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The Association Between Preschool Type and Children's Concentration Abilities

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THE ASSOCIATION BETWEEN PRESCHOOL TYPE AND CHILDREN'S CONCENTRATION
ABILITIES

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HONORS PROJECT

Submitted to the University Honors Program
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UNIVERSITY HONORS

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Introduction

Background

Preschool is becoming less of an option and more of a necessity in today's society. Studies around the world have revealed a plethora of benefits associated with preschool attendance, including improved primary school performance (Dice & Schwaneflugel, 2012; Duncan & Magnus, 2013; Melhuish, 2011). Although many academic improvements associated with preschool enrollment may fade over time, the preschool experience is nonetheless associated with benefits much later in life (Duncan & Magnus, 2013). Such long-term benefits include increased wages, academic achievement, and improved socioeconomic status (Melhuish, 2011). Decreased criminal activity has also been associated with preschool attendance (Duncan & Magnus, 2013). The advantages associated with preschool attendance are especially pronounced in children of disadvantaged families (Duncan & Magnus, 2013). As a result of such benefits, preschool attendance is highly encouraged by researchers as well as the government for three to six year-olds (Duncan & Magnus, 2013).

Over the past 40 years preschool attendance has steadily risen in the United States across all socioeconomic statuses (Duncan & Magnus, 2013). Choosing whether or not to enroll a child in preschool is only the first step for a parent or legal guardian. There are multiple types of preschools available. The two most prominent types in the United States are traditional and Montessori (Larson, 2010). Both preschool forms aim to promote learning and development in children, but their approaches differ (Larson, 2010). Although many studies have assessed each type of preschool individually, there are a limited number of studies comparing the two in the United States. Further research in the United States

comparing child development outcomes produced from the two school types needs to be conducted.

Literature Review

Traditional preschools follow a curriculum for development that is led by a teacher. In such preschools, children are encouraged to follow instructions and learn on a schedule. On the other hand, Montessori preschools are based on the ideas of the Italian physician Maria Montessori. Collectively, her educational philosophy is referred to as “The Montessori Method” (Larson, 2010). Unlike traditional preschools, Montessori schools are child-led instead of being teacher-led. The teacher is known as a “directress,” and has the responsibilities of maintaining the environment, engaging children with materials, and refraining from interfering with appropriate play (Larson, 2010). The Montessori Method is based on the assumption that children are naturally curious and seek challenges for themselves (Larson, 2010). Montessori schools simply provide children with appropriate materials that encourage development and let the children do the rest (Larson, 2010).

The methods of traditional and Montessori preschools differ, but what does this say about their outcomes? Studies have found a significant association between Montessori attendance and increased readiness for primary school (Kayili & Ari, 2011). In one such study, conducted by Kayili and Ari (2011), 50 children were randomly selected from SU MEF Ihsan Dogramaci Application Nursery School in Turkey. Of the 50 children, 25 were exposed to traditional preschool methods and served as a control group. The other 25 were exposed to the Montessori Method and served as an experimental group. The researchers concluded that the Montessori Method is associated with significantly higher primary school readiness, as well as significantly higher social and concentration skills based on test

scores (Kayili & Ari, 2011). Concentration skills are particularly important for children entering primary school (Dice & Schwaneflugel, 2012). Studies have found a significant relationship between attention in preschoolers and emergent literacy skills in kindergarteners (Dice & Schwanenflugel, 2012). As a result, a preschooler's ability to concentrate serves as a predictor of his or her acquisition of reading skills or lack thereof. On top of this, attention skills in children have been identified as a problem for schools (Wagner, 1988). The notion that schools academically differ on their promotion of concentration serves as the basis for the study.

Few studies have assessed the difference in concentration abilities exhibited by children attending traditional and Montessori preschools. Besides the concentration portion of Kayili and Ari's study (2011), one other study conducted by Kocyigit, Kayili, and Erbay (2009) revealed a significant difference in concentration abilities of 5-6 year olds attending Montessori and Ministry of National Education (the traditional preschool of Turkey) preschools. Both studies were conducted in Europe. It is unknown whether such findings will translate to comparisons between traditional and Montessori schools in the United States.

This study specifically assesses the association between preschool type and preschoolers' concentration abilities in traditional and Montessori preschools located in Bowling Green, Ohio. Concentration is a key factor in language development and, thus, preschool learning (Berger, Hanschmann, Reece, Koukouraki, Wandel, & Bacher, 2011). The existing differences in traditional and Montessori methods provide potential for the development of differing concentration abilities in preschoolers.

Montessori education encourages extensive work periods, whereas traditional schooling typically provides shorter periods of teacher-delegated work (Lillard, 2010). Extensive work periods may allow for deeper engagement and, thus, concentration on one's work than shorter time periods. Montessori schools also encourage children to pay attention to their bodies during sensory and motor experiences (Lillard, 2010). Traditional preschools, on the other hand, place less emphasis on paying attention to sensorimotor experiences and more emphasis on paying attention to directions. Not only does Montessori schooling promote concentration on sensorimotor activities, it also promotes absorption in practical activities such as cleaning, cooking, and providing service (Lillard, 2010). Traditional schools tend to differentiate between work and play; children are not typically encouraged to engage in work for pleasure (Lillard, 2010). The encouragement of absorption in sensorimotor and practical activities may foster increased concentration abilities in preschoolers attending Montessori schools.

Studies have also shown that Montessori preschool attendance is significantly associated with less sedentary behavior in and outside of school (Byun & Pate, 2013). Such activity may allow preschoolers attending Montessori schools to focus their attention more easily when necessary. Furthermore, Montessori materials have been associated with lengthened reflection time (Wagner, 1988). The materials are designed to encourage problem solving (Larson, 2010). Such materials allow children to "easily notice their mistakes and...to gather more attention on the subject" (Kayili, 2011, p. 2108). In other words, Montessori materials are thought provoking and encourage extensive concentration. As a result of the differences in work period length, activities, activity level,

and materials in traditional and Montessori schools, it is likely that preschoolers attending Montessori schools will exhibit higher concentration abilities.

It should also be noted that concentration is a malleable characteristic. Studies have found that a preschooler's attention is associated with his or her temperament and motivation (Chang & Burns, 2005). That being said, other studies have found that providing teachers or students with attention-training is significantly associated with improvements in children's concentration. First, McCormick and Schnobrich (1971) found that perceptual-motor training was associated with an improvement in preschoolers' concentration abilities. The improvements included increases in auditory and visual attention spans, as well as decreases in impulsiveness and distractibility. Although all children in the study did not experience increases in attention, the researchers' data suggests that perceptual-motor training can help narrow gaps between children lacking in concentration skills and children with sufficient concentration skills. In another study, the researchers took a different approach, but found similar results. Specifically, Wagner (1988) focused on providing attention-training for teachers. The results suggested that teachers could be trained to provide appropriate materials for attention training in preschoolers. Therefore, because of the malleability of concentration, preschools possess the opportunity to train children with sufficient concentration skills to prepare them for literacy acquisition.

Preschoolers include children between the ages of 3 and 6. For the purpose of this study, concentration abilities were assessed in preschoolers aged 4 and 5. At these ages preschoolers have been exposed to multiple years of a traditional or Montessori preschool program in the United States. Also, studies have shown that the optimal age for revealing concentration abilities in preschoolers is 4-5 years old (Berger, Hanschmann, Reece,

Koukouraki, Wandel, & Bacher, 2011). Furthermore, for the purpose of this study, concentration will be defined as “the specific guidance and orientation of attentiveness towards certain learning material in order to work with it” (Berger et al., 2011, p. 130).

The general purpose of the study is to identify the association between traditional or Montessori preschool attendance and concentration abilities in 4-5 year olds residing in Bowling Green, an area of study that has not previously been investigated. A natural experiment was used to assess the association. It was predicted that children aged 4-5 who are attending a Montessori preschool will exhibit higher concentration abilities based on processing time and number of errors on the Marburg concentration test than children of the same age attending a traditional preschool. Further elaboration of the experiment follows.

Methodology

Design

A naturally occurring experiment was used in this study to explore the relationship between preschool type (the independent variable) and concentration abilities exhibited by preschool children (dependent variable). Concentration abilities were specifically assessed based on processing time and number of errors throughout the Marburg concentration test. The groups naturally occurred based on whether a child was enrolled at a traditional or Montessori preschool. Independent sample t-tests were used to interpret the data on preschoolers processing times and errors from the assessment.

Participants

The participants in this study were selected from three preschools in the city of Bowling Green, Ohio (two traditional and one Montessori) using a convenience sample.

Four and five year-old boys and girls participated in this study because at this age preschoolers have been exposed to multiple years of a traditional or Montessori method. The study employed a total of twenty-two preschoolers. Eight preschoolers participated from the Montessori School of Bowling Green (an American Montessori Society member). Nine preschoolers participated from All About the Kids (a traditional preschool). Lastly, five preschoolers participated from Bright Beginnings Preschool (also a traditional preschool).

The study took place in Bowling Green, Ohio, which resides in Wood County. Wood County has a population of approximately 31,384 people (Bowling Green, Ohio, 2013). Demographic information about the preschoolers participating in the study was collected through a take home survey for one of their parents to fill out. A comparison of some key demographics of the Bowling Green population and the preschool participants is presented in Table 1. Overall, the demographics from the sample appear to accurately represent the majority of demographics of the Bowling Green family population. In addition, no significant demographic differences, aside from family size and parental education, emerged between the traditional and Montessori participants.

Table 1
Demographic Information

	Bowling Green, OH	All Preschool Participants	Montessori Participants	Traditional Participants
Median Household Income	\$32,471	\$59-60,000	\$59-60,000	\$60-69,000
Percent of population that is Caucasian	84.4%	86.4%	87.5%	85.7%
Average Household Size	2.2 people	4.13 people	3.38 people	4.57 people
Mode Parental Education	N/A	Bachelor's/ Master's	Master's	Bachelor's

Note. Bowling Green demographics are based off Bowling Green, Ohio (2013).

Materials

In order to assess concentration abilities, the Marburg concentration test was administered. This test involved 80 yellow cards with a variety of 12 symbols on each of them. The symbols were objects that the children would know from experience such as a flower, hat, and book. Each symbol was outlined in black and the same relative size so that no particular image could be identified based on size or color alone. The cards were given to the children in 4 sets of 20 in order to facilitate their grasp of the cards. The children had to recognize two specific symbols (a dog and a duck), and sort the cards according to four criteria: 1) duck only 2) dog only 3) neither 4) dog and duck. The cards were sorted into four square wire bins labeled with pictures of each criterion. Authors of studies involving the Marburg concentration test have shown 4-5 years-old is the ideal age for revealing concentration abilities using this test (Berger et al., 2011). Furthermore, retest reliability has been verified for the Marburg concentration test in terms of processing time and number of processed cards (Berger et al, 2011). Also, preschoolers' Marburg test results have been compared with hearing-impaired children. Such comparisons have found no significant difference in results, indicating external validity for the assessment (Berger et al, 2011). For this study, processing time for the test and number of errors were used to determine the extent of each child's concentration abilities. Processing time was measured in seconds taken after 40 and 80 cards were processed. Based on the study conducted by Berger, et al. (2011), low concentration skills were regarded as 1000 seconds, and high concentration skills were regarded as 250 seconds. As for number of errors, no errors were regarded as high concentration abilities, and 25 errors as low concentration abilities (Berger et al, 2011).

Procedure

Before the study began, approval from the Human Subjects Review Board through the Office of Research Compliance at Bowling Green State University was secured. Furthermore, informed consent from each preschooler's parent or legal guardian was obtained in addition to their demographic information. Child assent was also secured before the concentration test was administered. Confidentiality was observed throughout the course of the study.

In terms of selecting participants, all eligible 4 and 5 year-olds were provided with consent forms from each school. Sampling from the entire 4 and 5 year-old population of preschoolers at each participating school provided each 4-5 year-old with an equal chance of participating in the study. A convenience sample was used, as preschoolers participated on a voluntary basis. Eight out of twenty-five eligible preschoolers participated from the Montessori School of Bowling Green. Nine out of twelve eligible preschools participated from All About the Kids. Lastly, five out of nine eligible preschoolers participated from Bright Beginnings Preschool. As a result, the study had a 48% response rate. Lack of participation from each school was due to failure to return parental consent forms.

The study occurred throughout the month of February, 2015. The Marburg concentration test administration began around 9am at each of the three preschools. These timings helped assure that children had been attending a traditional or Montessori preschool for most of the year, and that the children were tested around the same time of day. The test administration occurred in a secluded room so that the child could focus on the task at hand. The following script was utilized before the test began:

“You have 20 cards on which different small pictures can be seen (show the cards). The duck and dog are the most important pictures (show duck and dog images on a card). You need to look at the cards carefully and then arrange them into the four subjects that are here (show identification images). When the duck and dog are shown on the cards, like this (show sample card), you put the card here (show duck and dog identification image and bin). If you only see a duck on the cards, like this (show sample card), you put the cards here (show duck identification image and bin). If you only see a dog on the cards, like this (show sample card), you put the cards here (show dog identification image and bin). If you do not see a duck or a dog on the cards, like this (show sample card), you put the cards here (show blank identification image and bin). Do you understand? What little pictures do you see on this card? (View sample card) Where do you have to put this card? Exactly! (Or guide the child in right direction). Now you can practice with these cards before we start. Make sure you put them in the right place!”

Time allowed for practice.

“We now begin the test. Here are some cards. Look at them carefully and then sort them just as well as you did with the practice cards. I will give you more cards when you’re done with these. Do you understand everything? Then you can start now!”

No comments or assistance were given to the children during the test aside from asking him/her to carry on when distracted, hesitating, or acting in an eccentric manner. The tests took an average of 499.68 seconds per child, with the longest taking 946 seconds and the

shortest taking 309 seconds. At the conclusion of the test, the child was thanked for his/her participation, told he/she did “a good job,” and escorted back to class.

Results

It was predicted that children aged 4-5 attending a Montessori preschool would exhibit higher concentration abilities based on processing time and number of errors on the Marburg concentration test than children attending a traditional preschool. An independent samples t-test was conducted to compare processing times for 40 cards in traditional and Montessori preschoolers. The test revealed no significant difference in the processing times for traditional ($M = 260.93$, $SD = 80.57$) and Montessori ($M=224$, $SD=47.79$) preschoolers; $t(20) = -1.18$, $p = .130$. An independent samples t-test was also conducted to compare processing times for 80 cards in traditional and Montessori preschoolers. The test revealed no significant difference in the processing times for traditional ($M = 518.07$, $SD = 175.85$) and Montessori ($M=467.50$, $SD=107.11$) preschoolers; $t(20) = -.74$, $p = .302$. An independent samples t-test was also conducted to compare the number of errors in traditional and Montessori preschoolers. The test revealed no significant difference in the number of errors for traditional ($M=7.93$, $SD=4.75$) and Montessori ($M=5.25$, $SD=4.74$) preschoolers; $t(20) = -1.27$, $p = .912$. These results fail to support the hypotheses and suggest that there is no significant difference between concentration abilities for preschoolers attending traditional and Montessori schools. Final processing time and number of errors were not significantly correlated, $r(20) = .14$, $p = .547$. This suggests that the time preschoolers took to process the test did not directly relate to how many errors they made.

Despite lack of support for the hypotheses, a significant correlation did emerge from the study. Parental education and number of errors were strongly correlated, $r(20) = -.53$, $p = .011$. This suggests that parental education has a more significant association with children's concentration abilities than preschool type. As a result, parental education and concentration abilities may be an area of focus for future studies.

Discussion

The purpose of the study was to assess the association between preschool type and preschoolers' concentration abilities in traditional and Montessori preschools residing in Bowling Green, Ohio. Although such studies have been conducted in Europe, where the Montessori Method originated, no such studies have occurred in the United States. It was predicted that children aged 4-5 who attend a Montessori preschool would exhibit higher concentration abilities based on processing time and number of errors on the Marburg concentration test than children of the same age who attend a traditional preschool. For the purpose of this study, concentration abilities were defined as "the specific guidance and orientation of attentiveness towards certain learning material in order to work with it" (Berger et al., 2011, p. 130).

The absence of significant differences in concentration abilities for traditional and Montessori preschoolers suggests that the implementation of the Montessori curriculum in the United States could differ from implementation of the Montessori curriculum in Europe in some way. As a result, further comparisons of Montessori schools in the United States versus Europe should be conducted. Children attending a Montessori preschool did tend to take less time and have fewer errors on the Marburg concentration test; however the results were not significant. It is possible that further studies with larger samples might

produce significant results that support the concentration research done in Europe. As of now, no significant differences in preschoolers' concentration abilities emerged despite the unique curriculums of traditional and Montessori schools. This suggests that the preschool types present different means to the same end. In other words, the Montessori curriculum utilizes child-led practices, while the traditional preschool utilizes teacher-led practices, and similar concentration abilities are fostered in the preschoolers exposed to each.

The strong correlation between parental education and number of errors on the Marburg concentration test also encourages further research. It is possible that parental influence is more significant in fostering concentration abilities in preschool children than preschool type. This is important to know because concentration is a key component to language learning, preschool learning, and primary school readiness (Berger, et al., 2011). The significant association between parental education and preschoolers' concentration abilities might also suggest that parents of higher education choose Montessori schools for their children at higher rates. This presents a further focus for future research studies. Future studies should look further into the parental education differences that exist between Montessori and traditional schools. Significant differences in parental education might account for cognitive differences, in addition to concentration, in preschool children.

It should also be noted that general differences in children's attitudes towards the Marburg concentration test emerged throughout its administration. Preschoolers from the traditional schools tended to complete the test without question. Preschoolers from the Montessori school, on the other hand, appeared to get bored with the test and often began fidgeting with the materials. Multiple children attending the Montessori school flipped over the pictures that served as labels for the four bins. No such behavior was observed in

children attending the traditional preschools. The fact that Montessori schools are child-led, as oppose to teacher led, could help explain these observed attitude and behavioral differences (Larson, 2010). Children attending Montessori schools are used to choosing what activities to do and when. In turn, asking Montessori children to complete a task on someone else's terms may have been something they were not used to and/or uncomfortable with. Preschoolers attending a Montessori school may have sorted the second half of the cards at a slower rate than preschoolers attending a traditional school because they became bored with the activity.

Limitations of the study include the small sample size and possible response bias. The small sample of preschoolers (N=22) puts the study at increased risk for Type II Error. Furthermore, the study had a 48% response rate. As a result, there is a chance that individuals who chose to participate in the study differed in some way from those who did not. For example, parents with lower education might not value research to the same degree as parents with higher education and, therefore, opted out of participating.

Future implications of the study include possible concentration training for teachers and possible modification of Montessori curriculum implementation in the United States. A study conducted by Wagner (1988) highlighted how teachers can be trained to provide preschoolers with materials that foster attention. Providing teachers with concentration training could increase the impact they have on preschoolers' concentration abilities and, subsequently, their literacy and primary school readiness. Additionally, if further studies with larger sample sizes fail to find significant differences in concentration abilities between preschoolers attending traditional and Montessori schools, then it is likely that

modifications need to be made to American Montessori curriculums so that they match that of their European originators.

Overall, the associations derived from this study suggest that traditional and Montessori schools in the United States achieve comparable concentration outcomes despite differing emphases. Montessori schools are child-led and simply provide children with appropriate materials that encourage development (Larson, 2010). Traditional preschools, on the other hand, are teacher-led and far more structured. Despite these curricula differences, no significant differences in concentration abilities emerged in the study.

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