

Original Investigation

Association between Socioeconomic Status and Motor Skill Development among Preschool Children of Lekhnath, Pokhara: A Cross –Sectional Study

Ripti Shrestha^{1*} | Bijendra Prasad Yadav² | Neebha Amatya¹ | Rajab Rana¹ | Rajesh Prajapati¹

1 Department of Physiology, Gandaki Medical College and Teaching Hospital, Pokhara, Nepal; 2 Department of Anatomy, Gandaki Medical College and Teaching Hospital, Pokhara, Nepal

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*Correspondence:

Dr. Ripti Shrestha. Department of Physiology, Gandaki Medical College and Teaching Hospital, Pokhara, Nepal.

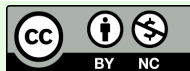
E-mail:

riptishrestha@gmail.com

 0000-0003-2740-6468

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ABSTRACT

INTRODUCTION: Gross and fine motor skills are both necessary for healthy growth. According to studies, children from lower “Socioeconomic Status (SES)” families have delayed development of these fundamental motor skills, placing them at risk for delayed motor skill development. The current research’s objective was to study the occurrence of developmental risks and the variances between the gross as well as fine motor growth related to the SES of preschoolers in Pokhara. **MATERIALS AND METHODS:** One district preschool in the Lekhnath municipality of Pokhara was selected for the study. 102 elementary school students between 3-6 years were evaluated. Children’s fine and gross motor skill and SES of their parents were calibrated. The values were compared and evaluated for the various economic status and genders keeping $p < 0.05$ as significant. **RESULTS:** Particularly in the area of fine motor abilities, significant variations between the SES groups were found. Gross motor growth had a greater variation and was substantial than fine motor skill. Fine motor growth risk prevalence ranged from 1.9% to 21.0%, while gross motor growth risk prevalence peaked at 14.63%. Age and sex also affected the prevalence rates. **CONCLUSIONS:** In pre-schoolers aged three to six, fine motor skills are strongly correlated with socioeconomic level. A correlation in gross motor skills was not established. In this study, sex had a greater impact on motor development than SES.

Keywords: Children, economic status, motor skills, Nepal, socioeconomic status



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INTRODUCTION

On a national scale, children’s and teen’s health is transforming rapidly [1,2]. Developmental problems can have a high prevalence rate. In a particular “Human Development Index (HDI)” of 0.54 and a “Gender Inequality Index (GII)” of 0.48, Nepal has one of the lowest levels of human development in the world [3]. There were 29.2 million people in Nepal as of the most recent national census in 2011, with 29.39% of them being children (0–14 years). 83% of people live in rural areas. Children in Nepal experience socioeconomic issues such as malnutrition, housing, domestic abuse, forced labor, and no accessibility to hospitals and basic education. In addition, a large number of kids and teenagers in Nepal have psychosocial and mental health issues linked to family dissolution, evolving family dynamics, domestic

violence, and parental substance addiction [3]. There is evidence from multiple studies that the Socioeconomic Status (SES) of the parents have proportionate influence on the growth of their children [4]. Such growing problems are detrimental to child’s ability to develop normally. Particularly motor developmental impairments are frequently linked to a sedentary lifestyle, and children who are overweight or obese are also harmed [5]. Overweight and inactivity are major risk factors for various chronic diseases throughout life [6,7]. It follows that these kids are more likely to experience dangers associated with motor development. In the rural regions of Nepal poor SES is seen that is impacted by a high unemployment rate, a sluggish economic expansion, and a low average annual income. Motor developmental deficits are very

common, with a prevalence rate of 20.3%, according to school enrolment exams. Additionally, 5.5% of children (preschool) are obese and 12.4% are overweight. These prevalence rates are higher than the average for the country. Obesity and a lack of nutrition are coexisting in Nepal at this time [8]. "According to the "Nepal Demographic Health Survey (NDHS) 2016", 1% of children <5 years in Nepal are overweight [9]. Given the socioeconomic data, it is reasonable to assume that both factors are strongly correlated. Therefore, it is critical to identify developmental concerns and start early intervention techniques for each individual. Unidentified developmental hazards are likely to evolve into persistent delays. Customized therapies should be used as early as preschool age because motor growth is proportionally connected with cognitive ability. Preschools can easily receive setting-oriented intervention due to the high utilization rate [10]. The objective of this research was to study the occurrence of developmental risks and the variances between the gross as well as fine motor growth related to the SES of pre-schoolers in Pokhara. It is possible to presume that improving motor abilities are related to improving SES. Additionally, because it appears that genders may be affected by financial and social status in distinct ways, any differences should be studied by gender. The findings may provide additional recommendations for enhancing intervention strategies, aimed at mitigating developmental delays that may arise as adverse effects of social disparities.

MATERIALS AND METHODS

Study design and setting:

A prospective research was piloted in the design of the current investigation. One district preschool in the Lekhnath municipality of Pokhara was selected for the study. The study was conducted from August 2022 to February 2023.

Participants, sample size and sampling technique:

A total of 102 elementary school students between of 3-6 years were evaluated in this study. Convenience sampling was used to get the specified sample size. Due to various factors like availability of the resources, familiarity with the area probably had an impact on the decision to use a single district preschool in Lekhnath. Children with metabolic and musculoskeletal disorders and of auditory visual disparity and epilepsy were not enrolled in this study. The children's fine and gross motor skills were

evaluated using suitable standardised methods, and socioeconomic data from the parents were gathered using a systematic questionnaire. The formula to calculate the sample size for a mean (or point) estimate used was $N = z^2 \times \sigma^2 / E^2$, where N = the required sample size, z = z-score, and σ = population standard deviation, E = margin of error $N = (1.962 \times 0.52) / 0.12 = 96$.

Data collection procedure and study variables:

Fine and gross motor abilities were the main areas of interest in this study. Dortmund's Developmental screening for preschools was used to detect the early developmental risks [11]. It is a standardized, valid and reliable instruments which adhere to scientific and practical conditions [12, 13]. The undertaken tasks requiring both fine and gross motor skills according to their age were: for the fine motor skills-buttoning or unbuttoning the shirts (3-4) years and to paint a human figure made up of six pieces (5-6) years. Competencies like skilled voluntary movements and eye-hand coordination were examined with the set of questions. For their gross motor development they were told to catch a ball from a length of 2 meters (3-4 years) and to demonstrate to walk by toe and heel and move backwards (5-6 years). With these tests, gross functions like balance, control and co-ordination were assessed.

A screening is an adequate opportunity to get a first impression of children's development however, the results of screening do not substitute a definite diagnosis. The "screening yields stanine values (standard nine values)" ranging from 1 to 9 for the motor, linguistic/cognitive, and social" domains of development individually as well as for the overall development. An indicator with a value of "1" suggests a valid doubt of developmental risk. A stanine reading of "2" indicates an inconclusive screening outcome, which makes it impossible to make a judgement concerning the likelihood of developmental concerns. Later, the screening must be repeated. The absence of developmental deficits is indicated by stanine levels between 3 and 9. A higher level corresponds to higher stanine values. A survey of the parents was conducted to learn about their socioeconomic situation. A standardized questionnaire was used to obtain information about parent's SES by mail. The questionnaire had statements regarding employment status, monthly income, and education. This data was used to calculate the SES by Modified Kuppaswamy's scale, [14] and classify the participants into low,

middle, and high, SES groups. The gathered information was organized and analyzed to determine the association between pre-schoolers socioeconomic status and motor skill development.

Statistical analysis and data management:

The data was analyzed using SPSS software. Mean, and standard deviations were used to report data. The connection of motor efficiency, SES, and gender, as well as the mean differences in the stanine values, were examined using ANOVA, and later using post hoc testing at $p=0.05$. T-test for independent sample was used to investigate sex and age variances using two-tailed testing at the 5% level of implication.

Ethical consideration:

Ethical clearance for this study was obtained from Institutional Review Committee (IRC) of Gandaki Medical College and Teaching Hospital, prior to starting of this study (Ref. No.145/079/080). Written consent was taken from the concerned school before data collection.

RESULTS

In total, 102 kids between the ages of three to six were evaluated in this study. 54.0% of male and 46.0% of female children was enrolled in this study. During the screening, 29% of the children were aged 3, 28% were aged 4, and 43% were aged between 5 to 6.

The social status questionnaire had a response rate of

participated in the investigation of the link between motor development and SES in pre-schoolers.

Table 1 displays descriptive data with the stanine values pertaining to fine motor skills (FMS) and gross motor skills (GMS) for different socioeconomic status (SES) groups and genders. Notably, no statistically significant variations were observed among the three SES groups for fine motor skills ($p>0.05$). Similarly, there was no significant connection found between SES and sex. Table 2 displays comparison of socioeconomic status (SES) and fine motor skills (FMS). The source of variations in fine motor skills was analyzed, including, SES, sex, and the interaction between SES and sex. The results showed that neither SES nor sex had a significant impact on fine motor skills. Table 3 displays comparison of socioeconomic status (SES) and gross motor skills (GMS).

Table 3 presents the analysis of gross motor skills in relation to SES, sex, and the interaction between SES and sex. The results indicated no statistically significant differences in GMS based on SES or sex. There were no discernible correlations between motor development and socioeconomic position, according to a two-way ANOVA for respective age groups, encompassing boys and girls. However, there was a linear relationship observed between FMS and SES levels specifically among girls. In other words, the

Table 1 | Descriptive data and significance testing for fine and gross motor skills (FMS and GMS) based on socioeconomic status (SES) and gender.

SES	Sex	FMS Mean	FMS SD	GMS Mean	GMS SD	p-value (FMS)	p-value (GMS)
Low	Male	3.96	1.68	4.69	2.01	0.251	0.080
	Female	4.28	1.8	5.10	1.92		
Medium	Male	4.25	1.79	4.89	2.24		
	Female	4.72	1.69	5.98	1.98		
High	Male	4.96	1.78	5.13	1.83		
	Female	5.22	1.58	5.89	1.74		
Total	Male	4.11	1.77	4.58	2.09		
	Female	4.65	1.72	5.58	1.94		

57%. Parents (37%) who responded to the questions regarding income, occupation, and education were classified as having a low SES, 44% had middle SES, and 19% had high SES. 102 parent-child pairs

Table 2 | Comparison of socioeconomic status (SES) and fine motor skills (FMS)

Source	Sum of squares	Df	Mean square	p-value
SES	37.58	2	18.659	0.251
Sex	64.00	1	64.22	0.201
SES * sex	0.033	2	0.018	0.948

Table 3 | Comparison of socioeconomic status (SES) and gross motor skills (GMS)

SES	Sex	Mean	SD	p-value
Low	Male	4.69	2.01	0.080
	Female	5.10	1.92	
Medium	Male	4.89	2.24	
	Female	5.98	1.98	
High	Male	5.13	1.83	
	Female	5.89	1.74	
Total	Male	4.58	2.09	
	Female	5.58	1.94	

Table 4 | Age and Gender Differences in Fine and Gross Motor Skills (FMS and GMS), Stanine Values

Age (Years)	Gender	FMS			GMS		
		(mean, SD)	p-value	Confidence Interval	(mean, SD)	p-value	Confidence Interval
3	Male	3.89 (1.78)	<0.05	-1.202 to -0.091	4.49 (2.18)	<0.05	-1.102 to 0.220
	Female	4.53 (1.97)			4.93 (2.27)		
4	Male	3.89 (1.84)		-1.513 to -0.400	5.28 (1.70)		-1.067 to -0.123
	Female	4.84 (1.82)			5.88 (1.39)		
5-6	Male	3.23 (1.77)		-1.769 to -0.945	4.60 (2.22)		-1.452 to -1.956
	Female	4.59 (1.58)			5.63 (1.88)		

FMS of girls appeared to be influenced by their socioeconomic status. This finding is supported by the results presented in Table 1.

The analysis showed that SES had a significant effect exclusively on girls' fine motor abilities, as revealed by a sex-specific analysis ($p < 0.05$). Notably, girls with both lower and higher SES demonstrated significant variations, which were confirmed through the Scheffe post-hoc test ($p < 0.05$). Table 4 provides independent fine and GMS stanine mean, SD by age and gender. Male children exhibited substantially lower stanine

boys aged 4 to 6 showed significantly lower stanine averages than girls ($p < 0.05$).

Table 5 demonstrates that the occurrence of fine motor developmental risks (stanine-value of "1") varied with age and sex, ranging from 1.9% in 5 to 6 year old girls to 21.0% in 5 to 6 year old boys. Risks for gross motor development ranged from 0.0% (4 and 5 to 6 year old girls) to 14.63% (3 year old boys). Only girls in the age groups of 4, 5, and 6 were not at risk for gross motor development. Among all ages, a large percentage of youngsters were able to complete several exercises without any trouble, while others presented challenges. In terms of fine motor skills, a large percentage of 3-year-old kids (33%) were unable to unbutton or button up. Additionally, 18% of all 4-year-olds who were tested struggled to draw a picture using multiple objects. Another illustration of a challenging task for children in the age range of 5 to 6 years is the transcription of at least three digits. 30% of the kids failed to complete this task. In contrast, other tasks like handling a rubber were simple for 93.0% of the kids in the same age range. 22% of the 3 year old kids lacked the gross motor ability to leap on one foot alone. Amazingly, 7% of the kids aged 5 to 6 years were unable to bounce a ball four times. But 97% of the 4 years old kids easily completed the five final jumps.

Table 5 | Frequency of Fine and Gross Developmental Risk

Age	Gender	FMS Risk (%)	GMS Risk (%)
3 Years	Female	10.9%	7.26%
	Male	12.1%	14.63%
4 Years	Female	2.9%	0.0%
	Male	12.5%	2.58%
5-6 Years	Female	1.9%	0.0%
	Male	21.0%	6.96%
Total		61.3%	31.43%

FMS- Fine motor skills; GMS- gross motor skills means than female children in the development of FMS across all age groups ($p < 0.05$). In terms of GMS,

DISCUSSION

A key conclusion of our study is the importance of gender in the development of motor skills. Our observed differences in motor abilities between the sexes could be attributable to a number of variables impacted by socioeconomic circumstances. An appropriate opportunity to acquire a quick overview of children's development is through a screening. The results of a screening, however, do not replace a firm diagnosis. For instance, a paediatrician should be consulted if the screening outcomes show a developmental risk in order to conduct a thorough medical examination and to further rule out physical

sources for the developmental risk. The findings of this study indicate that a sizeable portion of kids may be at developmental risk (GMS up to 14.63%; FMS up to 23%). According to Cohen's [15] theory, this study's findings on the motor development of preschool children aged 3 to 6 years only weakly correlated with socio-economic level. Effect sizes of 0.25 were already considered considerable in the literature [16]. As a result, it is also possible to view the relationship between motor development and SES as strong. However, this study yielded a contrasting view, there was considerable though not statistically significant

developmental disparities between kids with low and high SES (fine motor skills). SES had no impact on gross motor skills. In general, this study found that sex had a greater impact on motor development than SES, which was the primary focus. A linear relation was seen among the girl children. Similar, results were seen in Morley et al. [17] and Matarma et al. [18] which attribute the fact that girls outperformed boys in FMS and that boys were superior in GMS, to outside physical activities, as well as to computer games. The environmental factor and the cultural factor play an important role here. As SES is an integral part of environmental factor so girls with high SES have fine motor skills. These results could be explained by the possibility that girl's interests in this age group (such as art work) are more dependent on the availability of craft supplies and parent's collaboration, which are related to SES [19,20], than male children's interests are (e.g., outdoor plays). Regarding a different growth in terms of socioeconomic level, the age group had no bearing. Contrary to our studies Mulazimoglu-Balli [21] proved the opposite, where in, the children with lower socioeconomic status did not score that well in motor efficiency variables. We observed differences in motor abilities between the sexes could be attributable to a number of variables impacted by socioeconomic circumstances. When it comes to girls, their interests and extracurricular pursuits during the preschool years may be more closely associated with pursuits that call for funding and parental engagement, both of which can be influenced by socioeconomic position. For instance, participating in creative pursuits like painting and creating may depend on the accessibility of art equipment and a supportive setting. The

observed differences in FMS levels may be a result of children from higher socioeconomic families having easier access to these resources. The unique results of our study underscore the necessity for sophisticated interventions that take socioeconomic and gender issues into account. We can improve motor skill development and foster a more equal environment for preschool children's overall growth by adjusting programs to these specific effects. The statistical strength of gender differences in stanine values increased with age, which was an interesting discovery. These stark variations between the sexes point to the necessity of sex-specific interferences or advances for boys. All pre-schoolers must get preventive interventions since SES, cannot be the primary factor contributing to the high prevalence rates of motor developmental hazards. According to the typical physical development at this age, both the quality and quantity of the main motor abilities improve [22]. The environment and the health of the family relationships could, however, affect this. As a result, it is also necessary to examine the impact of leisure activities and media use. Preschools are a significant organization to bid programs and activities for the enhancement of skills irrespective of children's SES because of the high utilization rate of preschools. This would significantly advance the goal of equal chances for motor development prior to enrolment in school [23]. The limitation of the study was that only those children who were in the area same as that of the institute were analyzed. Hence the results can't be generalized to the population of the Nepal. Only a single scale of the SES evaluation was used. The results may vary if multiple scales are used.

CONCLUSIONS

Our study concludes that gender-specific interests and the degree to which they are impacted by socioeconomic circumstances have a substantial impact on how preschool children develop their motor skills. By taking into account these elements, interventions and assistance programs can be made to address gender-based disparities and advance the development of all children's motor skills, regardless

of their socioeconomic status. Future research should look into the causes of the high rates of supposed risks to motor development. Evidence-centered programs to improve motor skills must be employed in preschools, and guardians must understand much of their own significant active role with regard to their children's motor development.

ADDITIONAL INFORMATION AND DECLARATIONS

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Data Availability: Data will be available upon request to corresponding authors after valid reason.

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