Original Research

From policy to practice: Examining the role of recess in elementary school

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ABSTRACT

Objectives: To examine the relationship between school recess policies, the quality of the recess environment and body mass index (BMI) among elementary school children.

Study design: Observational.

Methods: Data were collected at 23 schools across four geographically distinct regions of the United States. Measures included recess observations using the Great Recess Framework-Observational Tool (GRF-OT), recess policies were collected with the School Physical Activity and Policy Assessment, and BMI was obtained through height and weight measurements among 429 students in third and fifth grade.

Results: Results showed that school policies related to recess access significantly predicted children’s BMI, and school policies related to investment in recess significantly predicted recess quality as measured by the GRF-OT.

Conclusions: Results from this study can be used to help inform future research regarding how school recess policies can impact child-level outcomes and the recess environment.

1. Introduction

In the United States of America (USA), childhood obesity continues to be a major public health issue. Estimates suggest that 18.4% of children between the ages of six and 11 years old are obese [1]. This is concerning, especially among children, as it puts them at higher risk for high blood pressure, high cholesterol, and metabolic conditions [2]. Evidence has shown that an increase in sedentary behavior and a decrease in physical activity among this age group influences excess weight gain [2]. While the USA has current physical activity guidelines of 60 minutes of daily moderate to vigorous physical activity (MVPA), among children ages six to 11 years old only 42% meet current recommendations [3,4]. Given that over 50% of children in the USA are not meeting the physical activity guidelines, schools can play a vital role at increasing physical activity as a key strategy for obesity prevention [5]. Children in the USA spend an average of 6.8 hours in school per weekday, and recess is one of the few times during the school day where children can be physically active. In fact, up to 44% of all physical activity during the school day happens at recess [6]. Recess is the only unstructured part of the school day in which children can play and be physically active with their peers, and it also offers children physical, social and emotional benefits [7].

While recess is one of few opportunities for children to engage in physical activity during the school day, up to 40% of the 16,000 school districts in the USA have cut or eliminated recess from the daily elementary school schedule since the mid-2000’s [8]. Furthermore, while the push for additional academic and standardized testing time has played a role in the disinvestment of recess, there are additional factors at play as to why time for recess is not prioritized. According to a Gallup survey, despite the benefits of recess, 77% of school principals in the USA reported withholding recess from students as punishment for student behavior. Moreover, schools struggle with student behavior at recess, as approximately 90% of discipline related problems are reported during lunch and recess [8]. Recess can be an environment in which there are higher rates of bullying, victimization, conflict, and negative social interactions that are detrimental to children’s health [8-14]. There are also large disparities in how much time children get for recess, as urban and economically disadvantaged schools see less recess time as compared to their suburban, rural and higher income school counterparts [15,16], possibly compounding the greater risk for obesity and other chronic health conditions with these populations [17,18].

When considering the impacts of recess on children’s health and development, various ecological level influences play a role [19,20]. For example, intrapersonal factors such as gender and motor competence differentiate levels of children’s physical activity [21]. On an interpersonal level, evidence shows that improving adult-student relationships possibly compounding the greater risk for obesity and other chronic health conditions with these populations [22], and decreasing bullying and exclusionary behavior between
children [23], are important for recess quality [24]. On an organizational level, several important factors play a role in recess outcomes. Previous research has found that recess length significantly predicted children’s MVPA and steps per minute, which suggests that children will be more physically active if given additional access to recess [24]. Moreover, when schools provide additional investment through school-level recess interventions, physical activity at recess increases [25,26], especially for girls [27], and minority students [28]. Additionally, adult leadership on the playground, staff development for recess, and investment in recess equipment have shown improvements in regard to child-level outcomes such as physical activity and prosocial behaviors [6,22–24,29,30]. Finally, evidence shows that there are reciprocal benefits in how recess can help improve school climate and classroom behavior [15,23,31,32].

Despite this evidence, few studies to date have examined the impact of policies on recess outcomes. Two previous studies examined school district policies on physical education; however, there are inconsistent findings in how district policies are carried out at the school-level, or how they impact child-level outcomes [33,34]. Given this, it is pertinent to study more proximal influences, such as school-level policy, to examine the impact of recess policy on both processes and outcomes. Therefore, the purpose of the current study was to examine the relationship between school recess policies, the quality of the recess environment and body mass index (BMI) among elementary school children.

2. Methods

2.1. Study participants

Research requests were sent to 15 school districts across five different states that represented diverse geographical regions in the USA (i.e., East Coast, West Coast, Mountain West, Midwest, South) and encompassed urban, rural, and metropolitan demographics. Of the school districts that agreed to participate, large districts (>30 schools) were stratified by socio-economic status and enrollment (above or below the district median for both) so that equal numbers of schools would be invited to participate from each quadrant; whereas all schools were invited to participate in smaller districts. The final sample included 23 schools in four of the five regions (see Table 1). Schools ranged from 31.6% to 98.2% economically disadvantaged (M = 78.50; SD = 18.48). A total of 429 children were randomly selected for height and weight measurements from third and fifth grade classes.

2.2. Measures

2.2.1. Recess quality

Recess policies at the school-level were assessed using selected items from the School Physical Activity Policy Assessment (S-PAPA) [33]. This assessment examines policy related to physical activity opportunities at elementary schools and includes three modules: (a) Physical Education; (b) Recess, and (c) Other Before, During, and After School Programs. The recess module items were collected in the current study. Items on the S-PAPA used in the current study were scored as a yes/no (1,0) dichotomized variable, with the exception of daily recess minutes, which was scored as 1 – less than 20 minutes per day, 2 – 21 to 30 minutes per day, and 3 – more than 30 minutes per day. Two composite variables, recess access and recess investment, were created by summing relevant S-PAPA items. Recess access included four S-PAPA items; (a) school policy for daily access to recess, (b) minutes of recess provided daily, (c) provisions for students to be physically active during inclement weather, and (d) teachers not withholding recess from children for academic or behavioral reasons. Recess investment included six S-PAPA items; (a) provision of organized activities at recess, (b) encouragement of physical activity by recess supervisors, (c) posted recess rules, (d) students being taught recess rules, (e) formal recess supervisor training, and (f) annual budget for recess equipment and supplies.

2.2.2. Recess quality

Recess quality was measured using the Great Recess Framework – Observational Tool (GRF-OT) [35]. The GRF-OT contains 17 items that each describe in short detail critical aspects of a quality recess environment and response formats for all items are according to a 1 (low quality) to 4 (high quality) rating. Previous research has revealed a four-factor measurement model and established measurement validity and reliability for the subscales including (1) structure and safety (SS); (2) adult engagement and supervision (AES); (3) student behaviors (SB); and (4) transitions (T) [35].

2.2.3. Body mass index (BMI)

In order to measure BMI, height and weight measurements were obtained from randomly selected children in the participating third and fifth grade classes. Height was measured using a portable stadiometer (Hopkins Medical Products) and weight was measured using a digital scale (RENPHO). Recordings of height and weight were transformed into BMI scores, translated to z-scores, percentiles, and age-adjusted BMI category using the age- and sex-specific parameters from the Centers for Disease Control and Prevention’s BMI-for-age growth charts [36]. Upon calculating and adjusting BMI scores, each participant was classified based upon their BMI percentile value as underweight (BMI < 5th percentile), normal weight (5th ≤ BMI < 85th percentile), overweight (85th ≤ BMI < 95th percentile), or obese (BMI ≥ 95th percentile).

2.3. Study procedure

All study procedures were approved by the Human Research Protection Program at the first author’s institution. Data collection took place over several days at each of the 23 schools and data were collected by trained undergraduate and graduate students. When third and fifth grade classrooms participated in separate recess sessions, those sessions were scored independently. Across each recess session, a minimum of two lunch time recess observations were conducted. Approximately 15 minutes before the scheduled recess session, trained assessors completed a walkthrough of the playground and took notes about the built environment. They then observed the entire recess session, taking notes on each GRF-OT item throughout the process. In all cases, the recess environment was completely visible to the trained assessor, and they were trained to move throughout the playground in a discreet manner in order to observe patterns of interaction and behavior. In some cases, two trained assessors were present at recess, and one was focused on taking comprehensive notes of what happened at recess, while the other focused on scoring specific GRF-OT questions. Notes and scores were compared following recess to ensure consistency across multiple observers. In addition, final scoring was completed immediately after the recess session.

The S-PAPA was administered through an online survey platform and completed by the principal or assistant principal at each of the 23 schools. To measure BMI, height and weight measurements were obtained from randomly selected children, by trained assessors during the school day. Classroom teachers dismissed one child at a time to go with trained assessors to a quiet room with the measurement equipment. The trained assessors verbally reviewed the assent process with each child, and a clear yes or no response was required of the children prior to proceeding. Children who did not wish to participate were taken back to class. Children who agreed to continue had their weight measured using a digital scale and their height with a portable stadiometer. Children were asked to take their shoes off for both measurements. One of the trained assessors took the child through the protocol, while the other recorded the measurements.

2.4. Data analysis

To examine how policies governing recess are related to student health outcomes, a two-level regression model was run in Mplus (v. 8.4)
### Table 1
School-level participant demographics.

| School  | School Reported Race/ Ethnicity | School % Economically Disadvantaged | School Size | n in current study | Sex (%F) (Mean, SD) | Age (Mean, SD) | Recess Access Score | Recess Investment Score | BMI (Mean, SD) |
|---------|--------------------------------|------------------------------------|-------------|-------------------|----------------------|----------------|----------------------|----------------------|---------------|
| School 1| African American 24.9%; Hispanic/Latino 4.9%; Multiracial 5.6%; White 61.8%; Asian 2.1% | 31.6 | 607 | n= 29 | 58.24 (1.03) | 8.98 | 5 | 5 | 50.00 (5.20) | 18.20 (3.60) |
| School 2| African American 9.5%; Hispanic/Latino 19.6%; Multiracial 1.7%; White 30.2%; Asian 38.5% | 80.1 | 587 | n= 18 | 57.32 (1.08) | 9.24 | 4 | 2 | 42.67 (3.79) | 18.99 (3.40) |
| School 3| African American 90.7%; Hispanic/Latino 2.7%; Multiracial 1.8%; White 1.3%; Asian 3.1% | 97.3 | 225 | n= 15 | 47.36 (1.14) | 9.68 | 3 | 4 | 48.00 (3.61) | 19.24 (3.82) |
| School 4| African American 13.9%; Hispanic/Latino 32.7%; Multiracial 3.1%; White 27.7%; Asian 21.3% | 91.5 | 553 | n= 25 | 51.52 (1.17) | 9.43 | 2 | 2 | 45.17 (3.43) | 19.13 (3.33) |
| School 5| African American 55.5%; Hispanic/Latino 11.2%; Multiracial 7.8%; White 17.1%; Asian 7.6% | 63.1 | 409 | n= 21 | 55.81 (1.01) | 9.32 | 4 | 4 | 51.00 (3.41) | 20.73 (3.87) |
| School 6| African American 10.1%; Hispanic/Latino 81.4%; Multiracial 2.1%; White 4.2%; Asian 1.1% | 96.4 | 663 | n= 7 | 52.38 (.45) | 10.16 | 1 | 3 | 44.00 (1.00) | 22.99 (6.73) |
| School 7| African American 17.6%; Hispanic/Latino 51.7%; Multiracial 7.9%; White 12.5%; Asian 9.4% | 86.1 | 545 | n= 19 | 53.33 (1.28) | 9.68 | 5 | 5 | 41.67 (4.23) | 20.13 (5.18) |
| School 8| African American 96.6%; Hispanic/Latino 0.6%; Multiracial 0.6%; White 1.2%; Asian 0% | 98.2 | 328 | n= 10 | 40.0 (1.30) | 9.47 | 3 | 3 | 48.75 (3.20) | 20.93 (3.60) |
| School 9| African American 67.1%; Hispanic/Latino 7.8%; Multiracial 4.8%; White 6.6%; Asian 13.2% | 86.2 | 334 | n= 1315 | 60.0 (1.07) | 10.0 | 3 | 5 | 47.00 (1.73) | 18.55 (2.34) |
| School 10| African American 0.4%; Hispanic/Latino 97.7%; Multiracial 0%; White 1.4%; Asian 0.4% | 84.4 | 917 | n= 12 | 67.67 (1.09) | 9.38 | 2 | 3 | 50.75 (4.79) | 20.07 (5.59) |
| School 11| African American 0%; Hispanic/Latino 96.4%; Multiracial 0.1%; White 2.6%; Asian 0.9% | 95.4 | 695 | n= 25 | 57.45 (0.90) | 9.28 | 4 | 6 | 52.75 (1.71) | 22.01 (4.19) |
| School 12| African American 0.1%; Hispanic/Latino 96.5%; Multiracial 0.2%; White 2.7%; Asian 0.6% | 94.2 | 903 | n= 33 | 53.33 (1.18) | 9.75 | 5 | 5 | 51.00 (8.83) | 20.36 (4.05) |
| School 13| African American 0%; Hispanic/Latino 99.5%; Multiracial 0%; White 0.5%; Asian 0% | 92.6 | 876 | n= 27 | 50.05 (1.23) | 9.73 | 3 | 3 | 49.75 (3.77) | 20.17 (4.91) |
| School 14| African American 0.2%; Hispanic/Latino 98.7%; Multiracial 0%; White 0.5%; Asian 0% | 92.3 | 853 | n= 33 | 63.83 (1.19) | 9.25 | 3 | 2 | 40.50 (1.73) | 19.00 (3.91) |
| School 15| African American 0.1%; Hispanic/Latino 97.4%; Multiracial 0%; White 1.9%; Asian 0.6% | 86.2 | 698 | n= 20 | 43.24 (1.06) | 9.03 | 3 | 5 | 51.50 (5.07) | 19.31 (3.47) |
| School 16| African American 0.2%; Hispanic/Latino 96.5%; Multiracial 0%; White 3.0%; Asian 0.2% | 91.8 | 838 | n= 8 | 60.0 (0.88) | 10.10 | 4 | 2 | 35.00 (7.96) | 19.47 (3.76) |
| School 17| African American 1%; Hispanic/Latino 48%; Multiracial 5%; White 42%; Asian 2% | 60.0 | 440 | n= 11 | 77.77 (0.51) | 10.53 | 4 | 3 | 50.33 (3.51) | 18.35 (2.37) |
| School 18| African American 2%; Hispanic/Latino 34%; Multiracial 5%; White 58%; Asian <1.0% | 53.0 | 379 | n= 21 | 57.44 (1.11) | 9.40 | 6 | 5 | 41.63 (3.50) | 18.54 (3.01) |

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recess access significantly predicted BMI (b = −0.335, p = 0.030). However, no relationship was found between recess investment and BMI (b = 0.260, p = 0.301).

3.2. Recess access, recess investment and GRF-OT

Across the 23 schools, quality of recess as measured by the GRF-OT was considered low-to-moderate ($M_{GRF} = 46.88; SD_{GRF} = 4.79$; Range $= 24–68$). At the school-level, four schools averaged a minimum of three-out-of-four for each GRF scale item (i.e., total score of 51 or higher). As shown in Table 4, no relationship was found between recess access and GRF-OT ($b = −1.076, p = 0.185$). However, recess investment significantly predicted GRF-OT score ($b = 1.981, p = 0.014$).

4. Discussion

The current study examined the association between school recess policies, the quality of the recess environment, and children’s BMI among elementary school children. Results show that policies related to recess access were significantly associated with children’s BMI, while school policies related to recess investment were significantly associated with the quality of the recess environment.

Regarding policies of recess access, results revealed that only 34.8% of schools provided 30 or more minutes of recess per day, and just over half of schools provided physical activity opportunities on days with inclement weather. This is concerning due to the large proportion of children not meeting the current physical activity guidelines [3,4]. Moreover, only 13% of schools had policies that teachers could not withhold recess for behavioral or academic reasons, suggesting that recess may be further limited for already vulnerable students [38]. Regarding recess investment, 39.1% of schools reported policies that recess supervisors should provide students with organized activities, while 91.3% of schools reported policies that recess supervisors should encourage physical activity. This is encouraging considering previous evidence that adult engagement predicts children’s physical activity and recess engagement [24,39]. Almost all schools had policies for teaching students the recess rules, whereas only 39.1% had the recess rules posted. Lastly, just over half of the schools had annual budgets for recess equipment and supplies, and just under 50% of recess supervisors received formal training. Staff development for recess supervisors and improvements to recess equipment have been found to increase physical activity, recess engagement, and prosocial behaviors among elementary school children [23,30].

The current study found that the presence of school policies relating to recess access significantly predicted lower child BMI. This highlights the importance of recess access for children’s physical health, especially considering that a large portion of physical activity that takes place during the school day occurs at recess [6]. As schools in the USA have shifted to a greater focus on academic time, recess has been overlooked in terms of its potential benefits. However, increased physical activity and
### Table 2  
School-level recess policies from the S-PAPA.

| School | Daily Recess Minutes | Active During Inclement Weather | Teachers Cannot Withhold Recess | Organized Activities | Encourage PA |Posted Recess Rules | Recess Rules Taught | Formal Training for Recess Monitors | Annual Recess Budget |
|--------|----------------------|---------------------------------|-------------------------------|---------------------|-------------|-------------------|-------------------|------------------------------------|-------------------|
| School 1 | X                    | 3                              |                                | X                   | X          | X                 | X                 |                                    | X                 |
| School 2 | X                    | 3                              |                                | X                   | X          | X                 |                    |                                    |                   |
| School 3 | X                    | 2                              |                                | X                   |            | X                 | X                 |                                    | X                 |
| School 4 | X                    | 1                              |                                | X                   |            |                   |                   |                                    |                   |
| School 5 | X                    | 2                              |                                | X                   | X          | X                 |                    |                                    |                   |
| School 6 | X                    | 1                              |                                | X                   |            |                   |                   |                                    |                   |
| School 7 | X                    | 3                              |                                | X                   | X          | X                 | X                 |                                    |                   |
| School 8 | X                    | 1                              |                                | X                   |            |                   |                   |                                    |                   |
| School 9 | X                    | 1                              |                                | X                   | X          | X                 | X                 |                                    |                   |
| School 10 | X                   | 1                              |                                | X                   |            |                   |                   |                                    |                   |
| School 11 | X                   | 2                              |                                | X                   |            |                   |                   |                                    |                   |
| School 12 | X                   | 2                              |                                | X                   |            |                   |                   |                                    |                   |
| School 13 | X                   | 2                              |                                | X                   |            |                   |                   |                                    |                   |
| School 14 | X                   | 2                              |                                | X                   |            |                   |                   |                                    |                   |
| School 15 | X                   | 2                              |                                | X                   |            |                   |                   |                                    |                   |
| School 16 | X                   | 2                              |                                | X                   |            |                   |                   |                                    |                   |
| School 17 | X                   | 3                              |                                | X                   |            |                   |                   |                                    |                   |
| School 18 | X                   | 3                              |                                | X                   |            |                   |                   |                                    |                   |
| School 19 | X                   | 3                              |                                | X                   |            |                   |                   |                                    |                   |
| School 20 | X                   | 3                              |                                | X                   |            |                   |                   |                                    |                   |
| School 21 | X                   | 3                              |                                | X                   |            |                   |                   |                                    |                   |
| School 22 | X                   | 1                              |                                | X                   |            |                   |                   |                                    |                   |
| School 23 | X                   | 2                              |                                | X                   |            |                   |                   |                                    |                   |

Note: Coding for daily recess minutes: 1 - less than 20 minutes per day, 2 – 21 to 30 minutes per day, and 3 - more than 30 minutes per day.

### Table 3  
Effects of recess investment and recess access on BMI.

| Parameter          | Estimate | Std. Error | t-Test Statistic | p-value |
|--------------------|----------|------------|------------------|---------|
| Within level       |          |            |                  |         |
| BMI ON             | 0.132    | 0.291      | 0.453            | 0.651   |
| Gender             | 0.687    | 0.101      | 6.811            | <0.001  |
| Age                |          |            |                  |         |
| Residual Variance  |          |            |                  |         |
| BMI                | 19.446   | 1.762      | 11.038           | <0.001  |
| Between level      |          |            |                  |         |
| BMI ON             |          |            |                  |         |
| Recess Investment  | 0.260    | 0.252      | 1.034            | 0.301   |
| Recess Access      | -0.335   | 0.155      | -2.166           | 0.030   |
| Intercepts         |          |            |                  |         |
| BMI                | 13.318   | 1.529      | 8.711            | <0.001  |
| Residual Variance  |          |            |                  |         |
| BMI                | 0.031    | 0.130      | 0.238            | 0.812   |

### Table 4  
Effects of recess investment and recess access on GRF-OT scores.

| Parameter          | Estimate | Std. Error | t-Test Statistic | p-value |
|--------------------|----------|------------|------------------|---------|
| Within level       |          |            |                  |         |
| BMI ON             |          |            |                  |         |
| Grade ON           | 1.205    | 0.679      | 1.774            | 0.076   |
| Residual Variance  |          |            |                  |         |
| BMI                | 14.929   | 2.188      | 6.822            | <0.001  |
| Between level      |          |            |                  |         |
| BMI ON             |          |            |                  |         |
| Recess Investment  | 1.981    | 0.804      | 2.465            | 0.014   |
| Recess Access      | -1.076   | 0.812      | -1.324           | 0.185   |
| Intercepts         |          |            |                  |         |
| BMI                | 41.388   | 3.549      | 11.663           | <0.001  |
| Residual Variance  |          |            |                  |         |
| BMI                | 11.658   | 3.396      | 3.433            | 0.001   |
lower BMI among children are complementary to learning goals, as previous evidence has shown that health status, such as BMI, is associated with cognitive performance in children [4,40]. Therefore, recess and academic time should not be viewed as competing priorities, but rather complementary to children’s overall development.

Although policies about recess investment were not found to be significantly associated with children’s BMI, they were significantly related to recess quality as measured by the GRF-OT. Previous literature has shown that the quality of the recess environment, specifically adult engagement and supervision at recess, significantly predicts children’s physical activity and recess engagement [24], especially for girls’ [39]. Furthermore, higher quality recess, as measured by the GRF-OT, has been found to predict adaptive behaviors like social skills, adaptability, and communication among elementary school children [41].

Findings from the current study linking recess access and investment policies to children’s BMI and recess quality demonstrates the importance of strong local policies when considering children’s health and development across the school day. Additionally, most schools in the present study had a high percentage of low-income students, indicating that recess policies at schools serving predominantly low-income communities might be especially important for children’s physical health and recess quality. Previous evidence has documented that children attending schools in low-income communities, often have limited access to recess compared to students attending schools in higher-income communities [15,42]. Children in these communities also have a higher risk of health disparities [43], and schools often do not have robust budgets for recess equipment and playground improvements [44]. However, research evidence has shown that recess improvements at the school-level have increased physical activity, decreased sedentary behavior, improved adult engagement, and availability of recess equipment [25].

While this study has several strengths, it is not without limitations. Firstly, this study did not include a measure of policy implementation. Simply having policies in existence does not mean they are carried out efficiently and consistently. Future research should consider the addition of measures examining policy implementation when examining the impact of recess policy on children’s physical health. Secondly, research suggests that the benefits of recess go beyond children’s physical health, including improving cognitive and academic achievement. Therefore, examining measures of other development domains might provide additional insight on how school recess policies are related to children’s overall development. Despite these limitations, this study highlights the need for and benefits of supporting recess time within the school day as well as the beneficial impacts that recess policy has on children’s physical health and the quality of the recess environment.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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