Psychological health, stressors and coping mechanism of engineering students

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ABSTRACT
Psychological distress is frequent among young college students which affects their cognitive, physical and emotional well-being. Data was collected from 76 (38 male and 38 female) M.tech and Ph.D. students of Indian Institute of Technology, Roorkee, India. The purpose of this research paper is to examine the levels of stress, anxiety and depression in male and female engineering students. Depression Anxiety Stress Scale-21 and informal interview method were explored to determine the factors responsible for stress among students and also to determine the coping mechanism of the students of a technical institution of India. t-Test is used to examine the significant difference in the levels of stress, anxiety and depression in male and female students. The finding suggests that female students are more stressed and depressed and anxious than male students.

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Introduction
The slogan for world health day 2017 is ‘Depression–Let’s talk’. People of all age groups and socio-economic background are suffering from depression in India or worldwide. At the global level, approximately 322 million people were affected by depression (World Health Organization, 2017). Depression influences one’s quality of life, causing enormous economic and social burden at individual, family, nation and global levels. In India, almost one person in 20, above 18 years, have almost suffered once in a lifetime the consequences of depression (National Mental Health Survey of India, 2015–16, 2016). Nearly 45 million people were diagnosed with depressive syndrome in 2015. Approximately 2.6 million (22.5%) people across the world will be affected with the problem of depression due to population expansion and ageing by 2025 (Charlson, Baxter, Cheng, Shidhaye, & Whiteford, 2016).

Stress is an inevitable part of a student’s life (Gallagher, 2009; Mackenzie et al., 2011). Some previous studies state that moderate amount of stress is beneficial for students to achieve success in life (Larson & Luthans, 2006), whereas an extreme amount of stress may devastate them and lead to anxiety, depression and psychological problems (Larson & Luthans, 2006). During college life, students face academic strife and also health-related worries (Misra & McKean, 2000). Non-academic stresses such as moving away from home to college for higher studies, interpersonal relationship, work–life balance, etc. can overstress much psychological insecurity (Franklin, 2009).

Experience of college life is stressful for all group of students as it imputes to deal with new academic and social settings (Towbes & Cohen, 1996). Some of the stressors on college campus
may include interpersonal (alteration in social events, relationship with new friends, encounters with roommate, boyfriend/girlfriend, parents, etc.), intrapersonal (alterations in sleeping practices, everyday responsibility, difficulty of finances, alteration in usage of alcohol or drugs, etc.), academic (augmented class workload, low GPA (Grade Point Average), search for vocation, etc.) and environmental (cluttered living surroundings, computer harms, etc.) stress (Ross, Niebling, & Heckert, 1999). College students have anticipated the possible areas of concerns such as academics, future, relationship and personal health (Hurst, Baranik, & Daniel, 2012; Kumaraswamy, 2013; Sreeramareddy et al., 2007). Separation from home, higher academic demand, professional career and existential questions about life are some of the main sources of stress and anxiety for youth (Whitman, Spendlove, & Clark, 1984).

**Stress**

According to Brock University, there are two types of stress, namely, eustress, which deals with pushing individuals towards achieving their goals, and distress, which pulls down the performance of individuals and which could lead to physical and psychological problems for individuals. There are three dimensions of stress, i.e. acute stress, episodic acute stress and chronic stress (Miller, Smith, & Rothstein, 1994). Acute stress occurs for a short term, and although it does not have severe impacts, too much exposure to acute stress can cause problems. The most common symptoms are muscular problems such as back pain, jaw pain and headache. Acidity, diarrhoea, etc. can also be due to acute stress. Stress experienced regularly by humans rather than a fleeting random feeling refers to episodic stress. This type of stress is a result of higher expectations or goals which, when left unachieved, ends in the development of higher levels of stress pressurizing an individual to achieve those goals. The third category of stress, chronic stress, is the result of long-lasting issues such as getting trapped in an unhappy situation, low attendance, low GPA, frequent conflict with friends and family, etc., which may result in acute stress; however, when it becomes a frequent or long-term happening, it results in the unification of acute stress into chronic stress.

**Anxiety**

An individual’s action, reaction and interpretation of a particular situation under stress progresses an anxiety syndrome (May’s book, 2015). Stress leads to anxiety syndrome. A person who handles stress effectively would not experience anxiety, and those whose coping abilities and management skill are not effective will experience a high level of anxiety. Anxiety or nervousness is experienced daily by college students. Just before examination, college students face severe stress due to academic difficulty and not able to make important decision. An anxiety is a severe alarming situation for psychological-deprived health. Constant worry, fear and overwhelming are invariable, associated with anxiety. Experiencing uneven anxiety is normal but people with anxiety disorders frequently have extreme and continual concern and apprehension about everyday circumstances.

**Depression**

When one cannot tolerate usual high and low situations of life and mostly remain dejected, he/she is in the state of depression. Meaninglessness and desolation get the hold of life in depression. Depression makes it hard to gather and benefit from life. Depression is much more than just sadness or disappointment. Some people illustrate the melancholy situation of a depression such as living in a black hole. Some depressed people feel lifeless, empty and indifferent, or may even feel annoyed, disparaging and agitated. The feelings of helplessness, hopelessness and unimportance are intense and unrelenting. Depression is a disorder of major public health importance, in terms of its prevalence and the suffering, dysfunction, morbidity and financial burden. Women are more susceptible to depression than men. The report on Global Burden of Disease estimates the
point prevalence of unipolar depressive episodes to be 1.9% for men and 3.2% for women, and the one-year prevalence has been estimated to be 5.8% for men and 9.5% for women (Lopez, Mathers, Ezzati, Jamison, & Murray, 2006). The burden of depression will increase to 5.7% of the total burden of disease, and it would be the second leading cause of disability in the world by the year 2020.

Many researches have been conducted on undergraduate students, but there are limited studies accessible on M.tech and Ph.D. students. This study observes the prevailing problems of M.tech and Ph.D. students of a premier technical Institution in India.

The first objective of the study was to examine the gender difference in the levels of stress, anxiety, and depression of M.tech and Ph.D. students. The second objective was to identify the top 10 common stressors that influence the life of M.tech and Ph.D. students. The third objective was to recognize the coping mechanism used by male and female students of Indian Institute of Technology, Roorkee, India.

**Hypothesis**

1. There is no significant difference between the levels of stress, anxiety and depression of male and female engineering students.
2. There is no significant difference between the top 10 common stressors of male and female engineering students.
3. There is no significant difference between the coping mechanisms of male and female engineering students.

**Methods**

**Participants**

Hundred questionnaires were distributed among M.tech and Ph.D. students of Indian Institute of Technology, Roorkee, India. Questionnaires were distributed to the participants in their respective laboratories. It was requested to submit the filled questionnaire within 20 minutes. Eighty questionnaires were retrieved and after scrutiny four questionnaires were found incomplete and hence rejected from further analysis. A total data of 76 students were further analysed by using simple random sampling technique. The total male participants were 38 (50%) and female were 38 (50%). Total number of M.tech students were 21 (28%) and Ph.D. were 55 (72%). Age groups of participants were between 21 and 35 years.

**Measure**

The first objective was analysed with Depression Anxiety Stress Scale-21 (DASS-21), a standard psychometric test to measure the levels of stress, anxiety and depression of male and female engineering students. DASS-21 is a short valid questionnaire which is extracted from a version of DASS-42 questionnaire (Lovibond & Lovibond, 1995). There are seven items per construct, recorded on a 4-point scale from 0 (did not apply to me at all) to 3 (applied to me very much or most of the time). Sub-construct score is categorized as follows: normal, mild, moderate, severe and extremely severe (0–14, 15–18, 19–25, 26–33 & 34+) for stress; normal, mild, moderate, severe and extremely severe (0–7, 8–9, 10–14, 15–19 & 20+) for anxiety; normal, mild, moderate, severe and extremely severe (0–9, 10–13, 14–20, 21–27 & 28+) for depression. The overall Cronbach’s of this scale are 0.90 and 0.93–0.97 for sub-construct.

The daily lifestyle of M.tech and Ph.D. scholars were frequently and always affected by some common stressors. The second objective was examined with an informal interview. Participants were asked ‘Which are the most frequent stressors in your life?’ These common stressors were also assessed on 1–5-point Likert scale: 1, ‘Never’; 2, ‘often’; 3, ‘sometimes’; 4, ‘frequent’ and 5, ‘Always’. 
Objective three was analysed with an informal question. Participants were asked ‘What do you practice to cope up with daily stress of life?’. These coping mechanisms were also assessed on 1–5-point Likert scale: 1, ‘Never’; 2, ‘often’; 3, ‘sometimes’; 4, ‘frequent’ and 5, ‘Always’.

**Ethical procedures**

To conduct an ethical research, a written consent of dean student welfare, wellness wardens and professor in charge of Indian Institute of Technology, Roorkee, India, was undertaken. All respondents were well-informed about the study. Students participate voluntarily in the study without any compensation.

**Statistical analyses**

SPSS software (Statistical Package for Social Science, Version 20) was used to analyse the data. Demographic variables were examined by frequencies and percentages in the data. Descriptive statistics (mean, SD) was used to summarize the main variables in the study. Independent sample $t$-test was used to measure the significant difference between the levels of stress–anxiety–depression among engineering students. The assumption of normality, linearity, was found approximately satisfied by using skewness, kurtosis, and P-P and Q-Q plots.

**Results**

Objective 1: To examine the levels of stress–anxiety–depression of male and female students of Indian Institute of Technology, Roorkee, India.

The subsequent analyses are shown in Table 1. Mild-to-moderate level of depression was experienced by male and female students; moderate-to-severe level of anxiety was experienced by male and female students and moderate-to-extremely severe level of stress was experienced by male and female students. Overall, the majority of students experienced stress in their day-to-day life. It is also evident in the current study that the level of mild depression in male was 73.7%, whereas in female it was 81.6%. Hence, female students are more depressed in comparison to male students. The severe level of anxiety in male was 15.8% whereas in female it was 28.9%. It is concluded that female students are more anxious than male students. Severe level of stress in male was 50% whereas in female it was 81.6%. It is concluded that female students are more stressful than male students.

Hypothesis 1. There is no significant difference between the levels of stress, anxiety, depression of male and female engineering students.

| Table 1. Percentage of depression, anxiety and stress of male and female engineering students. |
|-------------------------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Gender                          | Levels         | Depression (%) | Anxiety (%) | Stress (%) |
| Male                            |                |                |              |            |
| Normal                         | 8 (21.1)       | –              | –              |            |
| Mild                           | 28 (73.7)      | 1 (2.6)        | 1 (2.6)       |            |
| Moderate                       | 2 (5.3)        | 30 (78.9)      | 13 (34.2)     |            |
| Severe                         | –              | 6 (15.8)       | 19 (50)       |            |
| Extremely severe               | –              | 1 (2.6)        | 5 (13.2)      |            |
| Total                          | 38             | 38             | 38             |            |
| Female                         |                |                |              |            |
| Normal                         | 5 (13.2)       | –              | –              |            |
| Mild                           | 31 (81.6)      | –              | –              |            |
| Moderate                       | 2 (5.3)        | 26 (68.4)      | –              | 6 (15.8)   |
| Severe                         | –              | 11 (28.9)      | 31 (81.6)     |            |
| Extremely severe               | –              | 1 (2.6)        | 1 (2.6)       |            |
| Total                          | 38             | 38             | 38             |            |
Table 2. Significant difference between stress, anxiety, depression among male and female engineering students.

| Gender | Mean | SD  | T-test | P-value | Analysis     |
|--------|------|-----|--------|---------|--------------|
| Stress |      |     |        |         |              |
| Male   | 27.26| 4.09| -1.272 | P=.208; P>.05 | Not Significant |
| Female | 28.26| 2.59|        |         |              |
| Anxiety|      |     |        |         |              |
| Male   | 13.31| 2.51| -1.396 | P=.167; P>.05 | Not Significant |
| Female | 14.10| 2.41|        |         |              |
| Depression | | |        |         |              |
| Male   | 10.10| 1.91| -1.832 | P=.045; P<.05 | Significant |
| Female | 10.89| 1.84|        |         |              |

Table 2 presents an Independent sample t-test which was conducted to examine the gender difference in the level of stress among engineering students. There is no significant difference found between the mean score of stress in male (M = 27.23, SD = 4.09) and female students (M = 28.26 SD = 2.59), t (62.63) = −1.27; P > 0.05. It means that the significant level of stress is the same in both male and female students. Hence, it failed to reject the null hypothesis.

There is no significant difference found between the mean scores of stress in male (M = 13.31, SD = 2.51) and female students (M = 14.10, SD = 2.41), t (74) = −1.396; P = .167; P > 0.05. It means that the significant level of anxiety is the same in both male and female students. Hence, it failed to reject the null hypothesis.

There is no significant difference found between the mean score of depression in male (M = 10.10, SD = 1.91) and female students (M = 10.89, SD = 1.84), t (74) = −1.832; P = .045; P < 0.05. It means that the significant level difference is found in the level of depression in both male and female students. Hence, the null hypothesis is rejected.

Objective 2: To examine the top 10 common stressors in male and female engineering students represented.

An informal interview for five male and five female students was conducted to examine the common stressors among them. Top 10 common stressors frequently confronted by male and female students are presented in Table 3.

Figure 1 shows that these top 10 common stresses were further evaluated on 5-point Likert scale: 1, never; 2, often; 3, sometimes; 4, frequent; 5, always.

It was found that 70% students always felt stress due to long hours of sitting in front of computer, 58% of students were always worried about their future prospect, 57% of students were always under financial constraint, 47% of students were always worried about their health, 46% of students were not able to fix their priorities in life and 32% of students were always worried about academics. Hence, the top six stressors of M.tech and Ph.D. students were working hours in the computer, future/career prospect, finances, health, fixing priorities in life, academics, etc.

Table 3. Frequent stressors and coping mechanism of male and female students.

| Respondents | Branch | Gender | Common stressors                        | Coping mechanisms           |
|-------------|--------|--------|----------------------------------------|----------------------------|
| 1           | M.tech | M      | Academics performance                  | Reading                    |
| 2           | M.tech | F      | Financial difficulties                 | Playing sports             |
| 3           | Ph.D.  | M      | Health issues                          | Meditation                |
| 4           | Ph.D.  | F      | Future uncertainty                     | Yoga                      |
| 5           | M.tech | M      | Lack of priorities in daily life       | Motivational lectures      |
| 6           | Ph.D.  | F      | Relationship with supervisors          | Music                     |
| 7           | Ph.D.  | M      | Relationship with family members       |                            |
| 8           | M.tech | F      | Lack of sports activities              |                            |
| 9           | Ph.D.  | F      | Maximum time with computer/internet surfing |                          |
| 10          | M.tech | M      | Parental expectation                   |                            |

Source: Authors’ own findings.
Hypothesis 2. There is no significant difference between top 10 common stressors of male and female engineering students.

Table 4 presents an Independent sample t-test which was conducted to examine the gender difference in the level of stress among engineering students. There is a significant difference found between the mean scores of the relationship of family members with male (M = 4.23, SD = .78) and female students (M = 3.81, SD = .80), t (74) = 2.313, P = .023; P < .05. It means that both male and female students differ in terms of their relationship with family members. Thus, the null hypothesis is rejected.

There is a significant difference found between the mean scores of lack of sports activities between male (M = 3.13, SD = 1.14) and female students (M = 3.60 SD = 1.05), t (74) = −1.878, P < 0.05. It means that both male and female students differ in terms of their sports activities. Thus, the null hypothesis is rejected. Except sports and family other variables were not statistically significant (P < 0.05). Thus, it failed to reject the null hypothesis in other stress variables.

Objective 3: To examine the coping mechanism of male and female engineering students.

An informal interview of five male and five female students was conducted to examine the coping mechanism of students, which is presented in Table 3. It was found in the informal interview that these common stressors were encountered by engineering students with the help of coping mechanisms such as music/movies, playing sports, reading, meditation, yoga and motivational lectures.

Figure 2. Coping strategies used by male and female engineering students and also evaluated on 5-point Likert scale: 1, never; 2, often; 3, sometimes; 4, frequently; 5, always.

It was found that 45% male and 45% female students were involved in reading, 45% male and 40% female students do yoga, 37% male and 40% female students listen to music, 32% female and 13% male students do meditation, 32% female and 21% male students listen to motivational lectures and only 13% male and 2.6% female students do play sport activities to cope up with daily stressors.

### Table 4. Significant difference in common stressors of male and female students.

| Stressors  | Mean (Male) | SD  | T-test | P-value | Analysis |
|------------|-------------|-----|--------|---------|----------|
| RWFm       |             |     |        |         |          |
| Male       | 4.236       | .7861 | 2.313  | P=.023; P<.05 | Significant |
| Female     | 3.815       | .8005 |        |         |          |
| Sports     |             |     |        |         |          |
| Male       | 3.131       | 1.143 | -1.878 | P=.044; P<.05 | Significant |
| Female     | 3.605       | 1.053 |        |         |          |
Hypothesis 3. There is no significant difference between the coping mechanisms of male and female engineering students.

There is no significant difference between the coping mechanisms of male and female students. Thus, it failed to reject the null hypothesis ($P > 0.05$). It means that the coping mechanisms used by both male and female respondents are statistically the same.

**Discussion**

It was found that the female participants were facing more stress, anxiety and depression than male students, whereas the level of depression was found to be statistically significant in male and female participants. These findings are coherent with the previous studies.

Recent studies indicated that women report higher levels of chronic and daily stressors than men (Hogan, Carlson, & Dua, 2002; Ptacek, Smith, & Zanas, 1992; Tamres, Janicki, & Helgeson, 2002). Cahir and Morris (1991) found that female students' emotional, financial and academic stressors are more in comparison to male students. Researchers have proposed that women experience more psychological sufferings than men (Gadzella, 1994). According to Sulaiman, Hassan, Sapian, and Abdullah (2009), it was found that females are more emotionally connected to their environment and thus experience more stress than male counterparts. Higher levels of stress and more health problems are found in females than males (Hall, Chipperfield, Perry, Ruthig, & Goetz, 2006). Women notice themselves in stressful situations more frequently than men (e.g., Almeida & Kessler, 1998; McDonough & Walters, 2001). The high occurrence of stress among females showed that women are more vulnerable towards stressful circumstances. Due to socio-economic problems, family affairs and educational restraints, women experience more stress (Fountoulakis, Iacovides, Kaprinis, & Kaprinis, 2006; Gunter, 2004; Hammen, 2005; Reed et al., 2009). The incidences of depression syndromes are higher in women than in men (Cryanowski, Frank, Young, & Shear, 2000). Some research findings on test-anxiety concluded that the level of test-anxiety is higher in female students than do males (Bandalos, Yates, & Thorndike-Christ, 1995).

Men and women are different in terms of their physical competency. In the current study, it is found that male and female students are statistically different in terms of their sports abilities. Men generally like to play aggressive games like fighting, etc., whereas women inclined towards interpersonal tactics like gossiping (Benenson, 2013; Campbell, 2002). Most scholars distinguish that men usually demonstrate greater interest in sports than women, whereas some argue that variances observed in sports behaviour do not indicate variances in fundamental interest (Brake, 2010; Hogshead-Makar & Zimbalist, 2007).
A strong positive relationship with the family member is important to avoid stress in day-to-day life. In the present study, it was shown that male and female students are statistically different in terms of their family relationship. Females are more close to their family members in comparison to male students. According to the previous literature, sex differences have been noticed on the subject of revealing the emotional expression. It was found that women are more expressive than men. The conceptualization of sentiment involves manifold aspects – ‘a behavioral or expressive component, an experiential or verbal component, and a physiological component’ (Kring & Gordon, 1998). Some studies reveal that those college students who have significant associations with family and friends are more probable to have overall life satisfaction (Diener & Diener, 1995).

One study conducted in a Pakistan medical college regarding coping mechanism (Babar et al., 2004) established that more than 90% of the students were facing a stressful situation during their academic days. Many stress coping techniques were used by the students such as listening to music, playing sports, sleeping, going to isolation, etc. Some past researches have investigated that continuous yoga practices are helpful in minimizing the effect of depression in the lives of young adults (Woolery, Myers, Stemlieb, & Zeltzer, 2004). A concentrative way of meditation and different techniques (transcendental meditation) of meditation lessenr the depressive symptoms by relaxing and focusing on our brain cell and dropping the level of heart rate, blood pressure, and metabolism (Harvard Cardiologist Benson, Greenwood, & Klemchuk, 1975). Reading, yoga, meditation, listening to music and motivational lectures are some coping strategies used by students in the present study.

**Implication**

Stressors are the natural part of an individual’s lifestyle. Due to various intrapersonal, interpersonal, academics and environmental stressors, students felt that college life is not fulfilling but worrisome. These stressors have to be dealt with the right approach and strategy. Institutions should build up and employ stress-intervention programmes efficiently to deal with the daily stressors (Ross et al., 1999). It was analysed that students face a lot of trouble from long durations of sitting in the front of the computer. College students should be given information about their diet and regular fitness exercise. Students should take regular breaks and relax themselves. Regular practice of yoga and meditation is beneficial to the students. All these could be attained with the help of college psychologists or counsellors who should motivate students to participate in the regular yoga classes, encourage students to participate in sports and provide motivational lectures to get rid of daily stressors of life.

**Limitations**

The analysis submitted in the present study is based only on one engineering institution, and precisely, research scholars’ and M.tech students’ viewpoints were assessed in the study. Due to the small sample size, the present study could not be generalized in other population, but the advantages of the study can be explored in future studies.

**Conclusion**

Individuals thought that modern computer-aided technology has compressed the psychological workload but in fact it has increased their psychological workload and it further debilitated their social support (Sharma, 1999). Students who have grown up in families lacking financial stability are more likely to show symptoms of depression and anxiety, indicating that financial difficulties correlate with higher rates of these mental health problems (Eisenberg, Gollust, Golberstein, & Hefner, 2007). Grades, economic complications, professional future, lack of study time, extensive amount of work, parental expectations of school performance, disagreement with friends, anguish with societal life and work-related problems are responsible for creating a stressful situation of life (Darling, McWey, Howard, & Olmstead, 2007; Goodman, 1993; Misra & McKean, 2000; Ross et al., 1999; Towbes & Cohen, 1996). Training of mind and
thought management through yoga and meditation helps students to manage a certain level of self-awareness and self-realization. This will bring internal transformation and increase the overall well-being of the students.

**Disclosure statement**

No potential conflict of interest was reported by the authors.

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