

Fluid intelligence as the predictor of academic performance and flourishing: role of academic stress

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Objective: To study the indirect effect of fluid intelligence on flourishing through academic performance and moderating role of academic stress.

Methodology: In this study, single-stage cluster 560 undergraduates from University of Sargodha were recruited. Raven's Standard Progressive Matrices™ Plus, Flourishing Scale, and Undergraduate Stressor Questionnaire were used to assess the fluid intelligence, flourishing, and perceived academic stress, respectively. The proposed model of the study was tested through path analysis by using maximum standard likelihood estimation in IBM SPSS Amos.

Results: Fluid intelligence not only had a positive

direct effect on academic performance and a negative direct effect on flourishing; it also had a positive indirect effect on flourishing through academic performance.

Conclusion: Students with high levels of fluid intelligence might not academically perform at their optimal level when they perceived a high degree of academic stress. Their sub-optimal academic performance being discrepant with their academic self-evaluations might compromise their degree of flourishing or psychological well-being. (Rawal Med J 202;45:569-572).

Keywords: Fluid intelligence, academic stress, adaptive behavior.

INTRODUCTION

Fluid intelligence is the ability to solve novel problems and to reason independently in order to acquire knowledge.^{1,3} It plays a critical role in human existence because it involves the cognitive processing of information, which helps to transform a given state into a goal state.⁴ It is a principal component of executive functions and logical reasoning and it has a well-established role in academics and psychosocial adaptation.³ Students with a high degree of fluid intelligence are regarded as successful learners because they have better access to prior knowledge and they can utilize it effectively in a variety of situations more adequately.⁵

Students perceive stressful situations as harmful or threatening, which may interfere or alter their academic performance. At a university level, students are exposed to various kinds of stressors such as the stress of academics with a compulsion to succeed and an unclear future. Consequently, their ability to inhibit psychological stress is taxed, which may negatively influence their academic performance.⁶ The students with high intelligence level are more likely to use their abilities and

energies in achieving their academic goals because they have or they can acquire more resources for effective regulation of their perceived stress.⁷

People with high IQ have a high level of happiness.⁸ Students who face academic problems and show consistently poor academic performance might have poor mental health.⁹ Poor academic performance could be due to stress, which might lead to poor psychological health.¹⁰ Moreover, failure to achieve the desired academic outcomes could result in a series of negative life experiences, which could be a potential cause of vulnerability to the low levels of flourishing.¹¹

The examinations at the university level are key criteria for student evaluation and are an important source of academic stress. This stress and poor academic performance may compromise the level of the flourishing of students.¹² Murphy reported that students with a high degree of fluid intelligence were more likely to perceive a low degree of stress, which might lead to better academic skills and improved academic performance.¹³ The present study aimed to test the indirect effect of fluid intelligence on flourishing through academic performance.

METHODOLOGY

This study employed a cross-sectional survey design in which the sample of 560 students was recruited through a single-stage cluster sampling. The self-report Urdu translated version of Flourishing Scale and Undergraduate Stress Questionnaire was used. Both of these scales were translated in the present study by following standardized procedure of translation developed by Brislin.¹⁴ The academic performance was conceived in terms of student's cumulative grade point average (CGPA) and their degree of fluid intelligence in terms of their scores Raven's Standard Progressive Matrices™¹.

Statistical Analysis: The data were analysed through IBM SPSS and AMOS. The means and standard deviations of all variables are analysed. Chi square was used and $p < 0.05$ was considered significant.

RESULTS

Out of 560 students, 228 were boys and 338 girls. The age of the sample ranged from 18 to 25 years (mean 21 ± 1.8). In this study, 110 students were from social sciences (33 male and 77 female), 221 were from pure sciences (86 male and 135 female), 132 were from management sciences (77 male and 57 female), and 89 were from arts (63 male and 26 female). The alpha reliabilities of all scales were satisfactory ($\alpha > .80$), which indicates good internal consistency of the scales (Table 1). None of the skewness values were aberrantly high, which suggested that variables of the present study are symmetrically distributed.

The correlations between variables were in the expected directions. Academic performance and psychological well-being were positively correlated; fluid intelligence was positively related

to academic performance and negatively related to flourishing, and the perceived (Fig. 1). The proposed model of the present study (Fig. 2) indicated a good fit to the data with a no significant chi square value of ($\chi^2(5) = 12.5, p = 0.02$). Other measures of fit were also suggestive of good fit to the data as all of them were well above the cut-off point of 0.95 (CFI = 0.96, GFI = 0.99, AGFI = 0.97 NFI = 0.94). RMSEA value of .05 ($p = 0.40, LL = 0.01$ & $UL = 0.08$) and standardized RMR value of 0.03 also affirmed to the fit of the proposed model.

Fig 1. The moderating role of perceived stress between fluid intelligence and academic performance.

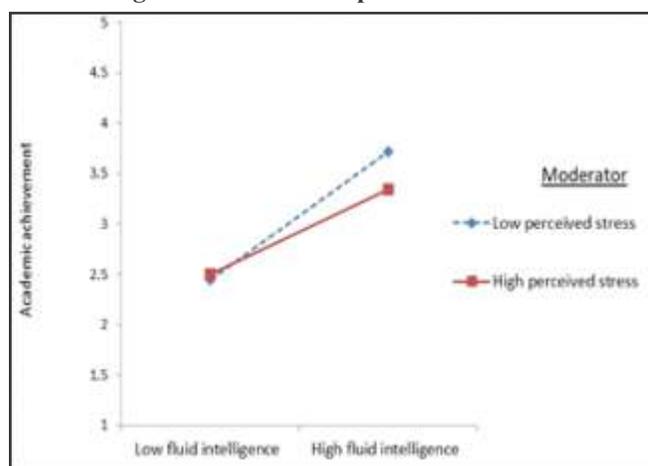


Fig 2. The conceptual model of flourishing.

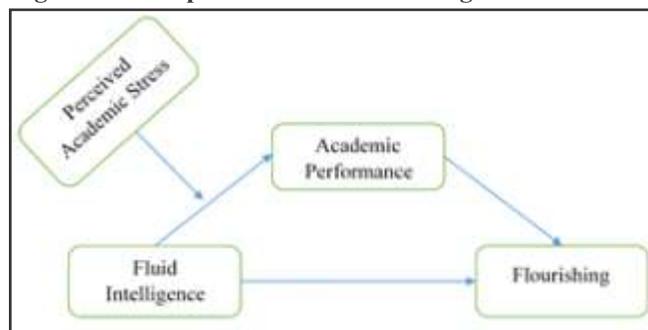


Table 1. Psychometric properties and descriptive of scales (N=560).

Variable	2	3	4	k	M	SD	.	Potential	Actual	Sk
1.AP	.53***	.08*	-.11*	--	2.8	.48	---	---	---	---
2.FI	---	-.08*	-.09*	60	32.7	8.05	.86	0-60	4-52	-.73
3.FS	---	---	-.14*	8	46	6.6	.80	8-56	14-56	-1.5
4.PS	---	---	---	28	61	12	.85	28-112	28-96	.01

Note. AP: Academic performance; FI: Fluid intelligence; FS: Flourishing; PS: Perceived stress

Table 2. Standardized path Coefficients for direct and indirect effect.

Path	β	95 % CI		p
		LL	UL	
Fluid intelligence → CGPA	.53	.47	.59	.000
Perceived stress →CGPA	-.08	-.15	-.01	.010
Fluid intelligence x Perceived stress →CGPA	-.11	-.19	-.04	.000
Fluid intelligence → Flourishing	-.10	.19	.01	.020
CGPA → Flourishing	.11	.00	.19	.030
Fluid intelligence → CGPA → Flourishing	.05	.00	.10	.030
Perceived stress →CGPA → Flourishing	-.01	-.03	-.001	.020
Fluid intelligence x Perceived stress → CGPA → Flourishing	-.01	-.03	-.001	.010

Table 2 show that the positive relationship between fluid intelligence and flourishing holds more strongly when perceived stress is low. These direct, indirect, and interaction paths showed 30% variance is academic performance $\{R^2 = .30, p = .003 (LL = .23 \& UL = .36)\}$. The results depict fluid intelligence and academic performance as a negative and positive predictor of flourishing, respectively. The indirect effects of fluid intelligence and perceived stress on flourishing through academic performance are also significant. These direct and indirect effects explained 1% variance in psychological wellbeing $\{R^2 = .01, p = .005 (LL = .00 \& UL = .02)\}$. Finally, the indirect effect of interaction between perceived stress and fluid intelligence on flourishing through academic performance is significant, which provides evidence for the moderated mediation since perceived stress weakened the positive indirect effect of fluid intelligence on flourishing through academic performance.

DISCUSSION

The results of the present study demonstrate that when perceived stress is low, fluid intelligence leads to better academic performance, which in turn, may lead to enhance the level of flourishing. Fluid intelligence is a vital predictor of academic

performance. Students with high fluid intelligence invest their knowledge to master strategies in order to solve the problem and standardized intelligence tests are considered as the best predictors of academic achievement.¹⁵ On the other hand, stress in academic life is a universal phenomenon; it affects the grades of all levels of students. University students may experience many academic, psychosocial and economic challenges, which can be due to competition among students, regular projects, long university hours, teaching methods and comparisons of student's performance.¹⁶

In Pakistan, students are also suffering from multiple problems linked with low academic performance. These problems can be personal, parental and social factors, which create stress in student's life and can negative influence their psychological health.¹⁷ Colom et al claim that students in educational institutions may experience many psychological and economical demands inside and outside their classrooms, which are important determinants of poor academic performance and this poor academic performance is a great source of poor psychological health of students.¹⁸ They suggest that even the highly intelligent student when experienced academic stress, would lower his/her academic performance and poor academic performance might compromise their psychological wellbeing.

Like any other scientific work, the present study has few limitations such as limited sample, poor control on extraneous and confounding variables, and it is very difficult to administer several tests on a student sample in one session. Studies using a multi-method approach should plan for several sessions of assessment so that they can efficiently apply multiple methods on a sample.

CONCLUSION

The present research has confirmed the importance of fluid intelligence, academic stress, and academic performance on the psychological health of university students. The academic stress can have detrimental effects on academic performance and the flourishing of students.

Author Contributions:

Conception and design: Adnan Adil
 Collection and assembly of data: Sadia Niazi
 Analysis and interpretation of the data: Qaiser Abbas
 Drafting of the article: Sadia Niazi
 Critical revision of the article for important intellectual content: Adnan Adil
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