



# Disability with Rehabilitation Characteristics as Predictors of School Achievement: Parental Education as a Mediator. A Follow-Up Study in Students with Intellectual Disability in Ujjain and Shajapur Districts of Madhya Pradesh, India

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**Financial Support:** None declared  
**Conflict of Interest:** None declared  
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#### How to cite this article:

Gupta H, Saroshe S, Sabde Y. Disability with Rehabilitation Characteristics as Predictors of School Achievement: Parental Education as a Mediator. A Follow-Up Study in Students with Intellectual Disability in Ujjain and Shajapur Districts of Madhya Pradesh, India. Natl J Community Med 2018; 9(4): 300-306

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**Date of Submission:** 07-04-18

**Date of Acceptance:** 27-04-18

**Date of Publication:** 30-04-18

## ABSTRACT

**Background:** This study examined the relation among family characteristics, school achievement and student's disability with rehabilitation characteristics in schooling. A dimensional approach was used, that is, the scores obtained by functional assessment checklists used for assessment of performance in all the study settings was considered as continuous variable. Quantification of the other two set of variables in terms of score was also done. Of special interest in this study was whether family characteristics contribute more importantly to the prediction of school achievement than student's disability with rehabilitation characteristics.

**Methods:** The research was conducted among children (n=206) with intellectual disability receiving rehabilitation services in centers run by a NGO in two districts of Central India.

**Results:** Results indicated that family characteristics made a smaller contribution to school achievement than student's disability with rehabilitation characteristics. We found that nonintact families and less-educated parents risk having low academic achievements for PwID. The regression analyses indicated that regularity to the schools and associated disabilities were related to school grades and that this relation was mediated through parental education.

**Conclusions:** Irrespective of student's disability with rehabilitation characteristics, studies show that parent's education is beneficial for school achievement of PwID. Result emphasis on systematically designed school and family partnership activities for PwID.

**Key words:** Intellectual disability, Mental retardation, Special education, Parental education, Rehabilitation

## INTRODUCTION

Several studies have indicated that families and parent's involvement exert an influence on skill development of persons with intellectual disability<sup>1</sup> (PwID). Recurrent themes are that children from lower income, less educated, single-parent and large families perform less well in school than those from higher income, better educated, two-parent and small families<sup>2-7</sup>.

Student's disability with rehabilitation characteristics have also been found to be related to school achievement of PwID. PwID are more likely to have associated physical and mental health problems which needs particular attention<sup>3</sup>. Apart from these medical perspectives some researchers attribute the student's skills to various rehabilitation dimensions like the type of rehabilitation center<sup>8,9</sup> they are enrolled in; factors associated with special education like regularity and years of school-

ing<sup>10</sup>, their IQ level, degree of disability and associated co-morbidities<sup>11-13</sup>.

However, no information was obtained as to whether family background characteristics or the student's disability with rehabilitation characteristics which best predicted school achievement. This study focused on the relation between family demographic characteristics along with student's disability with rehabilitation characteristics and school achievement. We addressed two major questions. The first question was whether family characteristics contribute more importantly to the prediction of school achievement than student's disability with rehabilitation characteristics. The second question was whether family characteristics mediate the effect of student's disability with rehabilitation characteristics on school achievement. Simply put, is the relationship between student's disability with rehabilitation characteristics on school achievement reduced or even eliminated after controlling for the influence of family characteristics.

## MATERIAL AND METHODS

The study was performed at two purposively selected districts i.e. Ujjain and Shajapur districts of Madhya Pradesh, India. During study period there were total five prevocational rehabilitation centers for PwID in selected districts (three in Ujjain and two in Shajapur). Of these five four were run by NGO Madhya Pradesh Vikalanga Sahayata Samiti, that include Manovikas special school in Ujjain and its all three outreach settings i.e. integrated training centers (ITCs). The study was conducted at the four centers run by NGO and all the students studying at the selected centers were included. However, students with profound mental retardation, whose parents didn't consent and who couldn't complete one academic year after start of study were excluded. A total of 204 students fulfilled the criteria from all study settings. This includes 25 students from Manovikas school on whom pilot study was conducted initially.

**Study period:** Follow up study over one academic year (July 2011-April 2012).

**Methodology:** This study will focus on three sets of variables. First variable set will be the one academic year performance score. Second variable set will be student's disability with rehabilitation characteristics. Third set is family demographic characteristics.

**Data collection:** Situational analysis of all study centers was conducted to assess infrastructure of each school, facilities available and teachers train-

ing component. Meetings were held with parents or caretaker (for students staying with foster parents) during periodic teacher-parent meetings within the school premises to collect socio-demographic details using a pilot-tested and semi-structured questionnaire. Medical problems or associated handicaps with PwID were interviewed from parents and school medical records of students were verified. Help of school appointed Psychologist was taken.

### Assessment of rehabilitative services:

Study of student's performance scores record files in schools was done. The study centers use functional assessment checklists developed by National Institute for Mentally Handicapped, Secunderabad (NIMHS) on regular basis for assessment of performance of these children. To do scoring using these checklists, special educators get regular training. Entry level scores were recorded during start of academic year (July 2011). Repeat assessment of performance score was done after completion of one academic year (April 2012). Students are grouped into different levels (classes) like pre-primary, primary, secondary and prevocational based on their ability and chronological age and each group has separate checklist. Validity of the checklist is established by field testing by NIMHS. Details of checklists are available from [www.nimhindia.gov.in/facp.pdf](http://www.nimhindia.gov.in/facp.pdf)<sup>14</sup>.

**Ethical considerations:** Protocol of the study was approved by Ethics committee of the institute. Information sheet was undersigned by NGO Head. Written informed consent was taken from parents. Analysis was done using SPSS 20.

**Variables selection and quantification:** Table 1 shows the student's disability with rehabilitation characteristics. Age of student's ranged from 4 to 34 years with mean age 13.02, where 69.1% were males. Factors included for analysis are: For MR grading three categories were identified and were scored as mild (2), moderate (1) and severe (0). Associated co-morbidities are included and if a co-morbidity is present it is scored 0 and if not then 1. Type of school was measured as 0 for special school and 1 for ITC. Four categories for years of schooling were defined for analysis purpose and were scored from 0 to 3. Children were classified into two categories based on the attendance in the school as regular >75 % attendance in school (1) and irregular < 75% attendance (0). Summation of all above factors was done to yield a combined score.

Family characteristics (Table 2) variables included in analysis are:

Family size: Four categories of families were defined: (a) one-child, (b) two-children, (c) three-

children, and (d) four-children or more. Because of the unequal sizes of categories, values of 1 and 2 were recorded as 0 and values of 3 and more were recorded as 1. Each adolescent was assigned to one of two types of family arrangements: first were intact families or both natural parents scored as 1. Second being non intact families or one natural parent only, one natural parent and a stepparent or neither of parent or the child is staying with some relative as caretaker scored as 0. Parents' education levels: Measures of both mother's and father's levels of education had three categories: (a) elementary level and a few years at the high school level (b) high school completed, and (c) college or university graduated. These measures were averaged to create a single parental education measure that had five categories and were scored from 0 to 4: (1) both parents with elementary level or few years at high school; (2) one parents with elementary level or few years at the high school; the other parent with high school completed; (3) both parents with high school completed; (4) one of the parents with high school completed and the other one who is college or university graduated; and (5) both parents who are college or university graduated. About the socio-economic status (kuppuswamy classification) families were divided into five categories scored 0 to 4 from low to high. Summation of all factors was done to yield combined score.

**RESULTS**

As sample size was more (n=204) which includes all PwID enrolled in the study settings included, data was assumed to be normally distributed. Correlations among three set of variables are illustrated in Table 3. This analysis shows strong positive significant correlation between student's disability with rehabilitation characteristics and school grades.

To answer the first question as to whether student's disability with rehabilitation characteristics contribute more importantly to the prediction of school achievement than family demographic characteristics we performed multiple regression analyses using the stepwise procedures. 16.2% of variance in school achievement was accounted by student's disability with rehabilitation characteristics (Table 4) which is more significant than family demographic characteristics (i.e., 3.1 %). Moreover, out of all student's disability with rehabilitation characteristics, regularity to the schools ( $\beta=0.32, p <.05$ ) and associated disability ( $\beta = 0.18, p <.05$ ) were significant. Further, out of all family characteristics parental education and family structure were significant. Parental education appeared to be a better predictor of school grades ( $\beta=.21, p < .05$ ) then family structure ( $\beta =.15, p <.05$ ).

**Table-1: Distribution of study participants according to student's characteristics along with factors associated with disability and rehabilitation characteristics**

Students Demographics (n=204)	Frequency (%)
<b>Age (yrs)</b>	
0-5	14 (6.8)
06-10	60 (29.4)
11-15	75 (36.8)
16-20	33 (16.2)
>20	22 (10.8)
<b>Sex</b>	
Male	141 (69.1)
Female	63 (30.9)
<b>Birth order of child in the family</b>	
1	74 (36.3)
2	100 (49)
>2	30 (14.7)
<b>Grading of MR</b>	
Mild (IQ 50-70)	77 (37.7)
Moderate (IQ 35-49)	89 (43.6)
Severe (IQ 20-34)	38 (18.7)
<b>Problem characterization*</b>	
Epilepsy	63 (30.9)
Hyperkinesis	31 (15.2)
Psychiatric co-morbidities	38 (18.6)
Associated handicap	125 (61.3)
Medical syndromes/chromosomal anomalies	33 (16.2)
<b>Other behavioural and emotional disturbances</b>	
One	86 (42.2)
More than one	23 (11.3)
<b>Associated disability</b>	
Without associated disability	19 (9.3)
One associated disability	59 (28.9)
More than one associated disability	126 (61.8)
<b>Type of school enrolled in</b>	
Special school	108 (52.9)
Integrated training center	96 (47.1)
<b>Years of schooling (at the time of baseline score assessment)</b>	
<1 year	23 (11.3)
1-3 year	67 (32.8)
3-5 year	50 (24.5)
>5 year	64 (31.4)
<b>Attendance of children in school</b>	
Irregular	63 (30.9)
Regular	141 (69.1)

To verify the mediating role of significant family characteristics i.e parental education and family structure in the relation between student's disability with rehabilitation characteristics and school achievement, sequential regression analyses were performed. The three-step procedure for testing a mediational model suggested by Judd and Baron<sup>15</sup> was followed. These include: (a) significant relations between the predictors and the outcome (b) significant relations between the predictors and the mediators (c) significant relations between the mediators and the outcome when all of the variables are entered into the same equation. The above rela-

**Table 2- Distribution of study participants according to family characteristics**

Family characteristics (n=204)	Frequency (%)
<b>Religion</b>	
Hindu	147 (72.1)
Muslim	36 (17.6)
Christian	11 (5.4)
Others	10 (4.9)
<b>Family type</b>	
Nuclear family	115 (56.4)
Third generation family	38 (18.6)
Joint family	51 (25)
<b>Family size</b>	
1 Child	4 (2)
2 Children	104 (51)
3 Children	78 (31.2)
4 Children & more	18 (8.8)
<b>Socio-economic status</b>	
Upper	22 (10.8)
Upper middle	68 (33.3)
Middle lower middle	52 (25.5)
Lower middle	50 (24.5)
Lower	12 (5.9)
<b>Family structure</b>	
Intact families	172 (84.3)
Nonintact families	32 (15.7)
<b>Education of parents</b>	
Category 1	34 (16.7)
Category 2	54 (26.5)
Category 3	48 (23.5)
Category 4	37 (18.1)
Category 5	31 (15.2)

tions must reduce the direct effects of the predictors on the outcome. There is perfect mediation if the relation between the predictors and the outcome is non-significant when the mediator is controlled.<sup>15</sup>

Three sets of sequential regression analyses were conducted to test each of the three conditions for mediation. We first regressed all student's disability with rehabilitation characteristics on school grades to test for direct effects. As reported regularity to the schools ( $\beta=0.32, p <.05$ ) and associated disability ( $\beta =0.18, p <.05$ ) had a direct relation with school achievement, thus satisfying the first condition for mediating.

In the second set of analyses each of mediating variables taken as criterion variable i.e parent education and family structure were regressed with the two significant student's disability with rehabilitation characteristics. Two out of four regressions was significant. With regard to parent education, regularity to schools ( $\beta = 0.149, p=0.041$ ) displayed a positive relationship and associated disabilities ( $\beta= -0.143, p=0.049$ ) a negative one. Living with better-educated parents was associated with regularity to the schools whereas being in less educated family was associated with presence of more associated disabilities. Family type did not have any direct relation with regularity and associated disabilities.

**Table-3: Correlation analysis among three sets of variables.**

Variables	Family characteristics	Students characteristics	Improvement in performance score
Family Characteristics*	1	0.218	0.079
Students Characteristics	0.218	1	0.001
Improvement in performance score	0.079	0.001	1

\* Pearson Correlation Sig. (2-tailed)

**Table 4: Results of multiple regression analyses using the stepwise procedures**

Step	Variables	R <sup>2</sup>	F	$\beta$	p-value
1	Family characteristics	0.031	2.638	9.582	0.035
2	Student's disability with rehabilitation characteristics	0.162	8.822	7.845	0.000

NOTE: R<sup>2</sup> Cumulative; p value < 0.05 significant

**Table 5: Standardized regression coefficients for mediating process predicting school achievement**

Variables	$\beta$	p-value
<b>Mediator: Parent Education</b>		
Regularity to the schools	0.308	0
Disability association	0.201	0.003
Parent education	0.122	0.062
<b>Mediator: Family Structure</b>		
Regularity to the schools	0.329	0
Disability association	0.177	0.008
Family structure	0.138	0.031

In third step, the mediating variables i.e parent education along with significant student's disability with rehabilitation characteristics were regressed with the school achievement. Finally the mediator (parental education) exerts a significant relationship with the school achievement when all of the variables (i.e regularity, associated disabilities and parental education) are entered into the same equation. The above relation reduces the direct effects of the predictors i.e regularity to schools ( $\beta=0.24, p <.05$ ) on the outcome, while the

second predictor i.e associated disabilities does not display any such reduced effect. Taking these findings into account, the subsequent analyses tested the mediating role of parental education in relation to school achievement and student's disability with rehabilitation characteristics. No other family characteristics could satisfy all three criteria for mediation.

As illustrated in Table 5, family structure introduced simultaneously with the two significant student's disability with rehabilitation characteristics yielded a model that accounted for 17.9% of variance in school achievement  $\{F(15.78), p < .001\}$ . Together, parental education and the two significant student's disability with rehabilitation characteristics accounted for 17.5% of variance  $\{F(15.31), p < .001\}$ . Results indicate that indirect effect of regularity to schools and presence of associated disabilities on school achievement through parental education and family structure was significant.

In the presence of mediator (i.e parental education) the direct relation of student's disability with rehabilitation characteristics to school achievement dropped with lower standardized beta weights, and thus satisfying Baron and Kenny's criteria for mediation. Thus, with respect to parental education, both direct and indirect effects were noted in relation between both regularity to the schools and associated disability with school achievement.

In brief, the results showed that family structure was uniquely indirectly associated with school achievement through its relation with regularity to the schools and associated disability. More importantly parent education level was both indirectly and directly associated with school achievement through its relation with regularity to the schools and associated disability.

## DISCUSSION

This study had two major goals. The first one was to examine the contribution of student's disability with rehabilitation characteristics and family characteristics to the prediction of school achievement. A second goal was to test a model in which family characteristics variables are mediators between student's disability with rehabilitation characteristics and school achievement.

In accord with the findings, student's disability with rehabilitation characteristics predicts more of the variance in school achievement than family characteristics. Such findings provide evidence that interventions must focus on malleable student's disability with rehabilitation characteristics since there is not much we can do with family structure or parental education.

The results revealed that out of all family characteristics, parental education and family structure has significant relation with school grades. Thus, adolescents who reported coming from highly educated parents or from intact families were more likely to obtain higher school grades as parents exert adequate monitoring and support them in their special schooling.

Moreover, parental education appeared to be a better predictor of school grades than family structure and other family characteristics. The findings is supported by Figen et al.<sup>3</sup> who reported that parent's education has a positive impact on skills acquisition while family size and income did not contribute much. Contradictorily, Koskentausta<sup>16</sup> identified socioeconomic status as risk factors for psychiatric disturbance in PwID.

Out of all student's disability with rehabilitation characteristics, regularity to the schools and associated disability were found to have significant relation with school grades. Thus, more regularly the child is attending the special schools, better is the performance score. The interactionary effect of number of associated disabilities on performance of student was also significant. This could be because students with less number of associated disabilities were regular in attending the schools (as told by teachers) so had better grades and also these associated disabilities further has deteriorating effect on skills acquisition. The findings are in congruent with Bolte and Poustka<sup>17</sup> and Wilkins<sup>13</sup> while Graham<sup>12</sup> reported contradictory result.

Though, no significant relation was found between other factors associated with schooling viz. type of study setting with school grades. This might be because training of student is important which can be in either segregated or integrated study setting. Also results revealed that integrated study center are at par with special school settings in providing skills to PwID. Results also depict that improvement in performance score was also not significantly influenced by duration of schooling. This might be because the study settings had IEP (individualized education plan) for every student according to his skills assessed during start of that academic year, based on which appropriate checklist was used. Though, positive correlation ( $r = 0.507$ ) was found between baseline performance score taken at start of study and duration of schooling which explains importance of rehabilitation through school services in skill development.

IQ level is prerequisite to children to acquire skills as per definitions by DSM-IV-TR, still there was no significant association between degree of MR and improvement in performance score. This can be because the checklist used to assess the perform-

ance were IEP based on their ability and chronological age. Many researchers<sup>18,19</sup> reported IQ to be positively related to adaptive behavior, while some<sup>12</sup> found similar findings.

Of particular interest is the indirect association found between family structure and school achievement through its relation with regularity to the schools and associated disabilities. Specifically, family structure predicted regularity to the schools and associated disabilities which predicted school achievement. Thus being regular to schools and presence of less associated disabilities is important for understanding why PwID from intact families do better in school than one from single-parent families. Parental warmth behaviors, supervision, affective support in schooling such as encouragement and attending their school activities are more prevalent in intact families than in non-intact families<sup>20-22</sup> and thus associated with skill enhancement<sup>23</sup>. Interestingly, there were both direct and indirect associations between parental education and school achievement through regularity to the schools and associated disabilities. Thus being regular to schools and presence of less associated disabilities is key for understanding why PwID with better educated parents do better in school than PwID with less educated parents suggesting an indirect association. Thus, in our study, adolescents from well-educated parents do better in school than their peers partly because their parents get timely management of various associated disabilities and encourage them to be regular to schools.

At the same time, parental education had a direct association with school grades, suggesting the presence of other intervening variables that have not been verified in this study. The explanations for the good school performance of PwID from well-educated parents can be because of high parental aspirations for their children<sup>24</sup> and parental belief in special schooling and in the importance of rehabilitation for PwID. The direct association is reported<sup>2,3</sup> where PwID of less educated families were rated significantly lower on scores of various domains than children of families with more education.

In other words, the more schools for PwID involve families, the less the family characteristics will explain the child's achievement. In the light of such findings, our results may be interpreted to support suggestions that home and special school partnership programs should include activities that foster parental caring, supervision and affective support (e.g., encouragement, praise, help with homework and parental attendance at their child's activities in schools). Parent training programmes emphasis on involving parent has been emphasized<sup>25-26</sup> wherein

the researchers discussed about the needs and benefits of involving and working with parents. Peshawria<sup>25</sup>, described the group parent-training model to train parent in a specific knowledge and skills.

## CONCLUSION

Our findings support the evidence that student's disability with rehabilitation characteristics are stronger predictors of school achievement than family characteristics. Among all the student's disability with rehabilitation characteristics, regularity to the schools and associated disability were significant. Further, out of all family characteristics, parental education and family structure were significant with parental education to be a better predictor of school grades. Current study has examined the mediating role of family characteristics in relation to school achievement and student's disability with special education characteristics. No other family characteristics except for parental education could satisfy all three criteria for mediation.

An important addition was that family structure was uniquely indirectly associated with school achievement through its relation with regularity to the schools and associated disability. More importantly parent education level was both indirectly and directly associated with school achievement through its relation with regularity to the schools and associated disability. In other words, being regular to schools and presence of less associated disabilities is important for understanding why PwID from better educated parents and intact families do better in school. Also, parental education had a direct association with school grades, suggesting that presence of other intervening variables have not been verified in the current study.

**Funding:** Authors received no financial support for the research and there were no conflicts of interests.

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