

RESEARCH ARTICLE

Recess Quality and Social and Behavioral Health in Elementary School Students

WILLIAM V. MASSEY, PhD^a  JANELLE THALKEN, MS^b ALEXANDRA SZARABAJKO, MS^c LAURA NEILSON, MPH^d JOHN GELDHOF, PhD^e

ABSTRACT

BACKGROUND: A majority of research findings have focused on recess as instrumental to achieving minutes of physical activity rather than focusing on the psycho-social benefits associated with a high-quality recess environment. The purpose of the current study was to examine the relationship between recess quality and teacher-reported social, emotional, and behavioral outcomes in children.

METHODS: Data were collected from 26 schools in 4 different regions of the United States. Teachers (N = 113) completed behavioral assessments for randomly selected children in their classrooms (N = 352). Data assessors conducted live observations of recess using the Great Recess Framework—Observational Tool. A series of 2-level regression models were fit in Mplus v. 8.2 to assess how recess quality was associated with indicators of children's social, emotional, and behavioral health.

RESULTS: Recess quality significantly predicted executive functioning problems ($b = -.360, p = .021$), resilience ($b = .369, p = .016$), emotional self-control ($b = -.367, p = .016$), and a composite of adaptive classroom behaviors ($b = .321, p = .030$).

CONCLUSION: Results of the present study demonstrate that recess quality impacts child developmental outcomes. Schools should ensure there is adequate training and resources to facilitate a positive and meaningful recess for students.

Keywords: recess; play; social-emotional health; school health; child development.

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Over the past decade, much attention has been paid to the amount of time children receive for school-based recess, and the implications of recess on child development. In 2013, the American Academy of Pediatrics released a policy statement citing the crucial role of recess within schools.¹ Authors of the policy statement suggested that recess provides cognitive and academic benefits, social and emotional benefits, and physical benefits to children. Many researchers have shown that recess can contribute to children's social development,² emotional well-being,³ and school behavior.⁴⁻⁶ Others have consistently

demonstrated that recess is an environment in which health-enhancing physical activity can take place.^{7,8} Conversely, recess is reported as a space in which bullying occurs^{3,9} as well as a problem area for school administration.¹⁰ This may, in part, explain why data continues to show that time for recess in schools remains limited.¹¹

Proponents of recess have begun pointing to the larger child development literature to justify this time as promoting social-emotional functioning and self-regulatory abilities, both of which are thought to be potential avenues to reduce disparities in

^aAssistant Professor (william.massey@oregonstate.edu), Kinesiology, College of Public Health and Human Sciences, School of Biological and Population Health Sciences, Oregon State University, Corvallis, OR, 97330, USA

^bPhD Student (thalkenj@oregonstate.edu), Kinesiology, College of Public Health and Human Sciences, School of Biological and Population Health Sciences, Corvallis, OR, 97330, USA

^cPhD Student (Szarabaa@oregonstate.edu), Kinesiology, College of Public Health and Human Sciences, School of Biological and Population Health Sciences, Oregon State University, Corvallis, OR, 97330, USA

^dFaculty Research Associate (neilsola@oregonstate.edu), College of Public Health and Human Sciences, Oregon State University, Corvallis, OR, 97330, USA

^eAssociate Professor (john.geldhof@oregonstate.edu), Human Development and Family Sciences, College of Public Health and Human Sciences, School of Social and Behavioral Health Sciences, Oregon State University, Corvallis, OR, 97330, USA

Address correspondence to: William V. Massey, PhD, Assistant Professor, (william.massey@oregonstate.edu), Women's Building 203C, 160 SW 26th Street, College of Public Health and Human Sciences, Oregon State University, Corvallis, OR 541-737-3226, USA.

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academic achievement.¹²⁻¹⁵ Specifically, it has been proposed that participation in play can help facilitate the development of social and emotional skills such as cooperative goal setting, teamwork, and emotion regulation.¹⁶ These ideas have been transposed into the recess environment, with the suggestion that participation in physically active games during recess is positively associated with pro-social behaviors, such as sharing, problem solving, and conflict resolution.¹⁷ However, physical activity has been a primary focus of researchers, with various interventions happening at recess to promote physical activity through both unstructured free-play, as well as more structured and supervised games. Yet, recent experimental data show a null effect on social skills competency following recess interventions aimed at improving engagement in physical activity during this discretionary time period,^{18,19} suggesting a need to consider the quality of recess beyond physical activity levels. To this end, there has been evidence that combining character training with additional recess opportunities has beneficial effects for on-task behavior, listening, and transitions.²⁰ Moreover, as recess remains an area in which conflicts are observed^{5,21} and students report high levels of bullying behavior,²² there remains a critical need to examine how recess quality impacts child development within schools, and not just focus on whether or not children have access to recess or the levels of physical activity during recess.

Previous research has shown that access to equipment,²³ levels of cooperative play,²⁴ adult engagement and interactions,⁵ and conflict resolution skills^{17,25} are important for promoting a quality recess. For example, Leff et al.²⁴ reported that the presence of organized games predicted higher levels of cooperative and intercultural play and thus might be an important mechanism for promoting social development. London et al.²⁶ reported that increased opportunities for student engagement and pro-social skill development had a positive impact on the overall school climate. Furthermore, Massey et al. have reported that conflicts on the playground decreased over time as positive adult-student interactions increased,⁵ and that higher levels of adult engagement were associated with higher student engagement in play at recess.²⁷ Thus, in considering the potential benefits of recess, the quality of the environment likely shapes how an individual experiences recess and is likely to affect outcomes associated with participation in school-based recess.

To this end, the US Centers for Disease Control and Society of Health and Physical Educators America²⁸ released evidence-based strategies to enhance recess quality. Strategies included developing recess plans, designating space, training adults to supervise, communicating and enforcing behavioral and safety expectations, and creating an environment that is supportive of physical activity. Subsequently,

researchers developed an observational tool to examine recess quality within elementary schools.²⁹ The Great Recess Framework—Observational Tool (GRF-OT) examines the size, location, and hazards present on the playground; access to equipment, boundaries, and availability of organized games and play; the number, spacing, and various engagement levels of adults; as well as verbal and physical conflict, conflict resolution, initiation of play, engagement in physical activity, and prosocial communication. Despite this progress, there remains a dearth of literature that specifically examines how recess quality affects children's development within schools. As such, the purpose of the current investigation was to examine the relationship between recess quality and teacher-reported social, emotional, and behavioral competencies for elementary school children.

METHODS

The current study was an observational study that utilized a cross-sectional design. Participants were nested within recess groupings to examine how an environmental level variable, recess quality, was related to individual level outcomes.

Participants

Recruitment took place at the school level. Research requests were sent to 15 school districts across 5 different states that represented diverse geographical regions in the United States (East Coast, West Coast, Mountain West, Midwest, South) and encompassed urban, rural, and metropolitan demographics. The final sample included 25 schools (Table 1). School populations ranged from 31.6% to 98.2% ($M = 78.53$; $SD = 17.95$) economically disadvantaged. Within schools ($N = 25$), participants were recruited from third- and fifth-grade classrooms. Teachers ($N = 113$) were asked to complete behavioral assessments for up to 5 randomly selected children in their classrooms, resulting in a child-level sample of 352 participants.

Instrumentation

Recess quality. Recess quality was measured using the GRF-OT. The GRF-OT contains 17 items that each describes in short detail critical aspects of a quality recess environment. Items include questions about the safety of the recess environment, number of adult supervisors, access to equipment, availability of play/games during recess, student initiation of play, levels of activity, physical conflicts, communication, conflict resolution, adult support for play, and transitions. Data collection is completed by a trained data assessor who (1) conducts an audit of the recess environment before recess, (2) observes live recess sessions, while completing process notes for each scored item, and (3) provides an overall score for

Table 1. Descriptive Data for Schools and Participants across All 4 regions

Region	School Reported Race/Ethnicity	School % Economically Disadvantaged	School Size	N in current study	Sex (%F)	Age (Mean, SD)	Scheduled Recess Time (mins)
School 1	1 African American 24.9%; Hispanic/Latino 4.9%; Multiracial 5.6%; White 61.8%; Asian 2.1%	31.6	607	23	69.57	9.17 (1.07)	40
School 2	1 African American 9.5%; Hispanic/Latino 19.6%; Multiracial 1.7%; White 30.2%; Asian 38.5%	80.1	587	19	68.42	9.26 (1.15)	25
School 3	1 African American 90.7%; Hispanic/Latino 2.7%; Multiracial 1.8%; White 1.3%; Asian 3.1%	97.3	225	15	53.33	9.15 (1.40)	20
School 4	1 African American 13.9%; Hispanic/Latino 32.7%; Multiracial 3.1%; White 27.7%; Asian 21.3%	91.5	553	20	50.0	9.20 (1.11)	25
School 5	1 African American 55.5%; Hispanic/Latino 11.2%; Multiracial 7.8%; White 17.1%; Asian 7.6%	63.1	409	20	60.0	9.15 (1.04)	25
School 6	1 African American 10.1%; Hispanic/Latino 81.4%; Multiracial 2.1%; White 4.2%; Asian 1.1%	96.4	663	7	71.43	10.57 (1.27)	25
School 7	1 African American 17.6%; Hispanic/Latino 51.7%; Multiracial 7.9%; White 12.5%; Asian 9.4%	86.1	545	16	56.25	9.63 (1.26)	25
School 8	1 African American 96.6%; Hispanic/Latino 0.6%; Multiracial 0.6%; White 1.2%; Asian 0%	98.2	328	7	28.57	10.0 (1.41)	25
School 9	1 African American 67.1%; Hispanic/Latino 7.8%; Multiracial 4.8%; White 6.6%; Asian 13.2%	86.2	334	8	62.5	10.0 (0.93)	25
School 10	1 African American 9.4%; Hispanic/Latino 32.6%; Multiracial 4.2%; White 49.5%; Asian 2.8%	60.4	641	8	50.0	9.50 (1.31)	25
School 11	2 African American 0.4%; Hispanic/Latino 97.7%; Multiracial 0%; White 1.4%; Asian 0.4%	84.4	917	3	33.33	9.33 (1.50)	25
School 12	2 African American 0%; Hispanic/Latino 96.4%; Multiracial 0.1%; White 2.6%; Asian 0.9%	95.4	695	20	45.0	9.40 (1.05)	30
School 13	2 African American 0.1%; Hispanic/Latino 96.5%; Multiracial 0.2%; White 2.7%; Asian 0.6%	94.2	903	24	33.33	10.0 (1.10)	30
School 14	2 African American 0%; Hispanic/Latino 99.5%; Multiracial 0%; White 0.5%; Asian 0%	92.6	876	22	50.0	9.36 (1.22)	30
School 15	2 African American 0.2%; Hispanic/Latino 98.7%; Multiracial 0%; White 1.1%; Asian 0%	92.3	853	17	64.71	9.53 (1.42)	30
School 16	2 African American 0.1%; Hispanic/Latino 97.4%; Multiracial 0%; White 1.9%; Asian 0.6%	86.2	698	20	35.0	9.30 (1.17)	30
School 17	2 African American 0%; Hispanic/Latino 98.1%; Multiracial 0%; White 1.6%; Asian 0.3%	92.3	624	11	72.73	8.36 (0.50)	30
School 18	2 African American 0.2%; Hispanic/Latino 96.5%; Multiracial 0%; White 3.0%; Asian 0.2%	91.8	838	2	50.0	9.50 (2.12)	30
School 19	3 African American 1%; Hispanic/Latino 48%; Multiracial 5%; White 42%; Asian 2%	60.0	440	10	90.0	10.67 (0.50)	40
School 20	3 African American 2%; Hispanic/Latino 34%; Multiracial 5%; White 58%; Asian <1.0%	53.0	379	11	63.64	9.82 (1.25)	40
School 21	3 African American <1%; Hispanic/Latino 15%; Multiracial 1%; White 83%; Asian 0%	48.0	301	10	50.0	10.20 (1.23)	45
School 22	3 African American <1%; Hispanic/Latino 53%; Multiracial 1%; White 44%; Asian <1%	70.0	202	10	50.0	10.20 (1.14)	60
School 23	3 African American <1%; Hispanic/Latino 13%; Multiracial 6%; White 80%; Asian 1%	57.0	386	19	68.42	9.53 (1.12)	45
School 24	4 African American 0.5%; Hispanic/Latino 74.9%; Multiracial 0.9%; White 21.8%; Asian 0.7%	80.0	427	7	42.86	9.43 (1.13)	20
School 25	4 African American 0.1%; Hispanic/Latino 52.4%; Multiracial 2.1%; White 40.4%; Asian 3%	70.0	513	23	65.22	9.78 (1.04)	20

each scored item. The range of possible scores on the GRF-OT is 17 (“1” for each item) to 68 (“4” for each item).

Previous data have supported the reliability and validity of the GRF-OT.²⁷ Massey et al.²⁷ presented data that established the content validity, measurement validity, inter-rater reliability, and

test-retest reliability of the GRF-OT. Subsequent data in independent samples supported the validity of the GRF-OT, as recess sessions scoring higher on the GRF-OT also had higher levels of student engagement in play and games at recess.²⁹ The GRF-OT items and scoring procedures are freely available at <https://www.playworks.org/resources/great-recess-framework/>.

Classroom behavior. The Behavioral Assessment System for Children—3 (BASC-3) teacher report was used to assess student behavior. The BASC-3 is a standardized, valid, and reliable tool that examines a range of student behavior during the school day. Clinical and adaptive scales include externalizing problems (hyperactivity, aggression, conduct problems), internalizing problems (anxiety, depression, somatization), school problems (learning problems, attention problems), behavioral symptoms (attention problems, atypicality, withdrawal), and adaptive skills (adaptability, social skills, leadership, functional communication, activities of daily living). In addition, the BASC-3 also includes content scales that allow investigators to examine various adaptive and maladaptive behaviors that take place during the school day. Content scales used in the current study include emotional self-control, executive function problems, bullying, and resiliency. Scoring is conducted by calculating standardized T-scores with nationally normative data. With the exception of adaptive skills and resiliency, higher scores indicate higher levels of problematic behavior.

Classroom quality. The Classroom Assessment Scoring System-Student Report (CLASS),³⁰ is a student report measure that captures classroom quality, specifically the quality of teacher-child interactions. The tool was developed to mimic observed quality as rated by the Classroom Assessment Scoring System, Upper Elementary³¹ and yields 3 domains of quality: emotional support, classroom organization, and instructional support. The total scale-score was used as a covariate in all analyses of student behavior ($\alpha = .911$).

Recess time. In an effort to gauge the amount of time students spend at recess, teachers were asked to keep a 5-day recess log that documented actual time spent at recess and a count of students held out of recess. However, logs were not consistently completed across classrooms, thereby rendering these data unreliable. As such, school schedules were used as an estimation of recess time students receive during the school day.

Procedures

Data were collected during the 2018 to 2019 academic school year. Prior to data collection, all procedures were approved by the Human Research Protection Program at the author's home institution, each school district, and individual schools. At each school, informed parental consent forms were sent home to all third and fifth grade students. For those with parental consent, verbal assent was also obtained prior to any study procedures. All students for whom signed parental consent and verbal assent were provided were eligible to participate

in survey data collection. Of those who consented, up to 5 children per class were randomly selected for teacher completion of BASC-3. Teachers were asked to spend no more than 1 hour completing BASC-3 forms (approximately 12 minutes per child) and were compensated with a \$25 Amazon gift card for completion of a minimum of 3 BASC-3 reports. BASC-3 forms were completed and scored electronically through the Pearson Q-Global System. Raw scores, standardized *t*-scores, and percentile ranks were available for each computed variable, however, standardized *t*-scores were utilized in analysis.

Recess observations were conducted by trained undergraduate ($N = 3$; kinesiology) and graduate ($N = 7$; public health, kinesiology) students. Prior to data collection, all data assessors read the complete GRF-OT training manual. Following this, 2 hours of didactic training were conducted with the lead researcher that covered GRF-OT protocols and procedures, inclusive of video and picture examples and explicit scoring instructions. In addition, all data assessors received live training in which they attended recess sessions with the lead researcher, or a trained user. Scores were compared and debriefed, with data assessors conducting supervised observations until consistency in scores had been reached between the trainee and lead researcher (or experienced user). Generally, a minimum of 3 supervised observations were conducted to ensure scoring consistency.

Across schools, and regions, recess schedules were variable, with some schools sending groups of students outside all at once, while others rotated the sessions with different children and different supervisors (eg, third and fifth grade combined into one recess vs third and fifth grade at separate recesses). When third- and fifth-grade classrooms participated in separate recess periods, those periods were scored independently. Across each recess period, a minimum of 2 lunch-time recess observations were conducted. Data assessors arrived at the outdoor playground approximately 15 minutes before the scheduled recess period to complete a walkthrough of the playground and take any notes about the built environment. Data assessors then observed the entire recess period, taking notes on each item throughout the process. In all cases, the recess environment was completely visible to the data assessor, and data assessors were trained to move throughout the playground in a discrete manner in an effort to observe patterns of interaction and behavior. Our protocol included one data assessor at each school, however, when available, a second data assessor was present. When 2 data assessors were present at recess, one was assigned to focus 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 the recess to ensure consistency across multiple observers. Final

scoring of each item was completed immediately after the recess session and took into account the aggregate patterns of behavior throughout the duration of the recess session. Schools were compensated with a \$75 Amazon gift card for study participation which included observations of recess, completion of recess policy report, and completion of assessments.

Data Analysis

We fit a series of 2-level regression models in Mplus³² to assess how recess time and quality were associated with indicators of children's developmental outcomes. The 2-level model structure accommodated child-level observations as being nested within recess groupings, such that recess quality and time were modeled only at the between-recess level. All models additionally corrected the standard errors for nesting within schools. Because the multilevel structural equation modeling framework implemented in Mplus separates variance for all modeled variables into distinct within- and between-cluster components, the limited amount of between-recess variation in sex led to convergence difficulties and led us to hand-separate sex into separate within- and between-level components.³³

An examination of outlier diagnostics (ie, cook's distance, loglikelihood contribution, and loglikelihood distance influence) informed which observations had potentially undue influence over the results for each model. Outlier removal did not substantially impact our final results and potential outliers were therefore retained in each analysis. Our primary analyses examined whether recess quality predicted various BASC-3 constructs after controlling for key covariates. The within-recess component of the model specified the within-classroom variation of age, sex, and the CLASS as predictors of BASC-3 constructs. The between-recess component specified between-recess variation in sex, CLASS, scheduled recess time and recess quality as predictors of BASC-3 constructs. Due to model complexity, we were not able to simultaneously model all BASC outcomes in a single model and instead blocked BASC subscales into 4 groups: (1) Internalizing and Externalizing, (2) School Behavior, Behavior Index, Adaptive Behavior, (3) Bullying and Emotional Self-Control, and (4) Executive Functioning and Resilience. Each group of outcomes were included in a separate statistical model and were tested against the total GRF score.

RESULTS

Demographics

Participants included 352 third (50.6%) and fifth grade (49.4%) elementary school children ($M_{AGE} = 9.55$; $SD = 1.18$). The overall sample was diverse, with 28.4% of students self-reporting

a Hispanic or Latino background, 16.8% of students identifying as African American, 13.4% of students identifying as White/Caucasian, 5.9% of students identifying as Native American, and 2.6% of students identifying as Asian. In addition, 9.3% of students selected "other" as a race category and 23.5% of students did not provide information on racial background. There were slightly more girls (56%) than boys (44%) in the sample. School-level demographics are provided in Table 1.

Recess Observations

In total, 41 unique recess periods were observed across the 25 schools (ie, 41 different student groups, observed multiple times each). Quality of recess as measured by the GRF-OT was considered low-to-moderate ($M_{GRF} = 47.47$; $SD = 4.17$; Range = 30-54). On the GRF-OT, each item is scored on a 1-to-4 scale, with scores of one and 2 generally representing a need for support and scores of 3 and 4 generally representing a high functioning area. At a school level, only 5 schools averaged a minimum of 3 out-of 4 for each GRF-OT scale item. On average, schools scheduled 29.54 minutes of recess per day ($SD = 8.63$ minutes).

Student Outcomes

Scores for the BASC-3 were congruent with national norms. Standardized T-scores were calculated based on national data, with a score of 50 representing the average, and 10 points representing 1 SD. Scores for the clinical and adaptive scales included: externalizing problems ($M = 49.95$; $SD = 11.00$; Range, 42-107); internalizing problems ($M = 48.16$; $SD = 9.86$; Range, 39-92); school problems ($M = 48.14$; $SD = 10.16$; Range, 36-83); the behavioral symptoms index ($M = 49.13$; $SD = 10.19$; Range, 39-92); and adaptive classroom behaviors ($M = 50.70$; $SD = 10.57$; Range, 22-69). Scores for the content scales included: executive functioning ($M = 48.55$; $SD = 10.67$; Range, 33-83); resilience ($M = 50.69$; $SD = 10.08$; Range, 24-68); emotional self-control ($M = 48.96$; $SD = 9.90$; Range, 40-94); and bullying ($M = 50.08$; $SD = 10.44$; Range, 44-120). The average score on the 5-point CLASS scale was 3.91 ($SD = 0.57$).

Primary Analyses

Using the GRF-OT total score, recess quality was not a significant predictor of externalizing behaviors ($p = .131$), internalizing behaviors ($p = .170$), school problems ($p = .166$), or the behavior symptoms index ($p = .187$). The GRF-OT was a significant predictor for a composite of adaptive classroom behaviors ($b = .321$, $p = .030$), which includes items related to adaptability, social skills, leadership, functional communication,

Table 2. Effects of Recess Quality on Teacher-Reported Internalizing and Externalizing Behaviors

Parameter	Estimate	s.e.	t-Test Statistic	p-Value
Within level				
Externalizing ON				
Age	0.137	0.441	0.312	.755
Class	-0.059	0.050	-1.199	.230
Sex	-6.353	1.901	-3.342	.001
Internalizing ON				
Age	1.057	0.518	2.038	.042
Class	-0.044	0.044	-0.997	.319
Sex	0.820	1.183	0.693	.488
Residual variance				
Externalizing	105.025	16.659	6.304	<.001
Internalizing	88.236	13.558	6.508	<.001
Between level				
Externalizing ON				
Class	-0.311	0.172	-1.811	.070
Recess time	-0.184	0.052	-3.503	<.001
Sex	-2.709	6.363	-0.426	.670
GRF	-0.287	0.190	-1.512	.131
Internalizing ON				
CLASS	0.173	0.323	0.534	.593
Recess time	0.033	0.091	0.363	.717
Sex	-4.983	6.716	-0.742	.458
GRF	-0.213	0.155	-1.371	.170
Intercepts				
Externalizing	107.622	23.692	4.543	<.001
Internalizing	35.512	36.605	0.970	.332
Residual variance				
Externalizing	0.119	15.189	0.008	.994
Internalizing	4.884	6.224	0.785	.433

activities of daily living. The models also suggested that increased recess time was related to lower levels of externalizing problems ($b = -.184$; $p < .001$) (see Tables 2 and 3). Using the GRF-OT total score, recess quality significantly predicted executive functioning problems ($b = -.360$, $p = .021$), resilience ($b = .369$, $p = .016$), and emotional self-control ($b = -.367$, $p = .016$). The models also suggested that increased recess time was related to lower levels of bullying ($b = -.268$; $p = .001$) (see Tables 4 and 5).

DISCUSSION

The purpose of the current investigation was to examine the relationship between recess quality and teacher-reported social, emotional, and behavioral competencies for elementary school children. Results indicate that recess quality is significantly related to adaptive and/or prosocial behavior health determinants, but not clinical behavioral health problems. These findings make an important contribution to the literature, as this is the first study to examine the relationship between recess quality and teacher-reported school behaviors. The data indicate a need to consider more than just if recess contributes to children's development, but rather, how recess contributes to children's development during the school day. In

contrast to previous literature, data in the current study suggest that recess quality, rather than time and access, is associated with positive social and emotional health outcomes. Given that previous literature has shown recess can be a tumultuous part of the day for students^{3,9,22} and administrators¹⁰ alike, it is important to set the right conditions for children to experience an opportunity for safe and healthy play. In the current study, recess quality was characterized by a safe play environment, adequate amounts of play equipment, supportive and engaged adults, student autonomy, and low-levels of disruptive conflict. Thus, for recess to support the social-emotional development needs of students, it may be necessary to consider recess as part of a holistic strategy for child development.

The results of the current study help to fill an important gap in the literature regarding the potential benefits of recess. The evidence-based strategies published by the US Centers for Disease Control and Society of Health and Physical Educators America²⁸ to enhance children's social and emotional development through recess were largely generated by studies aiming to increase physical activity, as opposed to a variety of social and emotional health outcomes. However, the results of some recent experiments have failed to support these claims of social and emotional health benefits. For example, Bundy et al.¹⁹ conducted

Table 3. Effects of Recess Quality on Teacher-Reported School Problems, Behavior Index, and Adaptive Classroom Behaviors

Parameter	Estimate	s.e.	t-Test Statistic	p-Value
Within level				
School problems ON				
Age	0.126	0.426	0.296	.767
Class	-0.042	0.035	-1.181	.238
Sex	-2.968	1.230	-2.413	.016
Behavior index ON				
Age	0.303	0.391	0.776	.438
Class	-0.062	-.039	-1.60	.110
Sex	-4.273	1.363	-3.135	.002
Adaptive classroom behaviors ON				
Age	-0.509	0.386	-1.318	.188
Class	0.123	0.047	2.640	.008
Sex	-4.273	1.363	-3.135	.002
Residual variance				
School problems	92.919	10.731	8.659	<.001
Behavior index	86.214	10.196	8.456	<.001
Adaptive classroom behaviors	95.932	9.023	10.632	<.001
Between level				
School problems ON				
Class	-0.086	0.375	-0.229	.819
Recess time	-0.043	0.092	-0.467	.641
Sex	-4.827	6.677	-0.723	.470
GRF	-0.234	-.169	-1.384	.166
Behavior index ON				
Class	-0.101	0.262	-0.386	.699
Recess time	-0.043	0.078	-0.551	.582
Sex	-3.562	6.733	-0.529	.597
GRF	-0.218	0.165	-1.320	.187
Adaptive classroom behaviors ON				
Class	-0.072	0.359	-0.202	.840
Recess time	-0.104	0.116	-0.898	.369
Sex	5.553	7.286	0.762	.446
GRF	0.321	0.148	2.166	.030
Intercepts				
School problems	76.493	40.135	1.909	.056
Behavior index	74.892	30.980	2.417	.016
Adaptive classroom behaviors	42.978	34.221	1.256	.209
Residual variance				
School problems	3.170	5.239	0.605	.545
Behavior index	1.642	2.860	0.574	.556
Adaptive classroom behaviors	3.450	4.458	0.774	.439

a cluster randomized controlled trial to examine the effects of a playground intervention that encouraged risk taking on the playground on physical activity and social skills. While the intervention increased objectively measured physical activity in intervention schools, the authors reported no changes in social interactions, teacher ratings of social competence and peer acceptance, or teacher and parent ratings of social skills. Similar findings were reported in a second cluster randomized controlled trial, in which Mayfield et al¹⁸ reported an increase in prosocial behaviors in control schools when compared to the schools receiving a peaceful playground intervention. Others have reported positive developmental effects of recess on children. For example, Massey et al⁵ reported significantly reduced conflict on the playground over

time for students in the Playworks intervention and improved classroom behavior for students in a recess leadership program. Similarly, Rhea et al.²⁰ have reported positive findings from the LiNK study related to on-task behavior and listening in the classroom. Critically, the findings from Massey et al. and Rhea et al. are from interventions that aimed to improve recess quality directly (eg, through the addition of games, conflict resolution skills, adult support for recess) or indirectly (eg, a whole school approach to developing social-emotional skills that can be transferred to recess). The results of the current study combined with these data suggest that recess quality may be the missing piece in understanding how recess positively, or negatively impacts children throughout the school day.

Table 4. Effects of Recess Quality on Teacher-Reported Executive Function and Resilience

Parameter	Estimate	s.e.	t-Test Statistic	p-Value
Within level				
Executive function ON				
Age	0.308	0.375	0.800	.424
Class	-0.097	0.045	-2.177	.029
Sex	-5.644	1.501	-3.760	<.001
Resilience ON				
Age	-0.249	0.405	-0.614	.539
Class	0.122	0.044	2.799	.005
Sex	3.264	1.527	2.138	.033
Residual variance				
Executive function	97.827	10.373	9.431	<.001
Resilience	87.218	7.757	11.243	<.001
Between level				
Executive function ON				
CLASS	-0.109	0.344	-0.317	.751
Recess time	0.002	0.086	0.025	.980
Sex	-7.136	7.828	-0.912	.362
GRF	-0.360	0.156	-2.301	.021
Resilience ON				
Class	-0.336	0.454	-0.740	.459
Recess time	-0.131	0.139	-0.942	.346
Sex	9.269	7.955	1.165	.244
GRF	0.369	0.154	2.401	.016
Intercepts				
Executive Function	86.385	34.235	2.523	.012
Resilience	62.956	43.275	1.455	.146
Residual variance				
Executive Function	2.277	3.699	0.616	.538
Resilience	3.336	4.431	0.753	.451

Limitations

The results of the current study should be considered in light of both the strengths and weaknesses noted. As it relates to strengths, measures in the current study relied on independent sources of data. Specifically, recess quality was measured through live observation by trained assistants, whereas children’s behavior profiles were completed by classroom teachers. Furthermore, our sample included a diverse range of geographical regions, communities, schools, and student racial and ethnic backgrounds, thereby reducing the chances that observed effects were due exclusively to local policies and practices that may not be generalizable to other areas. That said, there are several limitations to the current study as well. First, we are unable to establish a causal relationship between recess quality and student outcomes due to the cross-sectional nature of the data collection. This demonstrates the growing need for experimental studies that aim to improve recess quality and test the effects of changes on classroom behavior, emotional self-control, resilience, and executive functioning. In addition, the difficulties in recruiting school districts for participation resulted in a convenience sample at the school level, as we did not generate enough school districts to randomize school selection, thereby relying on only those willing

to participate. Moreover, the size of our data collection team, as well as diverse training and background of those involved, may have led to differences in how observation and scoring were conducted. Finally, the sample size is relatively small, and as such the findings should be interpreted with caution.

Conclusion

Previously, researchers have elucidated the importance of recess within the school day. For example, Barros et al.⁴ reported having at least one 15-minute recess period per day was associated with higher reported teacher behavior. Others have shown that children’s classroom behavior improves on days in which they have recess.³⁴ Given the direct implications on classroom behavior, concomitant with the extant child development literature showing connections between play and child development,^{35,36} as well as physical activity and human development,³⁷ researchers and policy-makers continue to advocate for more recess.^{1,38,39} However, recent policy efforts have focused solely on adding time for recess, without careful consideration that recess is an area in which bullying and conflicts regularly occur.^{5,21,22} Results of the current study suggest that recess quality is an important determinant in deriving positive

Table 5. Effects of Recess Quality on Teacher-Reported Emotional Self-Control and Bullying

Parameter	Estimate	s.e.	t-Test Statistic	p-Value
Within level				
Emotional self-control ON				
Age	0.790	0.441	1.792	.073
Class	-0.071	0.046	-1.530	.126
Sex	-3.588	1.481	-2.423	.015
Bullying ON				
Age	0.141	0.478	0.296	.767
Class	-0.022	0.040	-0.545	.586
Sex	-0.628	1.718	-0.366	.715
Residual variance				
Emotional self-control	86.843	14.664	5.922	<.001
Bullying	103.071	17.840	5.778	<.001
Between level				
Emotional self-control ON				
Class	0.204	0.368	0.553	.580
Recess time	-0.014	0.079	-0.178	.858
Sex	-7.239	7.247	-0.999	.318
GRF	-0.367	0.153	-2.406	.016
Bullying ON				
Class	-0.044	0.230	-0.191	.849
Recess time	-0.268	0.080	-3.328	.001
Sex	5.935	5.532	1.073	.283
GRF	0.189	0.140	1.348	.178
Intercepts				
Emotional self-control	47.717	38.477	1.240	.215
Bullying	43.590	23.455	1.858	.063
Residual variance				
Emotional self-control	1.767	4.275	0.413	.679
Bullying	0.320	3.222	0.099	.921

developmental outcomes, and thus should be considered in future research and policy-based initiatives.

IMPLICATIONS FOR SCHOOL HEALTH AND EQUITY

Recess continues to be a growing area of interest in school health, yet few policies and procedures exist at a national, state, or local level to facilitate an environment in which social-emotional growth through play can occur. If recess is considered a crucial part of the school day, it should be given the attention and resources necessary for children to learn and grow in this environment. While differences in time, space, resources, climate, and local policies preclude any universal approach to improving recess quality, we propose several action steps that schools may consider below:

- Create a recess leadership council to help ensure that recess is not a forgotten part of the school day. This may also empower stakeholders to take ownership over this time period. Recess leadership councils may differ in make-up but could include a parent and/or community member, member of the school staff who assists in recess supervision, physical education teacher, and a group of children. The council could be in charge of setting norms and expectations for

behavior during recess, making decisions around available games and equipment during recess, and advocating for needs to improve the quality of recess at the school.

- Develop recess policies and procedures. This can include an annual equipment budget, daily time allotted for recess, forbidding removal of recess as a disciplinary measure, plans for indoor and outdoor recess, and roles and responsibilities of a recess leadership council.
- Support recess-specific professional development of teachers and/or staff who facilitate recess. This might include training in conflict resolution, restorative justice practices, child development, large group facilitation, and/or the importance of play and physical activity.
- Organize the recess environment in a way that sets students up for success during this time period. This might include having games and equipment accessible when students enter the playground, developing and posting common rules, and having staff engage directly with students. To this end, London⁴⁰ has recommended identifying games and activities that are popular amongst the student body, as well as areas on the playground that tend to produce more conflict. In doing so, needed equipment can be provided to support popular play

and recess staff can be more efficient and effective as it relates to where they spend time during recess.

- Position recess as part of a whole school, whole child, whole community model of child development within the school setting.⁴¹ One strategy for this is to extend current behavioral supports, such as a Positive Behavioral Interventions & Supports, or Caring School Communities, into recess to create synergies across the school day.

Human Subjects Approval Statement

This study was approved by the Human Research Protection Program at Oregon State University (#8388).

Conflict of Interest

The authors declare they have no conflicts of interest.

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