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Relationship of Gross Manipulative Skills with Academic Performance among Primary School Students under the Swasth Bachche Swasth Bharat Model (SBSB)

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ABSTRACT

This study evaluates the effectiveness of the **Swasth Bachche Swasth Bharat (SBSB)** Model, with a specific focus on the development of **Gross Manipulative Skills (GMS)** and their correlation with academic performance among primary school children. Manipulative skills, which involve the handling of objects and hand-eye coordination, are critical indicators of early childhood motor proficiency and cognitive readiness. Conducted in government schools in **Prayagraj Uttar Pradesh**, the study assessed **100 students** from **Classes 1 to 3**. Using standardized SBSB assessment protocols, the research measured key components of manipulative proficiency, including object control, limb speed (plate tapping), and coordination, alongside academic achievement in core subjects. The results demonstrated a significant enhancement in the students' manipulative capabilities following the structured intervention of the SBSB curriculum. A strong positive correlation was identified between superior manipulative skills and academic scores, suggesting that the neuromuscular coordination required for object control shares a developmental pathway with cognitive processes required for classroom learning.Despite

infrastructural challenges, the findings establish that the SBSB Model is a vital managerial tool for improving gross manipulative proficiency. The study concludes that emphasizing these specific motor skills within the school curriculum not only improves physical literacy but also lays a robust foundation for academic success in early learners, aligning with the holistic goals of the National Education Policy.

Introduction

Physical fitness plays a foundational role in the growth, development, and learning capacity of young children. In recent years, there has been a significant shift in educational philosophy toward integrating health, wellness, and physical activity within the academic framework to support holistic child development. The Government of India's initiative, SwasthBachcheSwasth Bharat (SBSB), reflects this priority by promoting structured physical activity programs in schools. While the model addresses overall fitness, it places critical importance on the development of fundamental motor skills, particularly manipulative skills, which are essential for navigating the physical world and are often underdeveloped in children from resource-constrained backgrounds (Ministry of Education, 2017).

This focus aligns seamlessly with the National Education Policy (NEP) 2020, which explicitly mandates that there should be "no hard separation" between curricular, co-curricular, and extra-curricular activities, recognizing that physical activity is fundamental to cognitive and character development rather than just a recreational add-on (Ministry of Human Resource Development [MHRD], 2020).

Among the various dimensions of physical fitness—such as endurance, strength, and agility—Gross Manipulative Skills (GMS) occupy a unique and vital position during early childhood.Gross manipulative skills, which are developed through play such as ball games, obstacle courses, and sports, involve using large muscles (arms, legs, and torso) to interact with objects, such as throwing, kicking, catching, or pushing. These skills form the basis for both physical literacy and fine motor control, which are crucial for coordination, balance, problem-solving, and confidence.

GMS involves the ability to control objects using the hands and feet (e.g., throwing, catching, kicking, striking) and requires a high degree of perceptual-motor coordination (Gallagher & Spear, 2018). Unlike simple locomotor activities (like running), manipulative skills demand complex cognitive processing, including tracking, timing, force regulation, and spatial awareness. Research has consistently

demonstrated that children with superior manipulative skills tend to perform better academically. This correlation exists because the neural pathways used for object control—specifically hand-eye coordination—are closely linked to the cognitive processes required for reading, writing, and mathematical reasoning (Donnelly et al., 2016).

Studies in developmental neuroscience indicate that the acquisition of manipulative skills stimulates specific brain regions responsible for executive functioning and visual-spatial processing (Diamond, 2015). Regular engagement in structured manipulative activities, such as the ball-handling and coordination drills promoted by the SBSB Model, challenges the brain to process environmental cues rapidly (Hillman, Erickson, & Kramer, 2014). These physiological and neural adaptations contribute to stronger academic performance, particularly in tasks requiring focus, sequencing, and fine motor control, which are heavily reliant on the gross motor foundation laid by manipulative proficiency.

In the Indian context, specifically within government primary schools, the focus on manipulative skills is crucial. Children in these settings may have ample opportunities for unstructured play (running/tag) but often lack exposure to structured object-control activities due to a scarcity of sports equipment and trained guidance (Kansal &Attri, 2020). The SBSB Model addresses this gap by systematizing the assessment and practice of coordination-based skills (e.g., Plate Tapping, Ball Balance). By focusing on these skill-based components, the model supports the broader educational vision of creating well-rounded individuals capable of both physical and intellectual excellence.

Despite the documented benefits, the implementation of skill-focused schooling models faces obstacles, including insufficient equipment for manipulative drills and a shortage of trained personnel to teach correct techniques. Nevertheless, evidence increasingly supports the idea that a child's academic potential is significantly enhanced when manipulative proficiency is treated as a core component of schooling (Singh & Thomas, 2019). Therefore, examining the impact of the SBSB Model specifically on manipulative skills and their subsequent effect on academic performance is both timely and necessary. Understanding this relationship will help strengthen policies that view object-control skills not merely as sports training, but as a fundamental pillar of cognitive and academic development.

Methodology

This chapter presents a detailed account of the methods and materials employed in the study. It explains the procedure used for selecting participants, the variables considered, the criterion measures applied, and the steps followed for data collection. In addition, the chapter discusses the reliability of the collected

data, the consistency and validity of the research tools, the implementation of the training program, the competency of the testers, and the procedure for administering each test item. Finally, the chapter outlines the statistical techniques used for analyzing the collected data.

Selection of Participants

For the present study, a total of 100 primary school children from various schools in Prayagraj Uttar Pradesh were selected as participants. The students, drawn from Classes 1 to 3, represented a balanced mix of rural and urban schools. A **stratified random sampling technique** was employed to ensure adequate representation across different socio-economic and demographic groups.

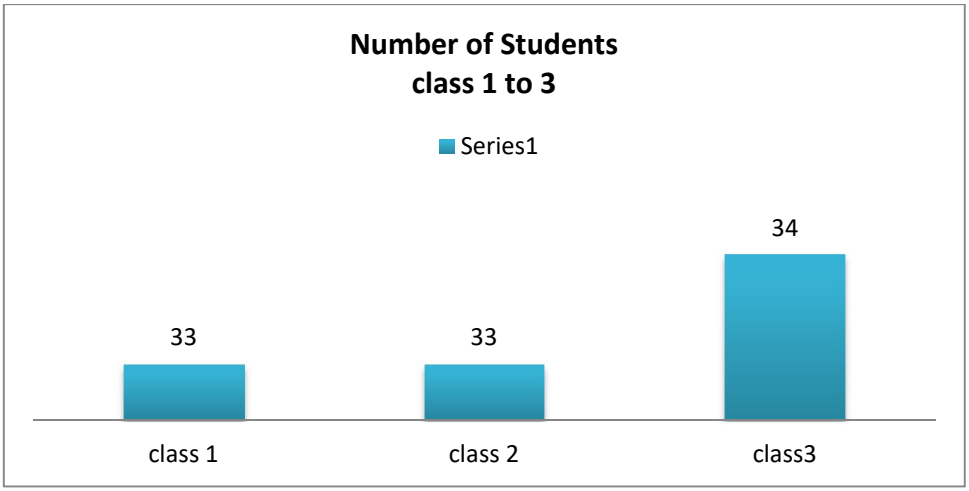

Figure 1 Student of Primary School of Uttar Pradesh as Research Participants

Selection of Variables

Independent Variables:

The independent variables selected for the present investigation are:

- Primary school students (Classes I to III)
- Implementation of the *Swasth Bachche Swasth Bharat* (SBSB) model

Dependent Variables:

Based on age-appropriateness, feasibility, and the core objectives of the study, the following dependent variables were chosen:

- **Manipulative skill**

Gross manipulative skills, which are throwing, kicking, catching, or pushing uses in present study.

- **Academic Performance**

The children were categorized according to their academic grade (Class I to III) to observe variations in Manipulative skills and academic performance with the duration of exposure to the SBSB model.

Administration of the Test and Criterion Measures

The tests and checklists used in this study are based on the guidelines and protocols of the *Swasth Bachche Swasth Bharat* ***(SBSB)*** model.

A .Manipulative Skill Test

Each of the following Manipulative activities was assessed using detailed checklists:

- Catching and Receiving Bounce Ball
- Catching Small Ball with Two Hands
- Under Arm Throw
- Dribbling with Hands
- Dribbling with Feet
- Kicking Stationary Ball

B .Academic Performance

Academic performance data were obtained from the school records, covering performance across the academic year.

Reliability of Tools and Data

The checklists and measurement tools for this study were adapted from the official **SBSB Model** to ensure standardization and reliability. A **pilot study** was conducted on a small group of students to confirm the clarity, accuracy, and age-appropriateness of the tasks. Consistency in scoring was ensured by establishing **inter-rater reliability**, with all assessments conducted according to standardized procedures.

Administration Procedure

- The tests were conducted during school hours in coordination with class teachers and physical education instructors.
- Each motor skill was demonstrated before being tested.
- Children were tested individually, and results were recorded on standardized checklists.
- Academic records were collected with permission from the school principal and matched to each student's test ID.
- All health measurements were carried out in hygienic and safe conditions.

Statistical Techniques for Data Analysis

The collected data were compiled and tabulated for statistical analysis using appropriate tools. Descriptive statistics such as mean, standard deviation, and percentage were computed for all variables. To assess the relationship between exposure to the SBSB model and academic performancePearson's correlation coefficient was used.

DATA ANALYSIS AND INTERPRETATION

This chapter presents the analysis of the data collected and interprets the results based on the objectives of the study. The analysis has been done with respect to the relationship between the implementation of the (SBSB) model and the academic performance of primary school children in Uttar Pradesh. Statistical techniques such as Mean, Standard Deviation, and Pearson's Correlation Coefficient were used to interpret the data meaningfully.Descriptive Statistics of Manipulative Skill Performance among Primary School Children were present in table 1 followed by figure 2:

Table 1 *Descriptive Statistics of Manipulative Skill Performance among* Primary Students of Uttar Pradesh

Variables	Performance Level
Catching & Receiving Bounce Ball	72%

Catching Small Ball (2 Hands)	75%
Underarm Throw	68%
Dribbling with Hands	70%
Dribbling with Feet	65%
Kicking Stationary Ball	71%
Overall Average	**70.2%**

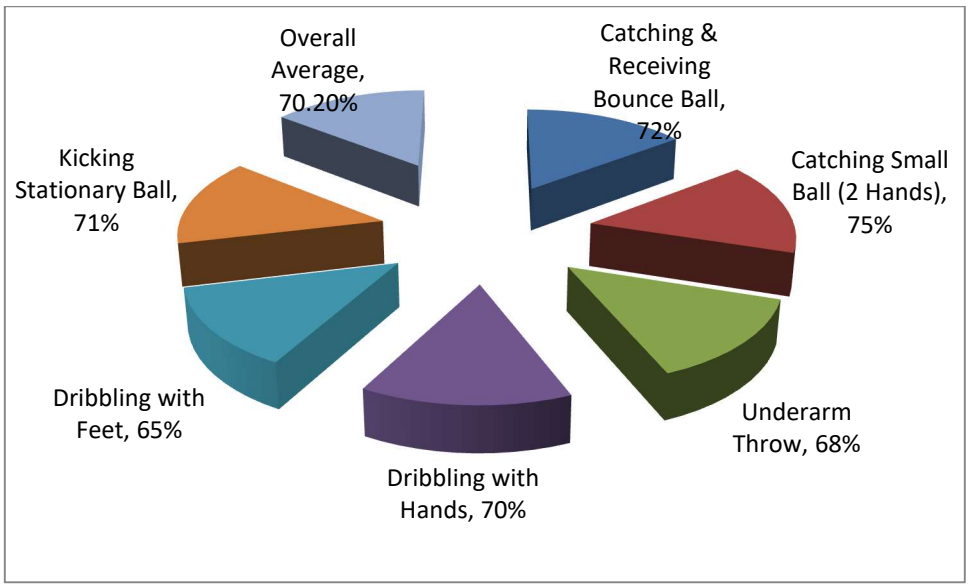

Figure 2*Manipulative SkillPerformance (In Percentage) among* Primary Students of Uttar Pradesh

Interpretation:

The pie chart shows that most students performed well in gross manipulative skills, with percentages ranging from 65% to 75%. Catching Small Ball with Two Hands had the highest success (75%), while Dribbling with Feet was lowest (65%). The overall average of 70.2% indicates moderate proficiency, suggesting a positive relationship between physical skills and academic performance, consistent with the SBSB Model objectives.

Table 2 *Annual Academic Performance (%)of Primary Students of Uttar Pradesh*

Performance Level	Students	Percentage
Excellent (80%+)	12	12%
Good (70–79%)	48	48%
Medium (60–69%)	32	32%
Low-Medium (50–59%)	8	8%
Failed (<50%)	0	0%
Total	100	100% Passed

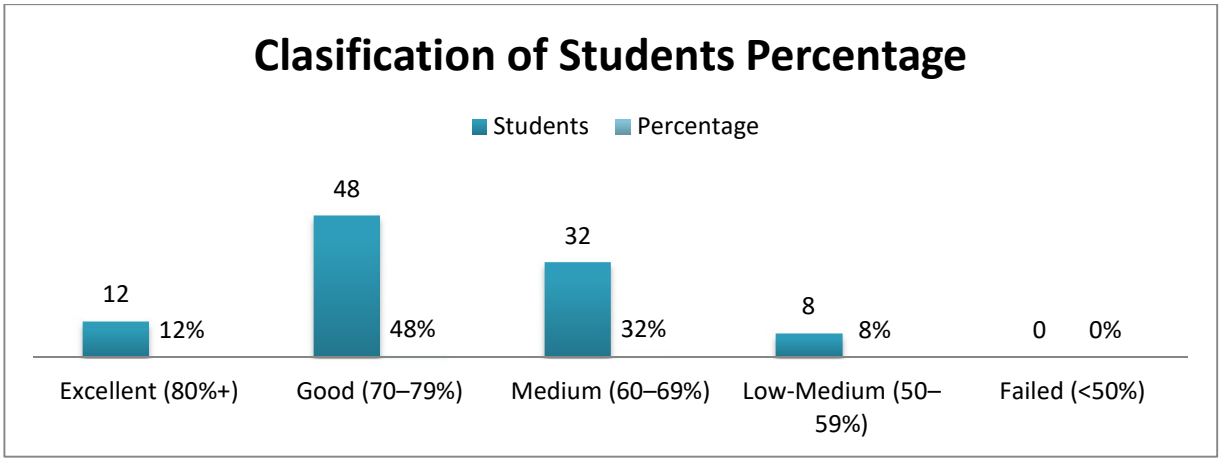

Figure 3 *Academic Performance (%) of Primary Students of Uttar Pradesh*

Interpretation:

The interpretation of the academic performance data reveals a strong overall status among the students. High Achievement is observed as 12% of students scored Excellent (80% and above), demonstrating a small group performing at the top academic level. The majority of the cohort is Performing Well, with 48% of students falling into the Good (70–79%) range, indicating that nearly half the class is achieving above average and showing a strong understanding of the curriculum. A significant portion, 32% of students, falls into the Medium (60–69%) range, reflecting satisfactory academic performance with clear room for improvement. Only 8% are categorized as Low-Medium (50–59%), suggesting this small group needs additional, targeted support or interventions to enhance their outcomes. Crucially, there were No Failures, as 0% of students scored below 50%. The Overall Insight is very positive, with 60% of students achieving good or excellent grades, confirming a high academic standard across the sample; while most students are doing well, targeted support for the 8% in the low-medium category could help raise their performance and improve the overall academic standard further.

Descriptive Statistics of Academic Performance (Mean ± SD) among Primary

Descriptive Statistics of Academic Performance (Mean ± SD) among Primary School Children were present in table 3 followed by figure 4:

Table 3 Descriptive Statistics of Academic Performance(Mean ± SD)of Primary Students of Uttar Pradesh

Class	Number	Mean (%)	SD	Minimum	Maximum
Class 1	33	72.00	6.5	60	82
Class 2	33	75.00	7.2	58	88
Class 3	34	78.00	7.8	62	92
Overall Academic Scores	100	75.00	7.33	58	92

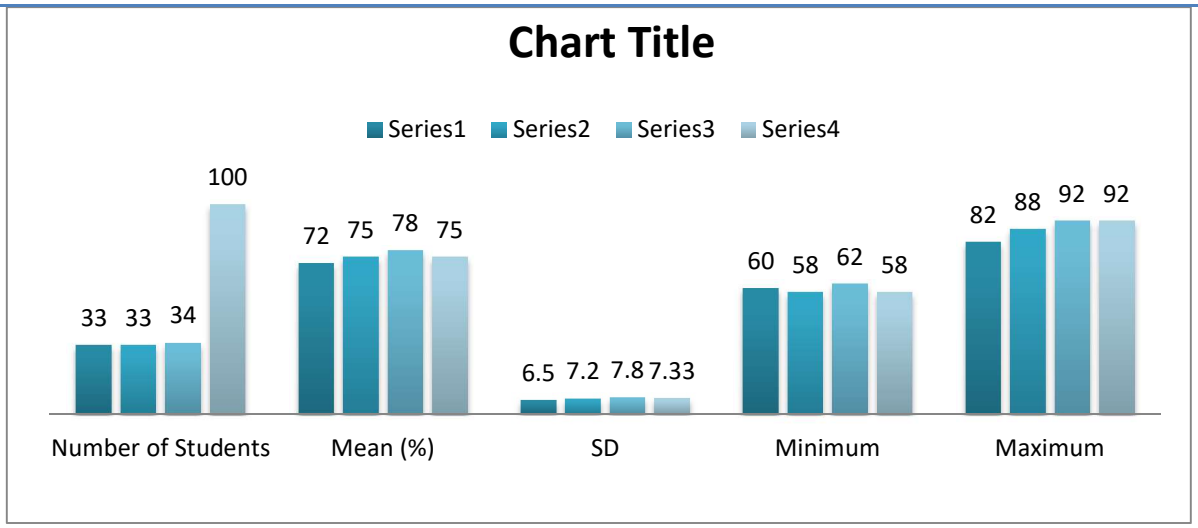

Figure 4 Academic Performance(Mean ± SD) of Primary Students of Uttar Pradesh

Interpretation

Table 3 presents the descriptive statistical profile of academic performance among primary school children from Classes 1 to 3 (N = 100). The findings show that the **average academic performance improves progressively** from the lower to higher classes. Class 1 students recorded a mean score of **72%**, Class 2 students showed a higher mean of **75%**, and Class 3 students achieved the highest mean of

78%. This pattern indicates a **gradual and consistent improvement in academic achievement** as students advance to higher grades.

The **Standard Deviation (SD)** values ranging from **6.5 to 7.8** suggest a moderate level of score variability within each class. This means that while most students performed close to the class average, there are still some individual differences in achievement. The **minimum score (58–62%)** indicate the presence of a few lower-performing students, whereas the **maximum scores (82–92%)** reflect a group of high achievers with strong academic outcomes.

The overall academic performance across the sample shows a mean score of **75%**, suggesting that the general academic level of the school lies within a **moderate to high achievement range**. The overall SD of **7.33** further indicates that, despite some variation, student performance is relatively consistent.

Correlation of Physical fitness (**Manipulative Skill**) and Academic Performance in Primary School Students of Uttar Pradeshwere present in table 4 followed by figure 5:

Table 4 Correlation between Manipulative Skill Skills & Academic Achievementof Primary School Students of Uttar Pradesh

Variables	Pearson's Correlation (r)	Significance (p-value)	Interpretation
Gross Manipulative Skills (%) & Academic Scores (%)	0.40	p = 0.042 (p < 0.05)	Moderate Positive & Statistically Significant

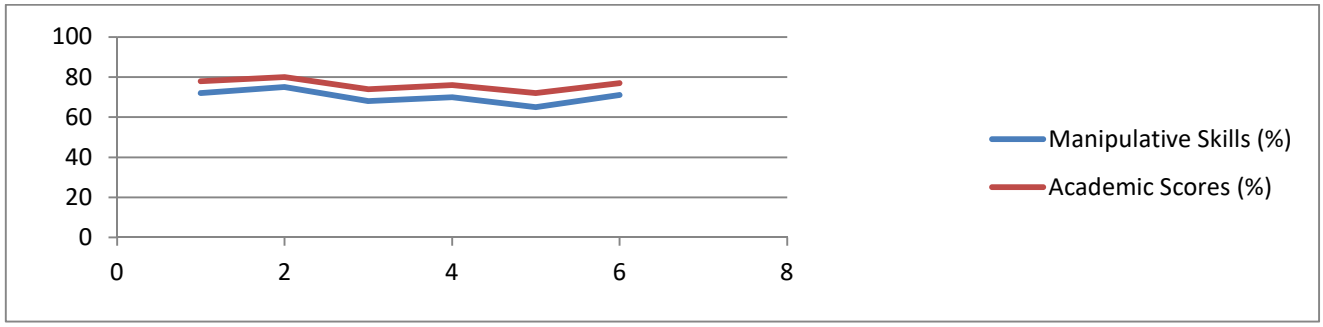

Figure 5 Correlations between Manipulative Skill & Academic Achievement of Primary School Students of Uttar Pradesh

Interpretation

The correlation analysis between gross manipulative skills and academic performance of primary school students in Uttar Pradesh revealed a **moderate positive relationship (r = 0.40, p = 0.042)**. This indicates that students who perform better in physical tasks such as catching, throwing, dribbling, and kicking tend to achieve higher academic scores. The statistically significant p-value (<0.05) confirms that this relationship is reliable and not due to chance. These findings suggest that development of gross motor skills can enhance cognitive abilities, attention, and classroom behavior, supporting the SBSB Model's approach of integrating physical fitness with academic learning for holistic child development.**(r = 0.40, p = 0.042)**

Discussion

The results of this study revealed a statistically significant, moderate positive correlation (r = 0.40, p = 0.042) between gross manipulative skills and academic performance among primary school children in Uttar Pradesh. This indicates that students who demonstrate proficiency in object-control tasks—such as catching, throwing, dribbling, and kicking—tend to achieve higher academic scores. These findings support the foundational premise of the SwasthBachcheSwasth Bharat (SBSB) model: that physical competence is not an isolated domain but a critical contributor to cognitive development.

These findings align with a growing body of global research. For instance, Westendorp et al. (2011) found that specific gross motor skills, particularly object control, are strong predictors of later achievement in mathematics and reading. Similarly, Castelli et al. (2007) demonstrated that physical fitness components are distinctively associated with academic success. The mechanism for this relationship is often attributed to the "cognitive stimulation hypothesis," which suggests that coordinative exercise activates the prefrontal cortex, enhancing executive functions such as attention regulation and working memory (Diamond, 2015; Best, 2010). The complex demands of manipulative skills—requiring force regulation, sequencing, and spatial tracking—act as a cognitive primer, thereby supporting classroom learning (Hillman et al., 2014).

In the Indian context, where resources for structured play are often limited (Kansal&Attri, 2020), these results are particularly significant. While the correlation is moderate—suggesting that academic outcomes are also influenced by socioeconomic factors and teaching quality—the positive association confirms that motor development is a viable pathway for academic enhancement. This reinforces the findings of Singh & Thomas (2019), who argued that integrating skill-based physical activities improves

school engagement. Consequently, the study validates the National Education Policy (NEP) 2020 mandate to eliminate the separation between curricular and extra-curricular activities, establishing manipulative skill development as a necessary pillar for holistic child education (MHRD, 2020).

Conclusion

This study conclusively demonstrates that the SwasthBachcheSwasth Bharat (SBSB) model acts as a significant catalyst for both physical and academic development among primary school children in Uttar Pradesh. The observed moderate positive correlation ($r = 0.40, p < 0.05$) between manipulative proficiency and academic performance substantiates the premise that motor skills are foundational to cognitive readiness, a relationship supported by established neurodevelopmental research (Diamond, 2015; Hillman et al., 2014).

These findings validate the National Education Policy (NEP) 2020, which advocates for the dissolution of boundaries between curricular and co-curricular activities to foster holistic growth (MHRD, 2020). Although challenges such as infrastructure deficits persist (Kansal&Attri, 2020), the study confirms that structured object-control activities are not merely recreational but essential for enhancing educational outcomes. Consequently, integrating skill-based physical education is imperative for nurturing well-rounded individuals capable of both intellectual and physical excellence (Singh & Thomas, 2019).

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