A COMPARISON OF NAME-WRITING ABILITY TO MOTOR AND PHONOLOGICAL

ABILITIES IN PRESCHOOL-AGED CHILDREN

By

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Title of Study: A COMPARISON OF NAME-WRITING ABILITY TO MOTOR AND PHONOLOGICAL ABILITIES IN PRESCHOOL-AGED CHILDREN

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Abstract:

Purpose: The purpose of this study was to determine whether there is a relationship between name-writing and phonological development and name-writing and motor abilities in preschool aged children through a correlational analysis.

Method: Previous data collected on children ages 3;0 to 4;11 (years; months) were gathered from the Phon Farm laboratory at Oklahoma State University and Purdue University. The children's name-writing was taken from an assent form they were asked to print their names on and was scored with the Simple Scale (Puranik, Schreiber, Estabrook, & O'Donnell 2014). The measures of phonological development were based on four previously collected measures and the children's motor abilities were taken from a parent questionnaire in which the parents rated their children's fine- and gross- motor abilities. The children's socioeconomic status was also taken into consideration and used as a variable. This study used a Pearson correlational analysis to examine relationships among these variables.

Results: The analysis yielded statistically significant correlations between age and two-syllable nonwords collected from another study, age and name-writing score, two-syllable nonwords and name-writing score, and two-syllable nonwords and Dollaghan and Campbell (1998) nonword repetition. Age was assumed to play a role in the correlation between name-writing score and two-syllable nonwords therefore a partial correlation analysis was conducted that controlled for the effect of age. Results of the partial correlation indicated no statistical significance between name-writing and two-syllable nonwords.

Discussion: The results indicated no strong correlation between name-writing and phonological development and between name-writing and motor abilities. Therefore, it cannot be concluded that name-writing is correlated to phonological development or motor abilities. Age may be considered a significant factor in that the children are more successful in name-writing and phonological development tasks the older they get. Future studies should be done to determine whether a relationship exists between name-writing and phonological development, and whether age should be considered a factor as a child matures with an inferred improvement of skills.

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CHAPTER I

INTRODUCTION

Name-writing is an important skill that is often learned when children begin school if not before. Name-writing has been studied with a child's emergence into literacy and writing. Puranik, Schreiber, Estabrook, & O'Donnell (2014) stated that names are most often the first words that children learn to write, as it is a form of their identity. Puranik, Lonigan, & Kim (2011) suggested that name-writing signals the start to knowledge of the alphabet. Later, learning letters apart from those in their name may lead to increased awareness and knowledge of the alphabetic principle. Phonological development also impacts children's literacy development as Lewis, Freebairn, Trag, Ciesla, Iyengar, Stein, & Taylor (2015) found that adolescents with persistent speech sound disorders had problems with literacy and language development. Based on this information, a child's ability to write their name may be linked to their phonological abilities. This relationship can be modeled as a triangle (see Figure 1). Research has determined that name-writing and phonological development are related to literacy development, but the link between both, name-writing and phonological development, has not been determined. This study suggests that there may be a connection between name-writing and phonological development. There may also be a connection between fine- and gross- motor movement and name-writing.

Figure 1: A possible relationship between Name-writing, Phonological Development, and Literacy Development.

Literacy Development

Name-writing

Phonological Development

Fine- and Gross- Motor Movement
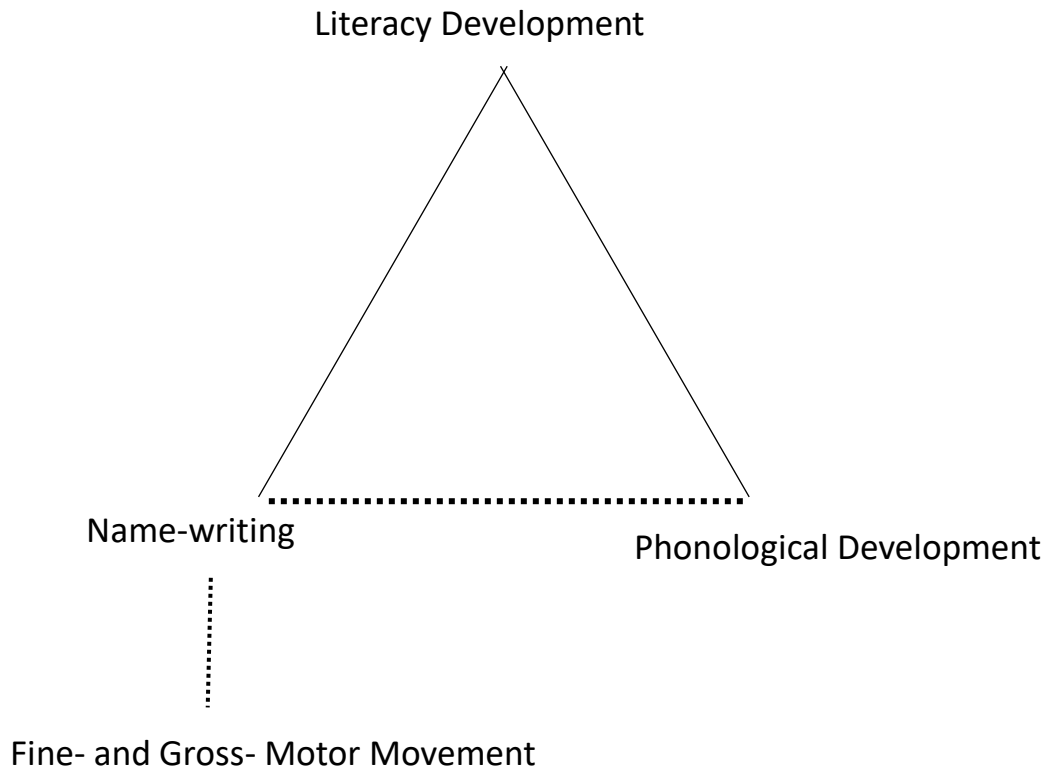
An overview of the relationship between name-writing and literacy development as well as phonological development and literacy development will be discussed in this chapter. Studies on name-writing have determined a correlation between name-writing and literacy development and the correlation between phonological development and literacy development, but they have not found the correlation between name-writing and phonological development.

Name-writing relates to literacy development

Several studies have been conducted to determine correlations between name-writing and the emergence of literacy and phonological development. In a study conducted by Bloodgood (1999), name-writing was observed over the course of a year to determine whether there was a relationship between children's name-writing ability with other aspects of their education. The

study was conducted on children ages 3 to 5 years old, and their name-writing abilities were measured using Hildreth's (1936) 7-point scale. Hildreth's (1936) 7-point scale is defined as follows 0: none, 1: scribble, 2: linear scribble, 3: separate units, 4: mock letters, 5: name generally correct, 6: consistent first name, 7: fluent first and last name. In the study conducted by Bloodgood (1999), the children's name-writing abilities were measured in comparison to their color knowledge, alphabet knowledge, spelling, reading ability, phonological development, and a writing sample. The study concluded that name knowledge and alphabet knowledge operate in a similar manner in the development of literacy. This could mean that the child's name helps with the comprehension and manipulation of written language concepts. The child's name has letter units with which the child is familiar and can manipulate to represent written expression and associate with sounds. Bloodgood found that when the children were able to write their name at a Level 7 on the Hildreth scale, they reached a ceiling in letter knowledge and were able to move on to word knowledge, spelling, and the concept of word. Overall, this study shows the correlation with name-writing and literacy as the children were able to move on to recognizing and spelling words after developing the ability to write their names.

Another study that examined the relationship between name-writing and emergent literacy was one conducted by Puranik, Lonigan, & Kim (2011). The study looked at name-writing and letter-writing and what aspects of each contributed to spelling and emergent literacy in children between the ages 51 and 65 months. The children in this study were assessed by their alphabet knowledge, phonological awareness, print knowledge, name-writing, letter writing, and spelling. These areas were then analyzed for correlations. The correlations were evaluated by multilevel modeling, which controlled for the child's age and ability to perform each assessed task. The study found that print knowledge and letter writing were related to name-writing in

children. Name-writing along with letter writing and alphabet knowledge were found to be significant predictors of children's emergent literacy abilities.

A factor that may affect how name-writing is correlated to literacy development is how a child learns to write their name. A child's motor movements may be a factor in this as writing requires motor abilities. A study conducted by Oullette and Tims (2014), focused on the effects of printing versus typing a name, and its relationship with literacy development. The study by Oullete and Tims (2014) determined that a child's printing or typing skills did not affect how the children learned orthographically. In their study, they tested whether the children remembered how to spell 10 novel non-words after having read the words and having spelled them using the writing modality, printing or typing, they were assigned to for the study. The children were tested one and 7 days after having been exposed to the non-words by a multiple-choice identification test and a spelling to dictation test to determine whether printing or typing showed significance in learning how to spell new words. Neither printing nor typing showed significance in the children's ability to learn how to spell new words. Therefore, a child's ability to print their name should not be significantly different than typing it when it comes to learning how to spell.

Although Oullette and Tims found there was no significant difference in how a child learned to spell new words, a study by Gerde, Skibbe, Bowles, & Martoccio (2012) determined that there is a significant correlation between a child's fine-motor development and their ability to write their names. In their study, they collected measures on children's name-writing ability, letter knowledge, decoding, fine-motor skills, problem behaviors, self-regulation, and the children's home learning environment in order to determine what factors contributed most to children's name-writing. Gerde, Skibbe, Bowles, & Martoccio (2012) determined that name-writing is an important aspect to literacy development therefore wanted to analyze which factor

promoted children's name-writing skills most. They used a dominance analysis and determined that the factors that contributed most to the children's name-writing ability were letter knowledge and fine-motor skills. The children's fine-motor skills were determined to be a strong predictor of the children's name-writing ability. In their study they discovered that fine-motor skills help children organize marks on the page and manipulate their fine-motor muscles to produce specific, differentiated shapes. This is specifically true to the formation of letters to write one's name.

Phonological development relates to literacy development

Phonological development is how children learn to form and use speech sounds. It is the basis of language learning and development, which is why it can be a valid contributor to literacy development. Studies in this area have shown how phonological development is a possible contributor to literacy development.

Children with speech sound disorders have been found to have a difficult time with literacy and spelling. For example, Lewis et al. (2015) conducted a study where they viewed literacy and language outcomes in adolescents with a history of speech sound disorders with a comorbid language impairment and adolescents with resolved speech sound disorders. In this study, adolescents that had persistent speech sound disorders and a comorbid language impairment showed problems with literacy and language later in life. The adolescents whose speech sound disorders had resolved did not have as many problems with literacy and language later in life. Due to the mentioned results from Lewis et al. (2015), it can be suggested that there is a link between phonological development and literacy development. In other words, the adolescents with speech sound disorders had a disruption in their phonological development which likely led to problems with their literacy and language development.

Current Study: Name-writing relates to phonological development

This thesis's purpose is to determine whether there is a correlation with children's ability to write their names and their phonological development. In the study conducted by Oullette and Tims (2014), the results indicate that orthographic learning through spelling developed more complete representations of a word than reading because the children were attending to the phonology and orthography of the words they were spelling in the study. These findings suggest that name-writing and phonological development can have a significant correlation. Although there are suggestions that link name-writing to phonological development, studies have not determined whether a child's name-writing abilities and phonological development are correlated. Another factor for the importance of this study is the result from the Lewis et al. (2015) study, which found that phonological development determines later success with literacy. For this reason, our study aims to determine whether there is a correlation between name-writing and phonological development. This correlation may help in developing an early detection of phonological disorders and problems with literacy.

This study also aims to find a possible correlation between name-writing, phonological development, and fine- and gross-motor movements. Fine- and gross-motor movements may impact whether a child is able to write their name and may also indirectly relate to their phonological development.

CHAPTER II

METHOD

Participants

Data from seventy-six participants were taken from a larger database of participants who had completed studies on phonological learning in the Phon Farm laboratory at Oklahoma State University and Purdue University. Participants were aged 3;0 (years; months) to 4;11. The participants that were included in the subset signed an assent form for the research study they were participating in. Of the seventy-six participants in the database, eleven of the participants did not have an assent form to review as it was maintained at another university and were not included in the study and two did not have a signed assent form. The majority of the participants completed the Goldman-Fristoe Test of Articulation-2 (GFTA-2 Goldman & Fristoe, 2000), an auditory discrimination talk, a two-syllable nonword repetition task from Richtsmeier and Good (2018), and a nonword repetition task based on Dollaghan and Campbell (1998). The results of the two-syllable nonwords identified, the name-writing score, gross motor score, fine-motor score, GFTA-2, Dollaghan and Campbell nonword repetition score, an auditory discrimination and socioeconomic status (SES) are summarized in Table 1.

Of the measures taken, the nonword measures differ in that Dollaghan and Campbell (1998) had words from one-syllable in length up to four-syllables in length, did not have any

sounds referred to as the late-eight sounds (/s, z, l, r, ʃ, ʒ, θ, ð/), and did not have any consonant clusters. Meanwhile the two-syllable nonwords from the Richtsmeier and Good (2018) study did include late-eight sounds as well as consonant clusters. Some examples of Dollaghan and Campbell (1998) words are /naib, veiʧɑip, dɔɪtɑʊvæp, tævɑʧɪnaɪg/. Some examples of the two-syllable nonwords are /sabləf, gɪsnək, fugdən/.

Of the measures that were to be collected, the gross- and fine- motor skills and the participants' socioeconomic status were taken from the parent questionnaire from each of the participants' files. The gross- and fine- motor skills were scored based on what each parent answered on their child's gross- and fine-motor skills. The child's gross- and fine-motor skills were converted into a scale score based on how they perceived their child's abilities and were compared to same-aged peers. Each number was defined as follows 1: much worse than same-aged peers, 2: worse, 3: similar, 4: better, and 5: much better.

The participants' socioeconomic status was based on the participants' mother's education. It was defined as followed: 1: below high school, 2: high school diploma, 3: some college; trade school, 4: Bachelor's degree, 5: higher education.

From the data set collected, all participants received a fine- and- gross- motor score of a 2 or above meaning that the children were not determined to be much worse than their same aged peers. The children also received a GFTA-2 score of 90 or above, indicating that most had above average articulation abilities. All the participants were typically developing children.

Table 1 shows the different tests along with the mean score, number of participants in each test, standard deviation and confidence interval. Due to the nature of the existing data not every participant completed all tests, but every collected measure was used for the analyses.

Table 1: Participants (N), Mean scores(M), standard deviations (SD), and confidence intervals (CI) for the descriptive measures collected from participants.

DESCRIPTIVE MEASURE	N	M(SD)	95% CI
Age in months	64	47.23 (6.57)	40.66 - 53.80
Two-syllable Nonwords	65	10.66 (0.92)	9.74 – 11.58
Name-writing Score	56	1.85 (1.43)	0.42 - 3.28
Gross-Motor Score	52	3.40 (0.72)	2.68 – 4.12
Fine-Motor Score	51	3.24 (0.62)	2.62 – 3.86
Goldman-Fristoe Test of Articulation-2	65	111.2 (8.19)	103.01 – 119.39
Dollaghan and Campbell NWR	51	74% (13%)	57% – 83%
Auditory Discrimination	56	67% (20%)	47% - 87%
Socioeconomic Status (SES)	58	3.91 (.84)	3.69 – 4.14

Materials

Materials included assent forms that the children signed at the time the original experiment was conducted. Along with the assent forms all the data collected, including the scores at each of the different tests performed were materials used for this study. The signature of the participants name in each of the assent forms is what was used to determine a score for name-writing. A more detailed explanation on how the name-writing samples were scored is presented in the Analysis section in Chapter III.

CHAPTER III

ANALYSIS

Analysis of Name-Writing

In order to conduct these analyses for the study, specifically to determine a good scale to score children's name-writing abilities, a study by Puranik, Schreiber, Estabrook, & O'Donnell (2014) was referenced. This study determined that there was no specific scale that was better at determining children's name-writing skills, and that all scales evaluated in the study showed similar relations to the children's emergent and conventional literacy skills. The skills that were evaluated for each scale included letter writing, phonological awareness, print knowledge, and spelling. This study found that there was no specific scale that was better in determining name-writing based on similar results in each scale when correlating them to emergent literacy skills. Therefore, this study infers that any scale can be used to correlate name-writing to phonological development, and that name-writing again is significantly correlated to literacy.

Due to the conclusions from the Puranik, Schreiber, Estabrook, and O'Donnell (2014) study, the Simple Scale was chosen to score the participants assent forms. The scores in this rubric ranged from 0 to 4 and are defined as 0: scribble, 1: writing contains simple or complex form (squares, circles, etc.) 2: writing contains first letter of name or a recognizable letter, 3: writing contains many letters of name, and 4: writes name using conventional spelling. An example of each score can be seen in Figure 2.

Figure 2: Children's name-writing samples of each of the five possible scores based on the Simple Scale from Puranik et al. (2014).

Score of 0

Score of 1
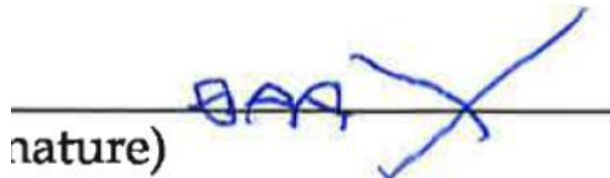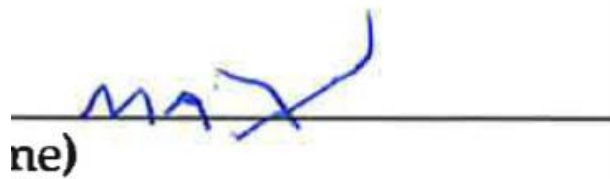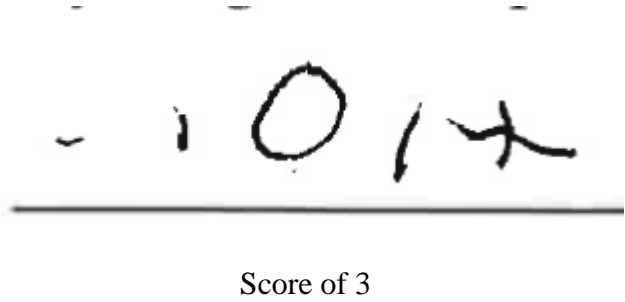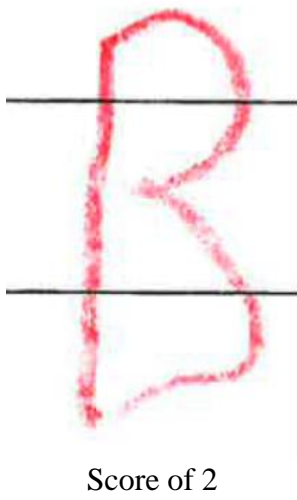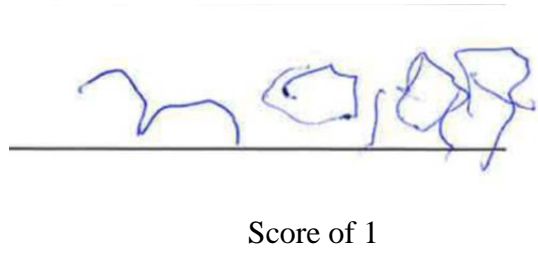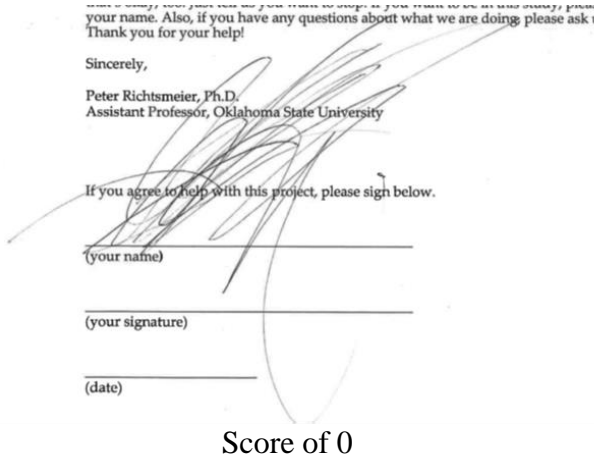
Score of 2

Score of 3

Score of 4

The participant's name-writing was further analyzed qualitatively by the length of the participants' names, the number of syllables in each name, and the scores each participant's name obtained. All the children with a name-writing sample were considered for the qualitative analysis. The children who received a score on their name-writing shared several key features. The majority of the children had two-syllable names with a total of 41 children of a total of 63 participants, and 46 of the children had more than four letters in their names. Also, many of the children had either a Simple Scale score of zero or two. Those that scored zero and two also made up the majority of the children who had names longer than four letters and greater than one-syllable in their names. A more detailed explanation and results from this analysis are presented in the Qualitative Analysis section in Chapter IV: Results.

Statistical Analysis

To aid with the statistical analysis of the collected data, SPSS statistical software package (Version 24) was used to determine Pearson Correlations and Partial correlations. Name-writing scores were entered into a correlation analysis along with the participants' age, socioeconomic status, and the measures of phonological development. Measurements of phonological development included standard scores from the GFTA-2, auditory discrimination, and performance on the tasks from the previous experiment the children participated in. This included the data collected on CVCCVC nonwords used in the Richtsmeier and Good (2018) study (two-syllable nonwords), and data collected on the children's ability to produce Dollaghan and Campbell (1998) nonwords. All participants under each measure were considered for the analyses. For the data analyses, an α, or significance level was chosen at 0.01 to reduce Type-I error. The correlations were determined significant if values were less than the α of 0.01. Of the

values that were significant, a partial correlation was made to determine whether there were true

correlations.

CHAPTER IV

RESULTS

Statistical Analysis

From the data collected: age, name-writing scores, gross- motor score, fine-motor score, GFTA-2 scores, Dollaghan and Campbell nonword repetition (NWR), two-syllable nonwords, auditory discrimination task, and socioeconomic status, a Pearson Product Moment Correlation analysis was conducted using SPSS statistical software. Although the number of participants under each measure were different, all participants in each measure were considered for the analyses. The results from the statistical analyses produced a correlation value, significance value, and the number of samples that were assessed. To be able to interpret the correlation factor obtained, it should be known that the closer the correlation value is to one or negative one, it can be interpreted as a strong correlation (Mukaka 2012). The closer the value is to zero shows that there is a minimal to no correlation. For the data analyses, an α, or significance level was chosen at 0.01 and is represented by two asterisks (**) in Table 2. Although the α was chosen at 0.01, the 0.05 significance level can be seen as well and is represented by one asterisk (*). If the significance is less than the α, it can be suggested that the collected data is sufficiently inconsistent with the null hypothesis and that the null hypothesis may be rejected. Each of the null hypotheses of this study

state that there is no correlation between each variable, and the study's hypotheses state that there is correlation. By rejecting the null hypothesis, the study's hypothesis that states there is a correlation can be accepted.

From the results of the analyses, it was found that age and two-syllable nonwords, age and name-writing score, two-syllable nonwords, and name-writing score, and two-syllable nonwords and Dollaghan and Campbell NWR were statistically significant and had a correlation of .381, .581, .402, and .494, respectively. Having a positive correlation means that when one variable increases so does the other variable. In the statistically significant correlations that include age this correlation may be due to the maturation of the children and their abilities to perform better within name-writing and two-syllable nonwords as they get older. The correlation between two-syllable nonwords and name-writing could be interpreted similarly in that the better the children were able to identify two-syllable nonwords the better their name-writing score was. The correlation between two-syllable nonwords and Dollaghan and Campbell NWR could be interpreted that if the child performed well with the two-syllable nonwords they would also perform well on the Dollaghan and Campbell NWR, or vice versa. This is expected since both scores are measures of phonological development, and it is expected that there should be a positive correlation in these scores. All the results for the Pearson's correlation can be found on Table 2.

Table 2: Pearson's Correlation and Number of Participants per Comparison

Pearson's *r* (n)	Two-syllable Nonwords	Name-writing Score	GFTA-2	Dollaghan and Campbell NWR	Gross-Motor Skill	Fine-Motor Skill	Auditory Discrimination	Socio-economic Status
Age in Months	.381** (64)	.581** (55)	0.043 (64)	.281* (50)	0.251 (51)	0.225 (50)	0.024 (55)	-0.235 (58)
Two-syllable Nonwords		.402** (56)	.273* (65)	.494** (51)	0.103 (52)	0.131 (51)	0.248 (56)	0.081 (59)
Name-writing Score			0.026 (56)	0.25 (44)	-0.019 (52)	0.026 (51)	0.156 (50)	0.187 (51)
GFTA-2				0.271 (51)	-0.059 (52)	-0.124 (51)	0.152 (56)	0.061 (59)
Dollaghan and Campbell NWR					-0.191 (41)	0.177 (40)	0.294 (45)	.360* (46)
Gross-Motor Skill						-0.032 (51)	-0.061 (49)	-.357* (51)
Fine-Motor Skill							0.028 (48)	0.025 (50)
Auditory Discrimination								-0.045 (54)

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

There was no significance within the study that suggested that there is a correlation between name-writing and fine- and gross- motor movement. Therefore, it cannot be concluded that name-writing has a correlation with motor development in this study. Further research in this area may yield more conclusive results.

Based on the initial analysis, there was a significant effect between two-syllable nonwords and name-writing. From the collected data and correlational effect of age on name-writing and two-syllable nonwords, it was identified there could be an influence of age on the correlation between two-syllable nonwords and name-writing. With the purpose of determining

whether there is a correlation between name-writing and two-syllable nonwords controlling for

the age factor, we conducted a partial correlation. By performing a partial correlational analysis,

we found the unique correlation between two-syllable nonwords and name-writing, when

eliminating the effects of age.

The purpose of the partial correlation was to determine whether there is a correlation

between name-writing and two-syllable nonwords, as age has been assumed to influence the

result of the correlation. Therefore, a partial correlation analysis was conducted for the

correlation between two-syllable nonwords and name-writing while controlling age. The results

of the analysis can be seen in Table 3.

Table 3: Partial correlation controlling for age between Two-syllable Nonwords and Name-writing score with Degrees of Freedom

Control Variables Correlation (df)		Name-Writing Score
Age in Months	Two-syllable Nonwords	.247 (52)

From the results of the correlation analyses and the partial correlation analysis, a trend is

seen between two-syllable nonwords and name-writing scores because the significance (p-value)

is 0.072 which is slightly greater than the significance level (α) of 0.05. The results of the

analyses imply that age may or may not be a significant factor in determining how well children

will do when writing their name and in two-syllable nonwords in that the older the child gets,

there seems to be a maturation factor in their ability to write their names. The goal of this study

was to determine the effect of age by using a partial correlation, however the results of the

analysis were not statistically significant enough to reject the null hypothesis suggesting that

more testing might be needed to determine whether or not there is an actual correlation between two-syllable nonwords and name-writing when controlling for the age factor.

Qualitative analysis

The participant's name-writing was analyzed qualitatively by the length of the participants' names, the number of syllables in each name, and the scores each participant's name obtained. The children who received a score on their name-writing shared several key features. The majority of the children had two-syllable names with a total of 41 children of a total of 63 participants, and 46 of the children had more than four letters in their names. Also, many of the children had either a Simple Scale score of zero or two. Those that scored zero and two also made up the majority of the children who had names longer than four letters and greater than one-syllable in their names. In Table 4, the results of the qualitative analysis in which the names were divided by syllable are shown. With this analysis, the table shows that there are more children whose name are two or more syllables long. The average score for the names which had two-syllables, or more was about a 2 on the Simple Scale indicating that the children were able to write at least one letter of their names. This is equally true for the one-syllable names, but the average score of almost 3 indicates that those children were able to write more than one letter of their names. More importantly Table 4 shows that the more syllables there are in each name the lower the child's score will be possibly due to the greater complexity of names with more syllables.

Table 4: Total number of names per syllable per score

	One-syllable names (n = 10)	Two-syllable names (n = 41)	Three+ syllable names (n = 12)
Score of 0	2	12	3
Score of 1	0	6	2
Score of 2	3	12	3
Score of 3	1	5	3
Score of 4	4	6	1
Average Score	2.5	1.7	1.8

In Table 5, the names were divided by number of letters. The majority of the children had 5-6 letters in their names and most of the names scored a 0 or a 2. The average for the number of letters was again 2 suggesting most children were at least able to write a letter of their names. The effect of number of letters on the children's names also shows an inverse relationship as the children with more letters in their names had lower average scores. This could also be due to the complexity of writing one's name with more letters.

Table 5: Total number of names per number of letters per score

	2-4 Letters (n=17)	5-6 Letters (n=35)	7+ Letters (n=11)
Score of 0	6	7	4
Score of 1	0	7	1
Score of 2	4	12	2
Score of 3	2	4	3
Score of 4	5	5	1
Average Score	2.0	1.8	1.6

The qualitative analyses only viewed factors related the children's names and their scores, but a more extensive analysis could provide more information on other possible factors such as including scores grouped by small age ranges or by frequency of each letter in their name in their native language.

It can be determined that most children were able to write at least one letter of their names with most names being 4 letters or greater, and greater than two syllables, and it can be assumed that the greater the length of the names and the number of syllables in the names are, the lower the scores will be as they are more difficult for the children to write. This is visible through the average scores in the Tables 4 and 5. Both show a decrease in the average scores with an increase in letters or syllables, but the average scores under Table 3 and Table 4 suggests that letter length may be a better predictor of how name length affects the complexity for children to write their name as compared to number of syllables. However, in order to be able to see the unique effects of number of syllables and letter length, one factor would have to be held constant to see the unique effect of the other.

The more notable downward effect of average score in Table 4 suggests that the number of letters in the children's names affects how well the child is able to write it. Although most children with longer names scored lower, it can also be inferred that the length of the names is not hindering the child's ability to grasp at least one letter, and likely letter sound of their names, and associating it to themselves.

CHAPTER V

DISCUSSION

Statistical Analysis

The results indicate that there is not an overall significant correlation between name-writing and phonological development. The four measures of phonological development included GFTA-2 scores, two-syllable nonwords, Dollaghan and Campbell NWR, and auditory discrimination task. The only measure that had a significant correlation with name-writing was two-syllable nonwords which -when it was partially correlated- showed there was not a true significant correlation when age was controlled. Although there was no correlation when age variable was controlled, there was a trend towards a correlation between name-writing and two-syllable nonwords in this study. This trend can be explored further in future studies. The original correlation between name-writing and two-syllable nonwords implies that age may be a significant factor in determining how well children will do when writing their name and in two-syllable nonwords. This could be explained in that the older the child gets, there seems to be a maturation factor in their ability to write their names and to produce novel words. This also suggests that as typically developing children get older the better their scores will be.

Because the children in the study were all typically developing children, the correlation between name-writing and phonological development may be due to age and maturation. Name-

writing and phonological development contribute to literacy development and may be viewed as the steps that lead towards literacy. Further studies are needed to establish whether or not name-writing and phonological development can be correlated, and whether they can help professionals determine deficits in children's development.

Based on the findings in Bloodgood (1999), Puranik, Lonigan, & Kim (2011), and Lewis et al. (2015) name-writing can be correlated to literacy development, and phonological development can also be correlated to literacy development. We could not, however, find the correlation between name-writing and phonological development with this study and when searching for previous studies done on the subject. The study conducted by Gerde, Skibbe, Bowles, & Martoccio (2012) suggests there is a link between fine-motor skills and name-writing, but the results of this study could not link the two measures.

Figure 1 from Chapter I, which is a triangular shape suggesting a link between name-writing and phonological development and the link between name-writing and fine- & gross-motor skills cannot be confirmed with this study, but a wedge shape, as shown in Figure 3, can be confirmed based on previous research.

Figure 3: Relationship between Name-writing and Literacy Development and Phonological Development and Literacy Development based on the Current Literature

Literacy Development

Name-writing   22 Phonological Development
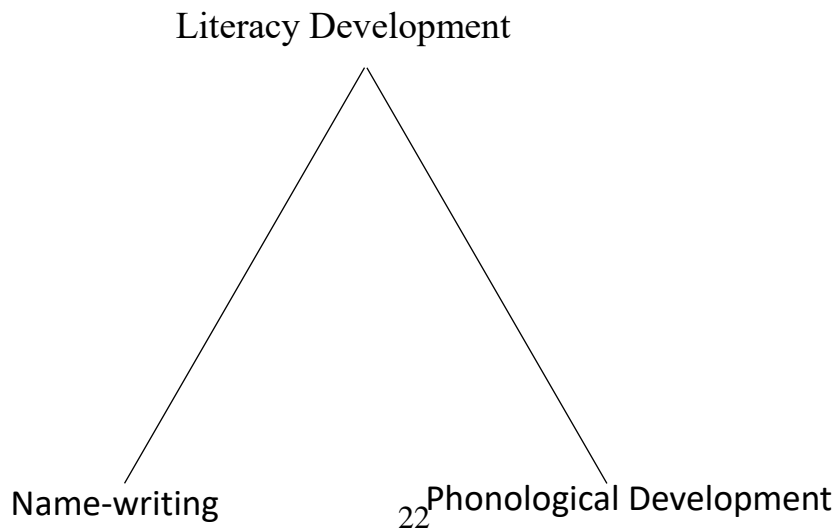
Qualitative Analysis

For the purpose of this study, the qualitative analyses were used to determine whether longer names contributed to the children's ability to write their names. From the analyses, it can be determined that most children were able to write at least one letter of their names with most names being 4 letters or greater, and greater than two syllables, and it can be assumed that the greater the length of the names and the number of syllables in the names are, the lower the scores will be as they are more difficult for the children to write. It can also be inferred that the length of the names is not hindering the child's ability to grasp at least one letter, and likely letter sound of their names, and associating it to themselves. By being able to relate a letter in their name and identifying the letter sound and associating it to themselves suggest that there is likelihood that children's name-writing abilities might be linked to phonological development. In order to determine whether this is a valid a conclusion, more experiments would need to be performed looking at the association of letters of their name with sound of letter of their name and exploring if those two factors together show children being identified to themselves.

Clinical Implications

Although the correlation between name-writing and phonological development could not be determined, name-writing does have a link to literacy development. Therefore, the Simple Scale used in this study can help teachers and therapists score preschool-aged children's name-writing. With the score, they can determine whether the child needs some help with writing their names, and possibly with other aspects of literacy. A ceiling score in name-writing informs teachers and therapists that the child is developing in literacy and able to improve in their letter

knowledge, knowledge of word, and spelling. Because name-writing had a strong correlation with age, it can be assumed that if an older child, about 5 years or older, is not scoring high in the Simple Scale or another name-writing scale, the child should be monitored for a possible delay in literacy development or should be further tested. Further testing can help determine what aspects of the child's literacy development they may be delayed in.

Name-writing can be addressed through a handwriting approach. It can help children learn letters and help with learning how to write their names and other words. One such approach with a strong evidence base is the Handwriting Without Tears® Program (Grindle, Cianfaglione, Corbel, Wormald, Brown, Hastings, & Hughes 2017). Grindle et al. (2017) conducted a study with a modified version of the Handwriting Without Tears® program on three children with autism and intellectual disabilities. The children were performing below their chronological age in handwriting, and Grindle et al. (2017) discovered that with their modified version of the Handwriting Without Tears® program, the children's handwriting improved. The Handwriting Without Tears® program includes curricula from preschool to fifth grade. The preschool through first grade curricula involves preparing children to write and teaching to them print capital and lower-case letters. The curricula for second grade and above involve teaching how to write cursive and sentence writing. Grindle et al. (2017) focused their modified version of the Handwriting Without Tears® program on the preschool through first grade curricula and took elements from each to teach the children with intellectual disabilities in their study. This method focused more on printing with fewer sensory motor activities. Grindle et al. (2017) also added a generalization component to their modified Handwriting Without Tears® program since children with autism and intellectual disabilities often have difficulty generalizing to other environments. Though their study had a small number of participants, it provided evidence, of improved

participant scores pre-post test in form on the Minnesota Handwriting Assessment (MHA), which assess legibility, form, size and alignment. Their modified Handwriting Without Tears® program and/or the original program can improve a child's handwriting skills.

Conclusion

The purpose of this study was to determine whether there is a correlation with children's ability to write their names and their phonological development. Although the results did not show a statistical significance in the correlation of name-writing and phonological development when controlling for age, based on the positive trend of the results this correlation should not be ruled out as it seems there might be a correlation. Instead more experiments should be conducted with more children of multiple and varied age groups. More testing would ensure there are enough samples to determine if the correlation is statistically significant or not and would give a better result for the Pearson's correlation analysis. Then, there can be better confidence on whether or not there is a link between name-writing and phonological development.

The qualitative analyses suggest that names of increasing syllable length and letter length are more difficult for the children to write as the average scores decreased with increased length. This was seen in both Tables 4 and 5. The decrease in average scores was more apparent in Table 5 where names were divided by number of letters. This could suggest that number of letters may be a better predictor on name-writing scores than syllable length, but more studies would yield more conclusive results. The average name-writing scores obtained in the analyses was near 2 suggesting that most of the children were at least able to write one letter of their names and suggesting that the children are able to link a letter and likely the letter sound to their name. In other words, the children's names may be associated with their phonological development, but more studies between name-writing and phonological development are needed

to determine more conclusive results. The qualitative analyses results are congruent with the trend observed in the results from the statistical analysis suggesting there may be a link between name-writing and phonological development.

This study also aimed to find a possible correlation between name-writing, phonological development, and fine- and gross-motor movements. Fine- and gross-motor movements may impact whether a child is able to write their name and may also indirectly relate to their phonological development. However, there was no significance within the study that suggested that there is a correlation between name-writing and fine- and gross- motor movement. Therefore, it cannot be concluded that name-writing has a correlation with motor development in this study. Further research in this area may yield more conclusive results.

Limitations

A limitation of this study is that it did not determine the inter- and intra-rater reliability for the scores obtained from the assent forms the children signed. This can be resolved in future studies by having another graduate student come in to score 20% of the writing samples to determine inter-rater reliability and by having the author score 20% of the writing samples again after two weeks to determine intra-rater reliability. Another possible limitation is that this study also gathered the data from previous research studies and did not have more accurate information on socioeconomic status, such as income, and a more objective measure on gross- and fine-motor movement on each of the participants, as the data obtained on gross- and fine- motor movement was based on how the parent viewed their child's motor abilities against same-aged peers. Future studies can resolve this by gathering information on family income on the parent questionnaire. Also, an occupational therapist can be consulted to determine the participants' fine- and gross- motor skills objectively.

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VITA

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