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Original Paper

Recess no Recess: Does It Make a Difference?

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Abstract

There is limited research on the relationship between recess and student academic achievement. The purpose of this study was to examine the relationship between academic achievement and recess among third graders in the state of Florida. The study is significant in two ways: (a) determine if there is a relationship between the independent variable of state-mandated free-play recess and the dependent variable student achievement, and (b) expand the limited body of knowledge available regarding the impact of recess on student achievement. An ex post facto research design was utilized and data were analyzed using Pearson chi-square and an independent t-test to determine if a statistically significant difference existed between the 2017 and 2018 Florida Standards Assessments (FSA) third grade English Language Arts (ELA) and mathematics test scores before and after the implementation of state-mandated free-play recess.

Keywords: recess, FSA, academic achievement, assessment

Introduction

Merriam-Webster (2019) defined recess as the "suspension of business or procedure often for rest or relaxation". The Cambridge Dictionary (2019) described recess as "a period of time during school hours in which students do not study. Pellegrini and Bohn-Gettler (2013) stated that recess is a break period from the structured academic portion of a school day. Recess is the scheduled time children get to experience physical, cognitive, and social, and emotional benefits, engage with peers, usually on playgroup equipment, that is monitored by teachers, administration, and staff (Tran et al., 2013).

Article 31 of the United Nations Convention on Children's Rights states that every child has the right to play and that recess is an entitlement of every child (Jarrett, 2019; Jarrett et al., 2001). Adults in the workplace take breaks; the workday is interjected with lunch, relaxation, and socialization, because studies have found it helps with job performance. Employees stepping away from work for a few minutes increases their productivity, job satisfaction, mental health and well-being, and are overall more engaged in their work (Tork, 2018). Similarly, for children, a recess break rejuvenates by providing the opportunity to develop social and interpersonal skills in an unstructured, free-play environment. Recess is critical in the development of children (Jarrett, 2019). Research shows that recess plays a vital role in how a child develops his or her social skills. During recess, game play frequently involves teamwork. Children have the opportunity to use leadership skills, because they educate one another about games to play, taking turns, and learning to resolve problems which may arise (Jarrett, 2019; Jarrett et al., 2001).

In the classical societies of ancient Greece and Rome, children's play was valued. Plato advocated the use of free-play, gymnastics, music and various other forms of leisurely activities as means of developing skills for adult life, as well as supporting health and physical development (Cunningham et al., 2005; Schunk, 2020). Aristotle also emphasized the value of play and physical activities for the overall development of the child (Cunningham et al., 2005; Schunk, 2020). Furthermore, Jean Piaget defined play as assimilation, or the child's efforts to make environmental stimuli match his or her own concepts. Piaget asserted that play, does not necessarily result in the formation of new cognitive structures (Schunk, 2020). Piaget proclaimed play was just for pleasure, and although, children were allowed to practice things they had previously learned, participation in this activity did not necessarily result in the learning of new things (Christie & Johnsen, 1987; Roskos & Christie, 2011; Schunk, 2020). Vygotsky also indicated that "play not so much reflects thought, as Piaget suggests, as it creates thought" (Vandenberg, 2019, p. 21).

One of the earliest known examples of recess occurred during the early 1790s. Timothy Dwight, an early advocate of non-instructional activities, allowed students at the Greenfield Hill Academy in Connecticut, where he served as school master, time for game play and sports. He also rewarded the winners of the school’s weekly spelling bee an extra play time (Carlisle, 2009). Mr. Dwight would later become the president of Yale University. However, by all historical accounts, Amos Bronson Alcott is considered the inventor of recess in the United States. In 1834, Mr. Alcott opened a controversial school for boys and girls, The Masonic Temple, in Boston, Massachusetts where he conducted one of the most famous education experiments of his career. His ideas centered on creating a school environment focused on being conducive to learning and simulating to the imagination, which until then, had never been a contributing factor in the education of American youth (Connecticut Humanities, n.d.). Mr. Alcott’s progressive views on how children should be educated were radical for his time. One of the outcomes of Mr. Alcott’s forward thinking was dedicated time each day for students to have outdoor playtime. The methods employed by Mr. Alcott encouraged children to explore their imaginations and he allotted time during the school day for students to play and participate in physical activities (Connecticut Humanities, n.d.).

Although the school closed in 1839, his ideals challenged traditional pedagogical beliefs. W. T. Harris, an educator and philosopher, was greatly influenced by the views of Amos Alcott and in 1884, delivered a paper before the Department of Superintendents of the National Education Association and debated whether or not recess should be retained. Mr. Harris concluded that the physical needs provided by recess outweighed any other concerns (Bossenmeyer, 2013).

The Impact of Florida’s Accountability Measures on Reading Scores

The ability to read is a survival skill that is essential for success in today's culture, but many children struggle with reading. Reading is a talent that must be taught and acquired through direct teaching, as well as practice; it is not an innate ability (Rayner et al., 2012). Reading instruction through connections must be combined with exposure to written texts because learning to read is a time-consuming and difficult process (Goodman et al., 2016). A significant portion of students from all social groups have traditionally struggled with reading (Rayner et al., 2012) and up to one in five children have trouble learning to read (Goodman et al., 2016). Students with low reading skills early on, frequently have limited reading skills later in life, according to reading research that is still ongoing (Goodman et al., 2016).

In order to meet the demands of an increasingly educated society, many policymakers recommended a 100% literacy rate (No Child Left Behind Act of 2001, 2002). As a result, large scale assessment became the standard for policymakers to measure progress (Ryan & Shepard, 2010). Assessment and accountability have historically appealed to policymakers as agents of reform for a number of reasons (Ryan & Shepard, 2010). First, assessments were relatively inexpensive with regard to programmatic or instructional change such as increasing instructional time, reducing class size, hiring more aides, or additional professional development for teachers. Second, assessment could be externally mandated, which may be easier than changing what happens inside the classroom. Third, testing could be rapidly implemented, particularly within the term of an elected official. Fourth, results of assessments were visible in that they could be reported to the press.

Florida students made improvement in reading and English language arts (ELA) on statewide assessments. During the administration of the Florida Comprehensive Assessment Test (FCAT) administration, 1999 to 2010; performance followed a consistent upward trajectory. In 2001, the first year FCAT was administered in grades 3-10, less than half (47%) of all assessed students were reading at or above grade level (Morris, 2016). By 2010, the final year the FCAT was administered, nearly two-thirds (62%) were reading at or above grade level, an increase of 15 percentage points. Following the adoption of more rigorous academic standards, more demanding assessments (FCAT 2.0), and increased student expectations (new performance level cut scores), a new trend line began in 2011

(Morris, 2016). Although student performance on the more recent standards and assessments was lower than on the final year of the former assessment (FCAT), scores improved over the four years of administration. In 2014, 58 percent of students across grades 3-10 scored at or above grade level in reading on FCAT 2.0, a two-percentage point improvement over 2011. Even though higher standards and assessments were put into place with FCAT 2.0 in 2011, the percent of students in grades 3-10 scoring at or above grade level on the FCAT 2.0 Reading assessment was still 11 percentage points higher than in 2001 under the previous assessment (Florida Department of Education, 2022).

In 2015, Florida again transitioned to more difficult college and career ready academic standards, more rigorous assessment, the Florida Standards Assessments (FSA) and even more increased student expectations. Once again, after raising the bar, Florida witnessed improved student performance. Table 1 shows that in the fourth year of the administration of the FSA (2018), 54 percent of students in grades 3-10 scored at or above grade level on the FSA ELA reading assessment, a two-percentage point improvement over the baseline year of 2015, still seven points higher than in 2001 under the previous assessment. As the past has demonstrated, Florida's students continued to improve their performance on statewide assessments, and, when the state raises its rigor and expectations, Florida's students rose to meet the challenge (Florida Department of Education, 2022).

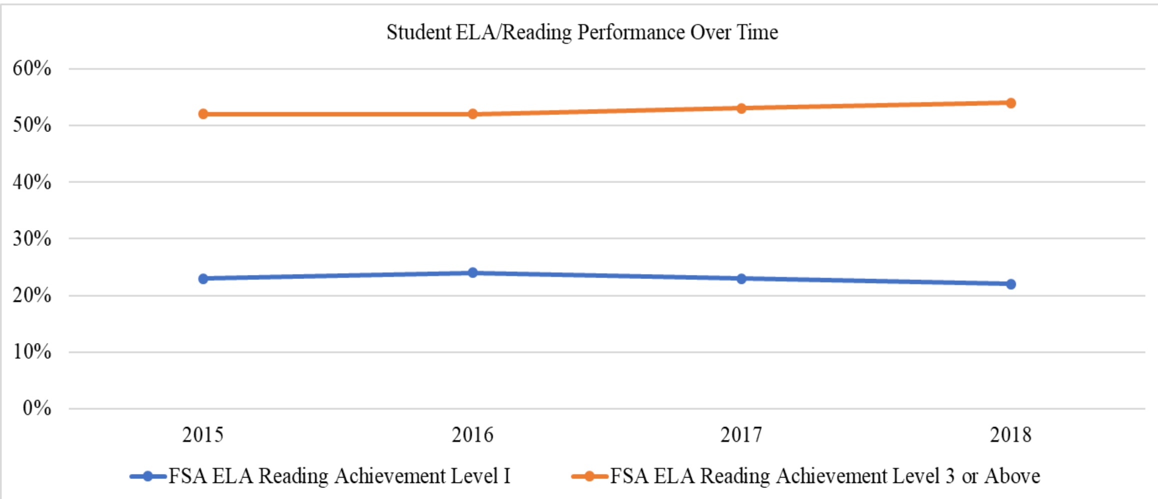

Table 1. Student ELA Reading Performance Over Time

The Impact of Florida's Accountability Measures on Mathematics Scores

In Florida, the Florida Comprehensive Assessment Test (FCAT) measured student achievement on the Sunshine State Standards (SSS), which were grade level standards of achievement that students are expected to meet for grade promotion (Florida Department of Education, 2022). The FCAT was Florida's plan to increase student achievement by implementing higher standards for public school students. There were two components to the test: (a) a criterion-referenced test (CRT) where scores could be measured against benchmarks in mathematics from the Sunshine State Standards and (b) a norm-referenced test (NRT) which measures each student's performance against national norms (Morris, 2016). The test used graphic displays and illustrations, and incorporated thinking and problem-solving skills that match the complexity of the standards being assessed. The FCAT involved a variety of item types including multiple-choice items, and performance items which required the student to write-in answers. Performance items were not used in the third-grade FCAT (Florida Department of Education, 2022). Florida Comprehensive Assessment Test scores were reported on a scale of 100 to 500 and assigned a number from 1-5 based on level of material mastery (Florida Department of Education, 2022). Scores at levels one and two were considered below level and levels three through five represent passing scores on the FCAT.

Florida has been committed to improving its national rankings and that progress has been evident in recent years with the National Assessment of Educational Progress (NAEP) results where Florida was the only state to increase its scores significantly on three of the four assessments in fourth grade mathematics and eighth grade reading and mathematics (Florida Department of Education, 2022). By many measures, the state's student performance was within the top ten states nationally. For 2015, assessments showed that Florida's low-income fourth-grade students were the highest-performing low-income students in the nation and in 2013 Florida was the only state to reduce the gap between White and African American students in both fourth and eighth grades in reading and mathematics (Florida Department of Education, 2022). Furthermore, in the 2017 NAEP results, in fourth grade mathematics, Florida's Hispanic, African American, students with disabilities, and students eligible for free or reduced priced meals outscored all other states and ranked number one based on their average scale score. In addition, all of Florida's student subgroups outperformed their national peers in fourth grade reading and many of them significantly outperformed their national peers (Florida Department of Education, 2022).

During the 2014-2015 academic year, the Florida Standards Assessments (FSA) superseded the Florida Comprehensive Assessment Test (FCAT). Student performance levels provided pertinent information on how well students were learning to parents and guardians, school districts, administrators, teachers, lawmakers, and the general public. Performance levels described a student's success with the content assessed. Performance levels range from 1 to 5, with Level 1 as the lowest and Level 5 as the highest. For all assessments, Level 3 indicated satisfactory performance. The passing score for each assessment is the minimum scale score in Performance Level 3 (Florida Department of Education, 2022). The performance levels were: Inadequate, highly likely to need substantial support for the next grade/course, Below Satisfactory, likely to need substantial support for the next grade/course, Satisfactory, may need additional support for the next grade/course. Proficient, likely to excel in the next grade/course, Mastery, highly likely to excel in the next grade/course. Table 2 shows the scale scores for each assessment level.

Table 2. Florida Standards Assessment Scale Scores for each Assessment Level

Assessment	Level 1	Level 2	Level 3	Level 4	Level 5
Grade 3 ELA	240-284	285-299	300-314	315-329	330-360
Grade 4 ELA	251-296	297-310	311-324	325-339	340-372
Grade 5 ELA	257-303	304-320	321-335	336-351	352-385
Grade 6 ELA	259-308	309-325	326-338	339-355	356-391
Grade 7 ELA	267-317	318-332	333-345	346-359	360-397
Grade 8 ELA	274-321	322-336	337-351	352-365	366-403
Grade 9 ELA	276-327	328-342	343-354	355-369	370-407
Grade 10 ELA	284-333	334-349	350-361	362-377	378-412
Grade 3 Mathematics	269-315	316-329	330-345	346-359	360-391
Grade 4 Mathematics	273-321	322-336	337-352	353-364	365-393
Grade 5 Mathematics	256-305	306-319	320-333	334-349	350-388
Grade 6 Mathematics	260-309	310-324	325-338	339-355	356-390
Grade 7 Mathematics	269-315	316-329	330-345	346-359	360-391
Grade 8 Mathematics	273-321	322-336	337-352	353-364	365-393

Both scale scores and performance levels were reported for ELA reading and mathematics assessments.

The scales on which students receive scores differ by grade and subject (Florida Department of Education, 2022). The assessment measures assist Florida to determine whether students are equipped with the reading and mathematical knowledge and skills they need to be ready for careers and college-level coursework.

Statement of the Problem

The significance of school recess and its necessity has been a central topic in school district debates for years. It was not until 2017 that the Florida legislature enacted Statute 1003.455–Physical education; assessment, that free-play recess became a mandatory requirement for school districts. In Florida Statute 1003.455, section 6 reads: "In addition to the requirement in subsection (3), each district school board shall provide at least 100 minutes of supervised, safe, and unstructured free-play recess each week for students in kindergarten through grade 5 so that there are at least 20 consecutive minutes of free-play." The University of Florida's Center for Children's Literature and Culture (2021) hosted a daily, three-minute program from 2001-2008 for adults called, "Recess" that explored the dynamic cultures of childhood, past and present, and around the world. The November 5, 2003, taped episode outlined a brief history of recess, but did not include any historical information. There is limited research on the history of recess in the United States and even less information on recess in the state of Florida as it relates to student academic achievement.

Purpose of the Study

The purpose of the study was to examine the relationship between third-grade students academic achievement on the reading and mathematics scores from the 2017 and 2018 Florida Standards Assessments (FSA) and the implementation of state-mandated free-play recess.

Research Questions

The main question investigated was: To what extent does mandatory free-play recess have on third grade ELA and mathematics test scores? Subsequently, four sub-questions emerged.

1. What is the difference between the 2017 and 2018 FSA reading scores among school demographic characteristics based on gender, race, economic status, and ELL status?

2. What is the difference between the 2017 and 2018 FSA mathematics scores among school demographic characteristics based on gender, race, economic status, and ELL status?

3. What is the difference between the 2017 and 2018 FSA reading scores before and after implementation of a standard state-mandated free-play recess?

4. What is the difference between the 2017 and 2018 FSA mathematics scores before and after implementation of a standard state-mandated free-play recess?

Hypotheses

Four null and alternative hypotheses were tested.

Ho1: There are no statistically significant differences between the 2017 and 2018 FSA reading scores among school demographic characteristics based on school size, gender, race, economic status, ELL status, disability status, and school type.

Ha1: There are statistically significant differences between the 2017 and 2018 FSA reading scores among school demographic characteristics based on school size, gender, race, economic status, ELL status, disability status, and school type.

Ho2: There are no statistically significant differences between the 2017 and 2018 FSA mathematics scores among school demographic characteristics based on school size, gender, race, economic status, ELL status, disability status, and school type.

Ha2 There are statistically significant differences between the 2017 and 2018 FSA mathematics scores among school demographic characteristics based on school size, gender, race, economic status, ELL status, disability status, and school type.

Ho3 There are no statistically significant differences in the 2017 and 2018 third grade FSA reading scores based on implementation of a standard state-mandated free-play recess.

Ha3 There are statistically significant differences in the 2017 and 2018 third grade FSA reading scores based on implementation of a standard state-mandated free-play recess.

Ho4 There are no statistically significant differences in the 2017 and 2018 third grade FSA mathematics scores based on implementation of a standard state-mandated free-play recess.

Ha4 There are statistically significant differences in the 2017 and 2018 third grade FSA mathematics scores based on implementation of a standard state-mandated free-play recess.

Research Design

Ex post facto research was selected for this study because it is a non-experimental approach used to investigate relationships between variables (Fraenkel, Wallen, & Hyun, 2018). Data were analyzed to determine if a statistically significant difference exists between school-level aggregate third grade reading and mathematics scores from the 2017 and 2018 Florida Standards Assessments following implementation of the state-mandated free-play recess. Sociodemographic characteristics of the schools were disaggregated and analyzed for further comparisons of school size, race, gender, economic status, ELL status, disability status, and school type.

Sampling Procedures

Purposive sampling was used to select the schools located in the Northwest region of Florida. The Northwest region was selected given the diversity of student population among third graders (Florida Department of Education, 2022). Schools with 10 or fewer students were removed from the population because of the lack of test scores reported. Additionally, schools appearing on the data sheet for the 2017 academic year, but not the 2018 academic year, were excluded and schools appearing on the data sheet for the 2018 academic year, but not the 2017 academic year, were eliminated. Schools in this study provided a range of diverse demographic data which was analyzed using subgroups: school size, gender, race, economic status, ELL status, disability status, and school type.

The study sample included 223 schools that reported third grade ELA and mathematics test scores for the 2016-2017 academic year and 210 schools that reported third grade ELA and mathematics test scores for the 2017-2018 academic year. A total of 33 schools were eliminated for the 2016-2017 academic year and 20 schools were eliminated for the 2017-2018 academic year. Schools were dismissed from the study if they did not appear in both 2016-2017 and 2017-2018 academic years and if the total population of the school was ten (10) or less. A total of 190 or 85% of Northwest Florida schools met the criteria for inclusion. None of the eliminated schools were considered. The adjusted sample size for the study included 190 schools, with 165 (87%) public schools and 25 (13%) charter schools. The school size data was determined by the number of third grade students in a particular school during the 2017 and the 2018 academic years. Schools were grouped into one of two categories: 1-99 third graders or 100 or more third graders. For the 2017 academic year, there were 110 (57.9%) schools with 99 or less third graders and 80 (42.1%) schools with 100 or more third graders. For the 2018 academic year, there were 105 (55.3%) schools with 99 or less third graders and 85 (44.7%) schools with 100 or more third graders.

In 2017 and 2018, the number of male students comprised the majority of the third-graders in schools. However, in 2018, the number of third grade male students compared to third grade female students was only slightly over 50 percent. Race and economic status were similar for the 2017 and 2018 school years, with 56.8 percent of the student population being majority Caucasian. The remaining student population being Black, Indigenous, People of Color (BIPOC). Almost 60 percent of schools had 40 percent or more of its students identifying as economically disadvantaged. In 2017, 36 percent of schools had an ELL population of 3 percent or higher, while that number in 2018 decreased to just over 31 percent. During the 2017 and 2018 academic years, over 45 percent of schools had 15 percent or more students with some type of documented disability. Table 3 shows the demographic characteristics of schools for the respective 2017 and 2018 academic years.

Table 3. Demographic Characteristics of Schools in 2017 and 2018

	2017 (%)	2018 (%)
Gender		
Over 50% Male	113 (59.5%)	98 (51.6%)
Over 50% Female	77 (40.5%)	92 (48.4%)
Race		
39.9% or less BIPOC	108 (56.8%)	108 (56.8%)
40% or more BIPOC	82 (43.2%)	82 (43.2%)
Economic Status		
39.9% or less Econ Disadv	77 (40.5%)	77 (40.5%)
40% or more Econ Disadv	113 (59.5%)	113 (59.5%)
ELL Status		
2.9% or less ELL	121 (63.7%)	131 (68.9%)
3% or more ELL	69 (36.3%)	59 (31.1%)
Disability Status		
14.9% or less SWD	97 (51.1%)	103 (54.2%)
15% or more SWD	93 (48.9%)	87 (45.8%)

Data Collection

The Florida Standards Assessments (FSA) reading and mathematics achievement scores were obtained from the 2022 Florida Department of Education website. Using the Know Your Schools portal, demographic characteristics of the selected schools were acquired. The percentage of gender, race, economic status, and ELL status among third graders were collected for each of the selected schools. In addition, the FSA third grade reading and mathematics scores from the 2017 and 2018 were attained from the Florida Department of Education website.

Student achievement data was downloaded from the Florida Department of Education public online records. When collecting FSA reading and mathematics tests results, the achievement scores and associated means were obtained. Student performance levels, ranging from level 1-5, were collected and analyzed.

Variations in third grade ELA and mathematics test scores for the 2017 academic year and the 2018 academic year were determined using Pearson Chi-square and independent t-test. A linear link between the independent and dependent variables was discovered. The objective was to forecast the values of the dependent variable (academic achievement scores in ELA and mathematics in the third grade) in relation to the independent variables (school size, race, gender, ELL status, disability status, and school type). The statistical significance of the associations was assessed using the p-values for Pearson Chi-square and the independent t-test.

Pearson Chi-square Results

Hypothesis 1 Results

Pearson Chi-square results indicated that school size was significantly associated with students who achieved less than level 3 on the 2017 FSA ELA score, $\chi 2 = 20.963$, $p = 0.001$ and the 2018 FSA ELA score, $\chi 2 = 10.281$, $p = <0.001$. In 2017, school size, characterized by 1-99 third graders, almost 40% of students did not achieve level 3 status on the FSA. In contrast, only 8.8% of schools with a population of 100 or more third graders did not achieve level 3 scores. During the 2018 academic year, school size percentages for populations achieving over 50% of the level 3 threshold, increased among schools with 1-99 third graders by 1% and by almost 9% among schools with 100 or more third graders.

There was no statistical significance between the ELA test scores and school demographic characteristics based on gender and school type. For 2017, the ELA gender scores were $\chi 2 = .0149$, $p = 0.7$ and for 2018, the results were $\chi 2 = 3.62$, $p = 0.057$. The ELA test scores for school type for the 2017 academic year were $\chi 2 = 0.048$, $p = 0.826$ and for the 2018 academic year were $\chi 2 = 0.055$, $p = 0.815$. The results showed that a student's race had a significant impact on FSA test scores and thereby, overall student achievement. For 2017, populations with 40% or more Black, Indigenous, People of Color (BIPOC) had over 52% of its schools' students not achieving level 3 status on the FSA examination and that demographic increased to 61% for the 2018 academic year. Among schools with 40% or less BIPOC, a significant association was found between students who achieved level 3 or more on the 2017 FSA ELA score, $\chi 2 = 53.532$, $p = <0.001$, and among students with less than 40% BIPOC that achieved level 3 or higher on the 2018 FSA ELA score, $\chi 2 = 65.912$, $p = <0.001$.

A significant association was found among schools with 40% or more economic disadvantage that achieved less than level 3 on the 2017 FSA ELA score, $\chi 2 = 36.386$, $p = 0.001$, and 2018 FSA ELA scores, $\chi 2 = 37.934$, $p = <0.001$. Additionally, there was a strong correlation between schools with 39.9% or less economic disadvantaged and significantly higher achievement of a level 3 or higher test score on the FSA examination (see Tables 5 and 6).

The results for ELL status and disability status were not as conclusive as the results for school size, race, and economic status. The 2017 academic year was the only one that a statistically significant association between test scores and ELL status was found. The results for the 2017 ELA test scores revealed that increases in a school's ELL population could be interpreted as having had a negative impact on test scores (see Table 5). There was no statistically significant finding for the 2018 ELA results. In contrast, disability status was shown to be statistically significant for the 2017 and 2018 ELA test scores. For these years, schools with less than 15% Students with Disabilities (SWD) outpaced schools with 15% or more SWD by at least 12 percentage points. The chi-square and p-value for each year with statistically significant results were: 2017 ELA, $\chi 2 = 3.983$, $p = 0.046$; 2018 ELA, $\chi 2 = 4.51$ $p = 0.034$. Students in schools with less than 15% SWD achieved level 3 or higher more often than schools with 15% or more SWD. Tables 4 and 5 show the percentages of 2017 and 2018 FSA ELA scores by demographic characteristics.

Table 4. 2017 ELA Level 3 or Above Percentages by Demographic Data

	49.9% or less ELA Level 3	50% or more ELA Level 3	Chi-Square	Sig.
School Size				
1-99 Third Graders	42 (38.2%)	68 (61.8%)	20.963	<0.001***
100 or more Third Graders	7 (8.8%)	73 (91.2%)		
Gender				
Over 50% Male	28 (24.8%)	85 (75.2%)	0.149	0.7
Over 50% Female	21 (27.3%)	56 (72.7%)		
Race				
39.9% or less BIPOC	6 (5.6%)	102 (94.4%)	53.532	<0.001***
40% or more BIPOC	43 (52.4%)	39 (47.6%)		
Economic Status				
39.9% or less Econ Disadv	2 (2.6%)	75 (97.4%)	36.386	<0.001***
40% or more Econ Disadv	47 (41.6%)	66 (58.4%)		

ELL Status				
2.9% or less ELL	25 (20.7%)	96 (79.3%)	4.579	0.032*
3% or more ELL	24 (34.8%)	45 (65.2%)		
Disability Status				
14.9% or less SWD	19 (19.6%)	78 (80.4%)	3.983	0.046*
15% or more SWD	30 (32.3%)	63 (67.7%)		
School Type				
Charter	6 (24%)	19 (76%)	0.048	0.826
Public	43 (26.1%)	122 (73.9%)		

Table 5. 2018 ELA Level 3 or Above Percentages by Demographic Data

	49.9% or less ELA Level 3	50% or more ELA Level 3	Chi-Square	Sig.
School Size				
1-99 Third Graders	43 (39.1%)	67 (60.9%)	10.281	<0.001***
100 or more Third Graders	14 (17.5%)	66 (82.5%)		
Gender				
Over 50% Male	28 (24.8%)	85 (75.2%)	3.62	0.057
Over 50% Female	29 (37.7%)	48 (62.3%)		
Race				
39.9% or less BIPOC	7 (6.5%)	101 (93.5%)	65.912	<0.001***
40% or more BIPOC	50 (61%)	32 (39%)		
Economic Status				
39.9% or less Econ Disadv	4 (5.2%)	73 (94.8%)	37.934	<0.001***
40% or more Econ Disadv	53 (46.9%)	60 (53.1%)		
ELL Status				
2.9% or less ELL	35 (28.9%)	86 (71.1%)	0.183	0.669
3% or more ELL	22 (31.9%)	47 (68.1%)		
Disability Status				
14.9% or less SWD	22 (22.7%)	75 (77.3%)	5.056	0.025*
15% or more SWD	35 (37.6%)	58 (62.4%)		
School Type				
Charter	7 (28%)	18 (72%)	0.055	0.815
Public	50 (30.3%)	115 (69.7%)		

Hypothesis 2 Results

The impact of school size on mathematic scores indicated a statistically significant correlation for the 2017 and 2018 academic years. The 2017 Pearson chi-square results indicate school size, $\chi 2 = 10.223$, p

= <0.001, was significantly associated with schools in both size groups. Schools identified as 1-99 third graders that achieved less than level 3 on the 2017 FSA mathematics score had a percentage score of 30.9 which was over double the percentage score for schools identified as 100 or more third graders. In contrast, 90% of the schools identified as 100 or more third graders had at least 50% of its student population at level 3 or higher on the 2017 FSA mathematics examination. The school size Pearson chi-square for 2018, $\chi2 = 9.386$, $p = 0.002$, revealed a slight decrease from the 2017 results, which were $\chi2 = 10.223$, p = <0.001. However, the association between school size for the 2018 academic year was almost identical to the 2017 academic year (see Tables 6 and 7).

According to the data results, race had a major impact on the mathematics student achievement scores. In schools with 39.9% or less BIPOC, over 50% of the student population attained level 3 or above status on the FSA mathematics examination. Over 90% of the schools were able to achieve this student achievement outcome. In contrast, for the 2017 and 2018 academic years, schools with 40% or more BIPOC had only 58.5% and 56% respectively of its student population achieving level 3 or above status. Schools with less than 40% BIPOC indicated a statistically significant association between schools that achieved level 3 or higher on the 2017 FSA mathematics score, $\chi2 = 29.218$, p = <0.001 and among schools with less than 40% BIPOC that achieved level 3 or higher on the 2018 FSA mathematics score, $\chi2 = 48.323$, p = <0.001. A statistically significant association was also found among schools with 40% or more economic disadvantage that achieved less than level 3 on the 2017 FSA mathematics score, $\chi2 = 25.955$, p = <0.001 and the 2017 FSA mathematics score, $\chi2 = 21.95$, p = <0.001.

The results for disability status were inconclusive for school size, race, and economic status. There was no statistically significant difference between the 2017 mathematics FSA test scores and SWD. Test results for the 2017 mathematics FSA were almost identical for schools with less than 15% students with disabilities (SWD) and schools with 15% or more SWD. The chi-square was determined to be $\chi2 = 0.459$, $p = 0.498$. However, disability status was shown to be statistically significant for the 2018 mathematics FSA score results (see Table 8). The data showed that schools with less than 15% SWD outperformed schools with 15% or more SWD by at least 12 percentage points. The chi-square and p-value for 2018 mathematics was $\chi2 = 4.51$, $p = 0.034$. Students in schools with less than 15% SWD achieved level 3 or higher more often than schools with 15% or more SWD.

There was no statistical significance between school demographic characteristics based on gender, ELL status, and school type. The results led to a failure to reject the null hypothesis, as there was no statistically significant difference for the 2017 and the 2018 mathematics results for gender, ELL status, and school type. Tables 7 and 8 show the percentages of 2017 and 2018 FSA mathematics scores by demographic characteristics.

Table 6. 2017 Mathematics Level 3 or Above Percentages by Demographic Data

	49.9% or less Math Level 3	50% or more Math Level 3	Chi-Square	Sig.
School Size				
1-99 Third Graders	34 (30.9%)	76 (69.1%)	10.223	<0.001***
100 or more Third Graders	9 (11.2%)	71 (88.8%)		
Gender				
Over 50% Male	28 (24.8%)	85 (75.2%)	0.734	0.392
Over 50% Female	15 (19.5%)	62 (80.5%)		
Race				
39.9% or less BIPOC	9 (8.3%)	99 (91.7%)	29.218	<0.001***
40% or more BIPOC	34 (41.5%)	48 (58.5%)		

Economic Status				
39.9% or less Econ Disadv	3 (3.9%)	74 (96.1%)	25.955	<0.001***
40% or more Econ Disadv	40 (35.4%)	73 (64.6%)		
ELL Status				
2.9% or less ELL	28 (23.1%)	93 (76.9%)	0.049	0.824
3% or more ELL	15 (21.7%)	54 (78.3%)		
Disability Status				
14.9% or less SWD	20 (20.6%)	77 (79.4%)	0.459	0.498
15% or more SWD	23 (24.7%)	70 (75.3%)		
School Type				
Charter	6 (24%)	19 (76%)	0.31	0.861
Public	37 (22.4%)	128 (77.6%)		

Table 7. 2018 Mathematics Level 3 or Above Percentages by Demographic Data

	49.9% or less Math Level 3	50% or more Math Level 3	Chi-Square	Sig.
School Size				
1-99 Third Graders	31 (28.2%)	79 (71.8%)	9.386	0.002**
100 or more Third Graders	8 (10%)	72 (90%)		
Gender				
Over 50% Male	22 (19.5%)	91 (80.5%)	0.191	0.662
Over 50% Female	17 (22.1%)	60 (77.9%)		
Race				
39.9% or less BIPOC	3 (2.8%)	105 (97.2%)	48.323	<0.001***
40% or more BIPOC	36 (43.9%)	46 (56.1%)		
Economic Status				
39.9% or less Econ Disadv	3 (3.9%)	74 (96.1%)	21.95	<0.001***
40% or more Econ Disadv	36 (31.9%)	77 (68.1%)		
ELL Status				
2.9% or less ELL	25 (20.7%)	96 (79.3%)	0.004	0.951
3% or more ELL	14 (20.3%)	55 (79.7%)		
Disability Status				
14.9% or less SWD	14 (14.4%)	83 (85.6%)	4.51	0.034*
15% or more SWD	25 (26.9%)	68 (73.1%)		
School Type				
Charter	5 (20%)	20 (80%)	0.005	0.944
Public	34 (20.6%)	131 (79.4%)		

Independent t-test Results

An independent t-test was used to determine the significance of differences between two groups. The pre-implementation academic year for recess was 2017 and 2018 was the post-recess implementation year. The t-test scores were disaggregated using the school demographic data based on school size, gender, race, economic status, ELL status, disability status, and school type. The independent t-test was administered to determine if there was a statistically significant difference between free-play recess and student achievement scores based on two null hypotheses:

$H_0$3 There are no statistically significant differences in the 2017 and 2018 third grade FSA reading scores based on implementation of a standard state-mandated free-play recess.

$H_0$4 There are no statistically significant differences in the 2017 and 2018 third grade FSA mathematics scores based on implementation of a standard state-mandated free-play recess.

Hypothesis 3 Results

School size data for the 2017 FSA ELA examination were: 1-99 third graders - M=302.33, SD=8.195 and 100 or more third graders - M=306.41, SD=6.914. For the 2018 FSA ELA scores, the results were: 1-99 third graders - M=301.446, SD=9.007 and 100 or more third graders - M=301.725, SD=7.206. Data results for the 2017 FSA ELA examination based on gender were: over 50% male - M=304.11, SD=7.603 and over 50% female - M=303.96, SD=8.424. For the 2018 FSA ELA scores, the results were: over 50% male - M=302.947, SD=8.10406 and over 50% female - M=302.649, SD=8.94687. Tables 9 and 10 show the ELA mean scale scores by school size, gender, race, economic status, ELL status, economic status, disability status and disability data for 2017 and 2018 respectively.

Table 8. 2017 ELA Mean Scale Scores by Demographic Data

	N	M	SD	df	F	t-value	Sig	One-sided p
School Size								
1-99 Third Graders	110	302.33	8.195	188	3.992	-3.619	0.047	<0.001***
100 or more Third Graders	80	306.41	6.913					
Gender								
Over 50% Male	113	304.11	7.603	188	1.411	0.124	0.236	0.457
Over 50% Female	77	303.96	8.424					
Race								
39.9% or less BIPOC	108	308.23	6.051	188	0.692	10.488	0.406	<0.001***
40% or more BIPOC	82	298.54	6.639					
Economic Status								
39.9% or less Econ Disadv	77	310.08	5.86	188	1.142	11.119	0.287	<0.001***
40% or more Econ Disadv	113	299.94	6.374					
ELL Status								
2.9% or less ELL	121	305.13	7.685	188	0.016	2.535	0.899	0.006**
3% or more ELL	69	302.14	8.034					
Disability Status								
14.9% or less SWD	97	306.45	8.065	188	2.427	4.486	0.121	<0.001***
15% or more SWD	93	301.54	6.976					

School Type								
Charter	25	307.72	9.454	188	5.457	2.522	0.021	0.006**
Public	165	303.49	7.545					

Demographic data based on race for the 2017 FSA ELA examination were: 39.9% or less BIPOC - M=308.23, SD=6.051 and 40% or more BIPOC - M=298.54, SD=6.639. For the 2018 FSA ELA scores, the results were: 39.9% or less BIPOC - M=307.074, SD=6.41071 and 40% or more BIPOC - M=297.232, SD=7.47886. Data results based on economic status for the 2017

Table 9. 2018 ELA Mean Scale Scores by Demographic Data

	N	M	SD	df	F	t-value	Sig	One-sided p
School Size								
1-99 Third Graders	110	301.446	9.007	188	8.069	-2.69	0.005	0.004**
100 or more Third Graders	80	301.725	7.206					
Gender								
Over 50% Male	113	302.947	8.10406	188	1.74	0.238	0.189	0.406
Over 50% Female	77	302.649	8.94687					
Race								
39.9% or less BIPOC	108	307.074	6.41071	188	1.876	9.751	0.172	<0.001***
40% or more BIPOC	82	297.232	7.47886					
Economic Status								
39.9% or less Econ Disadv	77	308.857	6.64061	188	0.742	10.068	0.39	<0.001***
40% or more Econ Disadv	113	298.717	6.93267					
ELL Status								
2.9% or less ELL	121	303.314	8.32369	188	0.023	1.056	0.879	0.146
3% or more ELL	69	301.971	301.971					
Disability Status								
14.9% or less SWD	97	305	8.43109	188	0.107	3.752	0.744	<0.001***
15% or more SWD	93	300.559	7.85945					
School Type								
Charter	25	306.36	11.7043	188	12.458	2.273	0.001	0.012*
Public	165	302.291	7.72864					

FSA ELA examination were: 39.9% or less economically disadvantaged - M=310.08, SD=5.86 and 40% or more economically disadvantaged - M=299.94, SD=6.374. For the 2018 FSA ELA scores, the results were: 39.9% or less economically disadvantaged - M=308.857, SD=6.64061 and 40% or more economically disadvantaged - M=298.717, SD=6.93267. Tables 11 and 12 show the mean scale scores by demographic data and socioeconomic status.

Table 10. 2017 Mathematics Mean Scale Scores by Demographic Data

	N	M	SD	df	F	t-value	Sig	One-sided p
School Size								
1-99 Third Graders	110	301.08	9.579	188	10.472	2.247	0.001	0.013*
100 or more Third Graders	80	303.89	6.728					
Gender								
Over 50% Male	113	301.77	8.33	188	0.269	0.959	0.604	0.169
Over 50% Female	77	302.99	8.961					
Race								
39.9% or less BIPOC	108	306.2	6.87	188	1.178	8.523	0.279	<0.001***
40% or more BIPOC	82	297.07	7.863					
Economic Status								
39.9% or less Econ Disadv	77	307.04	6.069	188	8.397	7.107	0.004	<0.001***
40% or more Econ Disadv	113	299.01	8.552					
ELL Status								
2.9% or less ELL	121	302.84	8.34	188	0.156	1.234	0.693	0.109
3% or more ELL	69	301.25	8.981					
Disability Status								
14.9% or less SWD	97	304.13	8.479	188	0.112	3.137	0.738	<0.001***
15% or more SWD	93	300.31	8.307					
School Type								
Charter	25	305.92	10.985	188	5.625	2.31	0.019	0.011*
Public	165	301.71	8.063					

Table 11. 2018 Mathematics Mean Scale Scores by Demographic Data

	N	M	SD	df	F	t-value	Sig	One-sided p
School Size								
1-99 Third Graders	110	301.446	9.007	188	8.069	-2.69	0.005	0.004**
100 or more Third Graders	80	301.725	7.206					
Gender								
Over 50% Male	113	302.947	8.10406	188	1.74	0.238	0.189	0.406
Over 50% Female	77	302.649	8.94687					
Race								
39.9% or less BIPOC	108	307.074	6.41071	188	1.876	9.751	0.172	<0.001***
40% or more BIPOC	82	297.232	7.47886					

Economic Status								
39.9% or less Econ Disadv	77	308.857	6.64061	188	0.742	10.068	0.39	<0.001***
40% or more Econ Disadv	113	298.717	6.93267					_
ELL Status								
2.9% or less ELL	121	303.314	8.32369	188	0.023	1.056	0.879	0.146
3% or more ELL	69	301.971	301.971					
Disability Status								
14.9% or less SWD	97	305	8.43109	188	0.107	3.752	0.744	<0.001***
15% or more SWD	93	300.559	7.85945					
School Type								
Charter	25	306.36	11.7043	188	12.458	2.273	0.001	0.012*
Public	165	302.291	7.72864					

Hypothesis 4 Results

School size data for the 2017 FSA mathematics examination were: 1-99 third graders - M=301.08, SD=9.579 and 100 or more third graders - M=303.89, SD=6.728. Also, for the 2018 FSA mathematic scores, the results were: 1-99 third graders - M=301.446, SD=9.007 and 100 or more third graders - M=301.725, SD=7.206. The 2017 FSA mathematics data based on gender were: over 50% male - M=301.77, SD=8.33 and over 50% female - M=302.99, SD=8.961. Lastly, for the 2018 FSA mathematic scores, the results were: over 50% male - M=302.947, SD=8.10406 and over 50% female - M=302.649, SD=8.94687.

The 2017 FSA mathematics data based on demographics were: 39.9% or less BIPOC - M=306.2, SD=6.87 and 40% or more BIPOC - M=297.07, SD=7.863. For the 2018 FSA mathematic scores, the results were: 39.9% or less BIPOC - M=307.074, SD=6.41071 and 40% or more BIPOC - M=297.232, SD=7.47886. The 2017 FSA mathematics data based on economic status were: 39.9% or less economically disadvantaged - M=307.04, SD=6.069 and 40% or more BIPOC - M=299.01, SD=8.552. For the 2018 FSA mathematic scores, the results were: 39.9% or less economically disadvantaged - M=308.857, SD=6.64061 and 40% or more economically disadvantaged - M=298.717, SD=6.93267. Tables 12 and 13 show the mathematics mean scale scores by school size, gender, race, economic status, ELL status, economic status, disability status and disability data for 2017 and 2018 respectively.

Disability status and school type FSA test results were found to be statistically significant when comparing the 2017 and 2018 FSA ELA and mathematics scores. There was no significant difference between gender and the 2017 and 2018 ELA and mathematics test scores.

Table 12. 2018 ELA Mean Scale Scores by Demographic Data

	N	M	SD	df	F	t-value	Sig	One-sided p
School Size								
1-99 Third Graders	110	301.446	9.007	188	8.069	-2.69	0.005	0.004**
100 or more Third Graders	80	301.725	7.206					
Gender								
Over 50% Male	113	302.947	8.10406	188	1.74	0.238	0.189	0.406

Over 50% Female	77	302.649	8.94687					
Race								
39.9% or less BIPOC	108	307.074	6.41071	188	1.876	9.751	0.172	<0.001***
40% or more BIPOC	82	297.232	7.47886					
Economic Status								
39.9% or less Econ Disadv	77	308.857	6.64061	188	0.742	10.068	0.39	<0.001***
40% or more Econ Disadv	113	298.717	6.93267					
ELL Status								
2.9% or less ELL	121	303.314	8.32369	188	0.023	1.056	0.879	0.146
3% or more ELL	69	301.971	301.971					
Disability Status								
14.9% or less SWD	97	305	8.43109	188	0.107	3.752	0.744	<0.001***
15% or more SWD	93	300.559	7.85945					
School Type								
Charter	25	306.36	11.7043	188	12.458	2.273	0.001	0.012*
Public	165	302.291	7.72864					

Table 13. 2017 Mathematics Mean Scale Scores by Demographic Data

	N	M	SD	df	F	t-value	Sig	One-sided p
School Size								
1-99 Third Graders	110	301.08	9.579	188	10.472	-2.247	0.001	0.013*
100 or more Third Graders	80	303.89	6.728					
Gender								
Over 50% Male	113	301.77	8.33	188	0.269	-0.959	0.604	0.169
Over 50% Female	77	302.99	8.961					
Race								
39.9% or less BIPOC	108	306.2	6.87	188	1.178	8.523	0.279	<0.001***
40% or more BIPOC	82	297.07	7.863					
Economic Status								
39.9% or less Econ Disadv	77	307.04	6.069	188	8.397	7.107	0.004	<0.001***
40% or more Econ Disadv	113	299.01	8.552					
ELL Status								
2.9% or less ELL	121	302.84	8.34	188	0.156	1.234	0.693	0.109
3% or more ELL	69	301.25	8.981					
Disability Status								
14.9% or less SWD	97	304.13	8.479	188	0.112	3.137	0.738	<0.001***

15% or more SWD	93	300.31	8.307					
School Type								
Charter	25	305.92	10.985	188	5.625	2.31	0.019	0.011*
Public	165	301.71	8.063					

Additionally, there was not a statistically significant association between 2017 and 2018 mathematics test scores for ELL status.

Conclusion

Based upon the analysis of data, the implementation of recess did not have a significant impact on Third grade students reading and mathematics test scores. The analysis revealed that there was no statistically significant difference between recess and FSA ELA and mathematics test scores, which led to the decisions to fail to reject the null hypotheses. The results suggested that participating in recess activities does not have a measurable impact on students' academic achievement in ELA and mathematics based on the FSA examination. The lack of statistical significance indicates that any observed variations in test scores between students who had recess and those who did not are likely due to other factors, rather than recess itself. While the research does not consistently demonstrate a statistically significant impact of recess on test scores, it is important to note that recess offers multiple benefits for students, including physical health, mental health, and social development.

The data analysis examined how third grade student test scores in elementary schools have been affected by the switch from non-mandated to mandated recess. Since the results showed that the difference between pre and post ELA and mathematics scores has not significantly increased, educational practitioners and policymakers will have to identify other factors contributing to achievement disparities. The FSA test score data can be used to make choices about how to enhance reading and mathematics curricula to satisfy the academic demands of the students because there is still a gap. Subsequently, the results showed that the difference between proficiency rates has not widened but remains consistent. Educational stakeholders need to continue the search to identify the root causes to close the achievement gap.

The results of this study can help explain how test scores fluctuated when new state-mandates are given. There is a need to reconsider how to effectively close the achievement gap in light of the statistically significant gaps and the results of the subgroup analyses (percent proficiency performance results for school size, race (Black, Indigenous, People of Color), economic status, and all other demographic data).

School size based on student enrollment influences various aspects of a student's educational experience, which can affect their performance on standardized tests. According to the data, school size had a statistically significant effect on third grade FSA test results, implying that student performance on the FSA examination is significantly impacted by enrollment numbers. This result suggests that learning experiences and outcomes differ between students in larger and smaller schools. Some key considerations regarding the impact of school size are: class size, teacher-student ratio, economies of scale, teacher quality, and school culture. Educational policymakers and administrators can find this study useful as it emphasizes the importance of taking school size into account when allocating resources, developing curricula, and implementing instructional practices.

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