Original Article

Trait emotional intelligence as predictor of psychological health in undergraduate medical students: A hierarchical multiple regression approach

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ABSTRACT

Objectives: Trait emotional intelligence (TEI) is a key personality construct by which an individual recognizes, understands, expresses and regulates emotions in self and others to adapt to environments or achieve one's goals. TEI skills are modifiable and have a potential to significantly influence psychological health (PH) of a person. The aims of current work were to evaluate relationship between TEI and PH of medical students and to explore the incremental validity of TEI to predict psychological distress beyond sociodemographic and educational factors in them.

Materials and Methods: One hundred and thirty-two medical students (mean age 18.02 years) participated in this cross-sectional study. TEI and PH were assessed using TEI questionnaire short form (TEIQue-sf) and depression, anxiety and stress scale (DASS-21), respectively. Hierarchical multiple regression analysis was carried out to determine if scores on TEIQue-sf added significantly to the prediction of psychological symptoms in medical students.

Results: There was a significant negative association (r = −0.57, $P < 0.001$) between TEIQue-sf and DASS-21 scores. Hierarchical regression analyses revealed that after controlling for sociodemographic and educational variables, TEIQue-sf scores explained a statistically significant increment of variance ($P < 0.001$) in DASS-21 scores. TEI emerged as best predictor of psychological distress of medical students followed by educational factors. However, sociodemographic profile as an attribute failed to demonstrate significant capacity to predict PH of our participants.

Conclusion: Our results indicate that TEI is a robust and unique predictor of better PH and plays a positive role in promoting psychological well-being.

Keywords: Trait emotional intelligence, Hierarchical regression, Medical students, Psychological health, Sociodemographic, TEI questionnaire short form, Depression, anxiety, stress scale-21

INTRODUCTION

Emotional intelligence (EI) broadly signifies an ability to perceive, evaluate and manage intrapersonal as well as interpersonal emotions. Early conceptualisation of EI referred to it as "Ability EI," representing a distinct group of cognitive abilities related to emotions and its information processing, assessed mainly by maximum performance-based test.[1] Subsequently, "Trait EI" (TEI) gained attention as a relevant EI measure. TEI is defined as an umbrella construct of emotion related self-perceptions and dispositions, located at the lower level of

personality hierarchies, measured through self-reported questionnaires and rating scales.[2] Essentially, TEI focuses on social-emotional competencies such as well-being, self-control, emotionality, sociability adaptability, as well as self-motivation. These attributes mainly encompass the affective aspects which are instinctive, involuntary and subjective to each individual and are different from conscious thinking, thereby fitting within the lower-order personality dimension framework.[2] Interestingly, TEI skills can be subjected to learning process and are modifiable too.[3]

Significant association of TEI on physical and mental health, emotional regulation and performance, life satisfaction and work success of an individual has been put forth.[4] Individuals with higher TEI have been found to be able to effectively express and manage their emotions as well as possess good stress management skills.[5] In addition, individuals with higher levels of TEI showed more adept decision-making in their career as compared to those who possessed lower TEI skills.[6] Furthermore, a negative association of TEI with depression[7] and psychosomatic complaints was also reported.[8] These findings suggest that TEI can contribute significantly in promoting psychological well-being in a person and protect against the negative mental health outcomes.[9] However, this is not a universal finding and contradictory results have also been reported.[10] For instance, individuals with higher TEI have been shown to react more strongly under adverse circumstances, leading to greater psychological distress and maladaptive consequences in them.[11]

Recently, some researchers have also explored the relation between measures of psychological illness and TEI in medical students.[12] The prevalence of self-reported psychological morbidity was found to be more in those undergraduate students who scored lesser on TEI skills as compared to those who had higher scores.[13] Mental well-being is an issue of concern in the field of medicine with alarmingly, increasing trends in the prevalence of psychological morbidity being consistently reported from across the world among various health-care professionals.[14] There is an important need to identify predictors of mental well-being especially in budding doctors as development of psychological distress symptoms has been reported to occur even in the psychologically healthy students during their formative years in medical institutes.[15]

This, in turn, predisposes to decreased attention and learning ability in them during the student life and is potentially detrimental during their clinical practice in future.[16]

Considering the potential beneficial role of TEI in promoting mental well-being, a worthwhile next step would be to assess whether they are valid predictors of psychological health (PH) domains. Preliminary evidence suggests that measures of TEI might actually be useful in predicting a wide range of psychological outcomes. For instance, TEI facets such as well-being and self-control have been linked to outcome variables such as stress reactivity,[17] symptoms of borderline personality disorder,[18] and use of adaptive coping strategies.[4] Research in this area is however, still in an incipient stage. Moreover, questions pertaining to its overall distinctiveness and incremental validity have also been raised. If the addition of TEI is able to demonstrate its unique variance in the dependent criterion that is not already explained by other existing predictors of PH such as social, demographic and environmental factors, it would be an encouraging step forward in providing evidence in favour for its incremental validity. To date, there are only few studies addressing the issue of utility of TEI in predicting mental well-being of undergraduate students. Much less is known about how TEI influences the psychological well-being in Indian population.

The purpose of the current work was to assess the association between TEI and PH of medical undergraduate students and to evaluate the incremental validity of TEI in predicting PH of these students.

MATERIALS AND METHODS

This cross-sectional study was conducted in department of Physiology, Maulana Azad Medical College, New Delhi after obtaining ethical clearance from the Institutional Ethical Committee.

Study participants

Undergraduate medical students of the institute were invited to participate in a questionnaire-based study. One hundred and fifty-six students volunteered to participate in the study. The purpose of study was fully explained and their informed signed consent was taken. Seven were absent on the days that these questionnaires were administered and 17 students returned incomplete forms and were excluded from the study. Identity of each participant was kept anonymous by allocating a random number to each one of them and strict confidentiality was maintained. Final sample ($n = 132$) consisted of males ($n = 76$) and females ($n = 56$).

Inclusion criteria

Undergraduate medical students of both genders in the age group of 18–25 years of age were included in the study.

Exclusion criteria

There were no exclusion criteria per se, but participants were self-selecting as their participation in the study was solely on a voluntary basis.

Sample size calculation

Sample size was determined for hierarchical multiple regression analysis (HMRA) using a priori power analysis

through G*Power 3.1.[19] The power analysis was computed for R^2 increase keeping an alpha level of 0.05, a beta error of 0.80, an effect size ($f^2 = 0.15$) and using two sets of predictors (A and B) having seven and eight predictors, respectively. Using these criteria, desired total sample size calculated was 115.

Data collection

Data were collected during August and September, 2019. The participants completed three paper-based versions of; a pre-designed structured form, a TEI and PH questionnaires in English language that were distributed amongst the participants during breaks from their teaching schedule. Process of filling in the questionnaire took about 20–25 min. Completed questionnaires were collected on the same day and no rewards were provided. Submission of incomplete forms did not affect their progression in medical course.

Measures

Structured form

This self-reported and pre-designed form consisted of two parts (A and B). Part A comprised questions pertaining to sociodemographics. Participants' information about their gender, age, place of stay after college admission (whether in a college hostel or home) and hometown (whether they belonged to urban or rural areas) were obtained. To assess their socioeconomic class (SEC), modified Kuppuswamy scale was used. It included questions pertaining to education and occupation of family head along with family income per month. It yields a composite score (range 3–29).[20] Part B included questions regarding educational characteristics of the participants. First question was on choice of medical career (whether self-chosen or parents' choice). Second was on number of attempts taken by them to clear medical entrance test (whether in 1st, 2nd, or ≥3 attempts).

TEI

TEI was assessed using TEI questionnaire short form (TEIQue-sf) which comprises total 30 questions (two questions per facet from TEI questionnaire long form). It is a sensitive instrument with good predictive validity, psychometric properties and adaptability across different countries and languages.[21] This instrument is primarily used for rapid assessment of global TEI and includes items like, 'expressing my emotions with words is not a problem for me; I often find it difficult to see things from another person's viewpoint; On the whole, I'm a highly motivated person; I usually find it difficult to regulate my emotions' Items are responded to on a Likert scale ranging from 1 (completely disagree) to 7 (completely agree). Item numbers 2, 4, 5, 7, 8, 10, 12-14, 16, 18, 22, 25, 26 and 28 are reverse scored.

Global TEI score is calculated by summing up the item scores (range = 30–210). Higher scores indicate better TEI.[2]

PH

PH was assessed using 21 items depression, anxiety and stress scale (DASS-21). Researchers have used DASS-21 to measure symptoms of depression, anxiety and stress as well as, overall psychological distress. DASS-21 as a single scale is a sensitive and valid instrument. Its internal reliability among student samples has been established in the previous studies. It has questions like, 'I found it hard to wind down; I was aware of dryness of my mouth; I could not seem to experience any positive feeling at all'. The items are responded to on a 4-point Likert scale ranging from 0 (did not apply to me at all over the last month) to 3 (applied to me very much or most of the time over the past month). Responses for all the items are summed up to get a composite score. Because the DASS-21 is a short version of DASS (the Long Form has 42 items), composite score is multiplied by two to obtain a final score.[22] Higher scores are indicative of poor mental well-being.

Data processing and analysis

Data were analysed with IBM SPSS Statistics 26 (IBM, 2019). Descriptive statistics in form of mean ± standard deviation (SD) and/or range were calculated for continuous data. Categorical data were expressed as frequency (%). Association between categorical variables was measured by Chi-square test. Reliability of the questionnaires was evaluated by Cronbach alpha. Independent samples t-test or analysis of variance were carried out on mean values of sociodemographic and educational variables in relation to DASS-21 and TEIQue-sf.

Three step HMRA was carried out to determine if scores on TEIQue-sf added significantly to the prediction of psychological symptoms. In step 1 (Model 1), sociodemographic predictors were entered. In next step (Model 2), in addition to sociodemographics, educational factors were also entered. In the third and final step (Model 3), global TEIQue-sf score was entered along with sociodemographic and educational variables. Violations of assumptions of multicollinearity, normality, linearity and homoscedasticity were ruled out.

As categorical variables cannot be entered directly into multiple regression analysis, they were converted into dummy variables (For sociodemographics: 1 = male/hostel/urban; 2 = female/home/rural; for SEC scores: 1 = 11–15, 2 = 16–25, 3 = 26–29, respectively, for educational: 1 = self-chosen, 2 = parents-behest; number of attempts: 1 = 1, 2 = 2 and 3 = ≥ 3, respectively) on dependent variable. We created a dummy variable for every category of the categorical independent variable as it enabled us to make multiple comparisons. There

were no theoretical or statistical reason for us to choose these labelling for sub-groups of a categorical variable and coding it as *vice versa* would have made no difference in the results.

$P < 0.05$ was considered significant for all analyses.

RESULTS

Preliminary analysis

Sociodemographics and educational characteristics

The mean age of participants was 18.08 years (SD = 1.17). Out of total participants, 35 (26.5%) were hostellers and only 6 (4.5%) belonged to rural areas. SES score of 10 (7.6%) participants was between 11 and 15. Almost 90% had self-chosen the medical career and <25% participants were selected on more than one attempt in entrance test [Table 1].

TEI and PH

Reliability coefficients of both TEIQue-sf and DASS-21 were good (Cronbach's alpha = 0.82 and 0.74, respectively). Students who chose medical careers on their own scored significantly more on TEIQue-sf ($P < 0.05$) and less on DASS-21 ($P < 0.01$) as compared to those who came to medical profession by parents' choice. No significant difference in TEIQue-sf or DASS-21 scores was observed based on socio-demographics or number of attempts taken to qualify entrance examination [Table 1].

Bivariate correlation analysis

Correlations among the predictor variables (sociodemographic and educational factors) included in the study ranged between r = 0.01–0.34; $P > 0.05$–$P < 0.01$. There was a positive correlation between age and number of attempts ($P < 0.001$). Gender showed a positive correlation with stay after admission and negative correlation with hometown and career choice ($P < 0.05$). A negative correlation between stay after admission and hometown was also observed ($P < 0.05$).

Correlational analysis between TEI and other predictor variables showed a negative correlation of TEIQue-sf with hometown and choice of career ($P < 0.05$). DASS-21 was significantly correlated with choice of career ($P < 0.01$) as well as with, number of attempts ($P < 0.05$). There was a strong negative correlation (r = −0.57, $P < 0.001$) between TEIQue-sf and DASS-21 [Table 2].

HMRA

Hierarchical multiple regression (HMR) was performed to examine the relationship between three sets of independent variables (sociodemographics, educational factors and TEI)

Table 1: Descriptive statistics of trait emotional intelligence (TEIQue-SF) and psychological health (DASS-21) of medical students on the basis of their sociodemographic and educational characteristics (*n*=132).

Variables	Frequency (%)	TEIQue-sf	DASS-21
Gender			
Males	76 (57.6)	116.28±20.66	34.24±19.10
Females	56 (42.4)	119.39±20.34	31.54±18.58
Stay after admission			
Hostel	35 (26.5)	114.66±23.35	35.66±17.60
Home	97 (73.5)	118.66±19.40	32.16±19.29
Hometown			
Urban	126 (95.5)	118.39±20.11	32.71±18.70
Rural	6 (4.5)	101.00±23.64	41.00±22.19
Socioeconomic scale score			
11–15	10 (7.6)	111.40±13.09	32.20±11.09
16–25	35 (26.5)	114.17±17.36	35.83±14.64
26–29	87 (65.9)	119.69±22.14	32.09±20.97
Career choice			
Self	115 (87.1)	119.05±20.40	31.25±17.25
Parents	17 (12.9)	107.76±18.94*	45.53±24.52**
Number of attempts			
1	101 (76.5)	118.67±21.29	31.11±18.19
2	25 (18.9)	114.36±18.59	38.88±18.52
>3	6 (4.5)	113.00±13.78	42.33±25.53

Values are mean±SD. *$P<0.05$, **$P<0.01$. DASS-21: Depression, anxiety, stress scale, TEIQue-SF: Trait emotional intelligence questionnaire short form

against one dependent variable PH. Preliminary analyses were conducted to ensure that there were no violation of the assumptions of normality, linearity and homoscedasticity. Regression models did not appear to be affected by multicollinearity among predictors (Tolerance between 0 and 1; variance inflation factors <1.2).

[Table 3] presents regression statistics. In the first step of HMR, sociodemographic predictors were entered. This model was statistically not significant F $(5,126) = 0.79$; $P > 0.05$ and explained 3% of variance in DASS-21. After entry of educational factors in Step 2, total variance explained by the model as a whole was 12%; F $(7,124) = 2.41$; $P < 0.05$. Introduction of educational factors explained additional 9% of variance in DASS-21, after controlling for sociodemographics [Table 3]. In the final adjusted model, introduction of TEIQue-sf explained additional 25% of variance in DASS-21, after controlling for sociodemographics and educational factors. This model as a whole was statistically significant F $(8,123) = 9.05$; $P < 0.001$ [Table 3]. In the final model, three out of eight predictor variables were statistically significant, with TEIQue-sf recording the highest beta value ($\beta = -0.53$, $P < 0.001$). The β coefficients for career choice and number of attempts (0.17 and 0.16, respectively) were significant at $P < 0.05$ [Table 3].

Table 2: Bivariate correlation matrix of study variables (*n*=132).

Variables	1	2	3	4	5	6	7	8	9
Age	-	0.01	0.03	0.01	0.13	0.06	0.34***	−0.11	0.11
Gender	-	-	0.17*	−0.19*	0.13	−0.19*	0.12	0.08	−0.07
Stay after admission	-	-	-	−0.20*	0.08	−0.13	−0.13	0.09	−0.08
Hometown	-	-	-	-	−0.09	0.24**	−0.11	−0.18*	0.09
Socio-economic scale score	-	-	-	-	-	0.04	−0.04	0.14	−0.05
Career choice	-	-	-	-	-	-	−0.07	−0.19*	0.26**
Number of attempts	-	-	-	-	-	-	-	−0.09	0.19*
TEIQue-SF	-	-	-	-	-	-	-	-	−0.57***
DASS-21	-	-	-	-	-	-	-	-	-

Values are Pearson correlation coefficient (r) *P<0.05, **P<0.01, ***P<0.001. DASS-21: Depression, anxiety, stress scale, TEIQue-SF: Trait emotional intelligence questionnaire short form

Table 3: Hierarchical regression of DASS-21 on sociodemographic, educational factors and trait emotional intelligence (*n*=132).

Variable	Beta	SE	t	R^2	▲R^2	▲F
Step 1				0.03	0.03	0.79
Age	0.12	0.88	1.32			
Gender	−0.04	3.46	−0.43			
Stay after admission	−0.07	3.90	−0.81			
Hometown	0.06	8.21	0.70			
Socio-economic scale	−0.06	2.71	−0.70			
Step 2				0.12	0.09	6.29**
Age	0.03	0.91	0.34			
Gender	−0.02	3.38	−0.27			
Stay after admission	−0.07	3.76	−0.76			
Hometown	−0.03	8.09	0.36			
Socio-economic scale	−0.06	2.62	−0.67			
Career choice	0.25	4.96	2.82**			
Number of attempts	0.21	3.18	2.29*			
Step 3				0.37	0.25	49.00***
Age	−0.02	0.78	−0.23			
Gender	−0.02	2.87	−0.30			
Stay after admission	−0.03	3.20	−0.38			
Hometown	−0.03	6.92	−0.41			
Socio-economic scale	0.02	2.26	−0.32			
Career choice	0.17	4.27	2.22*			
Number of attempts	0.16	2.71	2.08*			
TEIQue-SF	−0.53	0.07	−7.00***			

*P<0.05, **P<0.01, ***P<0.001. Beta: Standardised coefficient, SE: Standard error of the computed value, t: estimated coefficient (B) divided by its own SE. R^2: Amount of variance explained by IVs, ▲R^2: Additional variance in DV, ▲F: Change in F value, DASS-21: Depression, anxiety, stress scale, TEIQue-SF: Trait emotional intelligence questionnaire short form

DISCUSSSION

The present study was undertaken to assess the association between TEI and PH of medical students and to evaluate the incremental validity of TEI in predicting psychological distress in them beyond sociodemographic and educational factors. TEIQue-sf and DASS-21 scales were used to assess TEI and PH, respectively. Reliability analysis revealed that both measures had a high internal consistency as their Cronbach's alpha value was >0.7.[23]

We assessed PH as an outcome for two main reasons. Firstly, over the past decades, disturbing trends toward global increase in prevalence of depression, anxiety, stress,[13,24] burnout, substance abuse as well as suicidal ideations in doctors and medical students in comparison to their peer groups and general population have been consistently reported.[14] Second, more and more studies are recently reporting development of symptoms of psychological distress quite early among budding doctors during their formative years in medical institutes.[12,13] This, in turn, poses hindrance in their academic

capabilities during student life and can have deleterious effects in their clinical acumen in future.[25] To enable us to accurately measure the PH of students as a continuum rather than, as distinct series of separate conditions,[26] we considered the total DASS-21 scores only. Moreover, to rule out the issue of multicollinearity among various subscales of TEIQue-sf, we relied on its global score for explaining the construct's incremental variance in PH outcomes.[27]

Apart from looking at the descriptive of all the study variables, we also used inferential HMR statistics to examine independent contribution of each set of the predictor variables in the explanation of PH of medical students. We grouped conceptually similar independent variables and added them in a block for analysis. Family forms an innate, integral and indispensable part of every person. From perspective of an individual, family not only provides the initial 'social interaction' to a person, but also provides basic social needs such as love, loyalty, self-esteem and the sense of being a part of a group.[28] These initial interactions provide psychological aid to an individual and go a long way in determining one's mental well-being. As a child starts going to school, in addition to family and sociodemographics, school and social environment in that place begin to gain importance, which can alter the psychological dynamics of the person. These environments have the potential of not only motivating an individual positively but, are also capable of creating negative emotional and affective effects in a person. This, in turn, could be reflected as, lack of confidence, unsociable character, negative life thoughts and not being satisfied with one's life. Since, PH of an individual is based on the likelihood of being influenced or modified successively by the various predictor variables, we entered them in the form of three blocks in sequential order in regression analysis.

No significant difference was observed in global TEIQue-sf or DASS-21 scores of the participants on basis of sociodemographics including gender. This could be attributed to the fact that majority of our study participants had similar sociodemographic profiles, hailing primarily from urban, upper-middle or upper SEC families[20] and were day-scholars. In India, selection in medical colleges is through purely academic, highly competitive entrance examinations without any interview or personality assessment. It is quite plausible that majority of medical aspirants are self-motivated having similar personality traits and psychological dispositions. This could account for our observation of significantly better TEI and PH among students who had opted for medical profession on their own as compared to those who joined medical profession at their parent's behest. Lack of enthusiasm and motivation coupled with lower self-esteem and confidence among students who had joined medical

field due to parental pressure or were selected in more than one attempt, could have contributed to significantly higher DASS-21 scores in them in our study sample.[29] However, since our study sample was confined to medical undergraduate students, these observations need further statistical validation before their extrapolation to general population.

Consistent with prior studies, our correlational analysis data illustrated the beneficial effect of TEI on PH of medical students.[13,14] Negative association seen between global TEIQue-sf and DASS-21 scores indicates that students who possessed higher TEI skills experienced fewer symptoms of stress, anxiety and depression and were psychologically healthier as compared to their counterparts with lower TEI. Moreover, results of regression analysis revealed that TEI explained a statistically significant portion of variance in DASS-21 scores not explained by socio-demographics and educational dimensions. More specifically, TEIQue-sf scores increased the predictive ability of regression model by 25%. It is noteworthy that the predictive power of TEI was captured despite taking into consideration only global TEIQue-sf scores. In light of multifactorial structure of TEIQue, this may seem to represent a considerable increase. It is plausible that common method variance (i.e., Likert scale response format; single-respondent and single-occasion) might have artificially inflated TEI-outcome relationships in the presence of various contextual and situational factors. However, identification of career choice and number of attempts as significant variables along with the small amount of variance accounted for by these educational factors (9%) in regression model indicates that analyses were not unduly affected by bias arising from shared methodology. These findings suggest that TEI predicts affect-related variables, concerned essentially with individuals' perceptions of their emotional abilities.[10] Since, regression analysis was performed on DASS-21 scores from the domain of effect, it is unlikely that the predictive validity of TEIQue-sf at global composite level might have been compromised in our study.[30]

Overall, our results indicate that TEI emerged as best predictor of psychological well-being of medical students followed by educational factors. However, sociodemographic profile as an attribute failed to demonstrate significant capacity to predict PH of our participants. Demonstrating the role of TEI in predicting psychological distress over and above conceptually related attributes provides empirical evidence in support of the distinctiveness of TEI. These findings are particularly important in context of medical students. One of the objectives of medical education involves development of skills for managing one's own emotions, self-awareness, emotional self-control, empathy and proper handling

of relationships with their patients. From theoretical perspective, TEI constitutes exactly such competence. Moreover, being a modifiable trait, it can even be enhanced by training. Considering the incremental ability of TEI in predicting psychological morbidity, the study assumes even more relevance in our country, where the doctors are continuously exposed to working under extremely stressful environments, both in terms of duty hours and patient load. Hence, if sufficient measures in the form of holding TEI training workshops or imparting education about these skills to medical students in formative years of their careers are adopted, it might enable them to be emotionally more competent and cope better in stressful conditions, thereby reducing psychological distress in them. This may pave way for better academic performance, patient care and satisfaction in life among budding doctors.

Study limitations and future directions

These findings should be interpreted in light of limitations. Cross-sectional research design may fail to identify causal paths underlying the model. With prevention research suggesting that TEI skills can be fostered through counselling and various training programmes, relationships must now be examined prospectively through longitudinal designs. Second, given the sample composition of only undergraduate medical students, our results have limited generalizability. Finally, to avoid common-method variance effects due to using similar assessment methods (self-report or questionnaires), future studies might consider using new measures of objective dependent variables (such as academic achievement or work production). These new kinds of measurement would increase the validity of the results and would be a step forward in demonstrating the usefulness of this new kind of intelligence and its effects on criterion variables that are relevant for the individual.

CONCLUSION

Our results demonstrate that there was a significant negative association between TEIQue-sf and DASS-21 scores, thereby indicating that TEI plays a positive role in promoting psychological well-being among medical students. Results, further, demonstrated the incremental validity and unique variance of TEI in predicting lower psychological distress and better PH in these students beyond sociodemographics and educational variables.

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