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Effect of Present Bias on Dropout Among Higher Secondary Children in Tribal and Urban Region in Maharashtra

Apoorva Lalwani[1*], Vini Sivanandan[2]
[1]Research Scholar, Gokhale Institute of Politics and Economics, Deccan Gymkhana, Pune, Maharashtra 411004, India
[2]Assistant Professor, Population Research Centre, Gokhale Institute of Politics and Economics, Deccan Gymkhana, Pune, Maharashtra 411004, India

ABSTRACT

Leaving higher secondary education has lasting impact on not just the individual but also on the society and economy at large. With government's efforts the enrolment rate has increased but the transition rate is still considerably low at higher secondary education in India. This creates a persisting skill gap in the country. The present article is a novel attempt to understand the behavioural factors associated with dropping out. The study is based on primary survey conducted in Pune city and Tribal area of Mahad in Maharashtra among children between 16-20 years of age. The study captures the impact of present bias/ delay discounting, a cognitive bias, along with socio-economic and demographic variables. Employing cluster analysis and multivariate analysis it was highlighted that children with low present bias behaviour are 4 times less likely to dropout from school and children with higher standard of living index are 4 percent less likely to dropout. It was also found that boys are more likely to leave school, additionally, age is a significant determinant of dropping out. It was further elicited that SLI, and education of parents and siblings significantly impacts present bias/ delay discounting behaviour among children. The findings imply that low-cost nudges such as commitment devices, inculcating positive identities and emphasising long run benefits of education can overcome present bias among children thereby increasing their education progression.

Keywords: Present bias, Delay Discounting, Higher secondary, Dropout, Education Behaviour

INTRODUCTION

India is one of the largest and fastest-growing economies in the world with its GDP growing at an annual rate of 6.4 percent (Economic Survey of India, 2024-25). It has a demographic dividend to its side, with fifty percent of the population below 27.6 years of age[†]. In the emerging era of globalisation and ever-changing technology, a declining workforce, and aging populations in developed countries (Maestas et al., 2023; Aiyar et al., 2016), India with its largest young population has the opportunity to position itself as a key source of skilled manpower for the world. India has a wide window of opportunity for encashing the demographic dividend (Golley & Tyers, 2012; Mody et al., 2011). While there is opportunity in terms of demographic dividend, persisting skill gap remains a major roadblock (Okada, 2013). Thus, for a developing and a dynamic economy, dropping out is a menace.

According to Unified District Information System for Education Plus report (2023-24), over the years there is an increment in gross enrolment ratio (GER) at all levels of education,

* Corresponding Author
† https://www.worldeconomics.com/Demographics/Median-Age/India.aspx

however, the transition rate at each level tells another story altogether. Transition rate in India drops significantly post upper primary level. From upper primary to secondary the transition rate is 83.2 percent, and from secondary to higher secondary is 71 percent (UDISE, 2023-24).

There are studies that have adequately analysed socioeconomic, demographic and familial reasons of dropping out in the Indian context. Mali et al. (2012) conducted a study in urban slums in Maharashtra highlighting that socioeconomic class is the most dominant reason of dropping out among children. The study noted that children after 15 years of age have higher chances of dropping out. Religion is also one of the important factors affecting education attainment. The study showed negligible sex differentials with respect to dropout decision making. Gouda & Sekher (2014) conducted a study on the education related variables of the National Family Health Survey 3 to identify the factors affecting the dropout decision among children aged 6-16 in India. They noted that dropout among girls is higher (15.2 percent) than boys (11.3 percent) in India. The study also noted that dropout rate increases at the post primary level of education. The most important reason to discontinue school was that students were not interested in studies that basically amount to students not valuing their future self enough. Furthermore, rural areas saw higher dropouts. High expenditure on education, familial duties, working outside of home, repeated failures were among other reasons to drop out of school. The logistics multivariate analysis highlighted that household size, number of children alive, parents' education, mother's media exposure, occupation status of parents played significant role in the decision to drop out.

Choudhury (2016) highlights the role of parental bonding and familial duties play a significant role in the decision of dropping out among children. The study is a multivariate logistic regression analysis of data collected from government and government aided schools of Guwahati. Apart from that the study also highlights students' interest in studies/concern for doing well in studies and school as the most important variable to predict the decision to drop out among children. Religions, caste, parents' education, number of siblings, size of households, socio-economic status are predictors associated with dropping out/leaving of school. Kumar & Kugler (2011) use gender of the first child as an instrument variable. The study based in the Indian context elicits the impact of size of family on education attainment increasing the sibling number by one reduces the average year of schooling by almost one quarter of a year and attendance by 1 to 2 percent.

ASER (2023) report showed that learning outcomes have deteriorated in government schools with respect to functional numeracy and literacy skills. The longitudinal panel study conducted by Nakajima et al. (2018) in Andhra Pradesh firstly highlighted those critical stages where dropout risk is higher. They identified completion of the upper primary level and upper secondary entry were two stages that needed consideration. The analysis conducted noted that basic literacy level (functional numeracy and literacy) acquired till the age of 12 was an essential parameter in predicting continuity of education at both the critical stages mentioned above. Furthermore, dependency ratio, parents' education, availability of nearby factories and time spent on household chores were found important factors in attainment of education and number of years of schooling.

Lately, studies focusing on dropout behaviour among children have started analysing more nuanced reasons to dropping out. Kumar et al. (2023) conducted a longitudinal study with UDAYA (Understanding the lives of young adults and adolescents) data in Uttar Pradesh & Bihar. The study while re-emphasizing the already researched determinants to dropout such as wealth, caste, religion, gender, parents' education, engagement in paid work, marital status particularly for girls, etc. also highlighted some new factors that have a considerable impact on the dropouts such as involvement in sports, substance abuse, having a role model, parental interaction, discrimination practices in favour of boys as reasons of dropping out. Furthermore, lack of interest in studies was another significant

reason for dropping out highlighted in the study.

Paul et al. (2021) conducted a panel study with IHDS data to examine the impact of parental participation during children's primary level of schooling on the education outcomes in the secondary level of schooling. This evidence shows that parents who did not participate in parent teacher meetings, did not discuss academic progress with the teacher and did not supervise their homework during primary school had higher chances of dropping out during adolescence. Furthermore, the study noted that public schools showed higher dropouts than private schools due to shortage of teachers and poor performance of students at school. Private schools with better infrastructure and higher cost of schooling outperform students attending public schools. Students with lower grades or grade repetition have higher chances of quitting school. Moreover, like previous studies current study highlights the importance of income, parents' education attainment and caste on students' decision to drop out.

Behr et al. (2021) highlight that leaving education system without a degree is a long and complex decision-making process that depends on a combination of several reasons. In line with previous findings, descriptive and cluster analysis revealed that there is rarely a single reason, or reasons of a single type that lead students to leave university. To effectively reduce dropout rates, programs must focus on dealing with the most relevant motive, which according to the study was found to be lack of interest in the field of study and wrong expectations. Doll et al. (2013) in their study highlighted the recent trend in research that specifically note falling out as a major factor for dropping out in 10th and 12th graders as disengagement with school sets in during later high school years eliciting 10th and 12th graders are not valuing the future enough.

To that end, there is an emergence of using behavioural economics in the field of education, where economists integrate psychology, neuroscience, and sociology to understand the subjects' decision making. Behavioural economists have split individual's thinking in two systems- system 1 and system 2. System 1 thinking is quick and is based on intuition and heuristics and system 2 thinking is based on cognition and deliberation between current and future payoffs (Daniel, 2017). As immediate rewards are more salient than future payoffs- children and adolescents and sometimes even adults behave myopically. Present bias/ delay discounting behaviour has implications on education behaviour - such as completing homework, caring for grades/school performance, studying for exams and deciding to continue education, as such present bias or delay discounting is defined as a subject's tendency to choose smaller sooner reward vis a vis. larger later reward (Lavecchia et al., 2016). Myopic behaviour leads to suboptimal outcomes implying great welfare loss in the future (O'Donoghue & Rabin, 1999).

Carrillo (2020) highlights the long-term impact of coffee boom on the education attainment among children in Colombia, noting that sudden positive income shocks in coffee leads to lower investment in education among school going children and consequently lower income in adulthood. The study explains that this behaviour arises because children and adolescents highly discount their future in lieu of temporary small and immediate rewards. School going children in various age groups dropout because they value immediate income gains over long term benefits of education. Children and adolescents lack forward looking behaviour and reasoning due to underdeveloped prefrontal cortex part of the brain (Lavecchia et al., 2016). Neuroimaging have shown that pre-frontal cortex responsible for planning, cognition and self-control takes twenty years to mature. This makes teenagers and adolescents more susceptible to distractions and over-emphasizing the present. While mid-brain area called the limbic system responsible for registering rewards, desires and pleasures is fully developed. This relative mismatch between development of the limbic system and executive functions gives rise to time inconsistency which is most appropriately explained by the hyperbolic discounting (Lavecchia et al., 2016). Hence it is essential to study the role

present bias or delay discounting behaviour in their decision to continue schooling among adolescence.

To that end, the current study is a novel attempt to elicit the impact of present bias/ delay discounting behaviour on the decision to dropout while controlling socio-economic and demographic variables. The study is targeted at adolescents/ teenagers aged 16-20 years.

METHODOLOGY

The current study is conducted in Pune city and tribal area of Mahad in Maharashtra. The two very diverse areas were chosen for a representative sample. Pune city is diverse in population with more opportunities while tribal area of Mahad is more homogenous population with limited opportunities and is not as advanced (Daripa, 2017). Mani et al. (2013) in their experimental analysis elicit that poverty induces mental stress/load thus reducing cognitive abilities. Also, the research has established that more liquidity constraints lead to subjects appearing more present bias. Cassidy (2018) elicits that causation runs from subjects in poverty to appearing more present bias than vice versa. Mishra & Lalumière (2017) highlight people from lower socioeconomic strata show higher delay discounting behaviour. Hence the study is conducted among students and dropouts of government schools where more children from lower socioeconomic backgrounds enrol.

The sample size is 203 encompassing tribal dropout (=51), urban dropouts (=34), tribal non dropout (=47) and urban non-dropout (=71). The power calculation is based on Maharashtra's dropout rate at higher secondary level which is 1.4 percent according to Maharashtra'sEconomic Survey 2022-23. The power calculation suggests the ideal sample size to be 22.The study thus keeps n>30 for all groups for reliable results. The schools were selected through convenient sampling and the students (non- dropouts at higher secondary level) were selected through simple random sampling while dropouts (aged 16 to 20) were selected through snowball sampling.

To measure present bias behaviour a hypothetical ascending delay discounting task was devised where in the larger later reward was always the same i.e. 100 rupees. and smaller sooner reward changed in increments of 5 rupees going up from 10 to 100 rupees. The task was done in three different delays – one week, one month and three months (Burns et al., 2020). Hyperbolic discounting model (Kirby & Maraković, 1995) was employed using the Bayesian analysis to find discount parameter for each subject/participant (Vehtari et al., 2017, 2022). Structured household questionnaire was employed to collect household related information such as religion, standard of living, age, gender, parents' education etc. The variables were taken according to previous literature. The educational qualifications of parents and siblings were categorised in categories such as- primary, secondary and graduation and above. The educational qualifications were converted into an education index through principal component analysis. Standard of living index was also categorised into low, medium and high. To understand how various variables affected the decision to drop out among adolescence- correlation, cluster analysis and logistic multivariate regression analysis was conducted.

RESULTS

According to Table 1, there is a high correlation between standard of living and educational qualifications of family members as depicted. Table 1 shows that there is a high correlation between mother's education and standard of living; and father's education and standard of living (SLI). Correlation between sibling's education and standard of living is significant but not very high.

Table 1: Pair wise correlations

Variables	(1)	(2)	(3)	(4)
(1) Father'sEducation	1.000			
(2) Mother'sEducation	0.655*	1.000		
	(0.000)			
(3) Sibling'sEducation	0.272*	0.196*	1.000	
	(0.001)	(0.015)		
(4) SLI	0.418*	0.516*	0.159*	1.000
	(0.000)	(0.000)	(0.046)	

*Note: *** p<0.01, ** p<0.05, * p<0.1*

Additionally, there is significant correlation between mother's education, father's education and sibling's education. Thus, for further analysis, an educational qualification index is created using the principal component analysis.

Furthermore, by employing cluster analysis, 2*2 contingency table shows that higher standard of living leads to lesser dropout (see Table 2). Additionally, it can be also seen in Table 3 that higher education of parents and siblings affects decision to continue school positively.

Table 2: Tabulation of SLI and Dropouts

3 quintiles of SLI	Dropout (Yes/No)		
	0(No)	1(Yes)	Total
1 (Low)	9	63	72
	7.38	77.78	35.47
2 (Medium)	54	12	66
	44.26	14.81	32.51
3 (High)	59	6	65
	48.36	7.41	32.02
Total	122	81	203
	100.00	100.00	100.00

Note: Pearson chi2(2) = 106.5065 Pr = 0.000

Table 3: Tabulation of Education Index (EDI) and Dropouts

3 quintiles of EDI	Dropout (Yes/No)		
	0 (No)	1 (Yes)	Total
1 (Low)	14	37	51
	19.18	46.25	33.33
2 (Medium)	33	35	68
	45.21	43.75	44.44
3 (High)	26	8	34
	35.62	10.00	22.22
Total	73	80	153
	100.00	100.00	100.00

Note: Pearson chi2(2) = 19.6817 Pr = 0.000

The study also analyses if education index and standard of living have an impact on the present bias behaviour among children. It is shown in the table below that children with higher familial education index have lower present bias behaviour. Table 5 also elicits that children with higher SLI have lower present bias behaviour.

Table 4: Tabulation of EDI and Present Bias (Measured through K parameter)

3 quintiles of EDI	2 quintiles of K parameter		
	1 (Low)	2 (High)	Total
1 (Low)	13	38	51
	18.31	46.34	33.33
2 (Medium)	36	32	68
	50.70	39.02	44.44
3 (High)	22	12	34
	30.99	14.63	22.22
Total	71	82	153
	100.00	100.00	100.00

Note: Pearson chi2(2) = 14.7166 Pr = 0.001

Table 5: Tabulation of SLI and Present Bias (Measured through K parameter)

3 quintiles of SLI	2 quintiles of K parameter		
	1 (Low)	2 (High)	Total
1 (Low)	23	49	72
	22.55	48.51	35.47
2 (Medium)	40	26	66
	39.22	25.74	32.51
3 (High)	39	26	65
	38.24	25.74	32.02
Total	102	101	203
	100.00	100.00	100.00

Note: Pearson chi2(2) = 15.7 Pr = 0.001
Note: First row has frequencies and second row has column percentages

Table 6 presents the odds ratio of school dropouts of the sample. To isolate the effects of independent variables such as socioeconomic and demographic factors, a multivariate logistic regression was carried out. Other than the socioeconomic and demographic factors the study also elicits the impact of present bias behaviour of the children on dropping out. As discussed in the above section, limbic system in adolescents remains comparatively underdeveloped, they succumb to rewards/ temptations and are unable to analyse far off gains (Lavecchia et al., 2016). It is hence important to assess the impact of present bias behaviour.

The model incorporates parental and household characteristics of children (Gouda & Sekhar, 2014). Almost 56 percent of the variation is explained by the explanatory variables. The results of the logistic regression show the effect of behavioural factors along with socioeconomic and demographic factors on children's decision to drop out of school. The results of the current study were in line with the previous studies. The standard of living has a significant impact on school dropout in our sample population of higher secondary students. It is shown that students with higher SLI are 4 percent less likely to drop out. The positive effect of SLI is maximum at medium level. The effect on the decision to dropout fades at higher SLI. The education index constructed from parental and sibling education was dropped out because of high correlation between SLI and Education Index. Demographic variable such as age and gender are significant at 1 percent and 10 percent level of significance respectively. It is found that higher the age, it is 2.3 times more likely that student will dropout. This shows that repetition/failure in a grade affects school continuation. Additionally, the study shows that boys are more likely to drop out of school than girls.

The study incorporates present bias behaviour in the regression analysis and elicits the impact of behavioural characteristics of students on the decision to continue school. It is noted that present bias is a significant variable in the study. Children with lower present bias behaviour are 4 times less likely to discontinue school.

Table 6: Logistic regression

Dropout (Y/N)	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Present bias	4.007	2.057	2.70	.007	1.464	10.962	***
Type of Place Tribal~R	1	.	.	.	.	.	
Urban	4.411	2.979	2.20	.028	1.174	16.574	**
Ed_NativeLang Yes~R	1	.	.	.	.	.	
No	1.309	.751	0.47	.639	.425	4.03	
Religion Hindu~ R	1	.	.	.	.	.	
Other	1.884	1.354	0.88	.378	.461	7.709	
Migration Yes ~ R	1	.	.	.	.	.	
No	.645	.359	-0.79	.431	.217	1.922	
3 quintiles of SLI Low ~ R	1	.	.	.	.	.	
Medium	.041	.027	-4.75	0	.011	.152	***
High	.018	.013	-5.27	0	.004	.079	***
Age	2.306	.607	3.17	.002	1.376	3.864	***
Gender Female ~ R	1	.	.	.	.	.	
Male	2.395	1.199	1.74	.081	.898	6.389	*
Constant	0	0	-2.66	.008	0	.034	***

Mean dependent var	0.400	SD dependent var	0.491
Pseudo r-squared	0.560	Number of obs	200
Chi-square	150.827	Prob > chi2	0.000
Akaike crit. (AIC)	138.378	Bayesian crit. (BIC)	171.361

*Note: *** p<.01, ** p<.05, * p<.1*

DISCUSSION AND CONCLUSION

The present article elicits the impact of behavioural aspects along with socio-economic and demographic factors. It was found that apart from factors such standard of living, age and gender, behavioural aspects such as present bias behaviour significantly affect the decision to drop out. Children with higher present bias behaviour tend to choose smaller sooner reward over larger later rewards. Such behaviour also transcends into real life decision making such as choosing to play or watch television rather than working hard at school today. Students with myopic behaviour are unable to hold off temptations in order to focus on potential larger gains that can be accrued in future because of education (Cadena & Keys, 2015; Oreopoulos, 2007).

The study affirms with other studies: SLI, parents' education, age and gender are significant determinants for education continuation (Gouda & Sekhar, 2014; Paul et al., 2021; Kumar et al., 2023). Furthermore, it is highlighted that present bias behaviour is affected by educational qualifications of parents' and sibling. Children whose parents have

higher education show lesser present bias behaviour. Additionally, it is found that children with higher SLI show lower present bias behaviour. This result is in line with previous studies (Cassidy, 2018; Mishra & Lalumière, 2017).

The study shows greater impact of present bias behaviour on dropping out than standard of living. In fact, the effect of SLI fades at higher levels. As such improvement in the standard of living is a resultant of economic growth which requires structural changes. This is a cost intensive process to increase education progression. Thus, the findings of the study call for a policy suggestion to incorporate low-cost nudges such as commitment devices, inculcating positive identity by highlighting that ability is expandable and emphasising the benefits of education in the long run (Lavecchia et al., 2016) in developing countries like India to inculcate forward looking behaviour to thus increase education progression.

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AUTHOR PROFILES

Apoorva Lalwani is a Research Scholar at the Gokhale Institute of Politics and Economics, Pune.Her interests lie in behavioural economics, development economic and international trade. She has workedin renowned think tanks such as CUTS International and Observer Research Foundation

Vini's research interests are the areas of population, health and development. She is interested in measuring the extent of inequality and identifying the vulnerability in population groups. The challenges which arise in health issues and how to implement and build a reliable public health system for a complex and diverse population are the central questions that drive her research. She heads the Population Research Centre at Gokhale Institute. She has multiple research projects in her bag and likes to mentor research assistants and students as part of large research projects.