EFFECT OF RECESS ON SOCIALIZATION AND PHYSICAL ACTIVITY IN TYPICALLY DEVELOPING CHILDREN AND CHILDREN WITH LEARNING DISABILITIES

by

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Abstract

Unstructured, outdoor recess interventions have been shown to induce more moderate and vigorous physical activity as well as social skills development in elementary school children. The LiiNK Project provides children with multiple, unstructured, outdoor recesses daily. The aim of this study was to observe the effects of the LiiNK Project on the physical activity levels and socialization of children with different learning abilities in two schools. The study specifically focused on activity level, social group size and sex makeup, and trends across play equipment as well as age groups. Results revealed children spent most of recess engaged in moderate physical activity in small groups. Groups were generally divided by sex, with boys playing games together and girls talking; however, boys and girls with learning disabilities were more often found intermingling and playing games together. The playground was the location of the most moderate and vigorous physical activity, as it provided many pieces of equipment for children to use. The results indicate recess provides an opportunity for children to engage in physical activity and socialize with each other, and more work must be done to engage children spending recess alone or in sedentary activity.

Introduction

Play goes beyond physical activity. Play provides an opportunity for children to learn about the world, which includes socializing and taking others' viewpoints (Piaget & Inhelder, 1969). Physical activity and socialization are fundamental in the development of all children; therefore, it is essential that children have an opportunity to practice these skills during the school day. Recess provides an opportunity for children to play, have a break, exercise, make new friends, and express their creativity through games. These are all indicators of better physical, mental, social, and emotional health. In a collaboration between the Center for Disease Control (CDC) and Springboard for Active Schools, it was determined only eight states required daily recess in elementary schools (Springboard to Active Schools, n.d.). Though recess positively impacts children, it has been replaced by more time in the classroom.

With rising overweight and obesity rates in the United States, it is important to combat children's poor physical health with active school programs, without jeopardizing their learning. The U.S. Department of Health and Human Services (2018) recommends all children engage in 60 minutes of moderate to vigorous physical activity daily. In a survey of 830 mothers with children 3-12 years old, 31% reported their children played outside every day, whereas 10% reported their children played outside once a week or less (Clements, 2004). Many children are not receiving the recommended physical activity amounts in school or at home.

In addition to the rising rates of inactivity, there are also rising rates of intellectual disabilities in the United States. One disability is attention deficit hyperactivity disorder (ADHD), which is defined as hyperactivity-impulsivity and/or a pattern of inattention (American Psychiatric Association, 2013, p. 61). Hyperactivity presents as excessive motor activity and impulsivity presents as making decisions without thought. Inattention means it is difficult for

those with ADHD to focus on tasks, which makes engaging in conversations difficult as well. ADHD is a growing developmental disorder in the United States, with highest rates seen in elementary and secondary school-aged children (Wilkes-Gillan et al., 2016). A study by Zablotsky and colleagues (2019) showed ADHD prevalence significantly increased from about 8.47% of children studied in 2009 to 9.54% in 2017. Recess provides a time for children to release energy, which could be especially beneficial to help children with ADHD maintain focus in conversation and in the classroom. Another disability increasing in prevalence is autism spectrum disorder (ASD). ASD is defined as "persistent impairment in reciprocal social communication and social interaction" as well as "restricted, repetitive patterns of behavior, interests, or activities" (American Psychiatric Association, 2013, p. 53). The impairments in social skills present with ASD create difficulty for children to befriend peers; thus, leading to a gap in social development. Considering some children with ASD may be nonverbal, recess provides an opportunity for all to experience socialization through play, which does not require verbal communication. Overall, it is vital for children with ADHD and ASD to participate in play with others in order to be physically active and practice social skills.

The purpose of this study was to observe the impact of multiple daily unstructured recesses on typically developing children and children with intellectual and emotional disabilities. Some of the most prevalent intellectual disabilities seen in schools include ADHD and ASD. Though other disabilities will not be covered in depth, those disabilities may be present in the children observed in this study. The two specific differences to be examined were children's levels of physical activity (measured as sedentary, moderate, or vigorous) and socialization (measured by group size and sex of children) during recess. It was hypothesized children would follow previously observed trends—girls would be found in small groups,

engaged in sedentary activity, whereas boys would be in large groups, engaged in moderate to vigorous physical activity. Within observations, other aims involved determining play trends between different age groups and between similar play spaces at each school.

Literature Review

Research articles were split into five common themes to reflect the topics explored in the study. Themes include the theory behind play, the implications of play, how play impacts children with ADHD, how play impacts children with ASD, and group and sex trends seen during recess.

Piaget's Child Development Theory

Jean Piaget's play theory focuses on the development of children through play. Piaget divided children's development into stages, seen in Table 1 below (Cherry, 2020; Piaget, 1951). The concrete operational stage, used to describe children ages 7 to 11, will be the primary stage focused on in this study, since this is the typical age range of elementary school children.

Table 1. Stages of Development

Stage	Age	Goal
Sensorimotor	Birth to 18-24 months	Object permanence
Preoperational	2 to 7 years old	Symbolic thought
Concrete operational	Ages 7 to 11 years	Logical thought
Formal operational	Adolescence to adulthood	Scientific reasoning

In his theory, Piaget describes play as the best means of cognitive development, including gains in creativity, memorization, understanding, and problem-solving abilities (Ahmad et. al., 2016). In a word, Piaget defines play as "pleasure-seeking" (Piaget, 1951). Through exploration and engagement with their environment, elementary school children are able to adapt reality to their own viewpoint (Flavell, 1963). This adaptation is called assimilation. Assimilation teaches children how to think logically and also includes imitation of the world. Imitation involves taking the viewpoints of others in imaginative play and using objects in the play environment to symbolize objects in the world (Piaget & Inhelder, 1969).

Within the concrete operational stage, children advance socially by creating and playing games. Child-led games, also known as unstructured games, are more beneficial for development than adult-led games in this stage. Through unstructured play, children learn how to cooperate with others, which includes voting on rule changes and following the rules established by others. These social exchanges allow children to understand others can have different points of view than themselves (Piaget & Inhelder, 1969). Therefore, unstructured play time, provided through recess, is essential in the whole development of the child and paves the way for functional social skills into adulthood.

Implications of Play

Play can be structured or unstructured. Structured play involves instructor-led play, where children are shown an activity and asked to participate in it for a certain amount of time (Piaget & Inhelder, 1969). Unstructured play is defined as allowing children to decide which activities they would like to participate in and for how long (Piaget & Inhelder, 1969). Interventions have shown the benefits of both types of play, but unstructured play focuses more on whole child development, especially if the outdoors is involved (Raney et al., 2019).

Many intervention studies, either unstructured or structured, have focused on recess for whole child benefits, but most have been short in length (i.e. 6-12 weeks). Of these, one that focused on unstructured and structured recess simultaneously was conducted by Behrens and colleagues (2019). They focused on two school districts where the schools were assigned to either an unstructured approach to play or structured approach to play. Unstructured play involved increasing the amount of equipment available at recess. The structured approach involved organizing games for students to play at recess. Both approaches were intended to increase the moderate and vigorous physical activity levels of 4th grade students; however only the unstructured approach resulted in increased physical activity. In addition, less students were found to be engaged in sedentary behaviors with the unstructured approach. On the other hand, the structured approach resulted in increased sedentary behaviors and no change in moderate or vigorous physical activity. Increasing the number of activities available during unstructured recess also resulted in more positive social behaviors. Physical and verbal conflict rates decreased after children were given more activity options during recess (Raney et al., 2019). Children also played more games requiring their imaginations, which falls in line with Piaget's description of the concrete operational stage (Dankiw et al., 2020).

The LiiNK Project

The LiiNK (Let's inspire innovation 'N Kids) Project is a comprehensive, longitudinal intervention study focused on recess as unstructured, outdoor play. LiiNK defines unstructured, outdoor play as self-directed and self-controlled. The program implements multiple 15-minute unstructured outdoor recess periods into each school day. In addition, a 15-minute character development lesson is delivered daily (Clark & Rhea, 2017; Rhea et al., 2016). The LiiNK program has resulted in many improvements in children's behavior, from the playground to the

classroom. Farbo and colleagues (2020) compared the differences between students who participated in four 15-minute recesses daily and those who participated in two 15-minute recesses. In addition to meeting the recommended 60 minutes of daily physical activity (U.S. Department of Health and Human Services, 2018), students in the four-recess group also took more steps and spent more time in moderate and vigorous physical activity than the group receiving 30 minutes of recess daily. Providing multiple, unstructured, outdoor play opportunities throughout the school day positively impacted the physical activity level of students. Another LiiNK study found children participating in three 15-minute recesses daily displayed more positive emotions, such as smiling and high fiving, than children with one 30-minute recess (Clark & Rhea, 2017). Altogether, more frequent recesses resulted in an increase in physical activity and prosocial behaviors.

School Play Space Differences

The type of play space available may impact the amount of moderate and vigorous physical activity taking place during recess. Pawlowski and colleagues (2016) observed that children who spent the most recess time in a grassy field engaged in significantly more moderate and vigorous physical activity than those who spent time in the schoolyard or indoors. Similarly, Raney et al. (2019) found that increasing the amount of open, green space available for elementary school students to play on during recess resulted in more vigorous physical activity and creative play. Based on these results, providing an open area offers opportunity for more physical activity and engagement leading to social development. A review of similar green space interventions found one study that confirmed these results, but several others that showed no change in physical activity after the addition of green space (Dankiw et al., 2020). The conflicting results require further investigation to determine whether or not unstructured recess

benefits rely on the availability of green space, or more outdoor space in general.

Play and ADHD

Although typically developing children have been the focus of previously mentioned research, play is also important for children with intellectual disabilities. The rising rates of ADHD signify the need for an intervention, so children with ADHD can reach similar developmental milestones as their typically developing peers. Often, medication is recommended to treat ADHD; however, studies have shown other options may be more effective (Pelham et al., 2016).

Physical activity has been shown to improve the physical impairments of children with ADHD. Gawrilow and colleagues (2016) assigned young males with ADHD to five minutes of jumping on a trampoline (vigorous activity) or five minutes of coloring (sedentary activity) before completing a Go/No Go task. A Go/No Go task involves responding to certain stimuli and inhibiting a response when presented with other stimuli. Those who engaged in physical activity prior to the task were found to be more successful at inhibiting their response and limiting errors on the task than those who were sedentary. Similarly, in a study of 8-12 year-old boys with ADHD, Gapin and Etnier (2010) found more moderate to vigorous physical activity predicted better executive function performance. Specifically, more physical activity predicted appropriate planning of responses and inhibition of irrelevant responses. A study by Taylor and Frances (2011) determined milder ADHD symptoms were associated with children who played in open grass areas compared to children who played indoors. These studies show the importance of physical activity, specifically outdoors, for treating the physical symptoms of children with ADHD.

Physical activity through play has also been shown to improve the social skills and mood

of children with ADHD. Wilkes et al. (2011, 2016) studied the playfulness of 5-11 year-olds with ADHD. In the 2011 study, children participated in a 40-minute unstructured play session with typically developing peers once a week for seven weeks. Playfulness was measured using the Test of Playfulness (ToP), scored by a therapist watching a video recording of the children's play sessions. At the end of the study, children with ADHD had improved in 4 of the 7 ToP categories reflecting empathy. In the 2016 study, children participated in six clinic play sessions as well as weekly home sessions. At the end of the study, children's ToP scores had significantly improved. In a 10-day study by Gawrilow et al. (2013), children with ADHD reported feeling less depressed on days where they had taken more steps. These studies show the effectiveness of play interventions on improving the social skills and affect of children with ADHD.

Based on the research, physical activity is effective for improving the social, physical, and emotional symptoms of children with ADHD. Short-term, outdoor physical activity sessions have proven effective for mitigating ADHD symptoms; however, more research is needed on the long-term benefits of outdoor physical activity. Because children spend most of their day at school, these unstructured, outdoor, frequent play breaks provide an opportunity for children to socialize and engage in physical activity.

Play and Autism

Play is also important for children with ASD, but observations show that children with ASD engage in less physical activity and socialization during recess than their typically developing peers (Pan, 2007). It was found that elementary-aged children with ASD participated in 27.58 minutes of moderate to vigorous physical activity (27.70% of recess) compared to the 35.04 minutes (36.15% of recess) of participation by their typically developing peers (Pan, 2007).

Studies also show children with ASD socialize less on the playground than their peers. In one study, children with ASD had fewer initiations with others, spending about 40% of recess engaged with peers, compared to classmates who spent 70% of recess with others (Locke et al., 2015). Similarly, Gilmore and colleagues (2018) found children spent 30% of recess engaged with peers; however only 45% of the children spent any time talking to peers during recess. Significantly more recess time was spent in solitary activities for those with ASD, which could lead to a larger gap in social skills between them and their typically developing peers.

Interventions of structured play have been implemented to improve play and social behavior of children with autism. In a study of three boys with autism, following a schedule of which playground equipment to use and when helped increase play and decrease challenging behavior (Machalicek et al., 2009). Vincent and colleagues (2017) discovered that providing structured games for students with ASD and praising their positive social behaviors during recess resulted in increased time spent engaged with peers. In addition, most participating students initiated more social interactions by the end of the program.

Although the structured interventions are promising, these were performed with small groups of students for short research periods. There is a lack of evidence for the social implications of long-term unstructured play for children with ASD.

Recess Trends

Within recess, differences in activity level and group size exist among boys and girls. Ridgers and colleagues (2011) examined these sex differences through observations of one year of recess. Researchers found girls spent more recess time engaged in sedentary activities, playground games, or locomotion. Playground games included skipping and dancing, which required girls to wait their turn before participating. Taking turns resulted in long periods of

sedentary activity, as girls stood still while others participated. Because of the nature of the activities girls participated in, many spent time in small groups. Roberts et al. (2012) found a higher percentage of girls spending recess alone or in small groups. Boys, on the other hand, spent more time engaged in large group activities, such as sports. The boys often chose to participate in sports, such as football, which accounts for the significantly higher amount of time they spent engaged in moderate and vigorous physical activity.

Other studies show similar results. In a study by Lodewyk and McNamara (2020), over 400 students in 4th through 8th grade were surveyed about their favorite aspects of recess. Girls more often claimed to enjoy the social aspects of recess, including spending time with their friends and doing arts and crafts. If girls did engage in physical activity, they gravitated toward games, such as hide-and-seek and tag. Boys enjoyed playing sports and games and using recess equipment more than girls. The results of the survey show that boys are more likely to use recess as a time for physical activity, whereas girls use it as a time for sedentary activity and talking with friends. Roberts et al. (2012) confirmed these results when they observed boys engaged in more sport-specific activities than girls, who spent more time doing sedentary activities. In addition, the time spent in sport activities was significantly related to the percentage of time spent in moderate or vigorous physical activity, meaning boys spent more time engaged in moderate or vigorous activity, due to their involvement in sport activities. Both physical activity and socialization are important; however, the two can be experienced together through play.

Conclusion

Play is essential for the holistic development of children, including healthy physical activity habits and social skills. Giving children the freedom to decide which activities to participate in during recess through unstructured interventions results in more children engaging

in physical activity, which is promising for the physical and social health of America's children. The addition of more unstructured recesses throughout the day allows children more opportunities to engage in moderate and vigorous physical activity, and research shows children take advantage of these opportunities. Children also display more positive emotions when given multiple opportunities for a break throughout the school day.

Outdoor physical activity, specifically in open grass areas, has been associated with increased moderate and vigorous activity in typically developing children as well as children with ADHD; however, conflicting results call for more research to find long-term effects of recesses with large, open areas for play available. Children with ASD have been shown to engage in less physical activity and social interactions during recess than typically developing peers. Structured interventions helped children with ASD become more integrated with peers on the playground, but no implications of unstructured interventions were found.

Recess provides an opportunity for all children to be active and learn how to interact through play. Trends show boys typically use recess as a time for physical activity, whereas girls use it for socialization; however, both are necessary. Providing multiple unstructured recesses daily may change the way boys and girls utilize recess time. Because there is little research on multiple unstructured recesses daily for children of all abilities, this research will explore social (group size) and physical (level of activity) determinants of three unstructured recesses a day for typically developing children and children with intellectual and emotional disabilities.

Methods

Participants

Participants were observed from two elementary schools in Fort Worth, Texas. School A

participants (N=30) had a diagnosis of an intellectual or emotional disability, which ranged from autism to difficulty managing emotions. School B participants (N=240) had no known diagnoses of disability and were considered typically developing. Both groups of students ranged in age from 8-11. Participants were not given numbers or markings as identifiers; all students were included in the observations with no identifying information.

Measures

The school observations included three 15-minute recesses daily. Each school had all recesses scheduled, and all students from each grade level went to recess together. In order to determine how to collect results, an observation form had to be developed that would address two aspects of the literature that could look different for typically developing children and those with disabilities. First, the different types of playground spaces and equipment offered at each school had to be identified. Second, it was determined how to observe these different spaces for group, sex, and grade level differences.

Types of Playground Spaces

Each school's play area was divided into three sections. School A included a grassy field, big playground, and music/science sections. The grassy field provides an open space where students can sit, walk, swing on a swing, and occasionally play baseball or football, depending on which equipment is given to them. The big playground includes a structure with a climbing wall and two slides, as well as a small basketball court with one hoop and three benches. The music/science section makes up the rest of the play space and includes a covered area with five interactive instruments, two small tire swings, one small covered structure with two benches, a small playground with two slides, and a bench.

School B had three different play areas. The first play area was divided into a swing

section, big playground, and grassy field. The swing section consisted of two sets of four swings. The big playground included a play structure with three slides, two bridges, and monkey bars. In addition, a climbing structure and a spinning structure, where two kids could sit while other kids ran around to spin the structure, were included in the big playground observations. The grassy field included all the space around the playground, which was laid out as a large field with trees around the edges and a bench. The second play area was a parking lot, where teachers would bring jump ropes out for the students. This play area was observed by starting on one side and moving a third of the way down every 5 minutes, in order to observe each of the three sections during the recess. The third play area consisted of a smaller grass field with pavement around it, termed the "bus loop". This area was divided into a grassy field, the street, and the sidewalk around the edges.

Observation Form

In each playground section, children were observed to determine the social groups they formed and their activity levels. A child was considered "socializing" when engaged verbally or nonverbally with at least one other child. This included talking with another child, playing a game together, participating in a group activity together, or sharing equipment or toys. In order to quantify this behavior, an observation form was created, using a layout similar to the System for Observing Children's Activity and Relationships during Play (SOCARP) form (Ridgers, 2010). The form for this study is not considered a modified version of the SOCARP, as the layout is the only similar aspect. The observation form for this study is shown in the appendix, on pages 31-32. The form distinguishes group size, with four categories labeled: alone, small group (2-5 kids), medium group (6-12), and large group (13+). While counting the number of children in a group, and distinguishing between boys and girls, the observer determined their

physical activity level. The form identifies three levels of activity: sedentary (sitting or standing), moderate (walking, swinging, jumping rope, or playing basketball), and vigorous (running or climbing). Each child observed was accounted for by a tally mark. The same student could be counted in different areas of the playground since there was no way to identify who was in each group for each observation time point.

Procedures

This study was conducted as part of the Institutional Review Board's approval of the LiiNK Project's intervention. This research focused on socialization and physical activity level during three recess periods in two different schools. Permission to attend recesses was obtained by the Director of School A and Principal of School B. The researcher checked in with the front desk staff each day prior to going to the play areas to acquire observation data. As mentioned previously, this study required observation of number of children in specific play space areas and the children's activity for each observation time point. Since both of the schools are involved in the LiiNK Project, observations are a normal part of data collection.

Before initial observations, a trained observer did a pilot trial to determine which observation method would be most beneficial. The pilot was completed at School A, which was chosen because of its smaller class size compared to School B. First, the observer tried to capture the activity level and group interaction of all children at recess, without dividing the play area into sections. Too much was happening to efficiently record data, so the observer tested the observation form with the play areas divided into sections. The divided form worked better and was chosen for all further observations.

Before each recess period started, the weather was recorded using the AccuWeather Application, which measures temperature, humidity, and cloud cover. This was necessary

because weather can affect children's play behavior. Each recess lasted for 15 minutes. One playground section was observed for 5 minutes, consisting of three 90-second observations each followed by one 10-second recording period, before the observer moved to the second and third sections. The amount of time for each observation was chosen based on previous research.

The 8-11 year-olds at School A had two morning recesses and one afternoon recess. The morning recesses at School A included the students for this study, but could also, at times, have younger students from different grade levels. The 9-11 year-old students at school B had two morning recesses and one afternoon recess. To make everything consistent across the schools, one morning and one afternoon recess were observed from each school for five consecutive days. The time of day for recess was alternated for the schools. This means School A might be observed for the morning recess and School B observed that same day in the afternoon. The next day, School B would be observed in the morning and School A in the afternoon. In total, two morning and three afternoon recesses were observed for School A, and three morning and two afternoon recesses were observed for School B. Observations were conducted on school days from Thursday, November 11, 2021 to Wednesday, November 17, 2021. The schedule of the recess periods observed for each school is shown in Table 2 below.

Table 2. Recess Schedule

	November 11	**November 12**	**November 15**	**November 16**	**November 17**
School A					
ages 8-9	10:45-11:00am	-	10:43-10:58am	10:50-11:05am	10:45-11:00am
ages 10-11	10:45-11:00am	12:04-12:20pm	10:43-10:58am	-	10:45-11:00am
School B					
ages 9-10	12:31-12:46pm	9:00-9:15am	9:00-9:15am	1:30-1:47pm	9:00-9:15am
ages 10-11	1:02-1:17pm	9:20-9:35am	9:20-9:35am	1:05-1:20pm	9:24-9:39am

The schedule on November 16 was different for both School A and School B due to teacher conferences.

Design

Descriptive statistics were calculated for the weather and the percentage of children observed in each school's play space areas over the five day period of observations. An exploratory narrative was developed to explain types of activity observed on the playground and for differences between schools.

Results

The weather was recorded for each observation, for a total of two recordings a day—one in the morning and one in the afternoon. As seen in Table 3, the temperature recordings ranged from 47-76 degrees Fahrenheit, which is comfortable for children at play. In addition, four of the five days had higher humidity in the morning (i.e. 73-90%). The afternoon humidity was significantly lower four of the five days, ranging from 33-64%. November 17th was a fairly humid day overall.

Table 3. Weather

Day	Temperature (ºF)	Humidity (%)	Cloud Cover (%)
11/11/21			
AM	58	53	25
PM	64	33	10
11/12/21			
AM	47	73	0
PM	63	42	0
11/15/21			
AM	48	82	0
PM	59	64	0
11/16/21			
AM	69	78	76
PM	76	61	0
11/17/21			
AM	63	90	0
PM	69	75	11

The researcher observed children in one section for 90-second intervals before marking down activity level and gender within social groups. After five minutes of observation and recording, the researcher moved to a different section of the play area. To find the results, the number of children from each activity level and group size (each section of the observation form) were totaled for every recess observed. This appeared as twelve values representing number of children in each activity level and group per recess. Each value was then divided by the total number of children present at each recess and multiplied by 100 to obtain a percentage. For School A, the total number of children was 30. For School B, the total number of children aged 9-10 was 120 and the total number of children aged 10-11 was 120, for a grand total of 240 children. Tables 4-7, shown below, contain these percentages. Results are categorized by activity level and group size, sex, trends across ages, and trends across play areas. School A results are all together by age since students of all ages went to recess at the same times.

Table 4. School A

School A: ages 8-11	Alone	Small Group (2-5)	Medium Group (6-12)	Large Group (13+)
Sedentary				
1	3.3%	30.0%	20.0%	0.0%
2	6.7%	56.7%	0.0%	0.0%
3	20.0%	56.7%	0.0%	0.0%
4	10.0%	33.3%	20.0%	0.0%
5	6.7%	53.3%	23.3%	0.0%
Average	9.3%	46.0%	12.7%	0.0%
Moderate				
1	3.3%	80.0%	30.0%	0.0%
2	0.0%	43.3%	50.0%	0.0%
3	6.7%	36.7%	23.3%	0.0%
4	3.3%	60.0%	30.0%	0.0%
5	10.0%	56.7%	20.0%	0.0%
Average	4.7%	55.3%	30.7%	0.0%
Vigorous				
1	0.0%	16.7%	20.0%	0.0%
2	0.0%	0.0%	0.0%	0.0%
3	0.0%	20.0%	0.0%	0.0%
4	0.0%	13.3%	0.0%	0.0%
5	0.0%	36.7%	0.0%	0.0%
Average	0.0%	17.3%	4.0%	0.0%

Table 5. School B: ages 9-10

School B: ages 9-10	Alone	Small Group (2-5)	Medium Group (6-12)	Large Group (13+)
Sedentary				
1	1.7%	17.5%	0.0%	0.0%
2	0.8%	20.0%	14.2%	0.0%
3	3.3%	20.0%	30.0%	0.0%
4	6.7%	15.8%	13.3%	0.0%
5	1.7%	15.8%	5.0%	0.0%
Average	2.8%	17.8%	12.5%	0.0%
Moderate				
1	0.0%	35.8%	0.0%	0.0%
2	4.2%	15.0%	17.5%	13.3%
3	9.2%	7.5%	5.8%	0.0%
4	5.8%	32.5%	7.5%	0.0%
5	5.8%	25.8%	21.7%	13.3%
Average	5.0%	23.3%	10.5%	5.3%
Vigorous				
1	0.8%	8.3%	5.8%	0.0%
2	1.7%	1.7%	6.7%	12.5%
3	1.7%	10.8%	10.0%	0.0%
4	0.8%	17.5%	5.8%	14.2%
5	0.8%	9.2%	15.0%	12.5%
Average	1.2%	9.5%	8.7%	7.8%

Table 6: School B: ages 10-11

School B: ages 10-11	Alone	Small Group (2-5)	Medium Group (6-12)	Large Group (13+)
Sedentary				
1	7.5%	31.7%	14.2%	0.0%
2	3.3%	39.2%	25.0%	0.0%
3	4.2%	31.7%	15.0%	0.0%
4	4.2%	44.2%	18.3%	0.0%
5	0.0%	38.3%	0.0%	0.0%
Average	3.8%	37.0%	14.5%	0.0%
Moderate				
1	3.3%	16.7%	0.0%	0.0%
2	0.0%	40.0%	26.7%	0.0%
3	0.8%	32.5%	24.2%	0.0%
4	3.3%	50.8%	11.7%	0.0%
5	2.5%	50.8%	11.7%	16.7%
Average	2.0%	38.2%	14.8%	3.3%
Vigorous				
1	0.0%	10.8%	0.0%	0.0%
2	0.0%	2.5%	5.8%	0.0%
3	0.8%	10.8%	18.3%	0.0%
4	0.0%	10.0%	0.0%	0.0%
5	0.0%	5.8%	0.0%	13.3%
Average	0.2%	8.0%	4.8%	2.7%

Table 7: School B: ages 9-11

School B: ages 9-11	Alone	Small Group (2-5)	Medium Group (6-12)	Large Group (13+)
Sedentary				
1	4.6%	24.6%	7.1%	0.0%
2	2.1%	29.6%	19.6%	0.0%
3	3.8%	25.8%	22.5%	0.0%
4	5.4%	30.0%	15.8%	0.0%
5	0.8%	27.1%	2.5%	0.0%
Average	3.3%	27.4%	13.5%	0.0%
Moderate				
1	1.7%	26.3%	0.0%	0.0%
2	2.1%	27.5%	22.1%	6.7%
3	5.0%	20.0%	15.0%	0.0%
4	4.6%	41.7%	9.6%	0.0%
5	4.2%	38.3%	16.7%	15.0%
Average	3.5%	30.8%	12.7%	4.3%
Vigorous				
1	0.4%	9.6%	2.9%	0.0%
2	0.8%	2.1%	6.3%	6.3%
3	1.3%	10.8%	14.2%	0.0%
4	0.4%	13.8%	2.9%	7.1%
5	0.4%	7.5%	7.5%	12.9%
Average	0.7%	8.8%	6.8%	5.3%

Activity Level and Group Size

Based on Table 4, at School A, the majority of children were generally found in small groups, with one instance where there were more children in medium groups. Within small groups, children were most often engaged in moderate activity.

Based on Tables 5-6, at School B, the majority of children ages 9-10 were found in small groups, with four instances where higher percentages children were found in medium groups. Within small groups, children were most often engaged in moderate activity. The majority of children ages 10-11 were found in small groups, with two instances where higher percentages children were found in a medium or a large group.

Between School A and School B, average percentages of children alone looked similar. A higher percentage of children were alone and sedentary at School A, though. There were higher percentages of children in small groups at School A than School B. In addition, a significantly higher percentage of children were engaged in moderate activity in medium-sized groups at School A than School B. Much of the moderate, medium group activity was taking place on the grassy field and music/science area at School A. No large groups were observed at School A, most likely due to low number of children; however, more children on average were playing in large groups than alone at School B.

Sex

In School A, there were groups separated by sex; boys were observed playing basketball, whereas girls were observed walking around the grassy field. Boys and girls intermingled, however, when engaging in sports together on the grass (football, baseball, catch), playing tag, or talking in groups to come up with a game to play. When the equipment for sport games was not provided, boys and girls resorted to talking with their friends of the same sex.

In School B, most groups were separated by sex. On the playground, boys were observed playing tag in large groups, whereas girls were observed standing and talking, or walking around in small groups. Boys and girls played together when a small game of tag among friends expanded to include anyone around. The division between sex was most apparent when children spent recess at the parking lot or bus loop. These play areas provided less equipment, so children were left playing small games of tag or remaining sedentary while talking in groups. Girls were often found standing and talking in small groups, whereas boys were often found engaging in physical activity in medium and large groups.

Across Ages

Since 8-11 year-olds had the same recess times at School A, differences were not able to be observed across ages. At School B, however, 9-10 year-olds had separate recess periods than 10-11 year-olds. Multiple differences exist between the two age groups at School B as seen in Tables 5 and 6. First, a higher percentage of children ages 10-11 were found engaged in sedentary activity, across all group sizes, compared to children ages 9-10. Second, a significantly higher percentage of children ages 10-11 engaged in moderate physical activity within small and medium groups, compared to children ages 9-10. Third, more children ages 9-10, on average, engaged in vigorous activity across all group sizes.

Across Play Areas

The playground area proved to be the section with the most children engaged in moderate and vigorous activity, as children ran, climbed, and swung on the play equipment. At School A, children played basketball and participated in tag on the play equipment. At School B, children used the swings and also played tag on the play equipment.

Comparing recess across play areas, a general trend included sedentary children

socializing in small and medium groups on the grassy fields. Although the grass could be an area for creative play, such as tag and cheerleading seen at School B, or football and baseball at School A, many children on the grass were found sedentary, either sitting or standing.

Discussion

The observation tool used in the study seemed to prove effective to collect the data for the research hypothesis. The sections that will be covered are activity level and group size, sex differences, trends across ages, and trends across play areas.

Activity Level and Group Size

It was observed that at both schools, children were most often found in small groups, engaging in moderate activity. This could mean children are more likely to engage in physical activity when they have friends at recess. Many times, a large group of tag started with a few friends who then knew another person, and that person brought their friends. Noticeably, children at School B who did not seem to have a friend group spent recess alone, either swinging or walking the perimeter of the designated play area. Children alone at School A were often sedentary, found sitting entertaining themselves or standing, watching the other children playing. These differences in activity level for those alone at School B and School A could be explained by the characteristic traits of intellectual disabilities experienced by the children at School A.

Sex

Research shows girls are more likely to spend recess in sedentary small groups, and boys are more likely to be engaged in sports activities in larger groups (Ridgers et al., 2011; Roberts et al., 2012). School A did not follow these trends. In fact, girls and boys intermingled and spent most recesses playing sports together on the grass (football, baseball, catch), participating in a

game of tag, or talking in groups.

School B followed the trends shown in research, as many groups were divided by sex. Since these were general trends, outlying groups did exist. At School B, there were multiple recesses where a large group of girls worked on a cheer routine. In addition, there was some crossover between boys and girls in certain friend groups or when a small game of tag quickly turned into a large group activity. When children had recess on the playground, there was less division by sex. This could indicate that providing equipment and a larger area to play helps merge the divide between children of different sexes.

Across Ages

It was expected that a higher percentage of older children (ages 10-11) would be sedentary, as research has shown children engage in less activity as they age (Lodewyk and McNamara, 2020). Researchers found children in grades 4-6 most enjoyed organized sports and the fun of recess, whereas children in grades 7-8 most enjoyed the social free time recess provided (Lodewyk and McNamara, 2020). The results show this might be the feeling of older children at School B.

Across Play Areas

While green space has previously been shown to induce creative play, the most activity was seen when children had play structures to use. This was especially noticeable at School B, when children were confined to the parking lot or bus loop. Having less equipment available could be the reason children resorted to sedentary groups divided by sex. Physical activity seems to provide a means of connection for children of different sexes; it is difficult for them to talk in groups, but working toward a common goal in play makes these interactions easier. A solution to the time spent sedentary could be to provide sports balls, such as footballs or kickballs during

recess. Sports balls were provided during a few recesses at School A, and the addition resulted in more children engaging in physical activity during recess. Given that one purpose of the LiiNK program is to provide children the recommended 60 minutes of physical activity daily, the addition of sports equipment could support this goal while still giving children the opportunity to create their own games (Behrens et al., 2019). A flaw of structured recess interventions is the involvement of outside forces, such as teachers, showing children how to engage in an activity. Providing equipment but no instructions could be considered a less restrictive alternative, as children would be able to decide how to use the equipment.

Limitations

For both schools, play occurred in short spurts; for instance, kids would be running and then stop to talk. Because of inconsistent time spent in physical activity, children may have been marked in the wrong activity level. In addition, the observation form does not account for groups of children engaging in different levels of activity. For example, in some groups, multiple children were sedentary, and others were active. The main focus of the study was to observe trends in group size and sex makeup during recess. Therefore, the observation form was created to offer a simple way to determine these factors, as well as activity level during recess. The observer determined the activity level of each group based on the majority of group members. In future studies, the form could be updated to distinguish among activity levels within groups.

In both schools, a holistic view of recess is assumed using the sections captured. Children were using all play areas throughout recess, but the observer focused on one area at a time. Recess at School B involved over 100 children; therefore, select sections of the recess area were observed. The results captured include a small portion of total activity happening at

recess. Finally, group sizes were changing constantly; a group could go from ten children to five children within seconds. Although the observer tried to keep up with the changes, there could be discrepancies in the number of children in each group.

Conclusion

Physical activity and socialization are key factors in a child's development, and recess provides an invaluable opportunity for children to partake in these activities. The benefits of recess on holistic development have been shown, and there is a need to increase the amount of recess time available to children. Encouraging active involvement in recess, while maintaining an unstructured time for children to play, is necessary for children to continue engaging in healthy habits as they age. Based on observations, recess provides a time for children to talk and play with their friends, and more research needs to be done to find ways to incorporate children who spend recess alone. In addition, special emphasis must be given to girls in particular, as they are more likely to miss out on the physical benefits of recess. Overall, attitudes and involvement in recess can impact a person's entire development, so creating a positive recess experience for children is imperative.

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Appendix

Table 8. Recess Observation Form

Playground	Alone	Small Group (2-5)	Medium Group (6-12)	Large Group (13+)
Sedentary	B: G: B: G: B: G:	B: G: B: G: B: G:	B: G: B: G: B: G:	B: G: B: G: B: G:
Moderate (walk, swing)	B: G: B: G: B: G:	B: G: B: G: B: G:	B: G: B: G: B: G:	B: G: B: G: B: G:
Vigorous (run, climb)	B: G: B: G: B: G:	B: G: B: G: B: G:	B: G: B: G: B: G:	B: G: B: G: B: G:

Grass	Alone	Small Group (2-5)	Medium Group (6-12)	Large Group (13+)
Sedentary	B: G: B: G: B: G:	B: G: B: G: B: G:	B: G: B: G: B: G:	B: G: B: G: B: G:
Moderate (walk, swing)	B: G: B: G: B: G:	B: G: B: G: B: G:	B: G: B: G: B: G:	B: G: B: G: B: G:
Vigorous (run, climb)	B: G: B: G: B: G:	B: G: B: G: B: G:	B: G: B: G: B: G:	B: G: B: G: B: G:

Music/Science	Alone	Small Group (2-5)	Medium Group (6-12)	Large Group (13+)
Sedentary	B: G: B: G: B: G:	B: G: B: G: B: G:	B: G: B: G: B: G:	B: G: B: G: B: G:
Moderate (walk, swing)	B: G: B: G: B: G:	B: G: B: G: B: G:	B: G: B: G: B: G:	B: G: B: G: B: G:
Vigorous (run, climb)	B: G: B: G: B: G:	B: G: B: G: B: G:	B: G: B: G: B: G:	B: G: B: G: B: G: