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The Effects of Montessori's "Walking on the Line" Activity on Student Engagement and Concentration

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Montessori's "Walking the Line" Effects on Engagement and Concentration in an Early

Childhood classroom

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Advisor _____

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Abstract

This paper investigates whether and to what degree Montessori's "Walking on the Line" activity affected student engagement and concentration. This study took place in a private Montessori classroom serving twenty students, aged 33 months through five years. Data was collected using four tools on line usage, engagement, and concentration: a tally of how many times students walked the line, a tally measuring how engaged students appeared while working in the classroom, how long students concentrated following a lesson, and a professional journal. All but the line usage tool gathered baseline data five days before the intervention. Results were inconclusive. While overall student engagement and concentration rose, there was little to no correlation between number of times students walked on the line daily and engagement or concentration. I will continue to offer this activity while investigating additional activities to increase engagement and concentration.

Keywords: Montessori, engagement, concentration

The transition from a relaxed summer schedule to a more formal academic schedule at the beginning of the school year can prove challenging to both students and teachers. In September 2016, as some students transitioned back into my classroom after a summer break and some younger children began their first year in my early childhood Montessori classroom, I observed a general lack of prolonged engagement with the Montessori materials during that first month of school. An authentic Montessori school offers a “Great Work Period” each morning, an uninterrupted two- to three-hour period during which students are free to work with any of the didactic materials a teacher has presented to them and repeat the activity as many times as they’d like. While the Montessori school where I teach runs year-round, summer programming varies to include weekly field trips and extended outdoor play time. I surmised children had become accustomed to interrupted and shorter work periods and the adjustment to longer periods without gross motor playtime affected their ability to engage and concentrate.

The school where I teach and where I conducted this study is a private school with two infant classrooms, two toddler classrooms and three “Children’s House” classrooms serving young children ages 30 months through six years old. My classroom is one of these Children’s House classrooms. At the time of this study, my class consisted of nineteen children ages 31 months through five years old. Not all children attend school every day; parents may enroll children for three, four, or five days per week, selecting any of the days Monday through Friday for attendance. Our school day begins in the classroom at 8:30 every morning, though some children have attended early morning daycare. The Great Work Period in my classroom continues until 11:30 am.

During the Great Work Period, I observed children who had attended early morning day care would select Montessori apparatuses whose educational purposes they'd previously mastered and proceed to enact imaginative play mixing the apparatuses with those other nearby children had selected. Many other newly arriving children did not engage with any Montessori materials or would only work with a material for a short time before wandering away.

Our school building houses plenty of space for both indoor and outdoor gross motor and imaginative play. Children play outside every day after lunch and at the end of the school day (3:30 pm), weather permitting. Before school and during inclement weather, children play during these designated play times with standard issue toys in a play room or on an indoor climber in the gym. Considering the structure of our school day and the physical structure of the school building, I questioned how to best help the children concentrate on their work with the Montessori materials in the classroom.

As the following review of the literature finds, while both kinds of play can benefit children, yet another type of gross motor movement activity has proven most successful at helping children develop extended concentration while engaging with didactic materials in the classroom. Results of recent research on the effects of both imaginative play and increased gross motor play on students' attention and engagement during academic periods remain inconclusive. However, researchers who studied the effects of guided gross motor activities within the classroom setting and academic work time tended to find slight increased student attention on their academic tasks.

Literature Review

Early childhood educators have implemented various physical activities as a strategy to facilitate concentration and work engagement in preschool students. Among these are the implementation of separate free play time from academic work time and the use of imaginative, interactive peer play. Research has also revealed that the introduction of purposeful gross motor movement activities integrated into the daily instructional time and setting increased concentration (Goh, Hannan, Brusseau, Webster, & Larson, 2014; Goerg, 2016; McCabe, 2016; Weibehaus & Hanson, 2016). These strategies each have strengths and weaknesses.

Recess or Unstructured Breaks

Pellegrini and Holmes (2006) advocated for the implementation of a recess, or "unstructured break time between periods" (p. 37) of academic time, in primary schools. Per their research, the essential components of recess include children's free choice of activities and playmates, and minimal adult interaction. Holmes, Pellegrini, and Schmidt (2006) studied the effects of optimal recess timing on preschoolers' attention spans. They found that introducing outdoor recess, during which the children engaged in gross motor activities, increased students' subsequent attention in the classroom. However, only twenty to thirty minutes of outdoor free play time subsequently resulted in an increase of attention span among preschool students. Beyond that, children exhibited anti-social behaviors or expressed boredom.

Other researchers studied the effects of recess on young children's attention and behavior within the classroom and reported contradictory conclusions. May (2010) discovered no correlation between a recess and overall behavior among kindergarten students. Williamson (2013) studied the effects of both structured and free play time on

preschool children's overall physical activity, hypothesizing that increased physical activity might also affect student attention to classroom tasks. She found no significant statistical effects of structured physical activity or free play on subsequent concentration in her subjects, or of sedentary play time on concentration in her control group.

Therefore, while research lauds the many benefits of blocks of free play time, or recess, for young children, this intervention has not been definitively shown to affect young children's concentration on academic tasks during prolonged work periods.

Imaginative Play

According to Bodrova (2003), both Montessori and Vygotsky acknowledged concentration as an indicator of normal child development. Vygotsky theorized that children develop self-regulation through imaginative play while Montessori stated that it is engagement in a purposeful activity that fosters concentration and self-discipline or self-regulation (Bodrova, 2003). Montessori acknowledged the importance of play at home and during leisure time, but did not advocate for "adult-imposed fantasy," (Lillard, 2013, p. 173) wherein adults lead children in creating and sustaining imaginary situations, as Vygotsky did. Play, according to Montessori, could serve as a pretense for learning, allowing a teacher to observe children's interests, rather than a "means to development" (Lillard, 2013, p. 173). In *The Discovery of the Child* (1967), Montessori elaborated on refining both fine and gross motor movements. The initial exercise of "The Line" (p. 89) "requires close attention" on the part of the child. Further exercises with the line in the classroom, Montessori observed, led to student engagement, "calmness and discipline" (p. 91).

Berk, Mann, and Ogan illuminated the correlation between play and engagement during the preschool years: "as...play becomes more complex...children's attention spans increase and their distractibility declines" (2006, p. 79). The extensive literature review conducted by Lillard et al (2013) revealed no causal relationship and only an inconsistent correlation between pretend play and observed executive function skills, including attention. Several studies showed the coexistence of executive function skills and the tendency to engage in pretend play, but not that pretend play caused an increase in attention or other executive functions (Lillard et al., 2013). Another study (Bulotsky-Shearer, et al., 2011) did demonstrate causal relationships, but the results were not replicable among other settings or populations. Bulotsky-Shearer et al. (2011) did find that interactive, cooperative peer play increased resiliency and engagement in academic activities in preschool classrooms. All the previously mentioned research suggests that while play occurs naturally and spontaneously throughout childhood, only specific types of play, like those studied by Bulotsky-Shearer et al. (2011), lead to increased academic engagement and concentration within the preschool classroom.

Classroom Physical Activities

Another intervention employed in both early childhood and elementary classrooms to increase student engagement and concentration in the classroom has been the incorporation of physical activities within the classroom. Some of these interventions have been class-wide activities in which all students participate with the teacher at the same time (Goh, Hannan, Brusseau, Webster, & Larson, 2014). Other interventions have allowed students to select movement activities independently during the academic work

period (Goerg, 2016; McCabe, 2016). Both types of interventions, as explored below, have proven to increase student concentration.

Goh et al., (2014) implemented ten-minute bouts of class-wide physical activity using the TAKE 10! ® program in third, fourth, and fifth grade classes to study the effects of this intervention on concentration. The results of this study showed that intentional presentation of physical activity breaks during the school day positively affected concentration levels. The decrease in physical activity correlated to seasonal weather changes as the study neared its conclusion with the onset of the winter season. After the initial intervention, researchers postulated that continuing the implementation of in-class physical activity breaks would offset the effects of decreased recess time.

Similarly, Weibehaus and Hanson studied “The effects of classroom-based physical activities on off-task behaviors and attention” (2016) by implementing gross motor activity stations in a public kindergarten classroom. Students rotated through the researcher-designed stations three times per day, with the timing determined by the teacher. Results of this study revealed increased concentration and engagement among students, especially immediately following the gross motor activity times.

Two studies conducted in Montessori early childhood (Children’s House) classrooms centered around the incorporation of gross motor activities during the academic work time in the classroom. Goerg (2016) and McCabe (2016) each prepared and presented specific gross motor movement materials to children in their classes. Goerg and McCabe demonstrated appropriate use of the new gross motor activities to individual or small groups of children in the same way other Montessori materials were presented to the students. Once presented, the children were free to choose from the

materials at any time during the work period. Both studies showed that use of purposeful movement materials within the classroom increased concentration levels.

Goerg (2016) measured the effects of two movement activities, jumping and walking with an egg and spoon on a line, on concentration. She measured concentration levels within her classroom hourly both before and during the intervention, tallied the use of the movement materials during the intervention, recorded a daily reflection and interviewed the children as methods of data collection. In her study, she observed a small change in concentration levels. Goerg concluded that the introduction of movement activities helped concentration levels remain consistent throughout the work period.

McCabe (2016) designed an entire shelf of movement activities, accessible anytime to her students in an outdoor space adjacent to the classroom. The activities, which she introduced successively to the children included ball throwing and catching, balancing, running, jumping, skipping and galloping, and stilt walking. She collected data through observing and tallying impulsivity, distractibility, focus, and self-awareness among her students, by maintaining a reflective journal and through interviews with the children. McCabe noticed a slight decrease in distracted children during lessons as a result of her intervention. The activities that required more focus, McCabe noted, increased “feelings of calmness” (2011, p. 2) among children.

Gross motor activities requiring precision and focus seem to incur the greatest positive results on student engagement in the classroom. Research on the effects of free play recess on concentration and engagement showed little lasting effect on children's ability to concentrate on academic tasks in the classroom. Studies on imaginative play in early childhood classrooms show correlation between imaginative play and attention to

academic tasks, but imaginative play has not been proven to cause an increase in concentration.

Another theory on the role of play in child development holds that imaginative play is the means to healthy child development. Although Montessori did not subscribe to this theory, some Montessori practitioners and researchers increasingly advocate for the role of imaginary play within early childhood classrooms (Keppler, 2009; Lillard et al., 2013; Soundy, 2010). The resultant effects of such play on concentration levels, however, are corollary at best.

Researchers have implemented adult-designed and led physical activity exercises for children to complete within the classroom (Goh et al., 2014; Weibehaus & Hanson, 2011; Goerg, 2016; McCabe, 2016). These interventions have all proven to increase student concentration and engagement throughout the school day. Due to the success of these programs across diverse populations (elementary and preschool; urban, suburban and rural), and the similarity of these situations to my own, my study will employ the incorporation of Montessori's activity, "Walking on the Line," within the classroom to enhance student concentration and engagement with the Montessori materials during class work time. In accordance with the findings by Goerg (2016) and McCabe (2016), this activity requires students to focus on precision while executing gross motor movements. This activity is a standard activity in Montessori classrooms, but I had not yet incorporated it into my own classroom.

After reviewing the literature, I realized my classroom lacked one essential component of the Montessori curriculum: "The Line." In *The Discovery of the Child* (1967), Montessori described the implementation of "a line in the shape of a long ellipse

... drawn in chalk on the floor” (p. 89) to assist children in acquiring and perfecting balance while walking. She observed, “This exercise not only demands an effort on the part of a child to keep his balance, but it requires close attention” (p. 89). As I had not yet introduced this guided gross motor movement activity and concurrent exercises in walking on the line, I wondered whether introducing this activity and concurrent exercises utilizing the line would increase student engagement and concentration with the Montessori materials during classroom work time. This paper, therefore, explores the relationship between instruction on and children’s utilization of the Montessori activity “Walking on the Line” and student concentration and engagement with the other Montessori materials during the Great Work Period.

Methodology

This study included five days of pre-intervention observation to collect baseline data, using the same data collection tools that I used throughout the implementation of the intervention. Unfortunately, due to school closures for holidays, I was unable to collect baseline data on five sequential school days within one Monday through Friday week. I collected data on the first and last day of a shortened week and the following Tuesday, Wednesday, and Thursday. I chose these days for data collection to represent each day of the week, to account for holidays and special events that affected my school’s calendar.

As an intervention, I introduced the Montessori activity “Walking on the Line” to my students in a collective presentation, and allowed for children to repeat this activity at any time during the school day. To implement the intervention, I created a line in the shape of an ellipse on the floor of the classroom using one-inch wide tape. I initially

showed the children how to practice balancing by walking on the line, one foot in front of the other. Each subsequent extension involved walking with smaller steps while placing the toes of each foot on the line first then dropping one's heels, marching to a beat, and walking on the line while carrying objects including flags and beads threaded on a string.

For five days before and each day during the intervention period, I collected data on the effects of the Montessori "Walking on the Line" exercise on overall student engagement with other Montessori activities in the classroom by observing and documenting student work engagement and concentration using observation forms designed to measure student engagement with materials and amount of time spent concentrating on work. I also maintained a professional reflection journal to enhance the quantitative data gathered on the observation forms by explaining any variations in the daily routine that might have influenced the collected data. During the intervention, I also tallied the number of times students walked on the line each work period.

Data Sources

Work Engagement Tool. Before and during the intervention, I gathered data at 9:30 am and 10:30 am daily using the "Observing Work Engagement" (n.d.) from the National Center for Montessori in the Public Sector (NCMPS) website (see Appendix A). On this form, I tallied the number of children engaged in work, "using work as a prop" (Observing Work Engagement, n.d.), choosing work, receiving help from a teacher, wandering or interfering, or behaving disruptively. This tool measures "student engagement, with special focus on the characteristics of purposeful, effortful activity" ("Observing Work Engagement, n.d.). I predicted that over the course of the intervention,

the tally of children “engaging in work” daily would increase. Such an increase would indicate a successful intervention.

Work Concentration Log. Using a self-designed Work Concentration Log (see Appendix B), I recorded the amount of time children continued to work with a material after I made an individual presentation of that material. The end of work time was signified by the child putting away or abandoning the material, or ceasing to use the material according to expectations. I planned to record data for each presentation given for five days prior to and each day during the intervention. However, as I noticed during the baseline data collection, some children chose to put away the material immediately after the presentation without engaging in any independent work time. Because recording of such instances became burdensome, I recorded data for only the instances when children continued to work independently with a material after a presentation. I only logged the amount of time children worked with material after a presentation to ensure accuracy when recording start and end times. If the intervention was successful, children may have demonstrated increased concentration by continuing to work with Montessori materials after an initial presentation for longer than pre-intervention.

Professional Journal. Throughout the five days of baseline data collection and each day during the intervention, I maintained a professional journal (see Appendix C) in which I recorded my reflections on any collective Walking on the Line presentations along with my qualitative assessment of the morning work period. This journal also provided space to record the weather, number of students in attendance, and any special considerations, such as an interrupted work period, that may have affected student engagement and concentration. An increase in positive reflections on children’s behavior

during the intervention may indicate whether, from the teacher's point of view, the Walking on the Line activity increased children's work engagement. Furthermore, thematic analysis of this qualitative data alongside the quantitative data gathered using the other tools could explain variations in student behavior throughout the intervention.

Line Usage Tally. I tallied the number of times any child selected to walk the line, or to use any of the movement extension activities presented on a prepared sheet of paper (see Appendix D). Collection of this quantitative data alongside the daily collection of data from the student engagement tool and the work concentration log provides information from which to draw corollary or causal relationships between the Walking on the Line activity and student engagement and concentration. Correlations or lack thereof will illustrate whether the intervention activity affected student engagement. The Line Usage Tally was the only data collection tool that I did not use during the week of baseline data collection.

Implementation

After giving the initial lesson collectively to all children in attendance the first week, I intended to introduce an extension to the initial activity each subsequent week that the children would again be free to repeat at any time. However, interim analysis revealed that on this schedule, not all children were present for the collective lessons. Furthermore, the novelty of each lesson waned toward the end of the weeks I'd presented an activity at the beginning of the week. In accommodation, I repeated the initial presentation on Friday of the first week of the intervention and added some additional collective lessons of extension exercises mid-week during weeks two and three of the intervention.

The first day to introduce the Walking on the Line activity fell on a Tuesday, the first day returning to school after a four-day holiday weekend. Over the preceding weekend, I made an ellipse using one-inch wide blue tape on the floor in the center of the classroom. Arriving at school to this addition, several students asked about the line. At the morning gathering at 8:30 (before the Great Work Period), I explained to the children the line was a new activity in the classroom and over the next several weeks I would give lessons on how to use the line. Because it was a Tuesday morning and a music teacher comes to our classroom at 8:50 every Tuesday morning to sing and dance with the children, I chose not to present the initial lesson that day. Therefore, I gave the initial collective presentation at the beginning of the school day on the second day of the intervention. By the end of the work period Friday, I noticed the novelty of the new activity was beginning to wane and that some children who were not present at the time of the initial presentation expressed interest in the line but did not engage its use. Therefore, at the end of that work period, I repeated the initial presentation.

The following week, on Monday morning, I presented a collective presentation on how to walk the line toe first with the heel landing just in front of the foot behind. Throughout the intervention, I maintained my initial decision not to present any extension activities on Tuesdays, concerned that the morning music class might be a confounding variable. Therefore, on Wednesday of Week two, I presented how to march quietly on the line to background music.

Monday morning of the third week, I gave a collective lesson on how to walk on the line when carrying one small flag. Two days later I presented how to walk on the line

with two flags, and the following day, how to march on the line with two flags while listening to background music.

Finally, Monday morning of the fourth week of the intervention, I gave a collective lesson on how to thread two beads onto a 20-inch shoe lace with a knot tied at the bottom to line. “The challenge,” I told the children, “is to walk so carefully that the beads at the bottom of the string do not move!” This was the final lesson during the intervention period. Table 1 summarizes the sequence of activities during the intervention.

	Monday	Tuesday	Wednesday	Thursd ay	Friday
Week 1	No school	Music	First lesson		Repeat first lesson
Week 2	Walking on the Line (WotL): Toe to heel	Music	Marching on the line with music		
Week 3	WotL with flag	Music	WotL with 2 flags	Marching on the line with 2 flags and music	
Week 4	WotL with Beads	Music			

Table 1. Schedule of gross motor activities presented around the line during the intervention.

Data Analysis

For five days prior to introducing Montessori’s “Walking on the Line,” baseline data on student engagement and concentration were collected using the same data collection procedures and devices used throughout the intervention’s implementation. The tool to collect information on student engagement required twice daily tallying of different levels of the following student behaviors: “Engaging in work,” “Using work as a

prop;” (defined on the form as “not engaging with material in front of him/her” and which I applied to students who had selected then abandoned or neglected material), “Choosing work,” “Receiving help,” “Wandering/ interfering,” and “Behaving disruptively” (Observing Work Engagement, n.d.). To simplify the presentation of this data, I first calculated the mean number of students tallied in each category for each day then compared the distribution of student behaviors using an area graph (see Figure 1).

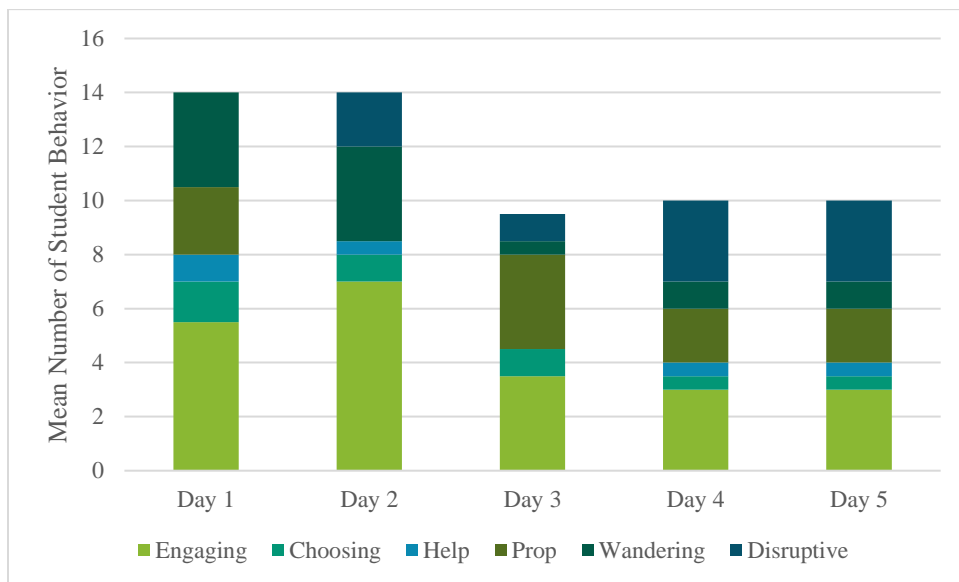


Figure 1. Baseline work engagement. Mean number of students participating in various behaviors during the baseline data collection period.

Figure 1 shows that the daily mean number of students engaged in work pre-intervention ranged from three to seven students, while the mean number of students behaving disruptively ranged from zero to three students and all other behaviors falling between these ranges.

Similarly, I collected data on the amount of time students worked independently after a presentation of work with any given Montessori material. This time was measured

in minutes from the end of the presentation until the student either abandoned or put away the material. For situations in which students chose not to continue working with the material at all after the initial presentation, no data was recorded. Analysis of the baseline data on student concentration, presented in Table 2, shows students spent between zero and 49 minutes working concentrated pre-intervention. Despite this range, the overall median time spent working concentrated after a teacher's presentation pre-intervention was five minutes.

	Day 1	Day 2	Day 3	Day 4	Day 5
	N/A	5.00	5.00	2.00	5.00
	N/A	6.00	5.00	N/A	38.00
	N/A	3.00	30.00	N/A	6.00
Sum	0.00	14.00	40.00	2.00	49.00
Mean	0.00	4.67	13.33	2.00	16.33
Median	0.00	5.00	5.00	2.00	6.00

Throughout the month of January, during which I presented the Montessori activity "Walking on the Line" and subsequent gross motor exercises on the line requiring student focus on precision, student work engagement and concentration were measured as well as students' usage of the Montessori line. Figure 2 shows a gradual increase in student engagement over the course of the intervention.

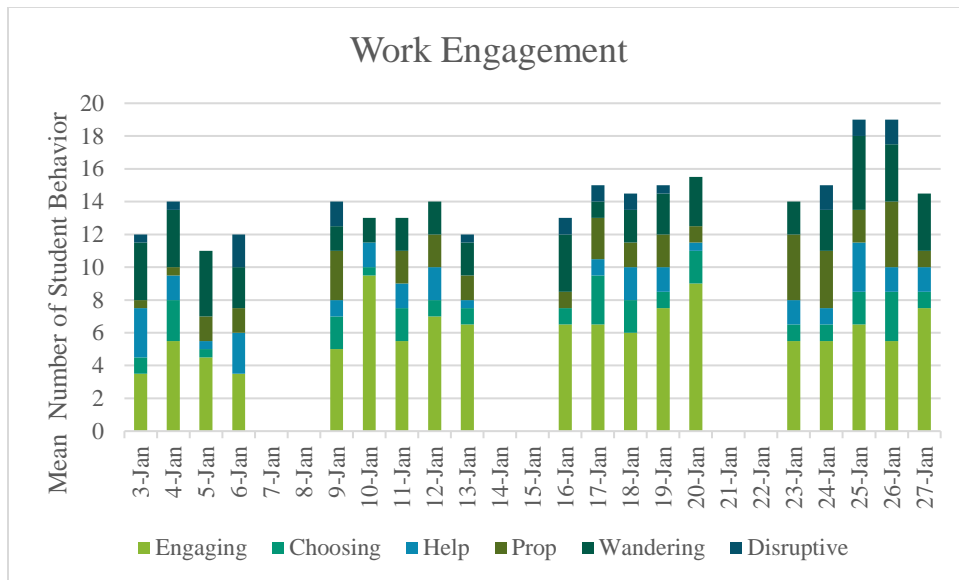


Figure 2. Work engagement. This graph charts the mean engagement level of students throughout the intervention phase of the research. Behaviors are organized from most acceptable (Engaging) to least acceptable (Disruptive).

The mean number of students engaging in work during the intervention ranged from 3.5 to 9.5, slightly higher than the mean number of students engaging in work pre-intervention. Meanwhile, the upper end of the range of students behaving disruptively fell slightly, from three students during the baseline data collection period to a maximum mean of two students during the intervention.

Analysis of student concentration during the intervention reveals a similar upward trend in concentration, as presented in Figure 3, which shows the baseline and intervention period side-by-side. The low levels of concentration on January 24 and 25 may be explained by the “special considerations” noted in the professional journal. On January 24, an incoming student visited, requiring one-on-one attention for much of the morning from either the lead teacher or the assistant. On both that day and January 25,

the professional journal noted “apparent regression” among other young children in the class.

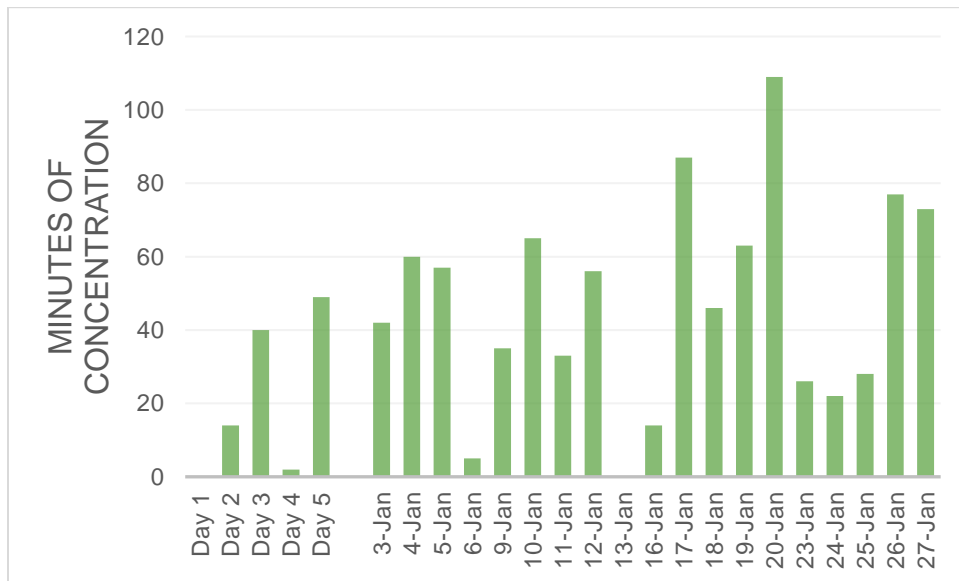


Figure 3. Concentrated work time. This bar graph shows how many minutes students spent concentrating on newly presented work throughout both the baseline and intervention periods.

Figure 4 illustrates students concentrated on their work after a teacher’s presentation during the intervention between zero and 109 minutes a day. The median overall time students concentrated on work during the intervention doubled the pre-intervention median time, while the calculated overall mean rose from 7.27 minutes pre-intervention to more than double that, 15.68 minutes during the intervention.

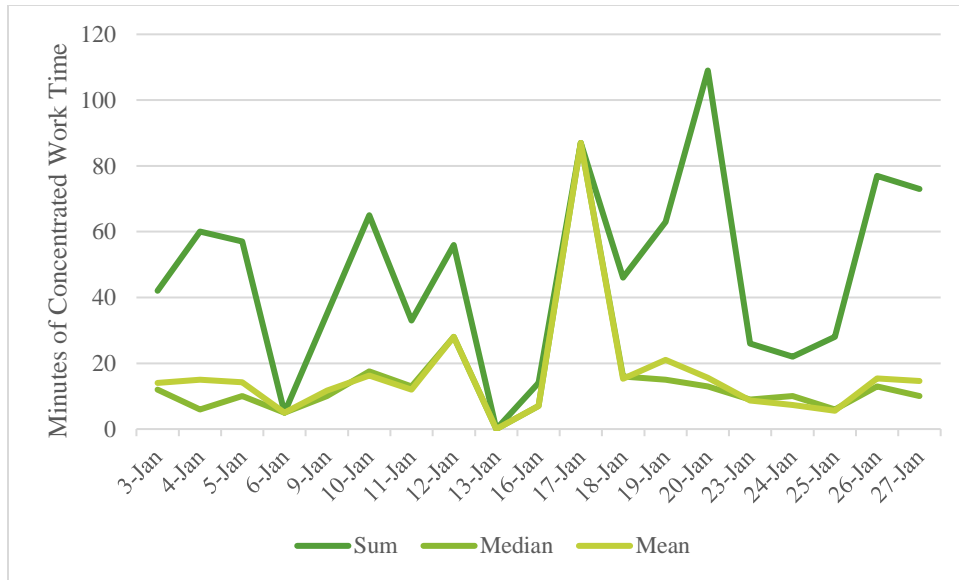


Figure 4. This graph illustrates the upward trend in overall concentration during the intervention. The median and mean calculations, while relatively constant during the intervention increased in comparison with pre-intervention measurements.

In conjunction with collecting data on student engagement and concentration during the “Walking the Line” intervention, I also tallied the number of times students chose any of the exercises of Walking the Line. The purpose of this tool was to triangulate the data on work engagement and concentration and to provide information that might demonstrate any correlations between the Walking the Line activity and student engagement and concentration. Figure 5 charts the number of times students chose to walk the line daily.

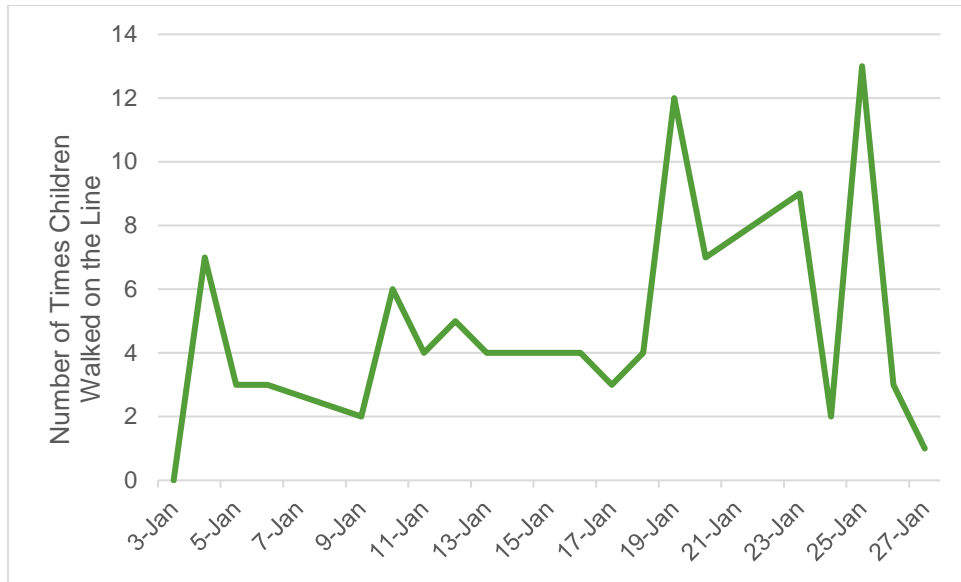


Figure 5. Line usage. This chart shows the number of times students chose to walk on the line throughout the intervention.

When layered with a line graph of the mean number of students engaging in work daily in Figure 6, there appears to be some correlation.

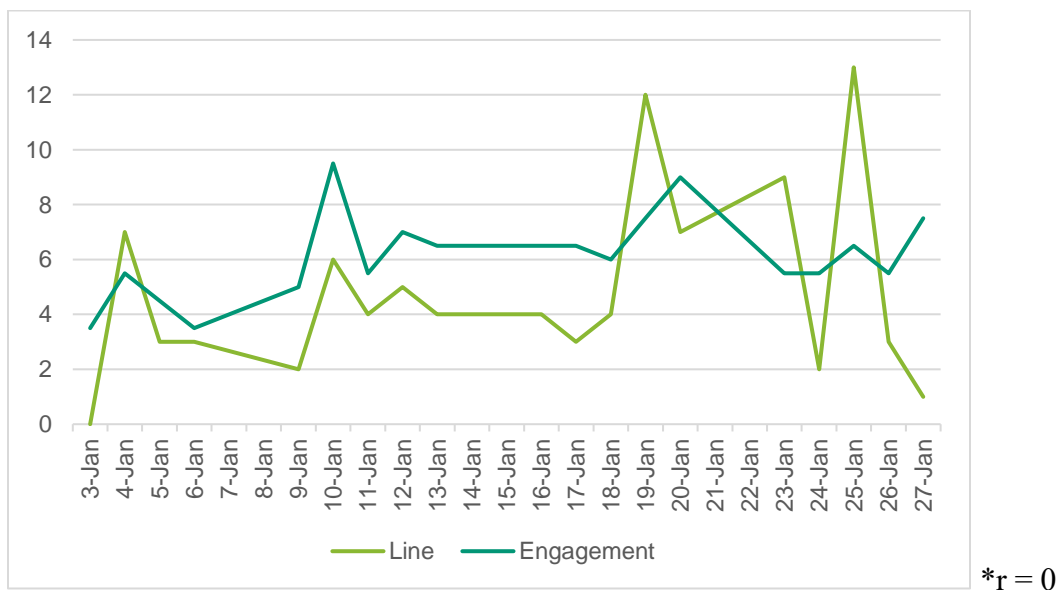


Figure 6. Line, engagement correlation. This graph demonstrates potential correlation, proven to be zero, between frequency of times students walked the line and mean number of students engaging in work.

After calculating for correlation, however, there is no statistical correlation between number of times students walked on the line and student engagement. To calculate possible correlation between number of students walking the line and minutes of concentration, I first removed the data set for January 17, which included an outlier of one student concentrating on an activity for 87 minutes. Removing the data for this date provided a more readable scatter plot, Figure 7, and a correlation of .07 between the number of times students walked the line and minutes of concentration.

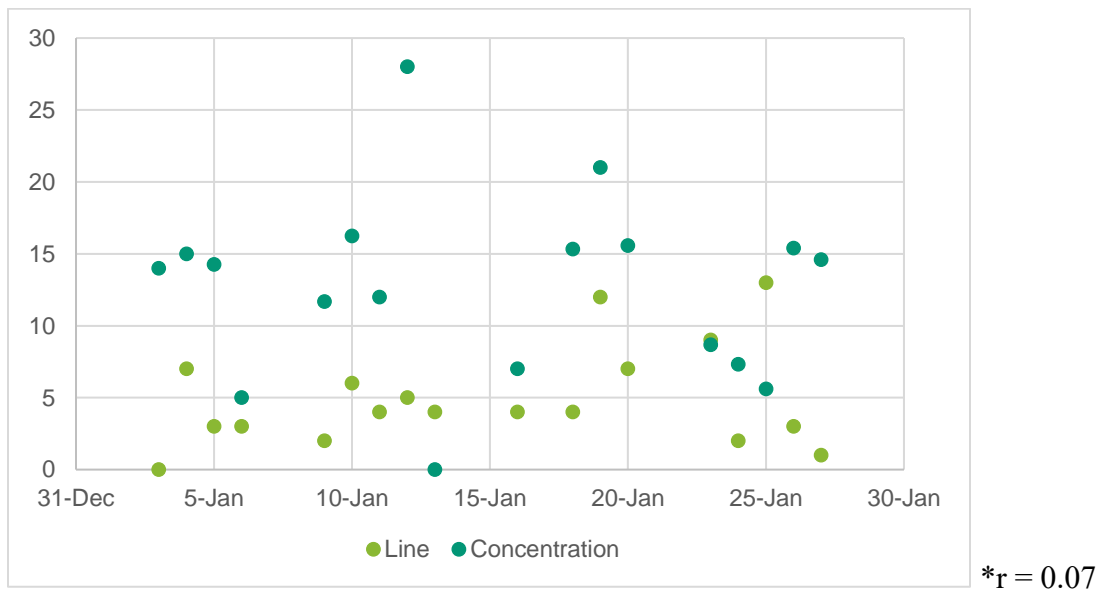


Figure 7. Line, concentration correlation. Correlation of 0.07 between frequency of students walking on the line and median number of minutes engaged in work, with the exception of one outlying data point from January 17.

While the raw quantitative data appear to show increase in both engagement and concentration during the intervention, statistical analysis fails to prove any correlation between Walking the Line and engagement and only weak correlation between Walking the Line and concentration.

In addition to the data tools measuring student engagement, concentration, and use of the line, I maintained a professional journal, in which I recorded my own impressions of the Great Work Period as well as any special considerations, such as an interrupted work period, visitors, or special events, with the expectation that such occurrences might skew the data (see Table 3). However, analysis of the days on which special considerations were recorded in the journal fails to correlate with any outstanding data, aside from the one extreme outlier on January 17, on which day one child concentrated after an initial presentation of the Metal Insets (a Montessori material designed to refine the movements of the hand for writing) for 87 continuous minutes. Even this however, has no apparent correlation with the special consideration occurring

Date	Engagement	Concentration	Line	Consideration
19-Dec	5.5	0	N/A	Winter Program
23-Dec	7.0	5	N/A	Observer
28-Dec	3.0	2	N/A	Combined with another class
4-Jan	5.5	6	7	Show & Tell
5-Jan	4.5	10	3	Birthday
10-Jan	9.5	0	6	Music
11-Jan	5.5	3	4	Show & Tell
17-Jan	6.5	87	3	Birthday
20-Jan	9.0	13	7	Observer
24-Jan	5.5	10	2	Visitor (child)
25-Jan	6.5	6	13	Show & Tell
26-Jan	5.5	13	3	Visitor (child)

on that day.

In conclusion, while overall numbers of students engaging in work tended to increase over the intervention's implementation period, analysis of the relationship

between students engaging in work with Montessori materials and number of times students walked on the line showed no correlation. Simultaneously, while the average time students spent concentrating on work more than doubled during the intervention, the correlation between minutes spent concentrating and number of students walking the line is weak. Finally, a qualitative analysis of circumstances that may have skewed the data showed no definite causal relationship to outlying data points.

Action Plan

Due to the inconclusive nature of the results of this study, more research is needed to determine whether and to what degree Montessori's "Walking on the Line" activity increases student engagement and concentration in the classroom. An examination of the current study's difficulties and deficiencies suggests possible improvements to the data collection devices that might yield more conclusive results. Additionally, returning to the literature review suggests alternate activities that may cause a greater increase in student concentration and engagement; introduction of some of these activities following the exercises on the line could provide more insight into which types of motor activities best increase student concentration and engagement in a Montessori classroom.

It is possible that a reiteration of this research using different data tools might yield clearer results. While the Work Engagement form from NCMPS provided opportunity to grade the levels of student engagement, it was timely to complete during the school day. The "Daily Observation – Whole Class at Work" form (see Appendix E) is also designed "to note the numbers of children fully engaged in work" (O'Shaughnessy, 2015, p. 4). O'Shaughnessy noted in this observation manual that "this chart ... allows us to record pertinent information such as ... changes in the environment"

(2015, p. 4). One such notable change could be the introduction of a new exercise on the line. Comparison of these charts over the course of an extended study on children's use of the Montessori line activities could produce more determinant data on whether children's work engagement increased due to the introduction of the line. Similarly, a side-by-side comparison of one day's tally of children's use of the line and this visual chart of student work engagement might shed more light on any potential causal relationship between walking the line and student engagement.

During the data collection period of this study, one flaw emerged in the use of the Work Concentration Log. Soon after beginning to gather data, a question arose on whether – and how – to record the students who chose not to spend any time working independently following a lesson, but rather immediately returned their work to the shelf. The design of this form did not allow space to record this data. On future iterations of this study, this form should be altered to include a space to note presentations given to students that are followed by zero minutes of independent work time. Analysis of this data would provide more information to answer the question of whether concentration increases in conjunction with the introduction of Montessori's walking the line in addition to measuring the extent of any possible relationship. In the current design, this tool allowed for analysis of possible correlation but additional data, in comparison with the tally on line usage, might provide clearer insight into possible causality.

The inconclusive results of this study may indeed indicate little to no correlation between walking on the line and student engagement and concentration, regardless of the tools used to gather and analyze the data. In this case, returning to the literature review provides alternative options for future research to determine whether

and which motor activities increase student engagement and concentration in the classroom. Both Goerg (2016) and McCabe (2016) conducted similar studies, introducing different movement activities in Montessori classrooms in pursuit of increased concentration and engagement. In these studies, the researchers also discovered slightly elevated levels of concentration among students over the course of their action research implementations. McCabe noted that movement activities requiring focus to achieve precision seemed to cause the greatest increase. Introducing additional movement activities after students have practiced precise movement by walking the line might incur even greater increases in concentration levels than previously observed. A future research project might be an extension of all three previously measured interventions: graduated introduction of movement activities in the classroom, beginning with the exercises of walking on the line and increasing in difficulty over time to the coordination required to accomplish an activity such as stilt walking (McCabe, 2016).

In my own professional practice, I will continue to include an ellipse-shaped line on the floor of my classroom for children to independently choose this movement activity during the Great Work Period. In future years, I will give collective lessons on the use of the Montessori line toward the beginning of the school year. Doing so will allow students more time to benefit from activities on the line. Furthermore, as students master the exercises of walking on the line, other movement activities could be added and introduced to the classroom environment, such as those introduced by Goerg (2016) and McCabe (2016). Data collection and analysis during the introduction and future implementation of each movement activity within the classroom could increase our understanding of which types of movement activities most strongly correlate to increased

engagement and concentration, and therefore allow the Montessori teacher to refine any supplementary movement activities to include only those that provide the greatest benefit to student engagement and concentration, and therefore success in the classroom.

References

- Berk, L. E., Mann, T. D., & Ogan, A. T. (2006). Make-believe play: Wellspring for development of self-regulation. In D. G. Singer, R. M. Golinkoff, & K. Hirsh-Pasek (Eds.), *Play = learning: How play motivates and enhances children's cognitive and social-emotional growth* New York: Oxford University Press.
- Bodrova, E. (2003). Vygotsky and Montessori: One dream, two visions. *Montessori Life*, 15(1).
- Bulotsky-Shearer, R. J., Manz, P. H., Mendez, J. L., McWayne, C. M., Sekino, Y., & Fantuzzo, J. W. (2011). Peer play interactions and readiness to learn: A protective influence for African American preschool children from low-income households. *Child Development Perspectives*, 6(3), 225-231.
- Goerg, S. M. (2016). The effects of purposeful physical activity on student concentration in a Montessori Children's House. *Masters of Arts in Education Action Research Papers*. Paper 170. Retrieved from <http://sophia.stkate.edu/maed/170>
- Goh, T. L., Hannan, J. C., Brusseau, T. A., Webster, C. A., & Larson, J. (2014). Children's physical activity and on-task behavior following a classroom intervention. *Research Quarterly for Exercise and Sport*, 85(1).
- Holmes, R. M., Pellegrini, A. D., & Schmidt, S. L. (2006). The effects of different recess timing regimens on preschoolers' classroom attention. *Early Child Development and Care*, 176(7), 735-743.
- Keppler, G. T. (2009). *The role of play in preschool Montessori classrooms* (Doctoral dissertation). Retrieved from ProQuest Dissertations Publishing. (Order No. 1468950)

- Lillard, A. (2013). Playful learning and Montessori education. *American Journal of Play*, 5(2), 157-186.
- Lillard, A. S., Lerner, M. D., Hopkins, E. J., Dore, R. A., Smith, E. D., & Palmquist, C. M. (2013). The impact of pretend play on children's development: A review of the evidence. *Psychological Bulletin*, 39(1), 1-34.
- May, L. L. (2010). *The effects of recess on kindergarten student behavior* (Doctoral dissertation). Retrieved from ProQuest Dissertations Publishing. (Order No. 1476515)
- McCabe, D. H. (2016). Purposeful movement in an early childhood classroom. *Masters of Arts in Education Action Research Papers*. Paper 145.
- O'Shaughnessy, M. (2016). *User's manual for Montessori observation and recordkeeping*. St. Paul, MN: Montessori Center of Minnesota.
- Montessori, M. (1967). *The discovery of the child*. New York: Ballantine Books.
- New View Montessori Consultancy. (n.d.). *Observing work engagement: Primary/3-6 Classroom*. Retrieved from <http://public-montessori.org/sites/default/files/resources/Primary%20Observation%20Rubric.pdf>
- Pellegrini, A. D. & Holmes, R. M. (2006). The role of recess in primary school. In D. G. Singer, R. M. Golinkoff, & K. Hirsh-Pasek (Eds.), *Play = Learning: How play motivates and enhances children's cognitive and social-emotional growth*. New York: Oxford University Press.
- Soundy, C. S. (2010). "We had to be sneaky!" Powerful glimpses into imaginary expression in Montessori classrooms. *Montessori Life*, 22(4), 18-25.

Weibehaus, S. E. & Hanson, M. F. (2016). Effects of classroom-based physical activities on off--task behaviors and attention: Kindergarten case study. *The Qualitative Report, 21*(8), 1380-1393.

Williamson, M. L. (2013). *The difference in physical activity levels and attention in preschool children before and after free play recess and structured play recess* (Doctoral dissertation). Retrieved from ProQuest Dissertations Publishing. (Order No. 3618843)

Appendix A

Observing Work Engagement Primary/3-6 Classroom

School _____ Classroom _____
 Number of children _____ Date _____

1. Sample of Work Engagement of Students

- Observe for two minutes or until you count each student once
- Tally each category observed; one tally mark per student

At the beginning of visit	Engaging in work	Using work as a prop	Choosing work	Receiving help	Wandering/interfering	Behaving disruptively
time _____	engaging in age-appropriate and concentrated work independently or in presentation	not engaging with material in front of him/her	in process of selecting and/or setting up work	consulting with or receiving direction from a teacher in class	moving aimlessly or conversing without focus	yelling, defiant, leaving room, obvious misuse of materials
Tally marks						
Totals						

2. Sample of Work Engagement of Students (repeat observation)

At the end of visit	Engaging in work	Using work as a prop	Choosing work	Receiving help	Wandering/interfering	Behaving disruptively
time _____	engaging in age-appropriate and concentrated work independently or in presentation	not engaging with material in front of him/her	in process of selecting and/or setting up work	consulting with or receiving direction from a teacher in class	moving aimlessly or conversing without focus	yelling, defiant, leaving room, obvious misuse of materials
Tally marks						
Totals						

Appendix C

Teacher Journal

Date:

Time of Reflection:

Weather:

Number of Students in Attendance:

Daily Gross Motor Activity: (activity + location of activity)

General Reflection on Work Period:

Special considerations (interrupted work period, visitors, etc.):

Appendix D

Tally of Children Repeating the “Walking the Line” Activity

Week 1:

Walking the Line Presentation:	Initial Presentation
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	

Week 2:

Walking the Line Presentation:	
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	

Week 3:

Walking the Line Presentation	
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	

Week 4:

Walking the Line Presentation:	
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	

Appendix E

Daily Observation - Whole Class at Work

Date:	Weather:	Visitors:
# of children present:	Names of absent:	
Changes in environment:		

Morning Work Cycle

30	*	*	*	*	*	*	*	*	*	*
28	*	*	*	*	*	*	*	*	*	*
26	*	*	*	*	*	*	*	*	*	*
24	*	*	*	*	*	*	*	*	*	*
22	*	*	*	*	*	*	*	*	*	*
20	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*	*	*
16	*	*	*	*	*	*	*	*	*	*
14	*	*	*	*	*	*	*	*	*	*
12	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*

Time:																				
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Groups: (songs, games, poems, etc.)

