya Khorana (pk2443@tc.columbia.edu)

Only 21% of U.S. children meet federal physical activity (PA) guidelines. Schools have insufficient time for physical education classes. School children typically have recess daily, making recess a venue to increase PA. Programs such as Wellness In the Schools (WITS) provide a coach during school recess to lead organized activities and encourage all students to participate may provide students with health, psychological, academic and social benefits.

This study was a quasi-experimental matched-control design with seven WITS intervention schools and seven matched control schools, measuring two outcomes: 1) PA level, 2) PA type (measured with an observational tool: System for Observing Play and Leisure Activities in Youth (SOPLAY)). Outcomes were measured in second and third graders pre-(T0) and post-(T1), one school-year into the WITS intervention during outdoor (T0 and T1) and indoor (inclement weather) (T1 only) recess. Results at T1 were compared between control and WITS schools with ANOVA tests.

For PA level, the WITS intervention increased PA in indoor recess, a higher percentage of WITS girls and boys were vigorously active, a lower percentage were sedentary, and overall recess PA levels were higher (all $p \leq .001$).

For PA type, WITS intervention schools had higher overall PA level during ball-like activities during outdoor recess in girls ($p = 0.002$) and boys ($p = 0.010$).

This study suggests active recess interventions increase PA level during indoor recess and during ball-like activities in outdoor recess, suggesting the WITS intervention has the potential to increase PA during school and help students receive the benefits of regular PA.

Keywords: Physical Activity; School Wellness; Recess; Intervention; Elementary school children; Soplay

Introduction

In the U.S., the majority of children aged 6 and up do not meet federal daily physical activity recommendations (National Physical Activity Plan Alliance, 2016). The U.S Department of Health and Human Services (HHS, 2012) recommends children and adolescents aged 6–17 participate in a minimum of 60 minutes of moderate-to-vigorous activity daily. According to the 2008 physical activity guidelines, which were the first official physical activity guidelines for Americans and the guidelines at the time of the current study, children should participate in vigorous activity at least 3 days per week, as well as 'muscle and bone strengthening activities' at least 3 days per week. Results from the 2016 United States Report Card on Physical Activity for Children and Youth (aged 6–11) show that only 21% of American youth met these guidelines, and only one in three children are physically active every day (National Physical Activity Plan Alliance, 2016).

Regular physical activity in children builds muscles, strengthens bones, facilities growth, and improves fitness. Conversely physical *inactivity* contributes to the dramatic rise of childhood obesity from 7% in 1980

to 18% in 2014 (Ogden et al., 2014). Currently, about 12.7 million children and adolescents are obese in the United States, as measured by body mass index (BMI) for age >95th percentile. The prevalence of obesity is higher among Hispanics (21.9%) and non-Hispanic blacks (19.5%) than among non-Hispanic whites (14.7%) (Ogden et al., 2014). The Office of the President (White House Task Force, 2010) endorsed childhood obesity as a major focus of public health efforts in the United States. More specifically, children who are obese are at increased risk for developing chronic diseases such as diabetes, high blood pressure, high cholesterol, asthma, arthritis, as well as some cancers such as colon cancer (Must et al., 1999). Therefore, regular physical activity can help to maintain health.

There are *academic*, *psychological* and *social* benefits when children engage in regular physical activity. There is some evidence that regular physical activity has immediate and long-term impacts on *academic performance* (Castelli et al., 2015). This includes improved scores on academic achievement tests, higher grades, betters academic behavior, increased time on task (Castelli et al., 2014), increased concentration (Tomporowski et al., 2003), and longer classroom attentiveness (CDC, 2010). *Psychological* benefits include reduced depression and anxiety, increased self-confidence and self-esteem (Biddle & Asare, 2011), and improved stress management (WHO, 2017). Finally, physical activity often involves students playing together providing *social* experiences (Hartle et al., 1994).

Because children spend a large portion of their day in schools, schools provide a unique venue for youth to meet physical activity guidelines (Kohl, 1998). Schools increase children's physical activity through physical education (PE) classes and informal physical activity such as during recess. New York City Department of Education (NYCDOE) requires 120 minutes of PE per week for kindergarten through 6th grade, or three 40-minute classes. Because many schools have limited space that keep them from meeting the physical education recommendations, (Kohl, 2013) recess is the next best alternative to provide students with additional daily time for physical activity.

Despite arguments that the elimination of recess would lead to academic benefits (via additional class-time), there is no research to support this concept. Additionally, students need active recess even when weather is inclement and students cannot go outside. The 2011 CDC report concludes that recess is a crucial part of students' school experience as it contributes to normal growth and development, increases social skills (e.g., cooperation, following rules, problem solving, negotiation, sharing, communication), improves engagement in classroom activities (e.g., being on-task, not being disruptive), and enhances cognitive performance (e.g., attention, memory) (CDC, 2011). Yet the Shape of the Nation Report (2016) identified only eight states have policies requiring daily recess in schools.

Wellness In The Schools (WITS) is a program that aims to encourage healthier environments in schools to encourage students to be more active and have access to healthy school meals in hopes of improving student outcomes. WITS programming incorporates two components: the WITS Coach for Kids and the Cook for Kids component. For the purpose of this study, the authors have only focused on the Coach for Kids component.

Description of WITS intervention

The WITS Coach for Kids component utilizes trained coaches (fitness professionals) to work with students on public school recess yards/spaces. The primary aim for the WITS Coaches is to transform recess from a time of sedentary socializing to a time for physical activity and teamwork, which helps students offset the desk bound time spent in class and teaches them to negotiate, share, and solve problems as a group. The coaches also aim to encourage pro-social behaviors amongst the students, aspiring to reduce conflicts and bullying. The intervention also aims to inspire participation and team building activities amongst school aides to "make recess an active, fun and safe environment for all students" (WITS website, 2017).

The WITS Coaches work at the schools every day. When recess is outdoors, coaches are on the school recess yards. When recess is indoors, during inclement weather, the coaches work in the indoor recess spaces organizing games and activities while providing equipment including balls, Frisbees, hula-hoops, jump ropes etc. Typically, recess is indoors most days during the winter months. Additionally, throughout the school year the WITS Coaches implement other strategies encouraging physical activity including WITS Fit Bits (short bouts of physical activity conducted on the classroom) and Family Fitness Fun Nights (one or two per year at each WITS school).

This aim of this study was to evaluate whether WITS Coach for Kids component can increase the *level* of physical activity and *types* of activities during recess, in NYC public schools.

Method

Study design

This study measured students' physical activity at recess during the first year of a larger study that involved an evaluation of a program, Wellness In The Schools (WITS). WITS has the goal to promote healthier school environments by adding a coach at recess to increase physical activity and engagement (Coach for Kids component) and adding a chef in the school cafeteria to increase healthy eating habits (Cook for Kids component). The focus of this paper is on the Coach for Kids component. This study used a quasi-experimental matched-control design to compare seven WITS and seven Control schools on: physical activity level (sedentary, walking, vigorous) at recess and physical activity types at recess.

School selection for intervention schools

New York City Public Schools that were interested in receiving the WITS intervention submitted an application directly to WITS. Schools learn about WITS through word of mouth; WITS did no active recruitment. After receiving applications, WITS staff members assessed the applications and visited the schools to assess whether the school is a good match for WITS programming. Schools that received WITS programming had to contribute part of the financial cost. The schools were able to cover this financial expense by conducting school-wide fundraisers, applying to grants, or through rewards in school contests. WITS used "sliding scale fee." Therefore, the cost for each school is determined on a case-by-case basis. For schools that cannot cover the full fee, what is not paid by the school was covered by WITS. For this study, seven elementary schools were accepted to receive the WITS programming.

Inclusion/exclusion criteria for control schools

Schools had to be a NYC public elementary school in order to be considered as a control school. There were several exclusion criteria, as listed below.

Exclusion: *Schools were excluded if they met any of the following criteria:*

- Had once received the WITS programming
- School lunch not provided by NYC School Food
- Does not have a kitchen and/or an in-school cook, or caters school lunch
- On a specialty (e.g., vegetarian) menu offered by NYC School Food (acceptable menus: regular, express, cold express)
- Had organized physical activity program during recess that was run by an external organization has fewer than 50% of students that qualified for free and reduced priced lunch
- Was inaccessible by New York City public transportation

Control schools

Seven-matched Control NYC public schools did not receive any WITS programming. For the Control schools, indoor and outdoor recess followed their usual practices based on the policies and procedures for that school.

Participants

The participants were second and third graders in the 14 schools. Data were collected in the location designated for recess. For outdoor recess this was typically a playground or schoolyard. For indoor recess, this was typically the school auditorium, gym or other location. The recess facilities had tremendous variation. These variations existed across both WITS and Control schools.

Institutional Review Board approval

This research obtained approval from Institutional Review Boards (IRB) of both Teachers College, Columbia University (TC), and the New York City Department of Education (NYCDOE), (TC IRB #15-413, NYCDOE IRB #1051). Because these data were collected anonymously by passive observations, this study was exempt from obtaining parent consent and student assent.

Outcome measures and data collection tools

Data were collected for both outdoor and indoor recess. Data collection for outdoor recess used a *pre-post design* with Time 0 data collection prior to programming and Time 1 data collection after one school year

of WITS programming. Data for indoor recess used a *post only design*. Data were collected at one time point (Time 1). For each data collection point, data were collected over two school days at each of the 14 schools.

The data were collected with a systematic observational tool, adapted from other tools commonly used to observe children at play called the System for Observing Play and Leisure Activities in Youth (SOPLAY).

Physical activity level measures the relative amount of movement of students during recess. The method for measuring physical activity level in this study is an observational tool called System for Observing Play and Leisure in Youth (SOPLAY) developed by McKenzie et al., (2002). To measure level of physical activity McKenzie's SOPLAY protocol uses momentary time sampling techniques to categorize physical activity at three levels:

Sedentary: sitting, standing or lying down;
Walking: exerting slightly more energy than being sedentary i.e. pivoting from one foot to another; and
Vigorous: exerting more energy than walking; *note: the original SOPLAY tool this is called "very active."*

When assessing physical activity level in a group of children, this observational method is considered the gold standard (McKenzie, 2002) and is consistent with how physical activity levels are measured in studies with children and has been used by other researcher (Ridgers et al., 2010; Willenberg et al., 2010; Sallies et al., 2003; Haerens et al., 2007; James-Burdumy et al., 2016; Trost et al., 2008; Bleeker et al., 2015). This tool is sensitive to measure relative physical activity of a group of children during a play episode. However, students categorized at the vigorous level of physical cannot be assumed to be meeting metabolic equivalent (METS) standards for moderate to vigorous physical activity (MVPA) as can be determined when using other methodologies.

To collect data using SOPLAY, McKenzie's original method was employed. A play space was divided into 'target areas' called *zones* and observer conduct momentary *scans* of physical activity level of students playing in the zones.

Zones were created for outdoor recess using a map of the play space. For indoor recess a site visit was necessary, and an image of the space was used for zoning or each outdoor and indoor recess space for the 14 schools in this study zone maps were created prior to data collection, with about eight zones per space. These pre-determined zones were used during data collection. During data collection, a zone could be further split into 'scan spaces' on two conditions: 1. If the density of students was too high to be able to accurately conduct a scan, and 2. If the students were moving too fast and in various directions at once. The two 'scan spaces' were ultimately summed up to provide an overall accurate measure for each 'target area' or zone.

The researcher conducted *scans* by standing in a corner of a zone and "scanning" students. Separate scans were made for girls and then for boys. Scans were made from left to right. A scan of a zone was called an *interval*. The start time for the interval was recorded. Each student in the zone is observed once and categorized as sedentary, walking or vigorous. If a student re-entered the zone, they were not to be observed or if new children enter the zone, back-tracking to re scan them was not to be done. The researcher tallied the number of students in each physical activity level using a mechanical tally counter, with three levers. After each scan, the number of students in each of the three physical activity levels were recorded (from the counter) on to the SOPLAY form. Scans took from 50 seconds to over a minute, depending on the number of students in the zone and the size of the space. The end time was recorded once the scan was complete for the interval. The observer then repeated the scan for the next interval, until 8 were completed or until recess ended.

Physical activity types are a list of the kinds of games or play students could be engaged in during recess. The activity list for this study was informed by the list on McKenzie's SOPLAY tool. The original SOPLAY tool (2002) codes activities into 15 codes (0–14), with a different list of activities for secondary groups and young, preschool-aged, children. For this study, the list of activities was modified, in order to capture the types of games and play encouraged by the WITS Coaches. Thus, our SOPLAY tool categorized activity types into 13 codes (0–13) (**Table 1**). This kind of adaptation is consistent with what was done in the outcome evaluation of PlayWorks (Bleeker et al., 2015). Additionally, this study, divided the activities into three sub-types: ball-like, non-ball like, and seated games & no activity.

Table 1: Subtypes and specific activities coded for physical activity types with code number.

Ball-like	Non-ball like	Seated games & No Activity
Basketball (1)	Running (3)	No specific activity (0)
Baseball/softball (2)	Jumping games (7)	Sedentary games/activities (11)
Football (4)	Dance (9)	
Kickball (5)	Tag/chasing games (10)	
Volleyball (6)	Climbing/Jungle gym (12)	
Soccer (8)		
Other ball activities (13)		

Codes for physical activity type were recorded for each scan of physical activity level. After the physical activity level data was recorded, the researcher visually assessed the zone and recorded the most dominant activity type for the entire zone.

Data Analysis

For the data analysis of activity level, a new variable was created, 'overall physical activity level'. To create this variable, 1 point was assigned for every percentage of student categorized as vigorous; 0.5 point was assigned for every percentage of student categorized as walking; and 0 points was assigned for every percentage of student categorized as sedentary, for a 0–100 point scale.

To measure for differences in physical activity level for outdoor recess, a repeated measures ANOVA was performed separately for boys and girls. Dependent variables were sedentary, walking, and vigorous physical activity levels (presented as the percentage of students at each activity level), and overall physical activity levels, presented as the score (0–100 scale). Independent variables were treatment group (IC) and time (Time 1, controlling for Time 0). These were included in the model as fixed factors. The interaction effect of treatment group (IC) was reported. For indoor recess, which was measured only at Time 1, an ANOVA was performed to compare intervention to control.

To measure differences in overall physical activity level for the three types of activities (ball-like; non-ball like; and seated games & no activities) for outdoor recess a repeated ANOVA was performed. Analyses were performed for each activity type and separately for boys and girls. The dependent variables 'overall physical activity level'. The fixed factors were treatment group (IC) and time (Time 0 and Time 1). The interaction effect of treatment group (IC) and time (Time 1, controlling for Time 0). For indoor recess, which was measured only at Time 1 an ANOVA was performed with 'overall physical activity level' as the dependent variable for each activity type separately for boys and girls.

Results

The fourteen New York City public schools that participated in this study were located in four boroughs of New York City: Bronx, Brooklyn, Manhattan and Queens. Students who qualified for free/reduced price lunch (FRPL) in the schools ranged from 82% to 100%. The percentage of students who were African-American or Latino at the schools ranged from 57% to 99%.

Physical Activity Level. Table 2 results suggest that there was only a difference for boys in sedentary activity during outdoor recess. For boys at WITS schools, 10% were sedentary at both Time 0 and Time 1. Whereas, for boys at control schools 18% of boys were sedentary at Time 0 and 20% at Time 1 ($p = 0.016$).

Table 3 shows the physical activity levels between WITS intervention schools and control schools during indoor recess. The results suggest that WITS intervention schools had a higher proportion of both girls and boys that were vigorously active than control schools ($p < .001$; $p = .001$ respectively). The table also shows that there was a lower proportion of both girls and boys in WITS intervention schools that were sedentary than in control schools ($p < .001$; $p = .001$ respectively). Both girls and boys in WITS intervention schools had higher scores for the overall recess activity level scale than control schools ($p < .001$; $p < .001$ respectively).

Physical Activity Type

Table 4 shows the comparison of overall physical activity level for the three categories of physical activity type between WITS intervention and control schools for outdoor recess. The results show that the WITS intervention schools had a higher overall physical activity level for ball-like activities in girls and boys ($p = 0.002$, $p = 0.010$ respectively) compared to control schools.

Table 2: Comparison of physical activity levels between WITS intervention schools and control schools for outdoor recess.

Gender	Variables	Control Mean% (SD)		Intervention Mean% (SD)		F (IC * Time)	p-value
	Activity level	Time 0	Time 1	Time 0	Time 1		
Girls	Vigorous	41 (14.8)	43 (23.8)	41 (14.2)	51 (17.4)	.314	.581
	Walking	40 (16.2)	34 (15.3)	42 (15.1)	32 (13.09)	.055	.817
	Sedentary	19 (14.8)	23 (17.0)	18 (13.7)	17 (14.2)	1.117	.301
	Overall recess activity level scale[a]	61 (19.69)	60 (19.19)	61 (11.75)	68 (14.5)	.648	.429
Boys	Vigorous	45 (27.4)	51 (22.5)	49 (9.81)	54 (18.6)	.102	.752
	Walking	37 (18.1)	30 (15.0)	41 (14.4)	36 (14.6)	2.514	.126
	Sedentary	18 (12.5)	20 (13.6)	10 (10.7)	10 (8.4)	6.713	**.016**
	Overall recess activity level[a]	64 (19.23)	65 (17.0)	69 (7.4)	72 (12.5)	1.332	.260

Repeated measured ANOVA for interaction effect between control and intervention groups at Time 1 with Time 0. (Time 1 Controlling for Time 0).

[a] Overall recess activity level is a composite score as: (% students vigorous) * (% students walking * .5) * (% students sedentary * 0), scale 0–100.

Table 3: Comparison of physical activity levels between WITS intervention schools and control schools for indoor recess.

Gender	Variables	Control	Intervention	p-value
	Activity Level	Mean[a] (SD)	Mean[a] (SD)	
Girls	Vigorous	7 (15.3)	44 (26.4)	**<.001**
	Walking	8 (14.3)	24 (16.8)	**.018**
	Sedentary	84 (2.91)	32 (31.9)	**<.001**
	Overall recess activity level scale[a]	11 (22.1)	56 (28.1)	**<.001**
Boys	Vigorous	9 (16.7)	46 (29.8)	**.001**
	Walking	9 (10.8)	18 (18.6)	.152
	Sedentary	81 (26.5)	36 (30.9)	**.001**
	Overall recess activity level[a]	14 (21.5)	55 (28.9)	**<.001**

ANOVA for interaction effect between control and intervention groups at Time 1.

[a] Overall recess activity level is a composite score as: (% students vigorous) * (% students walking * .5) * (% students sedentary * 0), scale 0–100.

Table 4: Comparison of overall physical activity level for the three categories of physical activity type between WITS intervention schools and control schools for outdoor recess.

Gender	Variables	Control		Intervention		F (IC * time)	p-value
	Code	Time 0	Time 1	Time 0	Time 1		
		Mean[a] (SD)	Mean[a] (SD)	Mean[a] (SD)	Mean[a] (SD)		
Girls	Ball-like activities	81.7 (17.2)	56.5 (32.6)	64.0 (29.3)	81.0 (19.3)	9.945	**.002**
	Non-ball like activities	83.6 (28.4)	90.9 (17.6)	70.1 (21.2)	79.5 (24.1)	.043	.836
	Seated games & no activity	33.69 (23.46)	25.33 (32.09)	39.82 (24.98)	42.18 (26.80)	.564	.455
Boys	Ball-like activities	92.10 (12.22)	76.61 (26.06)	69.81 (21.07)	79.03 (21.04)	6.783	**.010**
	Non-ball like activities	78.31 (29.46)	83.52 (23.50)	73.27 (27.18)	86.34 (20.11)	.463	.498
	Seated games & no activity	38.77 (30.04)	36.86 (38.29)	50.34 (17.08)	52.86 (20.42)	.078	.781

ANOVA for interaction effect between control and intervention groups at Time 1 with Time 0. (Time 1 Controlling for Time 0).

[a] Means are for the overall recess activity level, which is a composite score: (% students vigorous) * (% students walking * .5) * (% students sedentary * 0), scale 0–100.

Discussion

This study tested the impact of the WITS intervention on physical activity levels and physical activity types, measuring 2nd and 3rd grade students on the recess yard in seven control schools and seven intervention schools. We compared differences between WITS intervention school and control schools for physical activity level from Time 0 to Time 1 and at Time 1 for indoor recess.

Physical activity level. The most important finding was that the WITS intervention was effective at increasing physical activity level during indoor recess for both girls and boys. For outdoor recess, 'overall physical activity levels' for 'ball-like activities' were higher for both boys and girls in the WITS intervention than control students. For indoor recess, 'overall physical activity levels' for 'seated games & no activity' for WITS intervention schools were higher for both boys and girls in the WITS intervention than control students. These finding can contribute to the literature, as this is only the second study to measure indoor recess.

Our researchers had informal discussions with the principals of several NYC elementary schools and learned that recess may be indoors during the winter months, about 3–5 months of the school year. This is true for other areas of the Northeast. Although the students do not spend every day during these months in indoor recess, these data show that even when the students are inside for recess there may be ways to provide opportunities for them to be more physically activity.

Although our study evaluated the impact of WITS coaches, it may be possible to train available school recess staff on how to encourage indoor activities in small spaces, instead of the usual NYC fall-back of having students watch a movie in the auditorium. Schools should and can utilize and take advantage of more spaces (rather than just the auditorium) to provide students with occasions to be more active. In this study hallways, gyms, classrooms, and other spaces were used for indoor recess.

While we had hypothesized that there would be large differences in activity levels from Time 0 to Time 1 during outdoor recess in WITS intervention schools, the only statistical difference was for fewer boys from WITS schools being sedentary at the end of the school year (T1) as compared to the Control schools. These findings suggest that the WITS Coach for Kids intervention may be helpful in preventing what seems to be an inevitable increase in sedentary behavior, at least for boys, as the school year progresses. The Playworks study (Bleeker, 2015), in a randomized control trial of an intervention that is similar to WITS programming, did not find significant differences in the mean percentage of girls and boys engaging in vigorous activity based on the SOPLAY observations, similar to ours.

Because of the nature of the observational tool (SOPLAY) the students were coded as being sedentary, walking, or vigorous at the time of the scan. This momentary scan may not have captured the total level of activity for children during the entire recess period as would have been captured by other methods, such as accelerometers, which were able to capture differences in the Playworks study (Bleeker, 2015).

Physical activity types. For physical activity type, the most noteworthy finding was that at Time 1, there was a higher percentage of vigorous physical activity for ball-like activities for both girls and boys in WITS intervention schools compared to control schools. Playworks (Bleeker et al., 2015) suggest that interventions that provide active recess often encourage students to be engaged in more playground games (such as baseball, dodgeball, basketball) which can be classified as 'ball-like' activities than schools without structured recess. Similarly, for the Playworks intervention (Bleeker et al., 2015) more boys were at the vigorous level of physical activity during activity type codes that were similar to our 'ball-like' activities. What is novel about our study is that we found this was also the case for girls. These findings suggest that by engaging students in ball-like activities, the WITS Coaches are able to get more students more active than when students engage in ball-like activities on their own.

Limitations

WITS is a non-profit organization implementing real-world wellness intervention, with limited funding, programs in school. Due to this real-world setting, the schools were not randomized. Given that only a small number of schools are selected each year to receive the WITS intervention, we choose to use NYC schools matched on demographics as our comparison.

Since this study was part of the larger WITS evaluation, the power calculations done for this study were on the primary outcome of increasing fruits and vegetables and not on the outcomes measured in this study. Additionally, power was reduced because students were observed anonymously and thus the two days of observation captured the same students. This led to a reduced number of recess intervals for our analyses further decreasing power to see differences between groups.

It is important to note that only the primary activity that was played at the time of the scan was analyzed and because of the nature of the tool (SOPLAY) some activities may have been missed because the researcher only coded the primary (most predominant) activities on the zone at the time of the scan.

The sample of schools and children are consequently limited to an urban population pool that has a higher percentage of minority, poverty, and FRPL, and would not necessarily be nationally representative, or even representative of NYC. High needs schools were specifically chosen for this study: lower income, neighborhoods with poor outcomes and higher percentage of students of color.

At the same time as the students received the Coach for Kids intervention they also received another WITS intervention, Cook for Kids that changes to a more scratch cooked school meal. These results may be from the combination of these two components of WITS.

The evaluation was only a year long, which in a real life situation is not long and it can be said that the full effects of WITS may not be fully realized after a single school year, which was the scope of this study.

Conclusion

Implementing real-world physical activity programs in schools, efficaciously, can be a challenge. Measuring and testing the effect of these programs can also be complex. This current study found an impact of the one-year WITS intervention on physical activity during indoor recess for both girls and boys, encouraging students to be more vigorously active and less sedentary. This current investigation also found that after one-year, both girls and boys when playing 'ball-like' activities were more vigorously active than girls and boys in control schools.

Our study collected data not only on physical activity level but also on the types of activities provided to the students. We were able to decipher which activities provided the 2nd and 3rd graders with higher levels of physical activity, providing students with the benefits of physical activity and encouraging them to meet the recommended guidelines. The literature suggests (CDC, 2010) that children move in a more intermittent pattern, so even if children are not very active for long durations of time, if they are playing activities of higher intensity this can provide the physical activity benefits and help to encourage children in meeting the required physical activity guidelines.

This study evaluated a physical activity intervention in schools and the effect in the real world. While results are promising, particularly related to the impact on indoor recess, they should be interpreted with caution due to study limitations. A longer term evaluation seems warranted at this time.

Competing Interests

The authors declare that they have received a contract from Wellness In The Schools (WITS) to conduct an evaluation of the programming.

References

Biddle, S. J., & **Asare, M.** (2011). Physical activity and mental health in children and adolescents: a review of reviews. *British Journal of Sports Medicine*, bjsports90185. DOI: https://doi.org/10.1136/bjsports-2011-090185

Bleeker, M., Beyler, N., James-Burdumy, S., & **Fortson, J.** (2015). The impact of Playworks on boys' and girls' physical activity during recess. *Journal of School Health*, *85*(3), 171–178. DOI: https://doi.org/10.1111/josh.12235

Castelli, D. M., Centeio, E. E., Beighle, A. E., Carson, R. L., & **Nicksic, H. M.** (2014). Physical literacy and comprehensive school physical activity programs. *Preventative Medicine*, *66*, 95–100. DOI: https://doi.org/10.1016/j.ypmed.2014.06.007

Castelli, D. M., Glowacki, E., Barcelona, J. M., Calvert, H. G., & **Hwang, J.** (2015). *Active education: Growing evidence on physical activity and academic performance*. San Diego, CA: Active Living Research.

Centers for Disease Control and Prevention, & Centers for Disease Control and Prevention. (2010). *The association between school based physical activity, including physical education, and academic performance* (p. 9). Atlanta, GA: US Department of Health and Human Services.

Force, W. H. T. (2010). *Solving the problem of childhood obesity within a generation: White House Task Force Report on Childhood Obesity Report to The President*. Washington, DC.

Haerens, L., De Bourdeaudhuij, I., Maes, L., Cardon, G., & **Deforche, B.** (2007). School-based randomized controlled trial of a physical activity intervention among adolescents. *Journal of Adolescent Health, 40*(3), 258–265. DOI: https://doi.org/10.1016/j.jadohealth.2006.09.028

Hartle, L. (1994). Outdoor Play: A Window on Social-Cognitive Development. *Dimensions of Early Childhood*, *23*(1), 27–31.

James-Burdumy, S., Beyler, N., Borradaile, K., Bleeker, M., Maccarone, A., & **Fortson, J.** (2016). The Impact of Playworks on Students' Physical Activity by Race/Ethnicity: Findings from a Randomized Controlled Trial. *Journal of Physical Activity and Health*, *13*(3), 275–280. DOI: https://doi.org/10.1123/jpah.2014-0607

Kohl, H. W., & **Hobbs, K. E.** (1998). Development of physical activity behaviors among children and adolescents. *Pediatrics*, *101*, 549–554.

Kohl, H. W., III, & **Cook, H. D.** (Eds.). (2013). *Educating the student body: Taking physical activity and physical education to school*. National Academies Press.

McKenzie, T. L. (2002). *Use of direct observation to assess physical activity. Physical activity assessments for health-related research* (pp. 179–195). Champaign, IL: Human Kinetics.

Must, A., Spadano, J., Coakley, E. H., Field, A. E., Colditz, G., & **Dietz, W. H.** (1999). The disease burden associated with overweight and obesity. *Jama, 282*(16), 1523–1529. DOI: https://doi.org/10.1001/jama.282.16.1523

National Physical Activity Plan Alliance. (2016). *2016 United States Report Card on Physical Activity for Children and Youth*. Columbia SC.

Ogden, C. L., Carroll, M. D., Kit, B. K., & **Flegal, K. M.** (2014). Prevalence of childhood and adult obesity in the United States, 2011–2012. *JAMA*, *311*(8), 806–814. DOI: https://doi.org/10.1001/jama.2014.732

Ridgers, N. D., Stratton, G., & **McKenzie, T. L.** (2010). Reliability and validity of the System for Observing Children's Activity and Relationships during Play (SOCARP). *Journal of Physical Activity & Health*, *7*, 17–25. DOI: https://doi.org/10.1123/jpah.7.1.17

Tomporowski, P. D. (2003). Effects of acute bouts of exercise on cognition. *Acta Psychologica*, *112*(3), 297–324. DOI: https://doi.org/10.1016/S0001-6918(02)00134-8

Trost, S. G., Rosenkranz, R. R., & **Dzewaltowski, D.** (2008). Physical activity levels among children attending after-school programs. *Medicine and Science in Sports and Exercise*, *40*(4), 622. DOI: https://doi.org/10.1249/MSS.0b013e318161eaa5

U.S Department of Health and Human Resources. (2012). *Strategies to increase physical activity among Youth: Physical Activity Guidelines for Americans: Midcourse report*. Washington, DC: HHS.

Willenberg, L. J., Ashbolt, R., Holland, D., Gibbs, L., MacDougall, C., Garrard, J., & **Waters, E.,** et al. (2010). Increasing school playground physical activity: a mixed methods study combining environmental measures and children's perspectives. *Journal of Science and Medicine in Sport*, *13*(2), 210–216. DOI: https://doi.org/10.1016/j.jsams.2009.02.011

How to cite this article: Khorana, P., Koch, P. A., Trent, R., Gray, H. L., Wolf, R. L., and Contento, I. R. (2019). The Effects of Wellness In The Schools (WITS) on Physical Activity During Recess in New York City Public Schools. *Physical Activity and Health,* 3(1), pp. 117–126. DOI: https://doi.org/10.5334/paah.44

Submitted: 13 October 2019 **Accepted:** 31 October 2019 **Published:** 09 December 2019

]u[*Physical Activity and Health* is a peer-reviewed open access journal published by Ubiquity Press.

OPEN ACCESS