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THE EFFECT OF PSYCHOMOTOR STIMULATION ON WRITING SKILLS DEVELOPMENT AMONG PRESCHOOL CHILDREN

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Abstract

Writing is one of the imperative basic tools in early childhood education that leads to overall academic achievements as well as the personal growth of the child in the long run. However, writing is not the sole result of language learning in the early years, rather, it is a product of various psychological and even physiological developments, the coordinated and complex performance of children which is highly reliant on their psychomotor development, especially fine motor skills and visual-motor integration. This study was conducted to the main objective of this study is to examine the effectiveness of psycho-motor stimulation in enhancing the development of writing skills among preschool children. The analysis of this research project has delivered a thorough examination of how psycho-motor stimulation of children affects their writing development during preschool years. The investigation started by introducing the research background that stressed psycho-motor development serves as a fundamental writing readiness skill in early childhood education. The problem articulates the practice and research deficit that stems from insufficient psycho-motor stimulation practices in writing readiness development for young children. The investigation required specific objectives and research questions to address the observed gap in the study. The research scope was clearly established in this chapter by defining population samples studying variables and selecting geographical locations. The research paper discussed its importance by highlighting its potential benefits for both early childhood educators and parents as well as policymakers and future academic researchers. The research paper discussed its importance by highlighting its potential benefits for both early childhood educators and parents as well as policymakers and future academic researchers. The organizational plan serves as a reader guide which establishes logical information progression from beginning to end including summaries and proposals. The result of this study is useful to Pre School educators, teachers, and education related parties for identify the how to progress children writing skills.

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Introduction

Writing is one of the fundamental skills in early childhood education, as it is part of the elements needed for academic success, alongside communication improvement. Early writing skills are linked to the development of fine motor skills, hand-eye coordination, and muscle strength as they are some of the factors that form part of psychomotor skills (Priyadi et al., 2024). Psychomotor skills like fine motor skills, assist early childhood learners to attain handwriting readiness and develop appropriate pencil skills.

Several research studies conducted within recent years have identified that many preschoolers face problems in writing assignments due to lack of proper development of their fine motor skills (Roseli et al., 2024). The problem of poor handwriting skills among preschoolers is associated with poor quality of handwriting, poor pencil grip, formation of letters incorrectly, and poor speed of writing production. Preschool education institutes lack any form of programmed activities for developing writing readiness among students through psychomotor stimulation (Kartal et al., 2016).

Development in the form of physical, emotional, and cognitive development is not overlooked within the Sri Lanka National Preschool Standards Framework, but there exists an inconsistent approach towards developing these skills in local preschoolers. Many facilities lack systematic measures or instructions for ensuring proper coordination of children at the time of school preparedness. This should be paid special attention to, given the fact that psycho-motor stimulation is one of the first and the most variable predictors of future academic success (Carlson et al., 2013). Lack of intervention results in the failure of preschoolers to develop to the level of their intellectual ability, on the contrary, they just manage to make it through because of physical inability to move around properly.

Finally, the psycho-motor-literacy gap in early childhood education could be behind such an urgent need to study and find solutions on how to deal with it. This study will provide practitioners with a practical stand in the world of preschool teachers, curriculum planners, and policymakers since it will analyze the impact of psycho-motor stimulation on the development of writing skills and how fine motor skills mediate and parental involvement moderates this process.

Research Objectives

The main objective of this study is to examine the effectiveness of psycho-motor stimulation in enhancing the development of writing skills among preschool children. The specific objectives are:

RO1: To investigate the Psychomotor Stimulation (fine motor skills) in the development of writing skills among preschool children.

RO2: To investigate the Psychomotor Stimulation (visual-motor integration) in the development of writing skills among preschool children

RO3: To investigate the Psychomotor Stimulation (hand-eye coordination) in the development of writing skills among preschool children

RO4: To investigate the Psychomotor Stimulation (grip strength) in the development of writing skills among preschool children

Significance of Study

Importance of the proposed study lies in the fact that it will improve the fundamental learning abilities of young kids by reforming psycho-motor stimulation into one of the key factors of guiding training age kids to develop their writing skills. This research will provide some tips and intervention strategies that will be easily implemented by preschool

teachers during teaching without wasting any money on buying expensive materials or going through training for months. Academically, this study will contribute in filling any research gap prevailing in the field of early childhood education. It will lay a benchmark for all the similar future studies which should exceed the results in order to find out the connection between physical development and academic success.

Literature Review

The combination of several studies, models, and classroom practices allows discussing the benefits of movement-based strategy usage in terms of improving children's preparation to write at preschool. This chapter focuses on the discussion of Piaget's theory, Vygotsky's theory, dynamic systems theory, and psychomotor learning theory in terms of explaining the interplay of motor and cognitive-linguistic skills. The early writing skills become the foundation of academic success because they support literacy, communication, and critical thinking. According to Marr and Cermak (2002), handwriting can be considered one of the most essential fine motor activities of children in the first years of school and involves successful interaction between visual and motor processes. Deré (2019) states that the early writing skills are closely related to pre-literacy skills, which means that the children who develop such writing skills tend to read successfully in the future.

Breuhl (2020) further concluded that handwriting speed and quality can be significantly enhanced through direct intervention in promoting underlying motor skills. This indicates that children with problems in developing writing skills should be identified and assisted to prevent future learning problems (Saparahayuningsih & Badeni, 2019). As stated by Deré (2019), pre-literacy skills have a close relation to early writing. This means that children with good pre-literacy writing skills will be better off in terms of reading and language comprehension in future school years. Capellini et al. (2017) noted that good handwriting needs precise motor control, spatial arrangement, and pressure control during writing. The absence of these important skills among preschool children makes them face many difficulties in letter formation, which may affect their overall academic performance at school. Breuhl (2020) also suggested that handwriting speed and quality can be significantly improved through direct intervention that will enhance underlying motor skills. It means that it is important to identify children with writing problems early in life to prevent lifelong learning disabilities.

According to the authors of the research by Majorano et al. (2021), early writing is better predictor of future success in literacy than early reading. As for writing, children combine abstract thinking with concrete action that helps them develop comprehension and understanding of meanings of the texts they are reading. It is always the practice of developmental professionals that children pass a certain way while developing writing skills. In particular, children aged from 3 to 4 begin to engage in intentional drawing, copy different shapes, as well as create lines and circles (Yang & Noel, 2006). When children are 4 to 5 years old, they attempt to write their own names, create some letters, and even use words. Finally, when children reach the age of 5 or 6, they can write all letters individually, remember some basic words, and even use spaces and alignment in their writings. These achievements can be used to understand if a child is doing good or some intervention may be needed. However, it is possible that the failure in meeting developmental milestones is associated with children's difficulties with fine motor skills, visual perception, or symbolization. Nevertheless, such problems can be corrected through intentional activity (Ibaibarriaga et al., 2025).

However, some of the research studies indicate that fine motor skills contribute to the development of early literacy skills in children. According to Cameron et al. (2016), better performance in fine motor tasks from an early age enhances a child's ability to write as they

develop. In the same manner, Gull (2024) postulates that fine motor skills make the connection between motor and sensory activities with school-based learning.

The visual-motor integration (VMI) makes it possible for the kids to perceive visual information and convert it to fluent motor skills used in writing where the kid organizes the letters, preserves the space and readability (Dong and Yin, 2023). Young children may suffer from deficient early literacy skills such as tracking, copying the shape or lettering due to poor VMI skills. It is evident how important it is to integrate visual and motor skills at an early stage to enable the kids transition between the pre-writing and writing tasks (Pereira et al., 2025).

Hand-Eye Coordination (HEC) is one of the essential factors involved in the development of the skill of writing for preschoolers. HEC is defined as a skill that entails coordination of the hand movements and visual perception for performing the required actions that include proper directionality of the letters, as well as writing (Arun et al., 2022).

The grip strength refers to the muscle strength of the hand (thumb, fingers, and palm, specifically) that is involved in the act of gripping or handling the object. Grip strength is essential for writing for providing both sustained muscle strength (for holding the pencil while writing) and fine modulation (for manipulating the pressure during writing) (Breuhl, 2020).

The theory of Jean Piaget (originated in 1952) plays a significant role in the sphere of child development as it provides an explanation of children cognitive development. In case with the given sample, children at preschool age (from three to six years old) pass the preoperational stage and begin to use symbols more actively and develop their basic abilities (Pakpahan & Saragih, 2022). Additionally, it should be noted that Vygotsky described the impact of various tools on cognitive development. Crayons, chalk, and markers are not only tools but also cultural tools which help children to visualize their thoughts by drawing. Using these tools your child will develop movements, and this preparation helps him/her to progress from scribbling to writing actual words (Marti, 2013).

Although the amount of literature that emphasizes the importance of psycho-motor development in the early years of childhood has significantly increased, a relatively low number of researchers have attempted to examine the influence of psycho-motor development programs and the extent of their impact on the development of writing skills among preschool children. Therefore, the current study aims at filling this gap through investigating the influence of psycho-motor stimulation on writing skills among preschool children. This will provide a holistic experience of the early writing process that takes into account all aspects of learning.

Methodology

Positivism paradigm has been used in the current study as it seeks to test the hypothesis and establish significant correlations between psychomotor stimulation and the writing abilities of preschool children (Creswell and Creswell, 2014). Deductive research methodology has been chosen for the current study as it is derived from some existing theories on psychomotor development and writing abilities. Survey method has been chosen for the current study due to its ability to allow the researcher to organize the process of collecting data on psychomotor abilities of preschool children and writing skills.

The research method used in this study is a quantitative research design because the research will statistically test the hypothesis of whether the use of psychomotor stimulation will enhance writing ability in preschool children (Dannels, 2018). The choice of the population in this study is preschool teachers. In this research, the simple random sampling method is used and this is a subdivision of the probability sampling. In this research, 225 preschool teachers were used as a sample. These respondents were sampled using various preschools in various parts of Sri Lanka including urban and semi urban areas. The primary tool applied to survey preschool teachers in various parts of Sri Lanka was a structured questionnaire.

In order to establish the validity and reliability of the structured questionnaire to be used in this study, the Cronbachs alpha coefficient was used as a statistical data of internal consistency. The resulting data of the structured questionnaire were analyzed with the help of Statistical Package of the Social Sciences (SPSS) software that enjoys high levels of accuracy, efficiency as well as large scale datasets handling. Ethics is a core element of any research involving human subjects whereby the study is done with integrity, transparency and respect of the rights and well-being of the respondents.

Findings

Chapter on Data Analysis and Presentation focuses on the important findings from the data analysis process. In order to perform data analysis, a quantitative data analysis method was applied based on the primary data gathered. A sample size of 225 teachers was chosen and data was collected through a structured questionnaire. Collected data was analyzed using statistical methods such as descriptive and inferential statistics to assess the impact of psychomotor stimulation in developing writing skills among preschoolers.

Table 1 Demographic analysis of respondents

Factor	Categories	Frequency	Percentage (%)
Gender	Male	7	2.9
	Female	218	90.8
Age	Between 25 years	17	7.1
	Between 26-35 years	88	36.7
	Between 36-45 years	76	31.7
	Between 46-55 years	27	11.3
	Above 56 years	16	6.7
Marital status	Single	43	17.9
	Married	182	75.8
Education	Up to O/L	23	9.6
	Up to A/L	50	20.8
	Diploma or Certificate Course	147	61.3
	Degree level	5	2.1
Preschool attended by students	Government preschool	10	4.2
	Private preschool	200	83.3
	International preschool	11	4.6
	Home-based preschool	4	1.7
Frequency in use of hands	Rarely	6	2.5
	Sometimes	23	9.6
	Often	187	77.9
	Very often	9	3.8
Time spent on a day on writing/ drawing	Less than 10 minutes	13	5.4
	10–20 minutes	174	72.5
	21–30 minutes	31	12.9
	More than 30 minutes	7	2.9

Among the respondents, 90.8% (218) were female and 2.9% (7) were male. The age distribution analysis reveals that the age group of 26-35 is the biggest group with 36.7% of the

respondents. The results of this survey show that the majority of the respondents fell in the age group that falls under the category of middle age. Among the respondents the majority of respondents married and it was 182 (75.8%) and 43 (17.9%) were single. The analysis reveals that the majority of the respondents had moderate education qualifications and professional education background. The results from this study certainly show that the private sector's preschool education plays a dominant role in the sample selected. The results indicate that most of the preschool children in this study had regular exposure to activities which nurtured psychomotor skill development and fine motor skill development. The results for the amount of time children spend on writing/drawing tasks show that most children spend 10-20 minutes a day on writing/drawing tasks.

Descriptive statistics

The descriptive results provide some insight into the degree of psychomotor abilities and writing skill development in preschoolers participating in the research. On the whole, the descriptive statistical results reveal that preschoolers participating in the study possess a medium to high level of psychomotor abilities and development of writing skills. The independent variables revealed the highest mean score for fine motor skills that indicates the presence of fine motor skills in the studied preschoolers. Relative variability was higher for visual-motor integration and hand-eye coordination that could vary in certain degree from one child to another. The results serve as a primary indication of existence of the psychomotor stimulation factors in the studied sample and their great importance in development of writing skills in preschoolers.

Table 2 Reliability analysis

Variable	No of items	Cronbach's alpha value	Decision
FMS	05	0.806	Acceptable internal consistency and reliability
VMI	05	0.879	
HEC	05	0.792	
GS	05	0.752	
WSD	05	0.879	

As can be seen from the findings presented above, all Cronbach's alphas for the variables used in this study are above 0.70, the level considered to be the minimum acceptable value. Therefore, all the scales used in this study have acceptable levels of reliability. In other words, it could be said that the questions asked in the survey serve as valid tools to measure the variable of psychomotor stimulation.

Table 3 Correlation analysis

Dependent variable	Independent variables	Pearson correlation coefficient	P value (significance value)	Decision
Writing Skill Development	Fine Motor Skills	0.701	0.000	Positive significant correlation
	Visual-Motor Integration	0.764	0.000	Positive significant correlation
	Hand-Eye Coordination	0.933	0.000	Positive significant correlation
	Grip strength	0.928	0.000	Positive significant

				correlation

From the findings of the correlation analysis, it can be deduced that all the psychomotor stimuli taken into consideration during the experiment are positively correlated with the skill of writing among pre-school children and have significant values in the statistical sense. Among the variables, Hand-Eye Coordination and Grip Strength showed the highest correlation with writing skill development, while Visual-Motor Integration and Fine Motor Skills ranked second. This is enough proof of a high degree of correlation between psychomotor skills and pre-school children's writing.

Table 4 Regression Analysis

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.980[a]	.960	.959	.55811	1.492

a. Predictors: (Constant), GS, FMS, HEC, VMI

b. Dependent Variable: WSD

The value of R square is 0.960 and it means that 96% of variations in writing skill development have been explained by the four independent variables included in this model. This is a very high level of explanatory power and it shows that psychomotor stimulation factors are highly important for the ability to write.

Table 4 Anova Summary

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1633.856	4	408.464	1311.349	.000[b]
	Residual	68.526	220	.311		
	Total	1702.382	224			

a. Dependent Variable: WSD

b. Predictors: (Constant), GS, FMS, HEC, VMI

Significance value is 0.000 and this means that the regression model is statistically significant and appropriate for predicting the Writing Skill Development of preschool children.

Table 6 Coefficient

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-1.482	.396		-3.742	.000
	FMS	.302	.030	.254	9.906	.000
	VMI	-.200	.027	-.234	-7.454	.000
	HEC	.497	.023	.570	21.971	.000
	GS	.506	.031	.461	16.249	.000

a. Dependent Variable: WSD

The conclusion that can be made based on the results of the general regression analysis is that there is a great possibility for the predictors to have a considerable effect on the development of skills in writing among preschoolers. Among the independent variables, it should be noted that Hand-Eye Coordination is the best predictor, and then follows Grip Strength and Fine Motor Skills. The model explains a very large amount of variability in the writing skill development, which makes the need to introduce psychomotor stimulation activities clear.

Table 7 Hypotheses testing

Hypothesis	B value	Sig. value	Decision
$H_1$1: There is a significant relationship between fine motor skills and the development of writing skills among preschool children	.302	.000	Accept alternative hypothesis
$H_1$2: There is a significant relationship between visual-motor integration and the development of writing skills among preschool children	-.200	.000	Accept alternative hypothesis
$H_1$3: There is a significant relationship between hand-eye coordination and the development of writing skills among preschool children	.497	.000	Accept alternative hypothesis
$H_1$4: There is a significant relationship between grip strength and the development of writing skills among preschool children	.506	.000	Accept alternative hypothesis

Discussion

The results of the present study indicated that Fine Motor Skills (FMS) have a significant positive correlation with Writing Skill Development ($\beta = 0.302$, $p = 0.000$). The findings obtained from this study are in line with the literature, which stresses the significance of fine motor skills in writing proficiency. According to Africa and van Deventer (2016), there is a significant effect of fine motor and visual-motor interventions on the development of pre-writing skills among preschoolers. Similarly, Capellini et al. (2017) concluded that children with better fine motor skills also exhibit higher handwriting proficiency.

The results showed that the Visual-Motor Integration (VMI) was significantly correlated with the Writing Skill Development ($\beta = -0.200$, $p = 0.000$). As is clear from literature, there is a positive relationship between visual-motor integration and writing skills. According to Marr & Cermak (2002), VMI is considered to be one of the best predictors of handwriting quality in

preschool and primary school children. In addition, a meta-analysis conducted by Lu et al. (2024) states that there is a positive correlation between high VMI score and handwriting skills, specifically with fluency and accuracy.

From the results obtained during this study, it is clear that Hand-Eye Coordination (HEC) has a significant positive correlation with the Writing Skill Development ($\beta = 0.497$, $p = 0.000$). It was found out by Johor et al. (2020) that children with good performance at hand-eye coordination task had good object manipulation skills and engagement in writing tasks. Similarly, Szabo et al. (2020) found that motor control and coordination are crucial for handwriting proficiency in children as they enter school. From these findings, it can be concluded that teaching handwriting should be seen as a continuous interaction of visual stimuli and motor response so that the child could form a letter or symbol.

The regression results showed that the Grip Strength (GS) had a significant positive correlation with Writing Skill Development ($\beta = 0.506$, $p = 0.000$). It can be observed that the results obtained in this research are in line with the previous research highlighting the significance of grip strength for writing tasks. Butt et al. (2022) stated that there is a direct positive correlation between the grip strength of hand muscles and handwriting speed.

Limitations of the Study

The limited scope of the sample is one of key limitation. Another constraint is related to the assessment of writing skills growth. The assessment was based on parent perspectives and not the actual writing skills of children or on the use of standardized writing assessments. Further, there are some limitations on data collection method regarding the study purpose since it was not allowed to collect perceptions and ideas of respondents.

Recommendations for Future Research

Future research could expand this study in several ways:

i. Include longitudinal research on the effect of psychomotor stimulation on writing skill development over a longer period.
ii. Experimental and quasi-experimental research designs could be used to explore the causal relationship between psychomotor stimulation and the development of writing.
iii. Recommended to investigate the moderating or mediating effect of parental involvement in the relationship between psychomotor stimulation and the development of writing skills.
iv. Other developmental variables can be added to the research framework in future investigations.

In summary, the findings from the study show that the use of psychomotor stimulation has an effect on the writing process among preschool children, generally speaking. From all the findings obtained above, it is seen that preschool children who have high levels of fine motor skills, high levels of visual-motor integration, high levels of hand-eye coordination, and high levels of grip strength have higher levels of writing skills. Among all these factors, grip strength and hand-eye coordination are the two factors with highest prediction. Based on the above finding, it is concluded that psychomotor development is an important component of preschool learning and psychomotor exercises must be conducted to prepare the children in writing.

Conclusion

The correlation analysis showed a positive significant correlation between all the independent variables and the dependent variable. However, the regression analysis showed a positive effect

of fine motor skills, hand-eye coordination, and grip strength on writing skill development where visual motor integration has a negative effect.

Co-Author Contribution

The author carried out the fieldwork, prepared the literature review and overlooked the whole article's write up, carried out the analysis and interpretation of the results.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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