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AN EXAMINATION OF PSYCHOSOCIAL PREDICTORS OF ACADEMIC ACHIEVEMENT AMONG FIRST YEAR MEDICAL STUDENTS

JAIGANESH K[1*], SOBANA R[2] AND BHARATHI P[3]

1: Professor of Physiology, Mahatma Gandhi Medical College and Research Institute, Sri Balaji Vidyapeeth, Pondicherry

2: Professor of Physiology, Mahatma Gandhi Medical College and Research Institute, Sri Balaji Vidyapeeth, Pondicherry

3: Retired Professor of Physiology, SR Medical College & Research Institute, Akathumuri, Thiruvananthapuram

[*]Corresponding Author: Dr. K. Jaiganesh: E Mail: jaiganeshk1966@gmail.com

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ABSTRACT

Personality styles are factor pairs or personality traits interacting with each other and with other characteristics of the person and the environment. In order to determine the impact of the various personality styles and psychomorbidity on the academic performance of new entrants to the medical school, 142 voluntary participants were recruited from a private University in South India. They were administered the Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale(SDS) devised by Zung. The personality traits of the students were elucidated using the NEO-FFI of Costa & Mc Crae. One way Anova revealed a significant difference between the percentage of marks secured by normal students and those with depression ($p<0.01$) among the students belonging to the "directed" personality style; the performance of those with anxiety and those with depression was also found to differ significantly ($p<0.05$).Pearson's Correlation revealed a negative correlation between the percentage of marks and SDS scores in the "directed" group of students. Multiple logistic regression analysis showed that Neuroticism is the best predictor for students securing average marks (50-69%).Our findings reveal that psychopathology does not hinder academic performance in the various categories of personality styles, except the "directed" group. In the case of " over controlled" group of students, all the students have some

form of psychopathology or the other, most of them being neurotic perfectionists. We can infer that psychological well-being is not the prime determinant of academic achievement among medical freshmen. Other factors like neurotic perfectionism may play key roles in academic achievement among this group.

Keywords: Psychomorbidity, Psychosocial Predictors, Anova

INTRODUCTION

Academic achievement has been usually associated with intelligence rather than personality **[1, 2]**. While intelligence plays a role in what a student *can* do by means of specific abilities which enhance understanding and learning, personality traits determine the way a student will perform, by facilitating or interfering with the use of these abilities. According to Tomas-Chamorrow *et al* **[3]** additional variance in academic performance can be obtained by using personality traits as predictors.

"Personality styles" or dimensional matrices are factor pairs-personality traits interacting with each other and with other characteristics of the person and the environment, which can play an important role in determining an individual's actions and experiences. They are stable individual differences and specific targets for psychosocial interventions **[4]**. So far, the psychosocial predictors of high achievement has focused primarily on depression, coping and stress, with little attention to personality styles. Personality styles are based on examination of pairings among the Big Five personality dimensions, viz., Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness **[5]**. These factor pairs can be represented in the form of an" interpersonal circle" or "circumplex" that aligns individuals along two axes, one representing Love, and the other, Dominance. Any point on this circle represents a blend of these two qualities, the relative importance of each dimension being determined by the point's distance from the poles of each axis **[4]** (vide **Figure 4**)

Exposure to medical curriculum is known to be associated with a high frequency of depression, anxiety, and stress **[5]**, though medical school training is meant for shaping competent graduates for a personally rewarding career, and to promote public health. Several studies report a high prevalence of psychological distress among this student population, and the levels of psychomorbidity are found to be consistently higher than in the general population, and age-matched peers **[6]**. Some traits and behaviors such as Neuroticism, introversion, and Conscientiousness are risk factors for

psychological distress during medical school **[7]**. The drastically new academic environment which imposes mastery of certain technical skills such as identification of anatomical structures in preserved corpses, makes the students more vulnerable for stress and psychomorbidity. Therefore, we decided to study the lacuna in this area concerning the interactions of psychosocial factors like personality styles with psychomorbidity, psychological resilience and academic achievement among freshers in the medical school who are exposed to a challenging curriculum coupled with stressful circumstances like separation from family nurturance. The study was initiated with the following aims.

1) To determine the impact of the various personality styles and psychopathology on the academic performance of new entrants to the medical school.

2) To identify which personality styles are more prevalent among high and low achievers of the above category of students.

3) To determine whether psychosocial factors like personality styles or psychomorbidity plays an important role in facilitating/ hindering academic performance among the above student population.

4) To assess the importance of psychological resilience in shaping high achievers.

MATERIALS AND METHODS

The voluntary participants of the study include one hundred and forty-two first-year medical students (68 males, 74 females) from a private University in Puducherry state, South India. The study was conducted in accordance with the declaration of Helsinki. After institutional research committee approval and informed consent from the students, the study was initiated. Their mean age was 21.4 years (SD - 2.3 years; range - 17 to 23 years).

ANXIETY – The Self-rating Anxiety Scale (SAS) of Zung **[8]** is a brief, 20-item self-report questionnaire that measures the presence and magnitude of the anxiety-based symptoms that are listed in the DSM-IV-TR (APA 2000) criteria for anxiety. Each item is scored on a 4-point Likert scale and raw scores were converted into SAS indices, with participants having cut-off index scores above 45 being classified as "clinically anxious".

DEPRESSION – The Self-rating Depression Scale (SDS) devised by Zung **[9]** was used to identify the students with depressive symptoms. This scale is also a brief, 20-item self-support questionnaire that measures the presence and extent of depressive symptoms. The same 4-point scale as in the SAS was used. Raw scores

(Range = 20-80) were converted into SDS indices, and a cut-off index score of 50 was used to identify the participants experiencing significant depressive symptoms.

After computing their SAS and SDS indices, the personality traits were elucidated using the NEO-FFI (NEO Five Factor Inventory) **[4]**, which was administered to the participants. The NEO-FFI comprises 60 items developed to provide a concise measure of the five basic personality factors and uses a five-point Likert response format. The participants responded by marking on each of 60 items whether they *strongly agree, agree, neutral, disagree or strongly disagree* with a given proposition about themselves. The scores of 12 items were summed to provide an overall measure of every factor. Raw scores were converted to T-scores using the formula $T = 50 + 10(X - Y) / Z$, where, X = Raw score of the student; Y = Average Score of the whole cohort; Z = Standard Deviation. Those with T-scores above 50 were classified as having elevation in the concerned personality trait. After evaluating the scores of the various personality traits, the average marks secured by the students in four consecutive academic examinations was entered. Pearson's Correlation was used to determine the correlation between academic performance and psychomorbidity. Multiple logistic regression analysis was done to determine which personality trait is the best predictor for students securing a) more than 70%, b) 50-69%, and c) less than 49%. One-way Anova and t-test was performed to evaluate the significance between the marks secured by normal students, and those with psychomorbidity, and the results have been graphically represented below.

RESULTS

The study was completed by all the students without any drop outs. **Figure 1** reveals that the personality style of Upbeat optimism(N<50;E>50) is more prevalent among high achievers (those securing >70%); Over controlled impulse (N>50;C>50) is more common among low achievers(marks <49%); there is not much of a difference between the proportion of high & low achievers among the Directed (N<50;C>50) group of students; Home bodies (E<50;O<50) are twice more common among high achievers. The other groups do not seem to exhibit a distinction in the proportion high and low achievers.

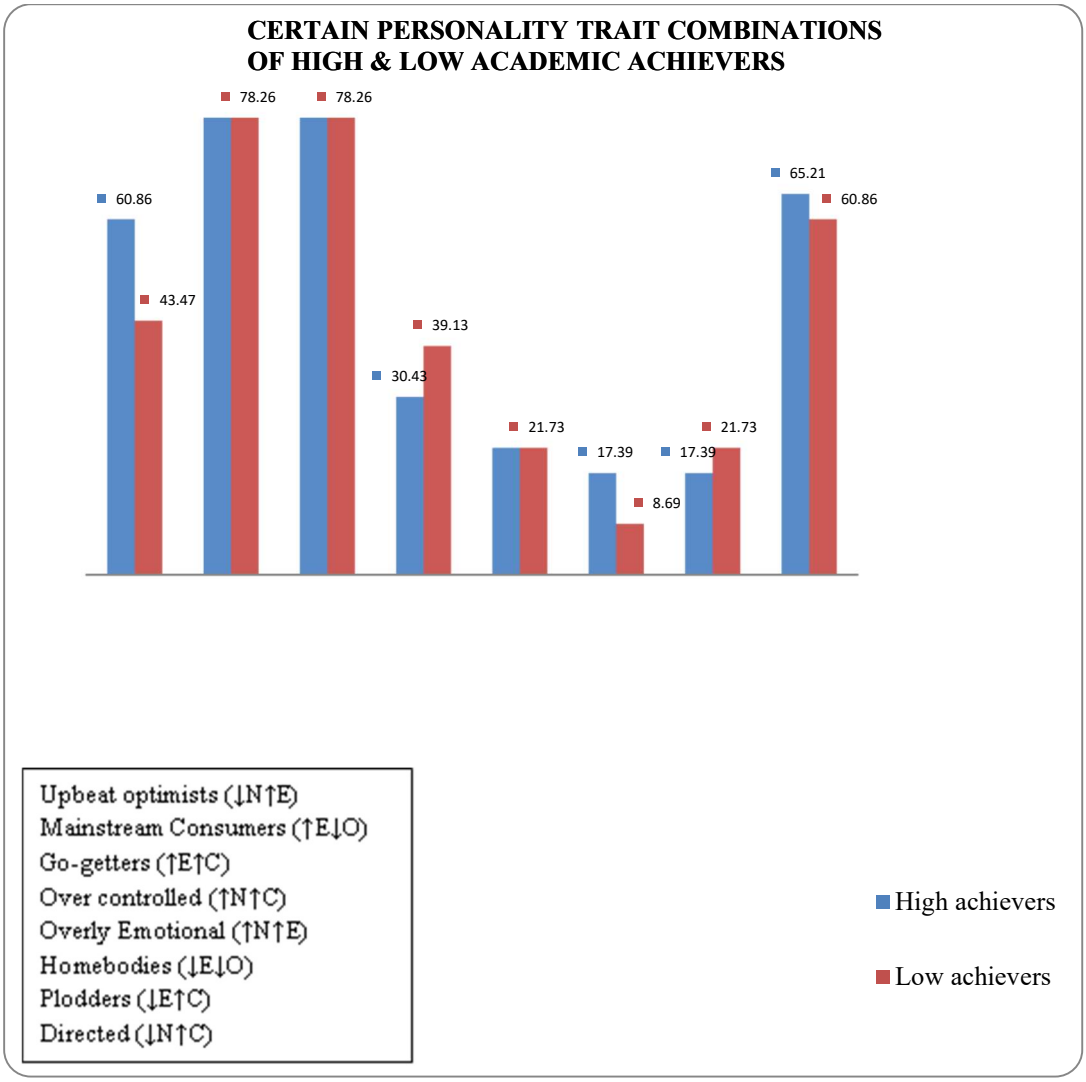
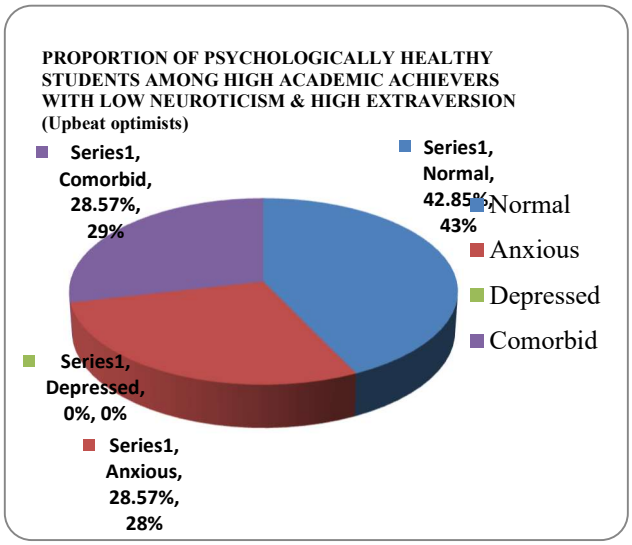
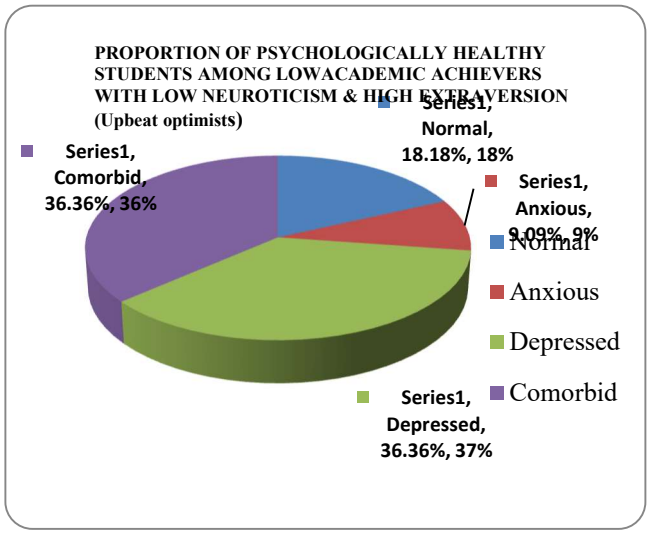
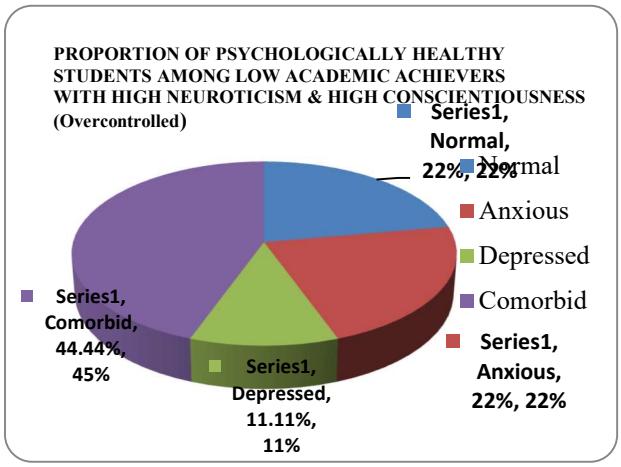


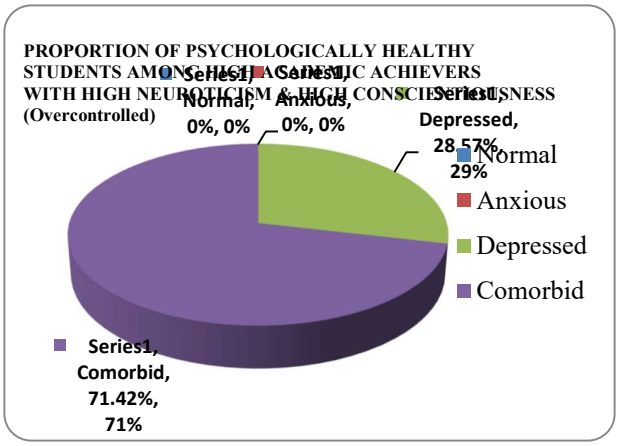
Figure 1:
***Upbeat optimism (↓N↑E) is more prevalent among high achievers, when compared to low achievers.**
***Over controlled impulse (↑N↑C) is more prevalent among low achievers.**
***Homebodies (↓E↓O) is more common among high achievers.**
(The numbers above the bar diagrams indicate the percentage of marks secured)
N-Neuroticism
E-Extraversion
O-Openness to Experience

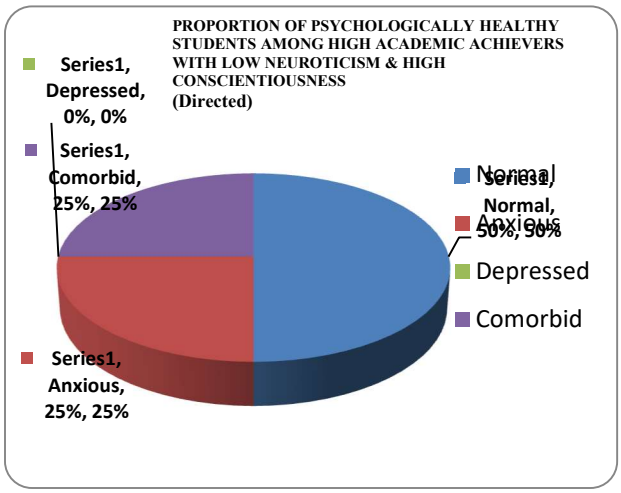
C-Conscientiousness











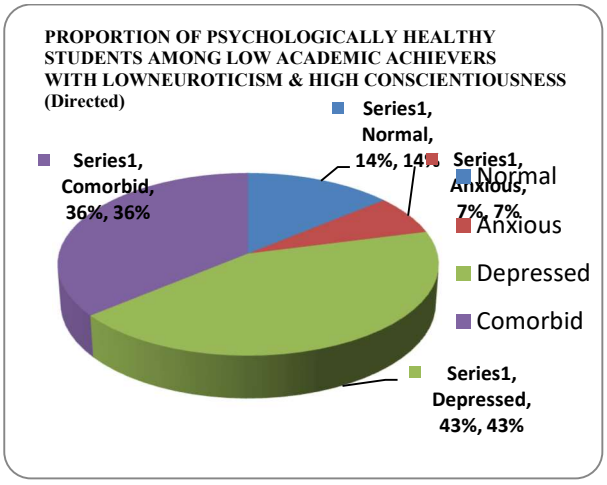


Figure 2
Psychological health, personality traits, and academic performance

***High achievers with over controlled impulse (↑N↑C) lack psychological health; most of them (71.42%) have comorbidity (i.e) co-existing anxiety and depression.**
***A small percentage (22.22%) of low achievers with over controlled impulse (↑N↑C) are psychologically healthy, in contrast to high achievers with a similar personality trait combination, who totally lack psychological health.**
***Psychological health is more prevalent (42.85%) among high achievers with upbeat optimism, when compared to low achievers with a similar trait combination (18.18%).**
Psychomorbidity, personality traits, and academic performance
***Comorbidity is most prevalent (71.42%) among high achievers with over controlled impulse.**
***Depression is totally absent among high achievers with upbeat optimism (↓N↓E).**
***Anxiety is totally absent among high achievers with over controlled impulse**
***Among low achievers, around 44.44% with over controlled impulse have comorbidity.**

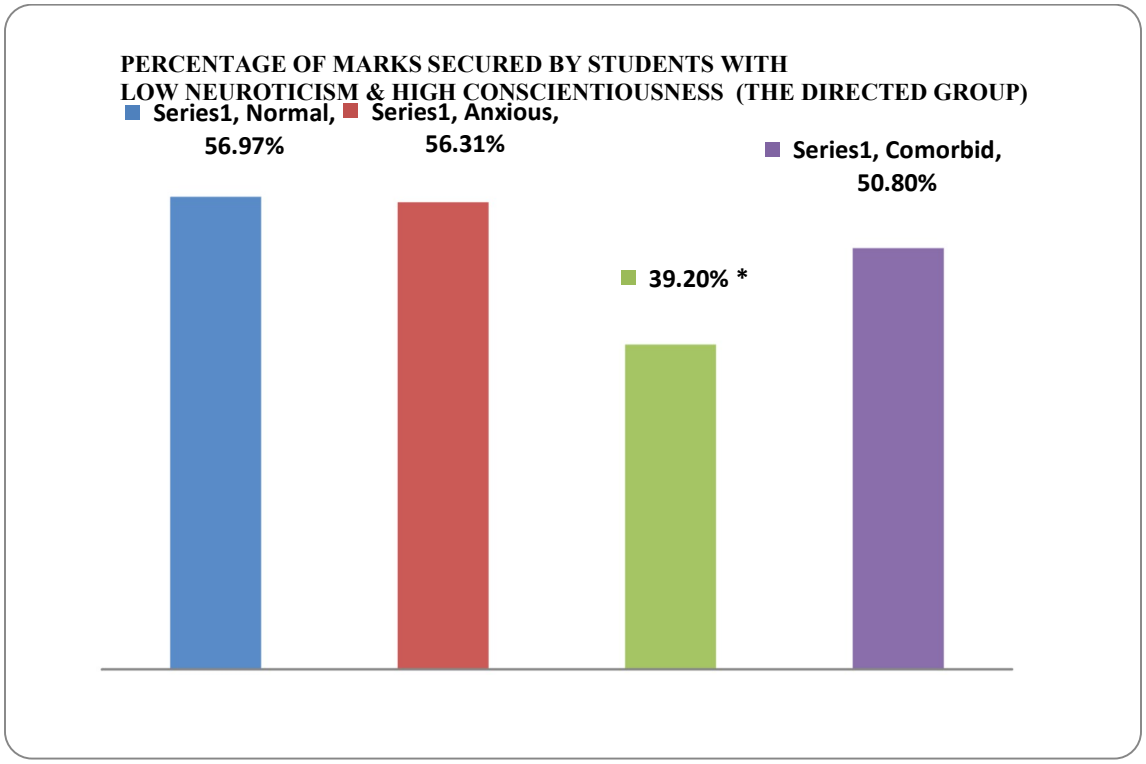


Figure 3
***There is a significant difference between the percentage of marks secured on comparing the performance of normal students with that of students with depression ($p<0.01$).**
***There is a significant difference between the percentage of marks secured on comparing the performance of students with anxiety with that of students with depression ($p<0.05$).**
***There is no significant difference between the performance of normal students and that of students with anxiety.**

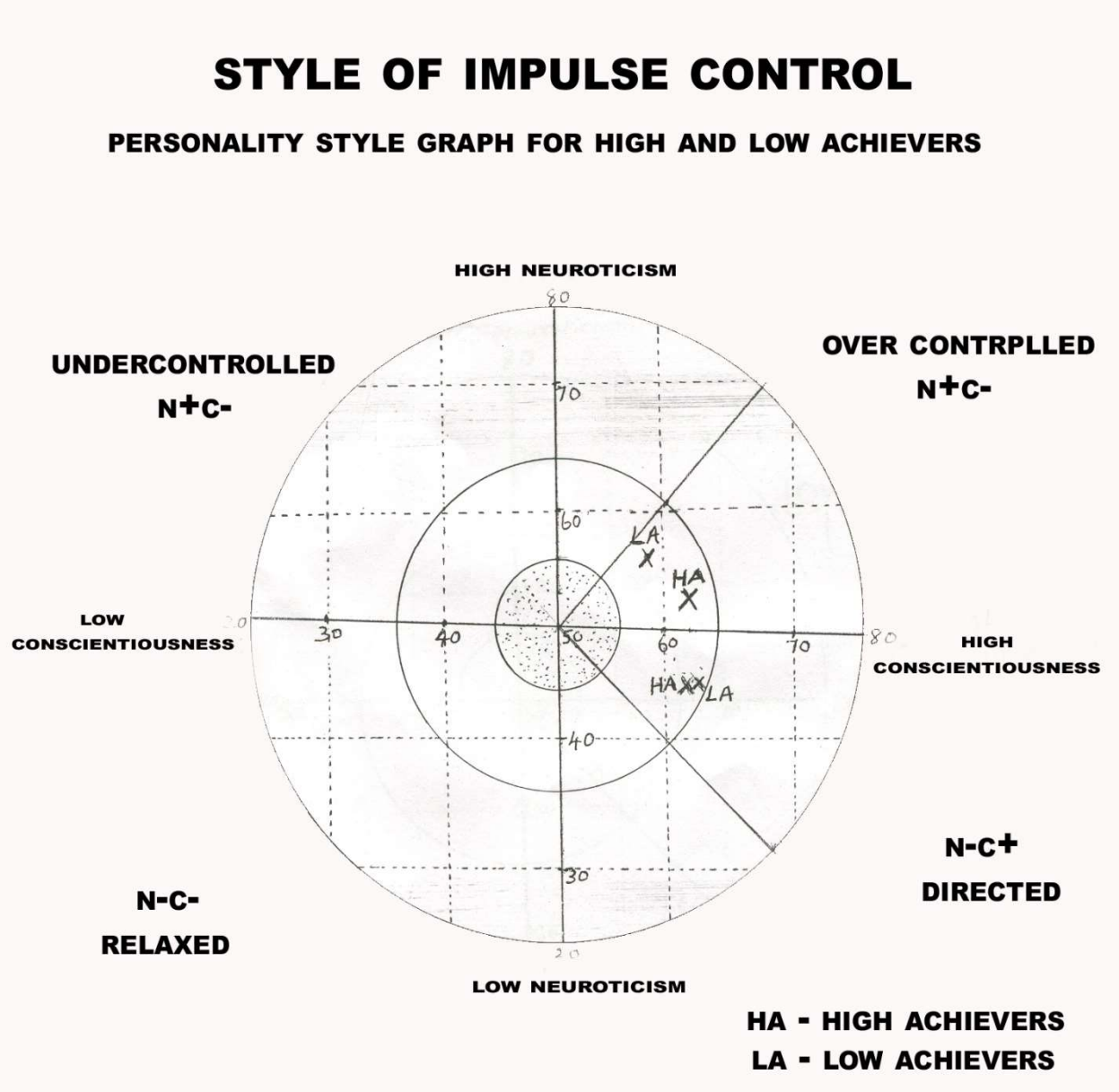


Figure 4a: Overcontrolled personality style
***Note that the respondent "X" for low achievers (N=56; C=58)is located closer to the diagonal passing through the centre of the quadrant, indicating that the overcontrolled personality style is more descriptive for low achievers.**
***High achievers have lower Neuroticism and higher scores for Conscientiousness (NB=54; C=61) – a tendency to shift towards the "Directed" Personality Style**

Directed personality style

* The respondents "X" for low and high achievers are located close to each other, indicating that this personality style does not contribute much in distinguishing between high and low achievers

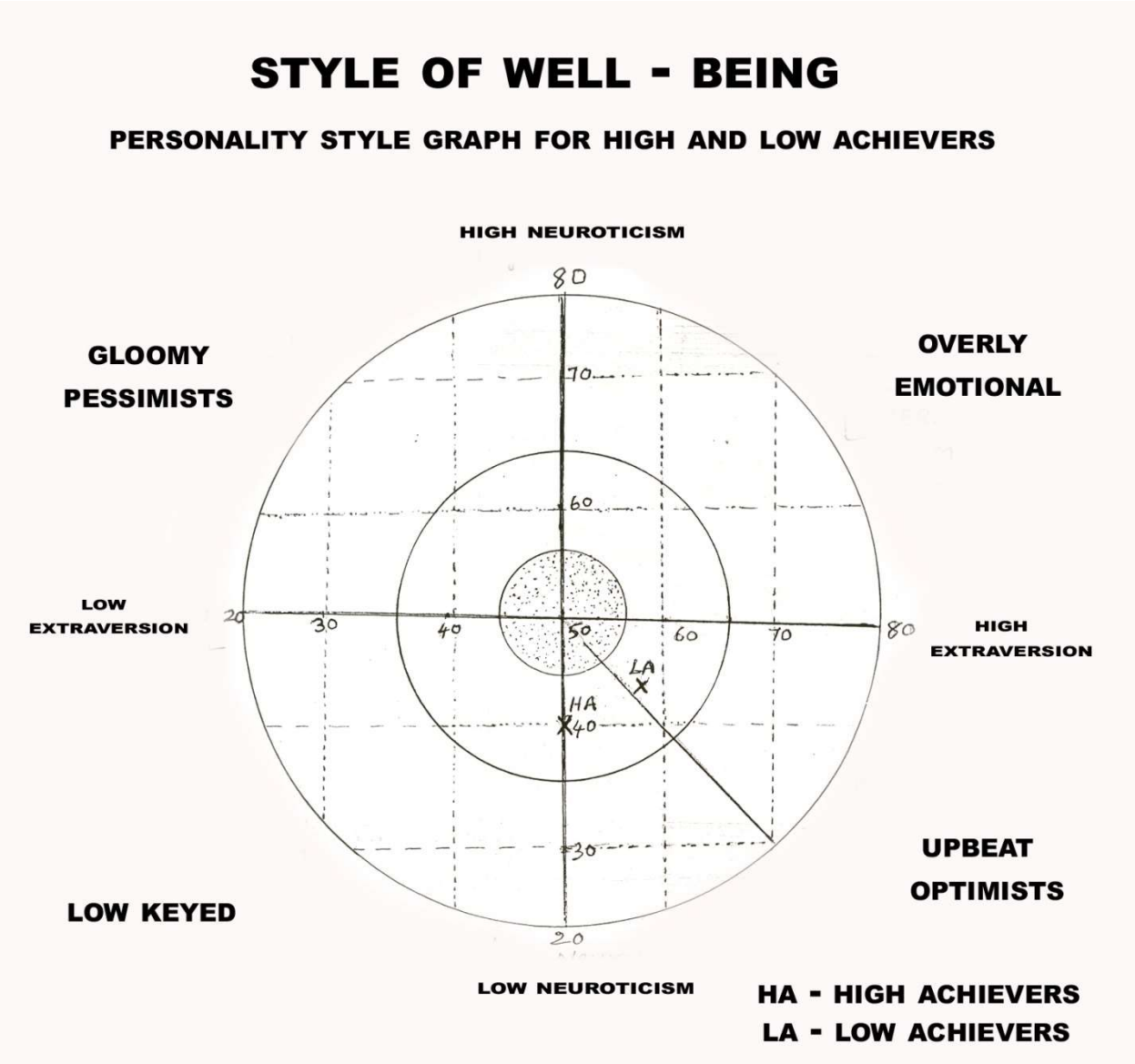


Figure 4b
***Note that the respondent "X" for high achievers is located on the vertical axis, indicating that both the quadrants of upbeat optimists and Low keyed are descriptive for this group.**
***The "X" for low achievers is near the diagonal passing through the centre of the quadrant, indicating that upbeat optimism is more descriptive for the low achievers.**

Table 1: Shows a negative correlation (p<0.05) between the percentage of marks and SDS scores in the students exhibiting the "Directed" personality style

		SAS	SDS
MARKS PERCENTAGE	Pearson correlation	-0.074	-0.227*
	Sig. (2-tailed)	0.474	0.026

Table 2: Shows the ANOVA results for the difference in academic performance between the normal students and those with psychopathology

MARKS PERCENTAGE					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3272.825	3	1090.942	4.952	0.003*
Within Groups	20268.081	92	220.305		
Total	23540.906	95			

***There is a significant difference (p<0.01) between the percentage of marks secured by the normal (psychologically resilient) students and those with anxiety, depression and comorbidity**

Table 3: Showing multiple comparison of academic achievements with depression

Group		Mean Difference	Std.Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Normal	Depression	17.810	4.846	0.002**	5.13	30.49
	Anxiety	0.664	4.347	0.999	-10.71	12.04
	Comorbid	6.177	3.733	0.354	-3.59	15.94
Depression	Normal	-17.810	4.846	0.002**	-30.49	-5.13
	Anxiety	-17.146	5.668	0.017*	-31.98	-2.31
	Comorbid	-11.633	5.213	0.122	-25.27	2.01
Anxiety	Normal	-0.664	4.347	0.999	-12.04	10.71
	Depression	17.146	5.668	0.017*	2.31	31.98
	Comorbid	5.513	4.752	0.653	-6.92	17.95
Comorbid	Normal	-6.177	3.733	0.354	-15.94	3.59
	Depression	11.633	5.213	0.122	-2.01	25.27
	Anxiety	-5.513	4.752	0.653	-17.95	6.92

****There is a significant difference between the percentage of marks secured by the normal students and those with depression (p<0.01)**

***There is a significant difference between the percentage of marks secured by the students with depression and those with anxiety (p<0.05)**

Table 4: Shows the results of multiple logistic regression analysis for average students and high achievers(>70%).Neuroticism is found to be the best predictor for students securing average marks(50-69%);only in the case of high achievers, there is a negative correlation between the percentage of marks and SDS scores.

Marks		B	Std.Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
50-69%	Intercept	-4.253	5.294	0.645	1	0.422			
	N<50	0.159	0.078	4.177	1	0.041*	1.173	1.007	1.367
	C>50	0.019	0.076	0.065	1	0.799	1.020	0.878	1.184
	SAS	-0.024	0.032	0.570	1	0.450	0.976	0.916	1.040
	SDS	-0.052	0.028	3.436	1	0.064	0.949	0.898	1.003
≥ 70%	Intercept	0.158	7.129	0.000	1	0.982			
	N<50	0.125	0.104	1.444	1	0.230	1.134	0.924	1.391
	C>50	-0.053	0.100	0.281	1	0.596	0.949	0.780	1.153
	SAS	0.007	0.046	0.023	1	0.879	1.007	0.919	1.103
	SDS	-0.007	0.036	4.469	1	0.035**	0.926	0.863	0.994

***Neuroticism is found to be the predictor for students securing average marks (50-69%)**

****There is a negative correlation between the percentage of marks and SDS scores in the case of high achievers (≥70%)**

DISCUSSION

Since there is a significant difference between the proportion of high and low achievers among the following two different personality styles viz. Style of well-being (N & E combinations) and Style of Impulse Control (N&C combinations), it is worthwhile analysing the various factors which play a key role in academic achievement among these groups.

1) ***Style of well-being*** (Vide **Figure 4a**):

Upbeat optimistic personality style: High achievers have lower Neuroticism and Extraversion scores (N=40;E=50) when compared to the scores of low achievers, who score higher on both these scales (N=44;E=56).

Therefore, though the upbeat optimistic high achievers are proportionately more (60.86%) in contrast to low achievers (43.47%), low achievers have more of upbeat optimism in contrast to the high achievers who are low-keyed as well as upbeat optimistic, i.e. bordering on the two styles; the high achievers seem to be maintaining a balance between upbeat optimism and low-keyed personality styles. They are both cheerful, enjoy life, in addition to maintaining a stoic indifference to the ebb and tide of life's events. Since they are not much affected by either good or bad news, they are able to maintain an emotional balance, which may facilitate good academic performance. Therefore one can infer that the attainment of emotional balance, combined with a cheerful optimism plays a key role in high academic achievement among medical students who are exposed to a stressful academic curriculum and atmosphere. Though the low achievers have more of upbeat optimism, their keen aptitude for enjoyment of life's pleasures may be hampering their academic performance.

Style of impulse control (vide **Figure 4b**):

a) *Over controlled personality style:* High achievers have lower Neuroticism scores and higher scores for Conscientiousness (N=54;C=61), when compared to the scores of low achievers(N=56;C=58), exhibiting a tendency to shift towards the "directed" personality style, which is closely related to psychological resilience **[10]**. Further, the respondent for low achievers is situated more closely to the diagonal passing through the centre of the quadrant, indicating that the over controlled personality style (which is associated with neurotic perfectionism) is more indicative of the low achievers of this category 30.43% among the over controlled group are high achievers, while 39.13% among this group are low achievers. These individuals are distress-prone, and forcibly

control their behaviour. They have perfectionistic strivings and will not allow themselves to fail even in the smallest detail **[11]**. They may be susceptible to obsessive – compulsive disorder. According to our findings, most of these high achieving students (71.42%) have co-existing anxiety and depression, while 28.57% suffer from depression alone; psychological well-being is totally absent among this group. They may belong to the category of neurotic perfectionists of Hamachek **[12]**, who have intense perfectionistic strivings, feeling constantly unsatisfied and frustrated because they think that their goals are unattainable. Though high Neuroticism leads to ineffective coping with stressful situations, when coupled with high Conscientiousness it leads towards goal accomplishment due to certain protective factors such as self-belief, determination, inner will etc. **[13]**.

Our study reveals that psychological wellness is not the absolute determinant of high achievement, since the over controlled group of high achievers totally lack psychological well-being. Other factors like goal passion (which is intense in those with high Neuroticism), grit and neurotic perfectionism may play more vital roles towards high achievement among this group. Grit is a trait which is strongly correlated with Conscientiousness. It has the components of determination, motivation, and goal passion, despite facing adversity and failure for long time, and not related to intelligence **[14]**. According to several authors, perfectionism is neither healthy nor adaptive. Though it provides the driving energy for great achievement, perfectionists suffer from anxiety and low self-esteem, and are prone for obsessive – compulsive disorder, clinical depression etc. **[15, 16]**. It seems evident that the over controlled group of high achievers have secured their grades by means of an ecstatic struggle, or as stated by Burns **[17]**, a passion to move beyond the previous limits of one's capabilities,

b) *The "directed" personality style*:

The respondents "X" for both high and low achievers are located in close proximity to each other, suggesting that the difference in academic performance is not attributable to this personality style; factors like psychomorbidity play an important role in distinguishing high and low achievers among this group(vide **Figure 3**). The "directed" group of students with depression are found to score significantly lower marks ($p<0.01$), when compared to their psychologically healthy peers, as well as those with anxiety ($p<0.05$). Further, there is a negative correlation between the percentage of marks

secured and the Self-rated Depression scores (SDS) among this group, suggesting that depression hinders academic achievement among this group. This in contrast to the findings with regard to the "over controlled" group, where there is no association between academic performance and psychomorbidity. Multiple logistic regression analysis reveals that Neuroticism is the predictor for students securing average marks (50 to 69%), underscoring the association of low Neuroticism with attainment of high grades.

"Directed" students have a clear sense of their goals, and work towards them even under unfavourable conditions, taking setbacks and frustrations in stride. This personality style is strongly correlated with psychological resilience(r=0.77), several studies reporting a negative association between Neuroticism and psychological resilience, and a positive association between Conscientiousness and resilience **[11]**. 50% of the "directed" group of high achievers are psychologically healthy, in contrast to the 14% of the low achievers with psychological well-being. Depression is totally absent among high achievers of this group, while 43% of the "directed" low achievers suffer from depression, making it clear that depression is the major cause of low achievement among this group. We can therefore presume that psychological resilience or the phenomenon of bouncing back in response to adversity, does not rule out any psycho pathology, and is not the prime determinant of academic achievement, due to the following reasons:

1. Among the "directed" group (which is closely tied to psychological resilience), psychomorbidity seems to play a vital role in academic achievement.
2. In the "over controlled" group (which is closely related to neurotic perfectionism), psychopathology is prevalent both among low and high achievers, high achievers among this group totally lacking psychological well-being.

CONCLUSION

On analyzing whether conducive personalities styles or absence of psychopathology is more important for academic achievement, our findings make it clear that psychopathology does not hinder academic performance in all the categories of personality styles, except the "directed" group. In the case of "over controlled" high achievers, all the students have some form of psychopathology or the other, most of them being neurotic perfectionists. On the other hand, psychopathology does seem to play an important role among the "directed" group of high and low achievers, depression being

totally absent among the high achievers of this group, in contrast to the 43% of the "directed" low achievers, who have depression. Therefore, we can conclude that neither psychological well-being nor psychological resilience is the prime determinant of academic achievement among medical freshmen. Other factors like neurotic perfectionism may play key roles in securing high grades among this group.

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