



THE ASSOCIATION OF SELF CONCEPT OF MATHS AND PROBLEM SOLVING AND ACADEMIC PERFORMANCE

Dr Navpreet Mann Dhillon* Assistant Professor Deptt. of Physiology Santosh Medical College, Ghaziabad
*Corresponding Author

Dr. Shivani Agrawal Associate Professor Deptt. of Physiology ESI Medical College, Faridabad

Dr. Rinku Garg Prof and Head Deptt. of Physiology Santosh Medical College, Ghaziabad

ABSTRACT **INTRODUCTION:** Many years of research on self-concept has been extensively carried in relation to academic outcomes. Little decisive co relates could be gathered though. This paper intends to address the issue of causal relations between self-concept of maths and problem solving with academic achievement in young Indian students.

MATERIAL AND METHODS: Participants were students of both sexes preparing for National level Pre Medical Test. They were enrolled for the study while attending coaching classes in Delhi. They were in the age group of 18-19 years. We recorded the Self-concept twice in one year using Self Description Questionnaire III (SDQ III). Qualifying the exam was taken as a measure of academic outcome.

FINDINGS: Statistically significant differences were found between the self-concept scores of students. Students did not show significant differences in the before and after self-concept scores. However, before appearing for exam, those who eventually qualified had statistically significant higher scores on SDQ III.

CONCLUSION: Prior self-concept of maths and problem solving strongly influences subsequent academic achievement. Academic achievement didn't significantly improve prior self-concept of maths and problem solving nor did failure deteriorates it.

KEYWORDS : Self-concept, academic achievement

INTRODUCTION

There was evident an increase in studies on self concept in psychological research of recent years. Self-concept has been linked to various education outcomes such as academic effort, coursework selection, educational aspirations and academic achievement¹.

Amidst an array of definitions the most widely accepted definition of Self concept is by Shavelson et al. They state that self-concept is the perception that one has about oneself, formed from experiences and relationships with the environment, where significant people play an important role².

Based upon Shavelson's model of self-concept questionnaire was devised by Marsh et al. the Self Description Questionnaire (SDQ). The SDQ III is one of a series of three instruments designed to measure self-concepts for preadolescents (SDQ I), young adolescents (SDQ II) and late adolescents and young adults (SDQ III)³. It is a broadly covering, valid, and consistent tool measuring self-concept.

A large quantity of research has examined the relation between self-concept and academic achievement. However there are no conclusive studies that clearly identify the direction of the link which joins these two variables. This study differs from earlier studies in that it focuses on the finding the direction of association between self concept of maths and problem solving with academic outcomes.

METHODOLOGY

Participants – The study sample consisted of 50 students of both sexes, in the age group of 18 -19 yrs and enrolled with reputed coaching classes in Delhi for the preparation of National level Pre Medical Test.

Research tool/instrument – The research used SDQ III which is a self explanatory questionnaire, supposed to be used by late adolescents and young adults in the age range of 16-25 yrs. Taking this questionnaire needs no previous training. On the SDQ III, each item is a simple declaration of the concept or model with 8 possible responses, varying from definitely false scoring 1 to definitely true scoring 8. Half of Statements are negatively worded. The scoring for the negatively worded items is reversed.

Procedure – The study involved two sets of data collection. Over a period of 1 yr the students filled the SDQ III twice, once during the preparation of the exam and the other after 1 year. Informed consent was obtained from 86 students and SDQ III was then administered to them for the first time (phase I) in groups of 15-20 students, during

class time, over a period of 2 days. No discussion was allowed through the test. The SDQ III was administered for the second time a year later (phase II) However, not all students could be traced, only 50 students could be contacted in phase II and data was obtained from 30 students who qualified the exam and were studying in first year M.B.B.S. (group I) and 20 students who could not qualify the exam and were pursuing alternative paramedical or graduate courses.

The measure used to assess academic achievement was qualifying the National level pre medical entrance exam conducted by Central Board of Secondary Education. The exam tested the knowledge of students in science stream subjects through objective type questions.

Data Analysis – Descriptive statistics were used to calculate the means and standard deviations of SDQ III. A two tailed t-test was employed to examine the differences in the self-concept-

- In phase I between group I and group II
- Between phase I and phase II of group I students.
- Between phase I and phase II of group II students.
- p value <0.05 was considered significant.

RESULTS

The comparison of SDQ III score of Maths and Problem solving in phase I between group I and group II are shown in Table 1. Group II had statistically non significant lower scores in phase I. Table 2 presents the phase I and phase II SDQ III scores of group I students. No statistically significant differences were found in the scores. Table 3 presents the phase I and phase II scores of group II students. No statistically significant differences were found.

Table 1: Comparison of SDQ III scores in phase I between group I and group II

Scale	Group I	Group II	p value
Maths	54.40±14.08	46.35±12.81	0.04*
Problem solving	57.93±9.06	45.55±11.94	0.0*

*P<0.05

Table 2: Comparison of SDQ III scores between phase I and phase II of group I

Scale	Group I	Group II	p value
Maths	54.40±14.08	57.57±13.38	0.37
Problem solving	57.93±9.06	58.33±8.60	0.86

*P<0.05

Table 3: Comparison of SDQ III scores between phase I and phase II of group II

Scale	Group I	Group II	p value
Maths	49.45±12.98	46.3±13.36	0.45
Problem solving	45.55±11.94	49.05±8.88	0.29

DISCUSSION

Self-concept is an important factor that affects student's academic achievement⁴. The present study was undertaken to find out the causal association between self-concept of maths and problem solving and academic achievement and whether the variables are mutually reinforcing or not.

Looking at the results as obtained through three approaches it was found that in phase I, group I students had significantly higher SDQ III scores. However, self-concept is more adequately captured in terms of multidimensional profile of self-concept scores rather than a single total score⁵. The phase I and phase II scores of the two groups were not significantly different. This suggests that prior self-concept strongly influences subsequent academic achievement, or in simple words, how people value themselves positively influences their academic achievement. However, success in a competitive exam does not improve prior self-concept nor failure to clear the exam deteriorates prior self-concept.

The results are in agreement with the results of a one of the pioneer's study by Marsh⁶. In this study, he tested the causal ordering of academic self-concept and academic achievement with four waves of data (last three years of high school and 1 year after high school graduation). He found support for reciprocal effects in which the largest paths were from prior academic self-concept to subsequent school grades. A later study by Marsh and Yeung and a review of reciprocal effects model by Marsh and Craven also showed that academic self-concept and academic achievement are both strongly associated cause-effect relation^{7,8}. Other studies by Chapman and Turner, Bachman and O'Malley have shown no significant causal influence self-concept and academic achievement^{9,10}.

The findings of this study confirms that self concept of maths and problem solving positively reinforces the subsequent academic outcome. But at the same time the study does not agree on the assumption that academic achievement affects subsequent self-concept. Similar results have been reported by Byrne, who found no cross-lagged effects and by Shavelson and Bolus who reported causal predominance of self-concept over academic achievement^{4,11}. The present study has few limitations. There are perspectives of a student such as conscientious effort, intrinsic motivation, persistence in the face of difficulties, academic choice and coursework selection might positively influence prior self-concept and hence subsequent academic achievement.

CONCLUSION

Previous studies in different age groups have depicted no consistent pattern, but our study confirms self-concept of maths and problem solving positively affects the subsequent academic achievement. Our results support the idea that self-concept of maths and problem solving has a stronger influence on subsequent academic achievement. Further research is needed identify the psychological processes that mediate the effects of prior self-concept on subsequent academic achievement. Parents and teachers should be offered methodological guidance so that they can put more effort into enhancing student's self-concept rather than fostering achievement.

REFERENCES

1. Marsh HW. Causal ordering of academic self-concept and academic achievement: A multiwave, longitudinal panel analysis. *J. Educ. Psychol.* 1990a;82(4):646-56.
2. Shavelson RJ, Hubner JJ, Stanton GC. Validation of construct interpretations. *Rev. Educ. Res.* 1976;46:407-41.
3. Marsh HW. Self Description Questionnaire III: SDQ III. 2005. University of Western Sydney, McArthur
4. Byrne BM. Self-concept/academic achievement relations: An investigation of dimensionality, stability, and causality. *Can. J. Behav. Sci.* 1986;18:173-86.
5. Marsh HW, Hau KT, Sung RY, Yu CW. Childhood obesity, gender, actual-ideal body image discrepancies, and physical self-concept in Hong Kong children: Cultural differences in the value of moderation. *Dev. Psychol.* 2007;43(3):647-62.
6. Marsh HW. A reciprocal effect model of the causal ordering of academic self-concept and achievement. 2003. Retrieved from <http://www.aare.edu.au/03pap/mar03755.pdf>.
7. Marsh HW, Yeung AS. Causal effects of academic self-concept on academic achievement: Structural equation models of longitudinal data. *J. Educ. Psychol.* 1997a;89:41-54.
8. Marsh HW, Craven R. Academic self-concept: Beyond the dustbowl. In G. Phye (Ed.), *Handbook of classroom assessment: Learning, achievement, and adjustment*. 1997. Orlando, FL: Academic Press.

9. Chapman JW, Tunmer WE. A longitudinal study of beginning reading achievement and reading self-concept. *Brit. J. Educ. Psychol.* 1997;67:279-91.
10. Bachman JG, O'Malley PM. Self-esteem in young men: A longitudinal analysis of the impact of educational and occupational attainment. *J. Pers. Soc. Psychol.* 1977;35:365-80.
11. Shavelson RJ, Bolus R. Self-concept: The interplay of theory and models. *J. Educ. Psychol.* 1982;74:3-17.