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Educational Achievement of Students between Passive and Active Commuting Modes to School

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Abstract

Commuting modes and socioeconomic inequalities shape students' educational achievement, necessitating an analysis of their combined effects on educational achievements of students. This study investigates the relationship between commuting modes to school and the educational achievement of students in Pokhara Metropolitan City, Nepal. Data was collected from 918 students of grade VIII across 12 community schools. Students' educational achievement was measured using multiple choice questions developed based on the Curriculum Development Center's model questions and the questions prepared by the National Student Achievement Assessment (NASA). Independent sample t-test, and one-way ANOVA were employed to examine the differences in educational achievement of the students by commuting modes to school and associated socio-economic factors. The results reveal the significant variation in educational achievement by commuting mode. The passive commuters achieve better than those who are active commuters. Moreover, it also shows that the primary socio-economic factors, including ethnicity, parental education, and household income, cause critical disparities within each commuting group. The results suggest that enhancing educational achievement requires not only promoting safe and efficient commuting but also addressing the underlying socio-economic inequities that influence both commuting and learning in resource-constrained settings. The study also has important implications for educational planning and urban transport policy, indicating the need for integrated strategies that address mobility, equity and learning opportunities among students.

Keywords: commuting mode, educational achievement, proactiveness, students, supportive environment

Educational Achievement of Students between Passive and Active Commuting Modes to School

Students' educational achievement is an important indicator of individual potential and reflects the overall effectiveness of educational systems. Particularly in low- and middle-income countries, in which educational access and learning outcomes are unequally distributed (Hanushek & Woessmann, 2008; UNESCO, 2015). While extensive literature has explored school resources, pedagogy, and household socio-economic status as drivers of educational achievement, the role of physical access, particularly the daily mode of commuting, remains underexplored (Chillon et al., 2010; Phansikar et al., 2019). This warrants systematic empirical investigation in urban contexts such as Pokhara Metropolitan City, Nepal, where commuting patterns are increasingly being driven by the transportation options, parental socio-economic status, and school infrastructure (AlQuhtani, 2023; Ko et al., 2019). Evidence from around the world suggests that active commuting, such as walking and cycling, can lead to better physical health and subsequently better cognitive performance (Chillon et al., 2010; Power & Fitzpatrick, 2023). Passive commuting, such as traveling by school bus, private vehicle, and public vehicle, could lead to double advantages in terms of reduced fatigue and improved punctuality (Faulkner et al., 2009). However, most research conceptualizes commuting in a binary framework, active versus passive, without examining intra-mode variations such as travel time and distance, which may moderate the effect on students' readiness and educational achievement. Furthermore, the interaction of commuting mode with students' socio-economic background, school environment, and behavioral characteristics is rarely addressed in a multivariate framework, limiting explanatory power (Garcia-Hermoso et al., 2017; Panter et al., 2008).

Although research has examined the role of parental support, socio-economic status, school factors, and distance to school on academic performance in Nepal (Sharma & Levinson, 2019; Tharu, 2024), there appears to be a research gap regarding the impact of active versus passive transportation modes on students' academic achievement. Therefore, this empirical research will address this gap in knowledge on this topic.

In Nepal, especially in community schools located in urban areas, research on how commuting mode affects students' educational achievement remains scarce. Despite the increasing trend of using school buses and private vehicles in urban areas of Nepal, policy and

practice have assumed that physical access to schools is uniformly equitable. However, disparities in commuting time, mode, and distance may have differential impacts on students' daily school experiences and ultimately their educational achievement. In addition to this, the economic status of their family may also influence students' commuting mode.

To address this gap, this study employs a cross-sectional quantitative design to examine the association between commuting mode and educational achievement among Grade VIII students in Pokhara. It specifically compares intra-mode commuting patterns while accounting for demographic, socio-economic, supportive environment, and student proactiveness factors.

Methods

Study Design Setting

This study employed a cross-sectional quantitative research design to examine the association between commuting mode to school and the educational achievement of the students. The study aimed to identify differences in academic performance based on mode of commuting, categorized as active and passive, while accounting for a range of commuting factors, demographic, socio-economic, supportive environment, and students' proactiveness factors.

Sampling Procedure and Participants

This study was conducted among grade VIII students from 12 community schools in Pokhara, which offer education up to grade XII, selected by systematic random sampling. This study encompasses all 918 students of grade VIII from these schools by employing a census method. Grade VIII was purposively selected as it marks a key educational transition to the secondary level. The number of students per school varied from 14 to 135, reflecting significant differences in school size and capacity.

For this study, multiple-choice questions (MCQs) were used as a tool to measure students' academic achievement. To assess their academic achievement, a set of 20 multiple-choice questions, one mark for each correct answer, was prepared for each of four subjects: English, Mathematics, Science, and Social Studies. Questions were developed based on the multiple-choice questions of the National Assessment of Student Achievement (NASA) (Khanal et al., 2022) and the model questions developed by the Curriculum Development Center, CDC (2021), using a self-administered test, which was a classroom test conducted by a researcher with the help of a class teacher.

Study Variables

This study used educational achievement as the outcome variable. The primary independent variable was commuting mode, which was derived from students' responses on their usual commuting method. Commuting modes to school are categorized as active commuting modes (ACS), walking or cycling, and passive commuting modes, such as school buses, public, or private vehicles. In the commuting factors, commuting time and distance were included for further study. In addition to computing time and distance, 17 potential confounding variables were identified and categorized into four groups to control for their influence on educational achievement.

Data Analysis Process

SPSS 27 was used for data analysis. Cross-tabulation was used to describe the characteristics of respondents by percentage and number according to sociodemographic characteristics. Independent sample t-test and one-way ANOVA were employed to assess the bivariate relationship between commuting modes and the educational achievement of students. Variance inflation factors were calculated to check for multicollinearity among predictors, with all values falling below the threshold of 10 (VIF <10), indicating no multicollinearity issues (Shrestha, 2020).

Ethical Considerations

Ethical approval was obtained from the Nepal Health Research Council (NHRC). Written informed consent was obtained from participants before data collection. An artificial intelligence (AI) tool was used for language clarity and structural refinement.

Results and Discussion

Results

Results present the analysis of educational achievements of students by active and passive commuting modes. The analysis identifies differences in educational achievement between students commuting via active and passive modes and considers the impact of student demographics, socioeconomic status, support systems, and student proactiveness.

Characteristics of the Sample

The socio-demographic characteristics of the 918 student participants are shown in Table 1. As shown in Table 1, 918 students are characterized by mode of commuting to school,

demographic, socio-economic status, supportive environment, and students' proactiveness. Among them, 75.1 percent of the students used active commuting modes.

Table 1

Percentage distribution of respondents by variable characteristics

Variables	Commuting mode					
	Passive mode		Active mode		Total	
	N	%	N	%	N	%
Commuting Factors						
Commuting Mode						
Passive					229	24.9
Active					689	75.1
Commuting Time						
≤20 minutes	43	18.8	373	54.1	416	45.3
>20 minutes	186	81.2	316	45.9	502	54.7
Commuting Distance						
$\leq 3\ KM$	136	59.4	480	69.7	616	67.1
$>\ 3\ KM$	93	40.6	209	30.3	302	32.9
Demographic Factors						
Age						
< 13 Year	38	16.6	146	21.2	184	20.0
13 Years	114	49.8	263	38.2	377	41.1
> 13 Years	77	33.6	280	40.6	357	38.9
Sex						
Male	95	41.5	310	45.0	405	44.1
Female	134	58.5	379	55.0	513	55.9
Ethnicity						
Brahmin/Chhetri	105	45.9	187	27.1	292	31.8
Janajati	79	34.5	270	39.2	349	38.0
Dalits	41	17.9	212	30.8	253	27.6
Others	4	1.7	20	2.9	24	2.6
Socio-economic Factors						
Father's Education						
Illiterate	3	1.3	45	6.5	48	5.2
Literate Only	30	13.1	144	20.9	174	19.0
Basic Level	61	26.6	267	38.8	328	35.7
Secondary Level	105	45.9	201	29.2	306	33.3
Higher Level	30	13.1	32	4.6	62	6.8
Mother's Education						
Illiterate	15	6.6	95	13.8	110	12.0
Literate Only	35	15.3	165	23.9	200	21.8
Basic Level	77	33.6	254	36.9	331	36.1
Secondary Level	88	38.4	143	20.8	231	25.2

Higher Level	14	6.1	32	4.6	46	5.0
Father's Occupation						
Agriculture	25	10.9	73	10.6	98	10.7
Household work	3	1.3	9	1.3	12	1.3
Dily wages	22	9.6	164	23.8	186	20.3
Private Job	23	10.0	51	7.4	74	8.1
Gov. Job	26	11.4	53	7.7	79	8.6
Foreign Employment	75	32.8	207	30.0	282	30.7
Business	55	24.0	132	19.2	187	20.4
Mother's Occupation						
Agriculture	27	11.8	73	10.6	100	10.9
Household work	120	52.4	342	49.6	462	50.3
Dily wages	12	5.2	90	13.1	102	11.1
Private Job	15	6.6	42	6.1	57	6.2
Gov. Job	18	7.9	43	6.2	61	6.6
Foreign Employment	11	4.8	46	6.7	57	6.2
Business	26	11.4	53	7.7	79	8.6
Monthly Family income						
Up to 20000	15	6.6	68	9.9	83	9.0
20001-40000	111	48.5	364	52.8	475	51.7
40001-75000	88	38.4	235	34.1	323	35.2
> 75000	15	6.6	22	3.2	37	4.0
Housing ownership						
Self	133	58.1	230	33.4	363	39.5
Relative's Home	12	5.2	47	6.8	59	6.4
Rental House	77	33.6	398	57.8	475	51.7
Gov. Quarter	7	3.1	14	2.0	21	2.3
Supportive Factors						
Parental Support at Home						
No	65	28.4	305	44.3	370	40.3
Yes	164	71.6	384	55.7	548	59.7
Parental Engagement in School Activities						
No	198	86.5	595	86.4	793	86.4
Yes	31	13.5	94	13.6	125	13.6
Supportive Teacher						
No	52	22.7	301	43.7	353	38.5
Yes	177	77.3	388	56.3	565	61.5
Student's Proactiveness Factors						
Participation of ECA						
No	40	17.5	156	22.6	196	21.4
Yes	189	82.5	533	77.4	722	78.6
Regularity of Homework						
No	44	19.2	217	31.5	261	28.4
Yes	185	80.8	472	68.5	657	71.6

Absenteeism from School						
No	177	77.3	437	63.4	614	66.9
Yes	52	22.7	252	36.6	304	33.1
Peer Relation						
Not Good	73	31.9	327	47.5	400	43.6
Good	156	68.1	362	52.5	518	56.4
Total Number	229	100	689	100	918	100

Among active commuters, 54.1 percent reported commuting to school in 20 minutes or less, compared to only 18.8 percent of passive commuters who commuted for the same time. On the other hand, 81.2 percent of passive commuters commuted for more than 20 minutes. Regarding distance, 67.1 percent of students reside within three kilometers or less from the school, with a higher share of them who were active commuters, at 69.7 percent, compared to 59.4 percent of passive commuters. This finding illustrates that active commuting is a more practical option for students living closer to school. Passive commuters were more evenly distributed, with 40.6 percent commuting over three kilometers.

Socio-economic characteristics revealed that 35.7 percent of the students' fathers had completed basic level education, and 33.3 percent of the students' fathers had completed secondary education, while mothers generally had lower educational attainment, with only 5.0 percent having completed higher education and 12.0 percent being illiterate. Passive commuting was more common, 13.1 percent, among students whose fathers had higher education, and 32.8 percent of fathers of passive commuters were engaged in foreign employment. Among mothers, 50.7 percent of mothers' occupations were household work, and 11.1 percent of mothers were engaged in daily wage labor. More than half of the students, that is 51.7 percent, lived in rented accommodations, while 39.5 percent resided in self-owned homes. Higher rates of passive commuting, that is, 58.1 percent, were observed among students from self-owned households.

Supportive environment factors indicated that 59.7 percent of students received parental support at home, with a higher prevalence among passive commuters (71.6%). Parental engagement in school activities was limited overall to 13.6 percent. Teacher support was reported by 61.5 percent of students, with passive commuters again reporting higher rates (77.3%).

Concerning student proactiveness, 78.6 percent of students participated in extracurricular activities, while 71.6 percent submitted their homework regularly. Passive commuters reported a

higher rate of participation in ECA, which is 82.5 percent, and a greater number of passive commuters, 80.8 percent, completed their homework. With respect to absenteeism, active commuters had a higher rate (36.6%) than passive commuters (33.1%). Good peer relationships were reported by 56.4 percent of active commuters, while passive commuters reported an even higher rate (68.1%), again indicating disparities based on the commuting mode to school.

Confounding Factors Associated with Commuting Modes and Achievement

The analysis of students' educational achievement was between modes of commuting. It takes into account commuting factors, socio-economic factors, supportive environment, and students' proactiveness. Educational achievement was measured by mean score, and the score was analyzed by demographic and socio-economic subgroups for the purpose of establishing distinctions. Key variables contained characteristics such as age, sex, ethnicity, parental education and occupation, family income, housing status, and various school- and home-based supports across modes of commuting to school. Statistical significance (p-values) determined the extent to which commuting mode interacted with each factor in producing variation in academic outcomes, as further outlined in Table 2.

Table 2

Students' Mean Educational Achievement Scores by Commuting Mode and Background Characteristics, with Associated P-Values

Variables	Commuting Mode to School				Total		
	Passive		Active				
	Mean	P-value	Mean	P-value	N	Mean	P-value
Commuting Related Factors							
Commuting Mode							
Passive					229	13.54	<.001
Active					689	11.49	
Commuting Time							
≤20 minutes	14.01	.291	11.58	.321	416	11.83	.106
>20 minutes	13.44		11.38		502	12.14	
Commuting Distance							
≤3 Km	13.43	.520	11.48	.982	616	11.91	.207
>3Km	13.71		11.49		302	12.17	
Demographic Factors							
Age							
< 13 Year	13.49	.100	11.92	<.001	184	12.24	<.001
13 Years	13.96		11.72		377	12.40	
> 13 Years	12.95		11.04		357	11.46	
Sex							
Male	13.61	.787	11.63	.178	405	12.10	.359
Female	13.49		11.36		513	11.92	

Ethnicity							
Brahmin/Chhetri	14.89	<.001	12.37	<.001	292	13.28	<.001
Janajati	12.61		11.33		349	11.62	
Dalits	11.92		10.88		253	11.05	
Others	13.25		11.75		24	12.00	
Socio-economic Factors							
Father's Education							
Illiterate	13.67	<.001	10.72	<.001	8	10.91	<.001
Literate only	12.63		11.10		174	11.36	
Basic Level	12.51		11.20		328	11.45	
Secondary Level	13.68		12.09		306	12.63	
Higher Level	16.06		12.91		62	14.43	
Mother's Education							
Illiterate	10.52	<.001	11.28	<.001	110	11.18	<.001
Literate only	11.89		10.89		200	11.07	
Basic Level	13.13		11.46		331	11.85	
Secondary Level	14.61		11.82		231	12.89	
Higher Level	16.45		13.83		46	14.63	
Father's Occupation							
Agriculture	13.35	.178	11.66	<.001	98	12.09	<.001
Household work	12.67		13.11		12	13.00	
Dily wages	12.13		10.76		186	10.92	
Private Job	13.91		10.81		74	11.78	
Gov. Job	14.77		11.75		79	12.75	
Foreign Employment	13.47		11.64		282	12.12	
Business	13.61		12.10		187	12.54	
Mother's Occupation							
Agriculture	13.14	.817	11.40	<.001	100	11.87	<.001
Household work	13.75		11.54		462	12.12	
Dily wages	13.23		10.55		102	10.87	
Private Job	13.72		12.08		57	12.51	
Gov. Job	13.78		12.15		61	12.63	
Foreign Employment	13.86		10.89		57	11.46	
Business	12.74		12.33		79	12.47	
Monthly Income of Household							
Up to 20000	11.95	<.010	10.82	<.001	83	11.02	<.001
20001-40000	13.09		11.26		475	11.69	
40001-75000	14.14		11.96		323	12.55	
More than 75000	15.03		12.24		37	13.37	
Housing Ownership							
Own house	14.22	<.010	11.70	.150	363	12.63	<.001
Relative's house	12.65		11.66		59	11.86	
Rental house	12.59		11.38		475	11.58	
Gov. quarter	12.64		10.30		21	11.08	
Supportive Environment Factors							
Parental Support at Home							
No	11.50	<.001	10.38	<.001	370	10.58	<.001
Yes	14.35		12.36		548	12.96	
Parental Engagement in School Activities							
No	13.55	.960	11.49	.944	793	12.00	.925

Yes	13.52		11.47		125	11.98	
Supportive Teacher							
No	10.37	<.001	9.79	<.001	353	9.88	<.001
Yes	14.47		12.80		565	13.32	
Student's Proactiveness Factors							
Participation in ECA							
No	12.73	.076	11.02	<.050	196	11.37	<.001
Yes	13.71		11.62		722	12.17	
Regularity of Homework							
No	8.84	<.001	9.20	<.001	261	9.14	<.001
Yes	14.66		12.54		657	13.14	
Absent from School							
No	14.63	<.001	12.62	<.001	614	13.20	<.001
Yes	9.84		9.51		304	9.57	
Peer Relation							
Not Good	10.60	<.001	9.73	<.001	400	9.89	<.001
Good	14.92		13.07		518	13.63	
Overall	13.54		11.49		918	12.00	

Commuting Factors

The educational achievement of students who used passive mode of commuting (mean=13.54) was statistically and significantly (mean=11.49, P<0.001) higher than that of students who used active modes of commuting. Notably, neither commuting time nor distance had a statistically significant association with educational achievement within both commuting modes.

Demographic Factors

The age group below 13 years of age scored significantly (p<0.001) higher within active commuting modes, with a mean of 11.92, compared to the age group above 13 years with a mean score of 11.04. The differences in sex in the mean score were negligible and not statistically significant. Ethnicity as an indicator of educational achievement was particularly stark, with Brahmin/Chhetri students obtaining the highest mean scores within both modes of commuting (p<0.001), consistently scoring higher than students in other ethnicities and groupings.

Socio-economic Factors

Students whose parents had higher education exhibit significantly (p<0.001) higher educational achievement within both commuting groups. Similarly, occupational differences among parents further explain variation in educational achievement. Students whose parents are engaged in government jobs or business demonstrate significantly (p<0.001) higher educational achievement compared to those whose parents work as daily wage laborers only in active commuting groups. Family income is positively associated with achievement; students from

families earning above NPR 75,000 monthly scored 15.03 (passive) and 12.24 (active), indicating a significant ($p<0.010$) association only within passive commuters and ($p<0.001$) within active commuters. Housing ownership plays a significant ($p<0.010$) role in educational achievement among passive commuters; students in self-owned homes score higher on 14.22 compared to those living in rented and government-provided housing.

Supportive Factors

Students who get parental support at home for educational activities achieve significantly ($p<0.001$) higher mean scores (14.35 for passive and 12.36 for active) within both commuting groups. If the students feel the teacher is supportive, they perform well in educational achievement. Students who report that their teachers are supportive achieve significantly ($p<0.001$) higher mean scores within both commuting groups. In contrast, students who did not have this supportive environment consistently scored lower and faced additional challenges.

Student's Proactiveness

Students' proactiveness, such as participating in extracurricular activities (ECA), completing homework, attending school regularly, and having positive peer relationships play a crucial role in better educational achievement. Students who participate in (ECA) exhibit significantly ($p<0.050$) better educational achievement than active commuters. Similarly, those students who have regular homework completion, regular school attendance, and good peer relations perform significantly ($p<0.001$) higher educational achievement within both commuting groups.

Discussion

The mode of commuting has a direct effect on the educational achievement of students; however, the variation observed within each commuting mode demonstrates that other additional factors, such as socio-demographic characteristics, socio-economic status, supportive environments, and the level of proactiveness among students, also play a significant role in shaping educational achievement. However, similar to the study by Ruiz-Hermosa et al. (2019), this study also showed that the time spent commuting for both passive and active transportation modes and the distance to school had no significant impact on students' academic achievement. Although he used a maximum travel time of 60 minutes.

Demographic differences, especially in age and ethnicity, were also evident in both groups. Younger students below 13 years who commute passively tend to achieve higher

educational achievement than older students, and a similar trend is evident among students who commute actively. This might indicate that older students in the same grade do not necessarily show better educational achievement compared to their younger peers, and they are more likely to experience fewer opportunities or exhibit challenges in their abilities because of their early entry to school decisions. This phenomenon, known as the relative age effect, was also observed by Navarro et al. (2015), who found that students older or younger than the average age in their classroom tended to show educational achievement. This could be associated with the developmental advantages experienced during early adolescence, which potentially increase cognitive ability, motivation, and the capacity to learn.

The finding demonstrated an intersection between caste and ethnicity, historically associated with education access, parental literacy, and social capital that contribute to achievement gaps even when students have similar structures in place (Bennett et al., 2008; Egede et al., 2024; Gellner, 2007). Closing these educational achievement gaps will mean addressing education-oriented social stratification based on ethnic and sex discrimination (Bécares & Priest, 2015). Commuting mode continues to exert influence over educational achievement, within both commuting modes, although its effect appears mediated by several socio-economic and contextual factors (Alfaro et al., 2025). These results are also consistent with evidence globally that family socio-economic status, especially parental education (Magnuson, 2007; Reina-Gutiérrez et al., 2021), occupation, and family income were strong predictors of students' educational achievement in both the passive and active commuters group (Dubow et al., 2009; Sirin, 2005).

The noticeable positive association between family income and educational achievement, as revealed through one-way ANOVA and independent sample t-test, is consistent with previous findings which illustrate the role of economic capital for academic achievement (Duncan et al., 2017; Mottaleb et al., 2019; UNICEF, 2023). The pattern in family income and educational achievement for both the passive and active groups suggests that financial stability likely augments the ability to access educational resources, reduces stress experienced as a result of poverty, and develops a supportive home learning environment, all of which enhance the educational achievement of students in the study. Erola et al. (2016) found that these socio-economic advantages served as a channel to improved educational achievement, through factors such as parental involvement and access to educational resources.

Supportive environmental factors that were parental support at home, parental engagement in school activities, and supportive teachers were identified as significant factors of educational achievement for students within both passive and active commuting modes. This supports the findings of Fan and Chen (2001), who emphasized that parental involvement promotes educational achievement because parental involvement promotes motivation and learning, discipline, and self-regulation. Notably, parental engagement in school activities did not indicate a statistically significant difference in achievement in either group and potentially indicates that home-based support may have a more immediate effect and is more important for student achievement (Đurišić & Bunijevac, 2017) than participation in school activities.

Teacher support contributed to the achievement of students with higher average scores in both travel modes, which is also confirmed by Hattie (2009). Therefore, Gyeltshen and Gyeltshen (2022) emphasized the essential importance of teacher-student relationships in enhancing students' academic achievement. It is these supportive environments, particularly parental support at home, parental support in school-related activities, and teacher support, that are seen as critical influences on students' educational achievement. These findings are consistent with prior research demonstrating that active parental engagement and supportive teachers contribute to better educational achievement (Boberiene, 2013; Kelty & Wakabayashi, 2020; Pandit & Adhikari, 2024).

Student proactiveness variables, including participation in extracurricular activities (ECA), regular completion of homework, attendance, and peer relationships, also differentiated educational achievement for both commuting groups. Participation in extracurricular activities and consistent homework completion were positively associated with educational achievement for both commuting modes. This is consistent with Mitra (2018) and Zimmerman (2013), who report that self-efficacy and self-regulated learning contribute to levels of educational achievement. Similarly, Carbonaro and Maloney (2019) and Kakungulu Samuel (2024) emphasize that ECA engagement contributes to social skill development, better time management, and a sense of belonging, and these dimensions shape educational achievement.

Conversely, school absenteeism has a significant negative association with educational achievement. This supports the literature on the adverse implications of attending school only sporadically. Absenteeism causes students to miss learning opportunities, disrupts the pacing of learning, and limits exposure to instructional material. This is consistent with existing literature

indicating that missing school disrupts learning continuity, reduces instructional time, and causes negative educational achievement (Gottfried, 2010; Keppens, 2023). Habitual absenteeism can also widen learning gaps and decrease student engagement, both of which are components within educational achievement (Chang & Romero, 2008; Jain & Jain, 2023). The impact of absenteeism affirms the importance of being present in school to maintain advancement toward educational achievement with minimal disruption to learning. Peer relationships had an important influence on academic achievement, with students reporting positive peer relationships achieving higher mean scores in both commuting groups, when compared to their peers who described negative peer associations. These findings are aligned with findings from Knox (2024) and Shao et al. (2024), who reported that positive peer relations enhance students' perception of belonging and facilitate the adoption of common academic tenets among peers, which allow for effective learning behavior and sustainability in recognizing educational achievement.

This study has several limitations that should be acknowledged. First, the cross-sectional design identifies strong associations but cannot establish causality. While passive commuting is linked to higher achievement, socio-economic status is likely the underlying factor influencing both commuting choice and academic outcomes. Second, the findings are based on students from community schools in a single metropolitan area in Nepal and may not be generalizable to students in private schools, rural areas, or other cultural contexts. Finally, data on family income and parental support were self-reported by students, which may be subject to recall or social desirability bias. Future longitudinal research could help untangle the causal pathways between these variables.

Conclusion and Implications

Passive commuters tend to have better academic achievement than active commuters, as they come from families with better socio-economic status, more supportive environments at home and at school, and more educational resources. Students' educational achievement can be improved by improving parental education, teachers' supportive behavior toward students, participation in extracurricular activities, regular homework completion, regular school attendance, and strengthening peer relationships. Student mobility patterns indicate systemic inequalities and inequities in low- and middle-income societies. To increase overall educational achievement and reduce disparities, education policies should prioritize encouraging students to participate in extracurricular activities, making teachers more student-friendly, increasing

motivation to complete homework, reducing absenteeism, and creating opportunities to build relationships with peers. Opportunities for educational achievement can be increased by reducing inequalities arising from commuting patterns.

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Competing interests

There is no conflict of interest with any of the authors.

Data availability

Data is secure with the first and corresponding author and can be made available if necessary.

References

Alfaro, E., Valle, E., Valle-Escolano, R., & Useche, S. A. (2025). Parenting 'on the move'? Active school commuting is linked to parents' well-being and children's academic performance. *Wellbeing, Space Society*, *8*, 100271. https://doi.org/10.1016/j.wss.2025.100271

AlQuhtani, S. (2023). Factors affecting active commuting to school in sprawled cities: The case of Najran City, Saudi Arabia. *Sustainability*, *15*(12), 9562. https://doi.org/10.3390/su15129562

Bécares, L., & Priest, N. (2015). Understanding the influence of race/ethnicity, gender, and class on inequalities in academic and non-academic outcomes among eighth-grade students: Findings from an intersectionality approach. *PloS One*, *10*(10), e0141363.

Bennett, L., Dahal, D. R., & Govindasamy, P. (2008). *Caste, ethnic and regional identity in Nepal* (Caste, Ethnic and Regional Identity in Nepal, Further Analysis of the 2006 Nepal Demographic and Health Survey, Issue). https://www.dhsprogram.com/pubs/pdf/FA58/FA58.pdf

Boberiene, L. V. (2013). Can policy facilitate human capital development? The critical role of student and family engagement in schools. *American journal of Orthopsychiatry*, *83*(2-3), 346. https://doi.org/10.1111/ajop.12041

Carbonaro, W., & Maloney, E. (2019). Extracurricular activities and student outcomes in elementary and middle school: Causal effects or self-selection? *Socius*, *5*, 2378023119845496. https://doi.org/10.1177/2378023119845496

Chang, H. N., & Romero, M. (2008). *Present, engaged, and accounted for: The critical importance of addressing chronic absence in the early grades. Report*. National Center for Children in Poverty, Issue. N. C. f. C. i. Poverty. https://eric.ed.gov/?id=ED522725

Chillon, P., Ortega, F. B., Ruiz, J. R., Veidebaum, T., Oja, L., Mäestu, J., & Sjöström, M. (2010). Active commuting to school in children and adolescents: An opportunity to increase physical activity and fitness. *Scandinavian Journal of Public Health*, *38*(8), 873-879. https://doi.org/10.1177/1403494810384427

Curriculum Development Centre [CDC]. (2021). *Specification grid and model question 2078*. Curriculum Development Centre. https://moecdc.gov.np/en/specification-grid

Dubow, E. F., Boxer, P., & Huesmann, L. R. (2009). Long-term effects of parents' education on children's educational and occupational success: Mediation by family interactions, child aggression, and teenage aspirations. *Merrill-Palmer Quarterly*, *55*(3), 224. https://doi.org/10.1353/mpq.0.0030.

Duncan, G. J., Magnuson, K., & Votruba-Drzal, E. (2017). Moving beyond correlations in assessing the consequences of poverty. *Annual Review of Psychology*, *68*(1), 413-434. https://doi.org/10.1146/annurev-psych-010416-044224

Đurišić, M., & Bunijevac, M. (2017). Parental involvement as a important factor for successful education. *Center for Educational Policy Studies Journal*, *7*(3), 137-153. https://doi.org/10.26529/cepsj.291

Egede, L. E., Walker, R. J., & Williams, J. S. (2024). Addressing structural inequalities, structural racism, and social determinants of health: A vision for the future. *Journal of General Internal Medicine*, *39*(3), 487-491. https://doi.org/10.1007/s11606-023-08426-7

Erola, J., Jalonen, S., & Lehti, H. (2016). Parental education, class and income over early life course and children's achievement. *Research in Social Stratification Mobility*, *44*, 33-43. https://doi.org/10.1016/j.rssm.2016.01.003

Fan, X., & Chen, M. (2001). Parental involvement and students' academic achievement: A meta-analysis. *Educational Psychology Review*, *13*(1), 1-22. https://doi.org/10.1023/A:1009048817385

Faulkner, G. E., Buliung, R. N., Flora, P. K., & Fusco, C. (2009). Active school transport, physical activity levels and body weight of children and youth: A systematic review. *Preventive Medicine*, *48*(1), 3-8. https://doi.org/10.1016/j.ypmed.2008.10.017

Garcia-Hermoso, A., Saavedra, J. M., Olloquequi, J., & Ramirez-Velez, R. (2017). Associations between the duration of active commuting to school and academic achievement in rural Chilean adolescents. *Environ Health Prev Med*, *22*(1), 31. https://doi.org/10.1186/s12199-017-0628-5

Gellner, D. N. (2007). Caste, ethnicity and inequality in Nepal. *Economic and Political Weekly*, 1823-1828. https://www.jstor.org/stable/4419601

Gottfried, M. A. (2010). Evaluating the relationship between student attendance and achievement in urban elementary and middle schools: An instrumental variables approach. *American Educational Research Journal*, *47*(2), 434-465. https://doi.org/03102/0002831209350494

Gyeltshen, S., & Gyeltshen, N. (2022). The impact of supportive teacher-student relationships on academic performance. *Asian Journal of Advanced Research and Reports*, *16*(12), 15-34. https://doi.org/10.9734/AJARR/2022/v16i12446

Hanushek, E. A., & Woessmann, L. (2008). The role of cognitive skills in economic development. *Journal of Economic Literature*, *46*(3), 607-668. https://doi.org/10.1257/jel.46.3.607

Hattie, J. (2009). The argument: Visible teaching and visible learning. In *visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge. https://doi.org/10.4324/9780203887332

Jain, C., & Jain, R. (2023). Chronic absenteeism and its impact on the learning outcomes of primary grade students in India. *Margin: The Journal of Applied Economic Research*, *17*(1-2), 124-162. https://doi.org/10.1177/00252921231197536

Kakungulu Samuel, J. (2024). The role of extracurricular activities in student development. *Eurasian Experiment Journal of Humanities and Social Science*, *5*(2), 26-30. https://www.researchgate.net/publication/383550810

Kelty, N. E., & Wakabayashi, T. (2020). Family engagement in schools: Parent, educator, and community perspectives. *SAGE Open*, *10*(4), 2158244020973024. https://doi.org/10.1177/2158244020973024

Keppens, G. (2023). School absenteeism and academic achievement: Does the timing of the absence matter? *Learning and Instruction*, *86*, 101769. https://doi.org/10.1016/j.learninstruc.2023.101769

Khanal, B., Bishwakarma, A., Acharya, S. P., Acharya, D., & Bhatta, L. D. (2022). *National assessment of student achievement 2020 main report*. file:///C:/Users/Acer/Downloads/National%20Assessment%20of%20Students%20Achievement%202020.pdf

Knox, P. (2024). Examining the influence and implications of peer relationships on the academic motivation and college and career readiness of rural adolescents. *Theory Practice in Rural Education*, *14*(1), 73-98. https://doi.org/10.3776/tpre.2024.v14n1p73-98

Ko, J., Lee, S., & Byun, M. (2019). Exploring factors associated with commute mode choice: An application of city-level general social survey data. *Transport Policy*, *75*, 36-46. https://doi.org/10.1016/j.tranpol.2018.12.007

Magnuson, K. (2007). Maternal education and children's academic achievement during middle childhood. *Developmental psychology*, *43*(6), 1497. https://doi.org/10.1037/0012-1649.43.6.1497

Mitra, D. (2018). Student voice in secondary schools: The possibility for deeper change. *Journal of Educational Administration*, *56*(5), 473-487. https://doi.org/10.1108/JEA-01-2018-0007

Mottaleb, K. A., Rahut, D. B., & Pallegedara, A. (2019). Spending privately for education in Nepal. Who spends more on it and why? *International Journal of Educational Development*, *69*, 39-47. https://doi.org/10.1016/j.ijedudev.2019.102076

Navarro, J.-J., García-Rubio, J., & Olivares, P. R. (2015). The relative age effect and its influence on academic performance. *PLoS One*, *10*(10), e0141895. https://doi.org/10.1371/journal.pone.0141895

Pandit, S., & Adhikari, R. (2024). Effect of internal migration of families on the educational achievement of their children. *Asian Journal of Population Sciences*, *3*, 83-97. https://doi.org/10.3126/ajps.v3i1.61835

Panter, J. R., Jones, A. P., & Van Sluijs, E. M. (2008). Environmental determinants of active travel in youth: a review and framework for future research. *International Journal of Behavioral Nutrition Physical Activity*, *5*, 1-14. https://doi.org/10.1186/1479-5868-5-34

Phansikar, M., Ashrafi, S. A., Khan, N. A., Massey, W. V., & Mullen, S. P. (2019). Active commute in relation to cognition and academic achievement in children and adolescents: A systematic review and future recommendations. *International Journal of Environmental Research Public Health*, *16*(24), 5103. https://doi.org/10.3390/ijerph16245103

Power, C., & Fitzpatrick, P. (2023). Child and adolescent patterns of commuting to school. *Preventive Medicine Reports*, *36*, 102404. https://doi.org/10.1016/j.pmedr.2023.102404

Reina-Gutiérrez, S., Martínez-Vizcaíno, V., Torres-Costoso, A., de Arenas-Arroyo, S. N., Saz-Lara, A., & Sánchez-López, M. (2021). Maternal education and academic achievement in Schoolchildren: The role of Cardiorespiratory Fitness. *The Journal of Pediatrics*, *232*, 109-117. e101. https://doi.org/10.1016/j.jpeds.2021.01.047

Ruiz-Hermosa, A., Álvarez-Bueno, C., Cavero-Redondo, I., Martínez-Vizcaíno, V., Redondo-Tébar, A., & Sánchez-López, M. (2019). Active commuting to and from school,

cognitive performance, and academic achievement in children and adolescents: A systematic review and meta-analysis of observational studies. *International Journal of Environmental Research Public Health*, *16*(10), 1839. https://doi.org/10.3390/ijerph16101839

Shao, Y., Kang, S., Lu, Q., Zhang, C., & Li, R. (2024). How peer relationships affect academic achievement among junior high school students: The chain mediating roles of learning motivation and learning engagement. *BMC psychology*, *12*(1), 278. https://doi.org/10.1186/s40359-024-01780-z

Sharma, S., & Levinson, D. (2019). Travel cost and dropout from secondary schools in Nepal. *Transportation Research Part A: Policy Practice*, *130*, 385-397. https://doi.org/10.1016/j.tra.2019.09.010

Shrestha, N. (2020). Detecting multicollinearity in regression analysis. *American Journal of Applied Mathematics Statistics*, *8*(2), 39-42. https://doi.org/10.12691/ajams-8-2-1

Sirin, S. R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research*, *75*(3), 417-453. https://doi.org/10.3102/00346543075003417

Tharu, R. P. (2024). Examining the factors affecting students' academic performance in Nepal. *Asian Journal of University Education*, *20*(3), 883-898. https://doi.org/10.24191/ajue.v20i3.5789

UNESCO. (2015). *Education for All 2000-2015: Achievements and challenges: EFA Global Monitoring Report*. United Nations Educational, Scientific and Cultural Organization. https://books.google.com.np/books?id=T-PvCAAAQBAJ

UNICEF. (2023). *Nepal Education Fact Sheets, 2022*. https://tinyurl.com/54a3tv44

Zimmerman, B. J. (2013). Theories of self-regulated learning and academic achievement: An overview and analysis. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement: Theoretical perspectives*. Routledge. https://doi.org/10.4324/9781410601032