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Cognitive, Behavioral, Emotional, and Social Influences on Academic Achievement of Children in Grade I, Aged Six to Seven Years

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ABSTRACT

Background: Academic achievement in early years has positive distal outcomes on functioning. Little is known about what predicts academic achievement in early years.

Aims/Objectives: This study examines cognitive, behavioral, emotional, and social predictors of academic achievement among 6–7-year-olds.

Method: The sample comprised 200 children in grade I. Academic achievement was indexed on total marks obtained in last-term examinations. Tools used were the Wechsler Intelligence Scale for Children (WISC-III UK), Strengths and Difficulties Questionnaire (SDQ), Incomplete Doll Stories (IDS), and Peer Nomination for Social Preference (PNSP).

Results: The mean age of sample was 6.67 years (SD = .38); prominently from the middle socioeconomic strata (80%). In terms of academic achievement, mean percentage obtained by children was 68.82%. Intelligence was in average range (mean IQ = 107.22, SD = 12.24). Majority were categorized as normal on SDQ (69% and 68% on parental and teacher report of total difficulties; 88% and 72% on parent and teacher report of prosocial behaviors). Children demonstrated secure attachment (mean score on IDS = 2.13, SD = 0.62), and were liked by peers (PNSP like ratio = 0.72, SD = 0.10). On stepwise linear regression, predictors of academic achievement were teacher reported hyperactivity/inattention (50% variance), general intelligence (33%), likability (23%), and teacher reported peer relationship problems (19%). These variables together accounted for 42% variance in academic achievement.

Conclusion: Teacher reported hyperactivity/inattention and peer relationship problems, and child's intelligence and likability are predictors of academic achievement in 6–7-year-old school-going children.

Keywords: *Academic Achievement, Early Childhood, Primary School, Predictors*

INTRODUCTION

In India, education for children is not only a fundamental right, but a social expectation. Education is regarded by parents to be the gateway for a better future. Despite this national and social stress on education however, the percentage of children enrolling in schools and completing schooling is less than ideal (United Nations Educational Scientific and Cultural Organization).

While systemic factors cannot be denied, a key motivator to persisting in school maybe academic achievement, through its contribution to motivation and self-concept (Awan et al., 2011; Chetri, 2014; Emmanuel et al., 2014). It is pertinent to note that 'achievement motivation' is contextually embedded; bridging contributions of systemic and individual level factors (Wigfield et al., 2007). In India, marks continue to be a measure of academic achievement. Thus, it may be expected that children who demonstrate academic achievement are also more likely to stay in school, given the confluence between the systemic and individual factors noted in achievement (Wigfield et al., 2007).

Like any other facet of development, the pathway to successful schooling begins in early childhood. Children make their foray into formal schooling at grade I, being subjected to the rigors of a structured school curriculum. These early years of schooling and academic achievement have been noted to be associated with subsequent academic, social, emotional, and behavioral competencies (Bennett et al., 2003; Carroll et al., 2005; La Paro & Pianta, 2000). If academic achievement predicts socio-emotional and behavioral functioning, does the opposite also hold true? This question, unfortunately has been inadequately addressed, especially in India.

In examining predictors of academic achievement, studies in India have tended to focus on older children/adolescents, with prominent emphasis on systemic factors (Dev, 2016; Doley, 2018). When examining individual factors, studies have sampled children with scholastic issues/learning disabilities (Agarwal & Kar, 2007; Kayastha, 2011; Ralte, 2011; Uma & Shanthi, 2002). Available literature reflects a relative absence of studies on typically developing children and academic achievement in India, specifically at younger ages. This lacuna needs to be bridged; given the call for a longitudinal approach to education with focus on formative years, rooted in research and social reality (National Focus Group on Early childhood Education, 2006). In this regard, the current paper, drawn from findings from a larger study, examines the predictors of academic achievement in children enrolled in grade I, between ages of six to seven years.

METHODS

Sample:

Participants comprised of school-going children between the ages of six through seven years, their parent (mother or father), and their class teacher. The sample was drawn from two schools, catering to the middle socioeconomic sections

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of society in the city of Bengaluru, India. Both schools used English as the medium of instruction. While one school was a girls-only school, the other was co-educational. Both housed classes from Nursery to grade X.

Children were drawn from grade I of both schools. All children who could comprehend simple instructions in English were recruited into the study, along with their parent and class teacher. There were no exclusion criteria. Assessments on study tools with children, parents, and teachers were carried out within the school premises.

Measures:

The domains of study were cognitive, emotional, social, behavioral, and academic facets of children's functioning. There were variables under each, which were assessed using the following tools:

Table 1: Tools used in this study

Sl. No.	Tool	Domain	Variable
1	Exam Performance	Academic	Academic achievement
2	Wechsler Intelligence Scale for Children	Cognitive	General intelligence Verbal intelligence Non-verbal intelligence
3	Strengths and Difficulties Questionnaire	Emotional	Emotional problems
		Social	Peer relationship problems Prosocial behaviors
		Behavioral	Conduct problems Hyperactivity/inattention Overall behavioral problems
4	Incomplete Doll stories	Emotional	Attachment style
5	Peer Nomination for Social Preference	Social	Likability

1. Exam Performance (EP) was the total marks scored by the child in the last term examinations. It was taken as a measure of academic achievement, which was the primary outcome measure in the study.
2. The Wechsler Intelligence Scale for children (WISC-III UK) is an individually administered test for ages six through 16 years, comprising of 13 subtests across verbal and performance domains. For the purposes of this study, 5 subtests, namely arithmetic, information, vocabulary, picture completion and dight-symbol coding were individually administered with each child. The performance of the child yielded a Full-Scale Intelligence Quotient (FSIQ), a measure of general intelligence. Also, Verbal Intelligence Quotient (VIQ) and Performance Intelligence Quotient (PIQ) were obtained, which facilitated as measures of verbal and non-verbal intelligence. For the purposes of this study, Indian norms established by Panicker (2005) were utilized for interpretation of participant performance.
3. The Strengths and Difficulties questionnaire (SDQ) (Goodman, 1997) is a screening questionnaire for assessing mental health of children and adolescents. It comprises of 25 items to be responded to on three-point Likert scale. The tool yields scores across five subscales (emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, and prosocial behaviors), in addition to a total difficulties score. Based on the scores obtained, the child is categorized as belonging to normal, borderline, or abnormal; with regard to each of the subscales and total difficulties. Widely utilized with good psychometric properties (ICC with Rutter scale: 0.78 to 0.92), the SDQ has been used across studies in India (Chari & Hirisave, 2020; Kayastha, 2011; Vijayaraghavan, 2018). For the purposes of this study, the parent and teacher report versions were administered.
4. Incomplete doll stories (IDS) (Cassidy, 1988) assess mental representations of self in relation to primary attachment figure. The child is required to complete six stories using a family of dolls. These stories are rated on a three-point scale (1-3), with higher scores representing better attachment security. Also, children's attachment styles are classified as secure/confident, avoidant, and hostile/negative attachment style. Adequate inter-rater reliability has been established for this test (Cronbach's alpha = 0.78). The IDS has been previously used in Indian studies (Nithya Poornima et al., 2005). For the purposes of this study, only two stories were used to assess attachment security; and the three-band categorization was collapsed into two, namely secure and insecure (combining avoidant and hostile/negative).
5. Peer Nomination for Social Preference (PNSP) (Coie & Dodge, 1988) is a sociometric approach that assesses social standing/status. Children are asked to nominate and rank three children whom they liked least and liked most in their class. Self-nominations are not permitted. For this study, a preference ratio was additionally estimated by calculating the ratio of the total likes and dislikes a child received against the total number of the children in the class. The PNSP has been found to be valid and reliable; and has been used in other studies examining social preference (Menting et al., 2011).

Procedure:

The study was funded by the Indian Council for Social Science Research (ICSSR), and approved by the institutional review boards at the National Institute of Mental Health and Neuro Sciences (NIMHANS), Bangalore. Informed consent was sought from the managerial heads and principals of participating schools, teachers, and parents. Verbal assent of children was obtained. All participants were assessed individually on respective tools. Assessment duration with parents/teachers was a maximum of 20 minutes. Assessment duration for each child was around $2\text{-}2^{1/2}$ hours, and was carried out with breaks, on the same day. Children were given sweets for their participation. Data was collected over a period of 6 months.

Ethical considerations:

Participation was voluntary, with choice to withdraw participation at any point over the course of the study without penalty. Confidentiality was maintained. Care was ensured to not disrupt a child's school activities. When required, parents of children who demonstrated difficulties in any domain were given suggestions for improving the same. Professional referrals were made, if required.

Data Analysis:

Data was entered and analyzed on the Statistical Package for Social Sciences (SPSS, version 16.0). Descriptive statistics was employed to estimate sample characteristics. Pearson correlation was utilized to examine association of variables with academic achievement. Step wise Linear Regression was utilized to examine predictors for academic achievement.

RESULTS

Sample background:

The sample comprised of 200 children (girls = 185, boys = 15) across two schools (only-girls school = 170; co-educational school = 30). The mean chronological age of the sample was 6.67 years (SD = 0.38). Majority of the sample was from the middle-income socioeconomic strata (80% family monthly income between INR 10,000 to 40,000). Most parents were educated up to grade XII (54.5%, mothers; 51% fathers). While majority of mothers were home makers (88.5%), fathers had their own business venture (67%).

Academic achievement:

The mean percentage of marks obtained by children in the last term examinations was 68.82% (SD = 18.33). Majority obtained A grade in their examinations (57.5%), followed by B (27.5%), C (11.5%), and D grade (3.5%).

Cognitive variables and academic achievement:

On the WISC-III UK, the mean Full Scale Intelligence Quotient (FSIQ) was 107.22 (SD = 12.24), falling within the average range of intellectual functioning. The mean Performance IQ (PIQ) and Verbal IQ (VIQ) were 103.7 (SD = 15.79) and 112.68 (SD = 15.13) respectively, falling with the average and above average range of intellectual functioning. FSIQ ($r = 0.37$, $p < 0.01$), VIQ ($r = 0.30$, $p < 0.01$)), and PIQ ($r = 0.37$, $p < 0.01$) were positively correlated with examination performance (academic achievement).

Behavioral variables and academic achievement:

Across subscales on the SDQ (total difficulties, conduct problems, hyperactivity/inattention), both parent and teacher reports suggested that majority of children were within the normal category.

The mean scores for parent report for total behavioral problems, conduct problems, and hyperactivity/inattention were 11.35 (SD = 5.76), 1.93 (SD = 1.66), and 3.98 (SD = 2.08) respectively; falling within the normal category on all three scales. The mean scores for teacher report for total behavioral problems, conduct problems, and hyperactivity were 9.01 (SD = 5.76), 1.25 (SD = 1.49), and 3.78 (SD = 2.57) respectively; falling within the normal category on all three scales.

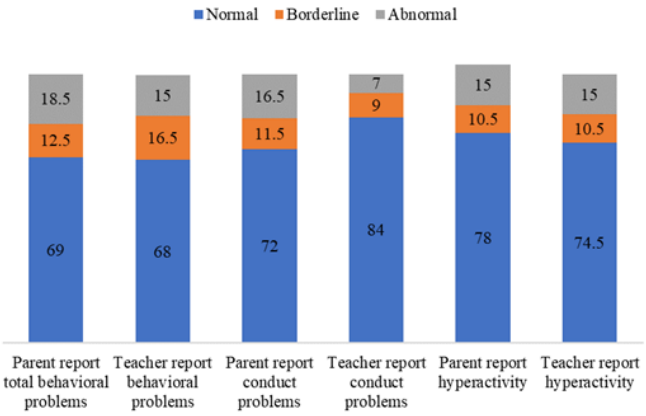

Figure 1: Percentage of children across categories on the SDQ behavioural subscales

Correlating behavioral variables with academic achievement demonstrated negative association between parental and teacher report of behavioral issues and academic achievement in the children.

Table 2: Pearson correlation between behavioral variables and academic achievement

Academic achievement	Total behavioral problems		Conduct problems		Hyperactivity/ inattention	
	P	T	P	T	P	T
	-0.38**	-0.52**	-0.17*	-0.28**	-0.37**	-0.50**

** $p < 0.01$, * $p < 0.05$; P: Parent report, T: Teacher report

Emotional variables and academic achievement:

On the IDS, most children were categorized as having secure attachment with their primary caregiver (86.5%, n = 173). On the three-point scale scoring (1-3), the mean score of the sample was 2.13 (SD = 0.62). Put together, these findings suggest that children in the sample had strong attachment security.

On the emotional problems subscale of the SDQ, both parent and teacher reports reflected majority of children to be within the normal category (parents: 63%, n = 126; teachers: 90.5%, n = 181). Mean scores on the subscale were 3.00 (SD = 2.41) and 1.69 (SD = 1.77) respectively for parent and teacher reports; falling within the normal score range (0-5).

Correlation analysis revealed an inverse relationship between emotional problems and academic achievement, such that more emotional problems was associated poorer exam performance (parent SDQ score: $r = -0.27$, $p < 0.01$; teacher SDQ score: $r = -0.35$, $p < 0.01$).

Social variables and academic achievement:

On the PNSP, more children were 'liked by few' and 'disliked by few'. The mean like preference ratio was higher than the dislike ratio, suggesting that children in the sample

were more liked than disliked by their peers (like ratio = 0.72, SD = 0.10; dislike ratio = 0.05, SD = 0.09).

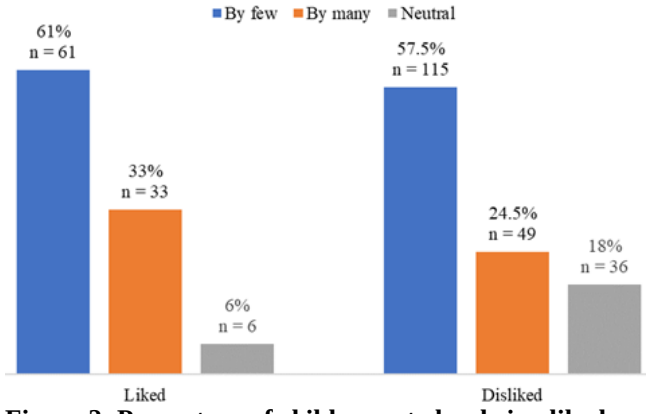

Figure 2: Percentage of children rated as being liked or disliked on the PNSP

As per parent and teacher reports on peer relations problems and prosocial behaviors of the SDQ, majority of children were categorized as being in the normal category

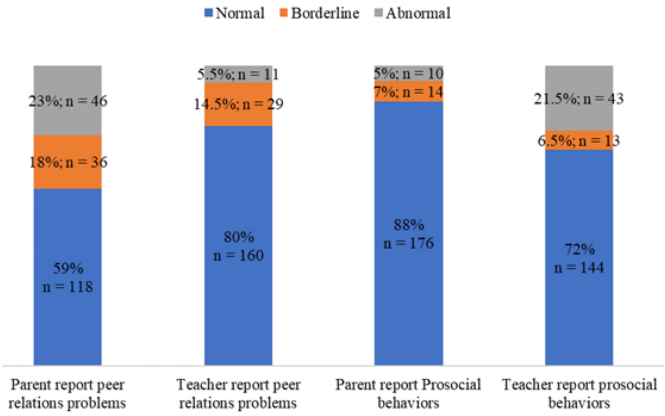

Figure 3: Percentage of children across categories on the SDQ peer relations problems and prosocial behavior subscales

The mean scores for parent report for peer relations problems and prosocial behaviors were 2.48 (SD = 1.80) and 7.82 (SD = 1.91) respectively; falling within the normal category. The mean scores for teacher report for peer relations problems and prosocial behaviors were 2.29 (SD = 1.63) and 6.57 (SD = 2.45) respectively; also falling within the normal category.

Correlating social variables with academic achievement reveal positive association with being liked (like ratio) and prosocial behaviors; and negative association with peer relation problems.

Table 3: Pearson correlation between social variables and academic achievement

Academic achievement	Social preference		Peer relation problems		Prosocial behaviors	
	Like ratio	Dislike ratio	P	T	P	T
	0.43**	-0.03	-0.24**	-0.37**	0.12	0.37**

*** p < 0.01, * p < 0.05;* P: Parent report, T: Teacher report

Model predicting academic achievement:

Stepwise linear regression analysis was done to identify predictor variables of academic achievement. Only those variables having correlation coefficients above 0.2 were included in analysis to minimize spurious correlation. Of these variables, teacher reports of hyperactivity/inattention, FSIQ, like ratio, and teacher reports of peer relation problems accounted for 50%, 33%, 23%, and 19% of variance on academic. Collectively, these variables accounted for 42% of the variance in academic achievement.

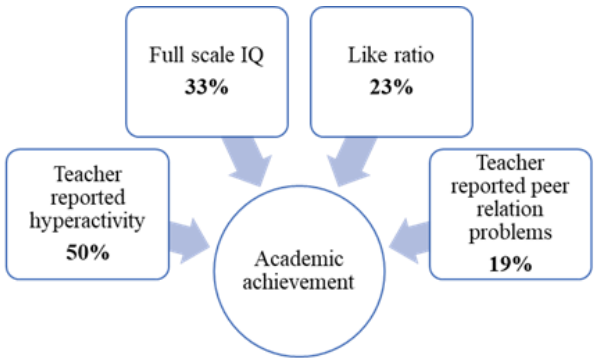

Figure 4: Percentage of variance of individual predictor variables on academic achievement

Table 4: Stepwise regression of predictor variables on academic achievement

Model	Predictor	Adjusted R^2	Beta Coefficient	t
1	Constant	0.25**		38.62
	SDQ Hyperactivity – Teacher rated		-0.50	-8.13
2	Constant	0.35**		2.51
	SDQ Hyperactivity – Teacher rated		-0.47	-8.29
	Full scale IQ		0.33	5.77
3	Constant	0.39**		2.46
	SDQ Hyperactivity – Teacher rated		-0.35	-6.31
	Full scale IQ		0.30	5.42
	Like ratio		0.23	3.76
4	Constant	0.42**		2.62
	SDQ Hyperactivity – Teacher rated		-0.31	-4.90
	Full scale IQ		0.32	5.78
	Like ratio		0.21	3.47
	SDQ Peer relations problems – Teacher reported		-0.19	-3.17

*** p < 0.01*

DISCUSSION

This paper examined academic achievement and its cognitive, behavioral, emotional, and social predictors among children attending first grade at school.

Most children performed well in their previous term examinations, with the sample's average percentage marks being close to 70%. The higher percentage of children obtaining 'A grade' in the sample further attests their academic achievement. This is a noteworthy finding, alluding to the quality of the academic curriculum at the selected schools. Both schools were non-government, private English medium schools. Over few decades, while

Indian government reported educational statistics have not been ideal, there has been a call to recognize the contribution of private schools in the education sector (Kingdon, 1996; Rao, Cheng, & Narain, 2003). Children attending private schools in India have been found to have higher reading and arithmetic skills than children in government schools, with more gains noted for those from the lower socioeconomic strata (Desai et al., 2008). Majority of children in this sample were from the middle-income socioeconomic group, albeit from the lower-end of this stratum (monthly family income: INR 10,000 to 40,000). It is plausible that facilitative school-related factors in private schools noted by Desai et al. (2008), also operated for children in this study sample, contributing to their academic achievement.

In examining cognitive, behavioral, emotional, and social factors, the children in the sample may be classified as typically developing. Their intelligence levels were average (mean full scale IQ approximately = 107) with nil significant behavioral or emotional issues (around 70% sample categorized as normal on SDQ). Sample children were noted to be securely attached (around 87% of sample), and generally liked by peers (around 94% of sample). In the background of relative absence of cognitive, behavioral or socio-emotional issues, combined with a supportive school clime, children's academic functioning may be expected to be average or above-average (noted in the academic achievement of the sample). It is arguable that academic achievement may be predicated for this sample on their typically developing status and supportive school environments.

However, regression revealed specific variables across cognitive, behavioral, and social domains to be predictive of academic achievement. In descending hierarchy of variance, these were general intelligence (cognitive), teacher report of hyperactivity/inattention (behavioral), child likability (social), and teacher report of peer relationship problems (social). Combined, these variables accounted for 42% percent of academic achievement. In this study, teacher reports of behavioral and social functioning predicted academic achievement; and not parent-report. This needs to be primarily addressed.

Discordance between parent and teacher report is not unusual in child mental health research; hence attesting the need for both (Lawson et al., 2017; Murray et al., 2004). However, it is argued that for this study, teacher report of behavioral and social issues be given salience. A large part of a child's day is spent at school. Also, the optimal test for behavioral and social issues is in the presence of another. Schools in housing children of all ages and adults, is fertile ground to witness behavioral and social competencies of children. Thus, it is likely that teachers held a more accurate view of children's functioning in these domains.

Hyperactivity and inattention have been noted to have a direct influence on academic functioning (Merrell & Tymms, 2001; Salla et al., 2016; Saudino & Plomin, 2007). Also, children with hyperactivity have also been found to have issues in peer relationships (Hoza et al., 2005; McQuade & Hoza, 2015). While the association amongst variables was beyond the scope of this study, it is proposed that hyperactivity was the larger predictor; contributing to issues in peer relationships and academic achievement. This is certainly a possibility, given the higher variance accounted for by hyperactivity/inattention (50%) than peer relationship problems (19%). It is pertinent to note that in this study, the association between hyperactivity/inattention and peer relationship problems with academic achievement was inverse, in that lower levels predicted higher academic achievement. This is again in line with previously established research (Hoza et al., 2005; McQuade & Hoza, 2015; Merrell & Tymms, 2001; Salla et al., 2016; Saudino & Plomin, 2007)

The association between intelligence and academic outcome is intuitive and well-established. Thus, the high predictive value of intelligence on academic achievement for this sample is explicable. Overlapping hyperactivity/inattention, intelligence, and academic achievement, Mayes and Calhoun (2007) noted Full Scale IQ on the Wechsler tests to be the strongest predictor of academic achievement in children with Attention-Deficit Hyperactivity Disorder (ADHD). Our sample being typically developing, the predictive potential of Full-Scale IQ on academic achievement is likely to be more robust (33% variance).

Finally, likability being a predictor of academic achievement, may be an index of broader socio-emotional competence. If one is liked by peers, it implies that he/she demonstrates social and emotional interpersonal skills that make him/her likable. A higher competence in these domains has been associated with better academic functioning among Indian and international sample of children and adolescents (Brouzos et al., 2014; Ratnaprabha et al., 2013; Shin, 2020; Welsh et al., 2001). While the actual mechanisms of socio-emotional competence contributing to academic achievement is not known, the same may be operative in this study. It is important to note that likability had more predictive potential than the absence of peer relationship problems (23 % Vs. 19% variance). It is hypothesized that children who were 'liked' demonstrated competencies above and beyond normative expectations, i.e., beyond typically developing status. This bodes well for future academic achievement (Shin, 2020; Welsh et al., 2001)

The major implication of this study is the elucidation of predictors of academic achievement amongst typically developing young children in India. Other studies in this area have stopped at correlation and noted general mental ability and home environment to be associated with academic achievement, albeit amongst adolescents (Dev, 2016; Doley, 2018). A study carried out in Pakistan examined the influence of intelligence, study habits, and behavioral maladjustment on academic achievement (Jamil & Khalid, 2016). However, their sample comprised older children (grades 4 and 5); and noted delinquency and social withdrawal, intelligence, and study habits to be predictive of academic achievement (Jamil & Khalid, 2016). This study is unique in focusing on children who just started schooling (6-7 years of age), and thus attributes of delinquency and study habits may not be applicable. The

findings from this study enhances the scope for early promotive interventions and longitudinal follow-up research. This study also contributes to international research that has tended to focus on home environment/parental engagement and/or pre-school readiness skills as predictors of academic achievement in this age-group (Kudrek & Sinclair, 2000; Pace et al., 2019; Schlee et al., 2009). Amongst lower income groups in India, teachers are primary tools for academic inputs, as parents often themselves are minimally educated. Thus, in focusing on teacher reports and their predictive potential, this study paves the way for scalable interventions in school mental health.

Possibly the biggest limitation of this study is the sample, specifically the gender-distribution. Of the sample of 200, only 15 were boys; urging caution in generalizing findings. However, this limitation may be a strength, in that, government data suggests girls representation in schools to be lower than that of boys. Thus, the study findings facilitate to address a much-needed area of public health concern; in attesting predictors of academic achievement in young girls. As stated earlier, achievement motivation in school settings may be intrinsically associated with persistence with school activities. Further studies may employ stratified random sampling to obtain more representative results. Also, longitudinal follow-up of this sample is encouraged to path trajectories for sustained academic achievement.

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