

Relationship between the Timing of Recess Breaks and Discipline Referrals among Elementary Children

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Abstract

Following recess, children's behavior typically improves and externalizing behavior decreases. We sought to determine whether multiple recess breaks and their timing leads to reduced discipline referrals. Participants included 607 elementary students who engaged in two 15-minute recess breaks each day. Discipline referrals were coded by type, time, and time elapsed after the most recent break. Findings revealed a complex picture of the role recess timing may play in decreasing discipline issues for children. As time elapsed, the odds of discipline referral increased for verbal disruptive and truancy-related behaviors. Results support multiple recess periods throughout the day, preferably every 90 minutes.

Keywords: physical activity, movement, elementary, externalizing behaviors, aggression, children, discipline

Physical activity opportunities in today's schools have declined in order to meet academic requirements (Barros, Silver, & Stein, 2009; Jarrett et al., 1998; Pellegrini, Huberty, & Jones, 1995); yet, empirical evidence indicates a consistently positive relationship between academic performance, classroom behavior, and physical activity opportunities provided during school (Barros et al., 2009; Jarrett et al., 1998). Recess, defined as scheduled outside-of-class time that allows students to engage in physical and social activities of their choice, is a highly recommended part of the school day for elementary students (Active Living Research, 2012). Preliminary research in this area indicates that classroom behavior and student attention improve following recess or classroom movement breaks because it may provide a change that keeps children healthfully stimulated (Barros et al., 2009; Mahar et al., 2006; Pellegrini et al., 1995).

It is known that children are active approximately 52-68% of the time during school recess (Robert Wood Johnson Foundation, 2012), which can be a significant amount of their daily physical activity. Boys have been found to be consistently more active than girls at recess (Ridgers, Fairclough, & Stratton, 2010; Sarkin, McKenzie, & Sallis, 1997), but results are mixed regarding the levels of physical activity by age and ethnicity (Ridgers et al., 2011; Ridgers et al., 2012). Research has demonstrated that younger children are generally more active than older children and that White youth are generally more active than Black and Hispanic youth (Armstrong et al., 2018; Belcher et al., 2010). Schools with higher percentages of American Indian or Alaska Native, Asian or Pacific Islander, Black and/or Hispanic students are less likely to even offer recess (Robert Wood Johnson Foundation, 2012).

Physical Activity and Externalizing Behaviors

Stimulation-seeking theory suggests children engage in externalizing, or disruptive, behaviors (e.g., physical aggression, verbal bullying, defiance, theft, vandalism) to heighten internal arousal, as children who frequently instigate such aggressive acts may have lower levels of internal arousal compared to children who do not act in these ways (Eysenck, 1997). Using this theory, Folino, Ducharme, and Greenwald (2014) used exercise as a means to decrease disruptive behaviors and found 30 minutes of aerobic-based physical activity produced improved behavior for approximately 90 minutes afterwards. Other research has found a small to moderate relationship between physical activity and lower rates of externalizing behaviors (Fite & Vitulano, 2011; Spruit, Assink, van Vugt, van der Put, & Stams, 2016).

Child Moderators That May Impact Disruptive Behavior

Multiple variables may impact children's behaviors, including age, sex and race/ethnicity. Certain externalizing problems such as aggressive behavior have been shown to either decrease with age or exhibit a curvilinear pattern in which the behavior decreases and then increases again during adolescence (Bongers, Koot, van der Ende, & Verhulst, 2003).

Sex moderates the relationship between age and aggression outcome. By fifth grade, boys have a higher rate of teacher-reported externalizing problems than

girls, while girls have higher teacher-reported levels of self-control (Bertrand & Pan, 2013). Boys are more likely to demonstrate aggression, property offenses, and status offenses (e.g., truancy or running away from home) (Lahey et al., 2000).

African American and Hispanic/Latino students are more likely to be referred to teachers or administrators for behavior problems at elementary and middle school levels than their White peers (Skiba et al., 2011). Individuals in a severe externalizing group from a nationally representative sample of adolescents were 101% more likely than normative youth to be African American (Vaughn, Salas-Wright, DeLisi, & Maynard, 2013). Simultaneously, African American youth tend to receive harsher levels of punishment for less serious behavior than other students (Downey & Pribesh, 2004; Skiba, Michael, Nardo, & Peterson, 2002).

Physical Activity Break Timing

Pellegrini and colleagues (1995) demonstrated that the timing of physical activity may further influence student behavior. For elementary students, following an indoor or outdoor recess break, on-task behavior and attention improved compared to those before the break. Further, longer periods of inactivity were associated with higher levels of inattention. However, what is unclear is the relationship between the timing of physical activity and disruptive behavior. Prior research indicates that students fare better behaviorally when provided with brief, intermittent movement breaks (Jarrett et al., 1998; Mahar et al., 2006; Pellegrini et al., 1995; Pirrie & Lodewyk, 2012). The purpose of this study was to examine the effects of two recess periods and their timing on student behavior.

Method

Participants

Participants included 607 kindergarten through sixth-grade students (49.7% female, $M_{\text{age}} = 8.4$ years) from a Title I elementary school in rural, southeastern United States. The school was selected as a convenience sample as the administrator agreed to changing their recess policy to evaluate effects on student achievement and discipline referrals. The demographics mirrored the surrounding schools in the region (54.2% African American, 30.5% White, 7.6% Hispanic, 7.6% Other, <1% Native Hawaiian or Pacific Islander). Approximately 89% of the students qualified for free/reduced-price lunch, while 2.6% were English Language Learners. All participants were in classrooms ($n = 30$) that added a second recess to the school day during the year of data collection. All methods were approved through the school administration, local school district, and University Internal Review Board.

Procedures

All teachers followed a new recess schedule for the 2017-2018 year that included two 15-minute blocks of recess time (as opposed to one 15-minute block the previous school year) (see Figure 1 for recess schedule). Teachers were instructed to allow students to organize games and have free play during their scheduled recess times. If weather did not allow for outdoor recess, teachers were asked to provide active indoor recess options.

Figure 1. Recess times by grade level

Time	8:00-8:15am	8:30-8:45am	8:45-9:00am	9:00-9:15am	9:15-9:30am	9:30-9:45am		11:25-11:40am	11:40-11:55am	12:00-12:15pm	12:50-1:05pm	1:25-1:40pm	1:45-2:00pm	2:00-2:15pm
Grade level	K									K				
		1										1		
				2				2						
					3				3					
						4					4			
			5											5
												6		

Discipline Referrals

The school utilized a mobile portal to maintain records of assignments, grades, attendance, discipline referrals and more for each individual student. Discipline referrals were thus documented for each classroom through an online portal by the classroom teacher throughout the school year. Minor infractions would result in warnings or interventions provided by the classroom teacher for the first five occurrences. For the first five behavioral incidents, teachers would provide students with a written warning that was sent home to the parent. After the fifth warning, students were referred to the principal's office. The present study analyzed these office referrals, and thus represented behavior that had continued to occur after five warnings or interventions had been put into place.

The disciplinary referrals were coded according to infraction type—(a) verbal aggression, (b) physical aggression, or (c) truancy/skipping class (leaving class and not coming back); time of referral (morning/afternoon); whether the referral occurred (coded as 1 for referred vs. 0 for not referred) before, between, or after the recess periods; and by time (in minutes) in proximity to scheduled recess periods. To distinguish between referrals occurring after the first recess but that could also be classified as “between” the first and second recess, referrals were coded by the time they occurred in proximity to a recess break. If the referral occurred within 5 minutes of the recess break, it was coded as “after” or “before,” but if it occurred more than 5 minutes from either break, it was coded as “between.”

Recess

For all children in the study, recess took place on a playground that consisted of a large swing set; a play set with slide and monkey bars; a large field where children could play tag, soccer, football, or kickball; and a basketball court. The activity that took place during recess varied based on grade level as some teachers were more active than others with students. There were three to four teachers monitoring

recess at all times with approximately 50 children on the playground during each recess period. Teachers were not allowed to deprive students of recess as a form of punishment or to make up for academic work.

Data Analysis

In 2018 the researchers performed a series of hierarchical generalized linear models (HGLM) to understand whether students' discipline referrals for (a) verbal aggression, (b) physical aggression, and (c) truancy/skipping school differ by 1) sex, 2) race/ethnicity, 3) proximity of time (in minutes) from the last recess break, and 4) whether the referral occurred before, between, or after recess periods. The HGLM—which extend generalized linear models by relaxing the assumption that errors are independent—was selected to properly model the dichotomous outcome (coded as 1 or 0) measured over time (time nested within individual). For each HGLM, the logit link (η_{ti}), where η_{ti} is the log of the odds of i^{th} student's being referred to discipline at t^{th} time, is predicted by level-1 (i.e., time in proximity, whether the referral occurred before, between, or after the recess periods) and level-2 predictors (i.e., gender and ethnicity) as follows:

$$\eta_{ti} = \gamma_{00} + \gamma_{01}(\textit{latency}) + \gamma_{02}(\textit{between}) + \gamma_{03}(\textit{after}) + \gamma_{04}(\textit{latency} * \textit{between}) \\ + \gamma_{05}(\textit{latency} * \textit{after}) + \gamma_{06}(\textit{Male}) + \gamma_{07}(\textit{AA}) + \gamma_{08}(\textit{Hispanic}) + u_{ti},$$

where $u_{ti} \sim N(0, \tau_{00})$, τ_{00} is level-2 variance; *latency* is the amount of time delay (in minutes) from the last recess break; *between* is a dummy variable representing whether a student was referred for disciplinary infractions *between* recess breaks; *after* is a dummy variable indicating whether a student was referred for disciplinary infractions; *male* is a dummy variable indicating whether a student was identified as male; *AA* is a dummy variable indicating whether a student was identified as African American; and *Hispanic* is a dummy variable indicating whether a student identified as Hispanic. All HGLM analyses were performed using lme4 library in R, where the parameter was estimated using Laplace approximations, which is known to perform optimally compared to other approximation methods. For all the estimated parameters, the odds ratio of the associated logit coefficient ($\hat{\gamma}$) was computed for interpretation as $\exp(\hat{\gamma})$.

Results

A total of 140 students were referred for disciplinary infractions 342 times ($min = 1$, $max = 18$, $M = 2.45$) over one academic year. Most students were male ($n = 105$; 75%), while 25% ($n = 35$) were female (see Table 1). Furthermore, 96 (68.6%) were African American, seven (5%) were Hispanic, and the rest were White ($n = 23$, 16.4%) or multiracial ($n = 14$, 10%). No significant differences were found in the likelihood that a student was referred for each disciplinary infraction by the following: sex ($p = .32$ for verbal aggression; $p = .21$ for physical aggression; $p = .54$ for truancy/skipping school), race/ethnicity ($p = .36$ for verbal aggression; $p = .38$ for physical aggression; $p = .66$ for truancy/skipping school), and grade level ($p = .26$ for verbal aggression; $p = .86$ for physical aggression; $p = .15$ for truancy/skipping school).

Table 1. Characteristics of students who were referred for disciplinary infractions

	N	%
Gender		
Female	35	25
Male	105	75
Race/Ethnicity		
2 or more	13	9.3
African American	96	68.6
Hispanic	7	5
White	23	16.4
Missing	1	0.7
Grade level		
K	5	3.6
1	11	7.9
2	26	18.6
3	28	20
4	23	16.4
5	27	19.3
6	20	14.3

The average amount of time that a discipline referral occurred after recess (in minutes) was 100.09 ($SD = 78.4$, $min = 10$, $max = 405$). Of 342 referrals, 163 (48%) were for verbally disruptive behaviors ($k = 74$, 45% before recess; $k = 41$, 25% between recesses; $k = 48$, 30% after recesses), 132 (39%) were for physically aggressive behaviors ($k = 42$, 32% before recess; $k = 30$, 23% between recesses; $k = 60$, 45% after recesses), 38 (11%) were for truancy and skipping school-related behaviors ($k = 16$, 42% before recess; $k = 4$, 11% between recesses; $k = 18$, 47% after recesses), and 9 (.03%) were for "other" behaviors ($k = 6$, 67% before recess; $k = 2$, 22% between recesses; $k = 1$, 11% after recesses), including inappropriate use of technology. Due to the small number of students who were referred for "other" behaviors, no statistical analysis was performed for this group.

Effect of Recess Breaks on Discipline Referrals

Table 2 summarizes results from three sets of HGLMs predicting whether a student was referred for a disciplinary infraction. These models were performed separately by the three main types of infractions: (a) verbally disruptive behaviors, (b) physically aggressive behaviors, and (c) truancy-related behaviors. The predictors entered in three subsequent models were: (a) the amount of time it took the infraction to occur after the recess break; (b) a dummy variable indicating a

discipline referral occurred between recess breaks; (c) a dummy variable indicating whether a discipline referral occurred after recess breaks; (d) the interaction between the time delay after a recess break and a dummy variable indicating a discipline referral occurred between recess breaks; (e) a dummy variable indicating a male student; (f) a dummy variable indicating whether a student is African American, and (g) a dummy variable indicating whether a student is Hispanic.

Referrals for Verbally Disruptive Behaviors

A statistically significant positive interaction effect was found between the amount of time after recess break (latency) and a dummy variable indicating whether a discipline referral occurred between the recess breaks ($\hat{\gamma} = 1.05$, $SE = 0.49$, $p = .02$, $\exp(\hat{\gamma}) = 2.84$), when controlling for the amount of time after recess, referral timing (morning, afternoon; before, between, after break), sex, and race/ethnicity (see Table 2). This indicates that the effect of latency was 184% higher for students who were being referred between recess breaks than those who were being referred within 5 minutes after a recess break. However, the likelihood that a student was referred for a disciplinary infraction was not found to be related to the student's sex or racial/ethnic background.

Referrals for Physically Aggressive Behaviors

The likelihood that a student was referred for physically aggressive behavior was not found to be statistically different depending on any predictors (see Table 2).

Referrals for Truancy-Related Behaviors

The statistically significant but negative intercept ($\hat{\gamma} = -3.39$, $SE = 0.71$, $p < .01$, $\exp(\hat{\gamma}) = .03$) indicates the likelihood that a student is referred for a truancy-related disciplinary referral is 97% lower before the recess break when controlling for time after recess and referral timing (morning, afternoon; before, after break) (see Table 2). In addition, the relationship between the time delay after recess and the likelihood that a student is referred to discipline for truancy was statistically significant and positive ($\hat{\gamma} = .38$, $SE = 0.19$, $p = .04$, $\exp(\hat{\gamma}) = 1.47$). This suggests that the odds of a student's discipline referral for truancy/skipping school is increased by 47% for every additional hour after their last recess break. Due to lack of variation in the number of a student's discipline referrals for truancy by sex and ethnicity, these effects were not examined in the truancy-related behaviors model.

Table 2. Summary of hierarchical generalized linear models

	Verbal Harassment				Physical Aggression				Truancy			
	$\hat{\gamma}$	$SE(\hat{\gamma})$	p	$exp(\hat{\gamma})$	$\hat{\gamma}$	$SE(\hat{\gamma})$	p	$exp(\hat{\gamma})$	$\hat{\gamma}$	$SE(\hat{\gamma})$	p	$exp(\hat{\gamma})$
Intercept	.54	.53	.32	1.71	-1.02	.62	.10	.36	-3.39*	.71	<.01	.03
Latency (hr)	.004	.14	.91	1	-.22	.17	.21	.8	.38*	.19	.04	1.47
Between	-.93	.59	.14	0.39	.63	.64	.33	1.87	.99	1.08	.36	2.71
After	-.86	.51	.13	0.43	.65	.56	.24	1.92	1	.76	.19	2.73
Latency * Between	1.05*	.49	.04	2.84	-.50	.52	.35	.61	-1.62	1.28	.20	.20
Latency * After	0.03	.27	.99	1.03	.07	.30	.83	1.07	-.13	.35	.73	.88
Male	-0.25	.37	.50	0.78	.34	.43	.42	1.41	-			
African American	-0.28	.34	.38	0.76	.26	.40	.52	1.29	-			
Hispanic	-0.49	.76	.50	0.61	.51	.87	.55	1.67	-			
Level-2 variance	.67				1.17				.98			
AIC	466.0				443.8				238.8			
BIC	504.4				482.1				265.7			
-2LL	-223.0				-211.9				-112.4			
Df	321				332				334			

Note. * $p < .05$; *latency* is the amount of time delay (in minutes) from the last recess break; *between* is a dummy variable representing whether a student was referred for disciplinary infractions *between* recess breaks; *after* is a dummy variable indicating whether a student was referred for disciplinary infractions within 5 minutes after recess; *male* is a dummy variable indicating whether a student is male or not; *AA* is a dummy variable indicating whether a student is African American or not; *Hispanic* is a dummy variable indicating whether a student is Hispanic or not; $exp(\hat{\gamma})$ indicates the change in the odds of being referred related to each predictor.

Discussion

This was the first study to examine the effects of two recess periods and their timing related to disciplinary infractions. Given our findings, it is unclear whether offering two scheduled activity breaks and their timing leads to a reduction in discipline referrals overall as we found a differential effect depending on the type of disciplinary infraction that occurred. No significant difference by sex or race/ethnicity was found, although a multitude of previous studies have found higher levels of disciplinary referrals for African American and Hispanic male students (Skiba et al., 2011; Skiba et al., 2002; Vaughn et al., 2014). This is a finding worth further exploring. Conceivably, the daily offering of two recess periods may have served as an intervention in which the proportion of discipline referrals leveled out for all students, regardless of sex or race/ethnicity. Additionally, the lack of race/ethnicity effects could be related to the homogeneity of the sample itself.

We confirmed our hypothesis that the odds of a student being written up for a discipline referral, regardless of age, race/ethnicity, or sex, would be higher as more time elapsed since recess. In this study, discipline referrals occurred on

average 100 minutes after recess. This finding mirrored an exploratory study conducted with adolescent boys (Folino et al., 2014) who demonstrated behavioral improvements for approximately 90 minutes following exercise bouts. Providing multiple recess periods or breaks for student activity may demonstrate a return on investment in terms of behavioral improvements.

We examined whether the type of infraction predicted whether a student was referred. Previous research suggests that type of externalizing problems do not moderate the effect of physical activity in adolescents (Spruit et al., 2016). Our study found that as the time after recess increased, students were more likely to have verbal and physically aggressive infractions, but not truancy-related behaviors. Additionally, the odds of disciplinary incidents for verbal harassment significantly *increased between* recess breaks compared to times immediately *before* a recess break. For physical aggression, the odds significantly *decreased between* recess periods compared to an occurrence immediately *before* recess. No differences by sex or race/ethnicity were found. As more time passes following an activity break, students are more likely to exhibit verbal and physical discipline issues. Although this finding is correlational, it is possible that implementing multiple recess periods and/or activity breaks may help decrease the overall number of discipline referrals.

One puzzling finding, however, was the increased incidence of verbally disruptive behaviors coupled with decreased reports of physically disruptive behaviors between recess breaks. It is unclear why one would increase while the other would decrease. Perhaps this was due to the time coding of referrals. Because two recess periods were offered within a seven-hour school day, it was difficult to determine the cut off between "after recess" and "between recess" time frames, so a short 5-minute window was selected to identify a time in close proximity to the beginning and conclusion of the recess break in defining "before," "after" and "between." To help tease out this relationship, the average amount of time occurring after recess until a discipline referral occurred was also incorporated into the results. What can be tentatively concluded is that referrals for verbal behavior appeared to increase as time passed following a recess break, suggesting that more bouts of recess may lead to fewer verbal infractions. Additionally, referrals for physically aggressive behavior significantly decreased between recess breaks, which again, may support the inclusion of more bouts of recess spread throughout the school day.

For referrals related to truancy, the odds of a student being cited increased by almost 50% for every additional hour following their last recess break. Perhaps students are most apt to skip class due to boredom or lack of free time. Therefore, some options for administrators to consider are providing more activity opportunities or more unstructured time within the school day.

Limitations

Multiple limitations existed for this study. First, the sample was one of convenience and thus limits generalizability of the results. Second, collapsing different types of referrals into larger categories may have prevented the analyses from capturing important differences in the types of incidences that were more or less likely to

occur. Third, several discipline referrals occurred outside of the school environment (e.g., on busses, $n = 28$ referrals). Given the different environment for students (i.e., large numbers of students, limited supervision), different authority figures (i.e., bus drivers), and unresolved issues from the day, school bus transportation is commonly associated with discipline issues (Casey, 1995; Putnam, Handler, Ramirez-Platt, & Luiselli, 2003). Future studies could try to account for these settings to better capture the context of when infractions occur.

What Does This Article Add?

This is the first study, to our knowledge, that examined the specific type of discipline referrals in reference to the time in which they occurred in relation to multiple recess periods. Findings reveal a complex picture on the role recess and its timing may play in decreasing discipline issues for elementary students. As more time elapses after recess, discipline referrals increase. It is suggested that more activity breaks should be provided throughout the day, preferably every 90 minutes, based on present findings. Additionally, physical activity breaks within the classroom can be mandated or highly encouraged. While this study did not analyze referrals related to classroom movement breaks, perhaps those may have similar effects on discipline referrals.

As more time passes after recess, infractions for verbal misbehavior and physical aggression appear to increase along with the chance of truancy. These findings tentatively support the inclusion of multiple recess periods throughout the day. A school-wide movement break time could be an effective strategy. Classroom teachers can also set sporadic alarms throughout the day, signaling for a movement break. There are multiple free online activity breaks and alarms for teachers to utilize, and free resources for activity breaks led by teachers are plentiful (<https://app.gonoodle.com>; <https://www.teacherspayteachers.com>; <https://www.bokskids.org>). Offering multiple opportunities for students to move their bodies seems to be one potential solution for decreasing discipline referrals, and scheduling breaks appears to be a cost- and time-effective way for schools to enhance the learning experience for students.

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