Assessing the mental health of medical students

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RESEARCH

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ABSTRACT

Background

Over the past years there has been a growing interest in investigating and studying the levels and causes of anxiety, depression and psychological deficits among medical students. Although there are numerous studies, there does not appear to be a comparative review of the reported results.

Aims

To identify key stressors for medical students and investigate if there are any significant events that are more likely to evoke a stressful response. Also, to investigate if there are any groups of medical students, more prone to be negatively affected.

Methods

This was a Retrospective Cohort Study, analysing data that was collected from students in a wide range of medical schools.

Results

Medical students are far more significantly affected by perceived stress than other university students; there are specific events in their course of study and lifestyle that have been identified as likely triggering events.

Conclusion

All medical students are at significantly higher risk of perceived stress, depression, anxiety, suicide ideation and risk of depression and psychological distress.

Specific gender and ethnic groups appear to be in the higher risk groups, as well as specific stressors, that would appear to be the main contributors to these mental health problems. If universities and medical schools consider these key points, they should be able to plan processes to develop greater resiliency in their students.

Key Words

Medical students, medical education, perceived stress, mental health

What this study adds:

1. What is known about this subject?
Although there have been numerous studies on the mental health of medical students, there has been no comparison between individual findings.

2. What new information is offered in this study?
This study does an analysis of the findings of multiple studies and has identified specific, agreed stressors and at-risk target groups.

3. What are the implications for research, policy, or practice?
Understanding the specific factors and events that trigger stress reactions in medical students can guide universities in increasing student resilience and reducing academic failure.

Background

The purpose of the proposed study was to collect, analyse and extrapolate on the reported mental health issues of students attending medical school; with the intent to offer universities an understanding of possible stressors and mental health issues that may arise within the student body – as well as possible strategies that students can implement to overcome them.

It may be the first step to the development of way-markers to inform student advisors of likely times and situations that can emote anxiety and/or depression, so that they can provide practical advice to assist, before serious issues develop. Remembering that, it is not the stressors that are detrimental, but our reaction and preparedness for them.

As many studies point to predictable and scalable scenarios which impact upon the mental health of medical students; the hypothesis of this study is that via a thorough and systematic interrogation of the gathered data a series of way-markers that flag likely periods of stressors for medical students, throughout their pathway of studies, can be developed. These way-markers can then be used by universities/medical schools to:

1. Prepare and forewarn students of stressors they are likely to encounter
2. Develop strategies that can assist in the development of greater resilience in medical students
3. Target specific personality traits and personal behaviours which can significantly increase the likelihood of students experiencing negative mental health issues.
4. Provide lecturers and academic / clinical advisors with practical advice to assist them in monitoring and supporting assigned students

This will then assist in reducing the negative outcomes in regards to; progression and successful achievement of medical studies and the likelihood of the development of more severe psychological disorders.

As the key issue or concept that lays at the very foundation of this research is 'stress', I have chosen the definition of stress as "a condition or feeling experienced when a person perceives that the demands placed on them exceed the resources the individual has available".[1] This definition attempts to explain the concept that stress is a perceived feeling, based upon an individual's self-belief, that what is required of them, is greater than their ability to provide. As is described across the literature, it is these feelings of inadequacy and hopelessness that lead to the development of depression, anxiety and psychological distress. One study explained that stress is a normal component of medical school and for some students it can act as a positive motivator, however for many students it can arouse negative feelings, associated with anxiety and depression.[2]

Method

This is a systemic review of current literature, utilising a Meta-analysis approach to analysing data that was collected from students in a wide range of medical schools; including student data collected during the 1st, 2nd and final years of preclinical and clinical years of study.

The data was obtained from previously completed studies. The studies were chosen based on the use of the same, or similar, data gathering tools (mental health assessment tests), as outlined below. By specifically using studies that have utilised similar data gathering devices the validity of the data comparisons will be greater and as the treatment of the data will be consistent, meta-analysis can identify the common effects.

The main tests used were:

- **PHQ-4:**[3] the four-item patient health Questionnaire for anxiety and depression - an ultra-brief screening scale for anxiety and depression.
- **Perceived Stress Questionnaire (PSQ)**[4] developed as an instrument for assessing the stressful life events and circumstances that tend to trigger or exacerbate disease symptoms. Developers Levenstein and colleagues conducted a psychometric evaluation of the scale and found an internal consistency ranging from 90 to .92 and a test–retest reliability of .82. Results of the PSQ correlated highly with trait anxiety and with scores on Cohen's Perceived Stress Scale.
- **The Medical Student Stressor Questionnaire (MSSQ)**[5] Developed to identify the stressors of medical students as well as measure the intensity of stress caused by the stressors. The SSQ grouped stressors into six domains, each based on a common underlying theme:
  - Academic related stressors (ARS)
  - Intrapersonal and interpersonal related stressors (IRS)
  - Teaching and learning-related stressors (TLRS)
  - Social related stressors (SRS)
  - Drive and desire related stressors (DRS)
  - Group activities related stressors (GARS)

Using the results from these sources this study captured and compared the following data:

1. **Demographics**
   a. Age
   b. Gender
   c. Cultural background
2. **Current study**
   a. first year of medical studies
   b. final preclinical year of study
   c. initial clinical year of study
   d. internship year

3. **Perceived health during study**
   a. **Perceived Stress Questionnaire (PSQ);** assessing the stressful life events and circumstances
   b. **PHQ-4:** for anxiety and depression
   c. **The Medical Student Stressor Questionnaire (MSSQ**).

The examination of the data captured encapsulates the significant causes of stress, and the relationship to age, gender, cultural background, level of medical study & related activities. This allowed the development of a list of significant time points and activities (way markers) that are most likely to instigate a stress response. This also allows the identification and description of the personal attributes of medical students and potential medical students and will allows the development of strategies to assist with medical students to cope with these stressors.

This information allows the identification and description of:
1. when and why a student will be presented with a stressful situation, more significant than normal,
2. what can be done prior to that way marker to make it more likely that the student will show a resilient and positive response to the situation, and
3. assist academic and clinical advisors prepare and support their assigned students by prior understanding of what that student will encounter at various way markers, possible reactions that can be anticipated and coping skills and information that can assist in preparing them prior to arriving at the way marker.

Results

The current literature has clearly identified a number of common stressors that medical students face globally. However, the literature showed that specific stressors and levels of depression and anxiety etc., does vary via geographic, ethnic and cultural regions. There does not appear to be any acknowledged explanation for this or any attempt to suggest the contribution of a geographic, ethnic or cultural cause.

One clear point that all studies have agreed on, is the negative outcomes in regards to progression and successful achievement of medical studies and the likelihood of the development of more severe psychological disorders. If, by the continued investigation into the causes, outcomes and preventative actions, related to the development of anxiety and depression, a more proactive approach in the support and care of medical students can be developed; this strengthens the importance for further investigation.

Recent studies

In recent years, there has been a growing interest in investigating and studying the levels and causes of anxiety, depression and psychological deficits among medical students. One study reported that when students commenced medical school, their mental health was at a level equal to their nonmedical school peers, but during the course of their studies, their mental health deteriorated.[6]

In another study, common stressors that were identified included adaptation to medical school life and requirements – including long study hours contributing, to lack of sleep; the financial burden of attending medical school; the amount of information and the sometimes graphic content of the information. In the final years of study stressors included; difficult patients and career planning. It was reported that the outcomes of these stressors often included anxiety and depression as well reduced academic performance and reduced competency, leading to medical errors and ultimately to increased attrition rates.[7]

There was frequently reported a strong association between perceived stress and the overall academic performance of students.[7-8] There was also a reported correlation between perceived stress and other factors, including; gender, marital status, where students live (at home *vs.* away from home), income and the level of progression in their study.[8] A study from North America proposed that the mental health of students deteriorates when they commence studies and remains low during the course of their studies. They identified that the transition from studying the basic sciences into clinical training caused an increase in perceived stress reported by the students.[7] This concept of there being predictable times when medical students may face anxiety or depression, is seen repeatedly in the literature and reports on studies. Gentile et al.[9] describe stressors developing at various stages of the medical school curriculum. The first year included the commencement of a far more rigorous course of study, in comparison to former studies as well as the topics being presented, including the study of trauma and diseases. The second year students were more likely to seek out mental health support when they commence preparing for their first medical board licensing exams. An Iranian study supports this, with their data showing that the first year was the most challenging for medical students; citing three of the main stressors as; work load, financial difficulties and lack of sleep. According to their study they surmised that the outcome of these stressors included more than just anxiety and depression. They reported an adverse effect on students' academic achievement and career as well as an increased likelihood of

substance abuse.[10] Cuttilan et al.[11] reported that pre-clinical medical students were 1.63 times more likely to be screened for depression than their clinical cohorts. Finally, Erschens and colleagues,[12] described the training requirements of students in their first semester, students at various phases of their study and students in their final year, listing stressors that could be specific to their progress. This included, all students reporting increased level of perceived stress when initially commencing study on topics that included disease, death and dying. They worked through the various stages up until the final year, when students reported the main stressors as commencing contact with patients and medical professionals in the hospitals.

When reviewing these studies, it becomes clear that a series of way-markers can be established along the academic pathway to mark out times of significant risk, in regards mental health, for medical students. These markers would align with the introduction of the student to the required content of the medical school studies; exams (and in the US, unlike in Australia and New Zealand, the USMLE exams would be very strong markers); the period leading up to fee payment; transition from pre-clinical to clinical etc. I will discuss specific stressors later in this paper.

Specifically related to medical students
Comparisons also need to be made to other tertiary students to determine if these stressors are unique to medical students. A 2015 study conducted by Hardeman et al.[13] he reported that between 40–79 per cent of medical students reported high levels of anxiety. This was compared to what is expected in the general population and found that within the same age group only 14 per cent reported high levels of anxiety. The study also identified that this was significantly higher than for students undertaking other graduate degrees. An Australian study by BeyondBlue in 2013, reported very similar findings, stating that for medical students the likelihood of being diagnosed with depression was substantially higher than for age related peers in the general population.[14] A German study from 2014, reported that in comparison to both students who studied in other areas as well as age related peers who worked, the risk of developing depression, anxiety and burnout was increased in medical students.[15] So, there appears to be a higher risk for psychological distress in medical students in comparison to individuals with equal demographics and in students completing other areas of study.

Specific stressors
In their study from 2015, Muhammad & Rahim[5] describe a stressor as an event that causes stress. In reference to

medical students they grouped these stressors into six categories related to; academic, intrapersonal, interpersonal, teaching and learning, social and group activities.

Various researchers have attempted to categorise the various stressors that have been impacting upon the mental wellbeing of medical students. Erschens et al.[12] used two categories:
1. Private related stressors, and
2. Training related stressors.

These were then further broken down to subcategories of each:
1. Private related stressors
   a. Financial concerns
   b. Living situation
   c. Conflicts in partnerships
   d. Additional employment responsibilities
   e. Conflicts with friends
   f. Sports/hobbies
   g. Childcare
   h. Conflicts with parents
2. Training related stressors
   a. Study-related time
   b. Time management / working style
   c. Missing consultation and support
   d. Selection performance pressure
   e. Professional requirements
   f. Timetable

In 2018 Moir et al.,[16] took a completely different approach. They looked at the same problem from the perspective of:
1. Well-being spectrum
2. Student motivation
3. Assessments
4. Characteristics of students
5. Selection process, and
6. Clinical environment.

Though there are some areas of crossover between the different studies, there are also some interesting variants – especially with student motivation, characteristics of students and the selection process.

Data analysis
In a 2015 report on a Global perspective on sleep disorders amongst medical students, it was found that between 24 per cent – 49 per cent of students, in different geographic areas reported sleep of less than seven hours a night. When this was compared to students studying Law and Economics,

they concluded that medical students had a significantly higher occurrence of poor sleep.[17] This creates another stressor that has been overlooked by many studies. Other factors that have not been greatly reported upon is the impact of age, gender and previous experiences on the effect of these stressors on medical students. Cuttilan et al.,[11] reported, that in relation to depression, there was no difference for gender, in relation reporting of perceived stress, but described medical students living at home as having 1.33 times higher chance of being depressed, than students who lived away from home. These results, however have not been supported in other studies. A 2017 study by Liaqat and colleagues,[18] reported that their study found that the level of stress and anxiety was elevated in students who lived at home and that depression was higher in students who lived away from home.

Heinen et al.,[1] studied first year medical students, using the PSQ-10, PHQ-4, PHQ-2 and GAD-2. Their study in a German university, in Hamburg, included a comparative examination of students, looking at (among other criteria) gender. They also looked at the data they collected by sorting it by students with no part time job and students with a part time job – this last group was further broken down to working up to 10 hours a week and more than 10 hours a week.

Based on the PSQ-20, which had a mean score of 0.390 (SD=0.154), males perceived less stress than females; having an overall mean score of 0.383 (SD=0.162), which is below the mean, whereas females showed an overall mean scored of 0.407 (SD=0.148), which is above the mean. The scores reported against students working showed that those who had no part time job, perceived less stress, with a mean score of 0.394 (SD=0.153), compared to an overall mean score for students with a part time job of a mean score of 0.407 (SD=159). This places the students who worked at the same level as the females alone. This is not overly unexpected, however students who worked up to 10 hours a week reported perceived stress at an overall mean of 0.394 (SD=0.155) against those who worked over 10 hours at an overall mean of 0.453 (SD=0.167). This equates to students working less than 10 hours a week, reporting perceived stress at the same level as students who did not work at all.

This study confirms that first-year medical students, females and students working greater than 10 hours a week, were more likely to perceive greater levels of stress. The authors also supplied the age-related levels for German normal population (mean=0.30, SD=0.15) and second year medical students (mean=0.37, SD 0.17). From this comparative data we can see a significant difference between the medical student and the age-related norms, in Germany as well as between the first and second year students.

The PHQ-4 shows scores for anxiety and depression. Scoring 3 or more for the first two questions suggests anxiety and 3 or more on the second two questions suggested depression. In this study[1] it was reported that 18.4 per cent scored 3 or higher on the first two questions (suggesting higher levels than normal of anxiety in the group) and 11.5 per cent of students had a score of 3 or higher on the second two questions (suggesting higher levels than normal of depression in the group). There was no reported significant difference between genders. However, when compared to the age-related German population, these are significantly higher; with students having a mean of 1.40 (SD=1.36) for anxiety, compared to the German population being a mean of 0.82. For depression; the students' mean score was 1.26 (SD=1.12) compared to German population of 0.94.

The Beyondblue National Mental Health Survey of Doctors and Medical Students, reported that their key findings included 20 per cent of medical students having had suicidal thoughts in the 12 months prior to the survey, 50 per cent of students reported that they suffered from emotional exhaustion and 18 per cent of students had been diagnosed with depression (compared to 15 per cent in general population). They reported that the actual risk for developing either depression or psychological distress was significantly higher in the female student population (at 47 per cent), as well as for indigenous students (at 61 per cent). They also reported that for medical students older than 26 years of age there was also a significantly higher risk.[14]

The actual reported comparisons were: current diagnosis of depression male, 5.2 per cent, female, 9.8 per cent; current diagnosis of anxiety – male, 5.2 per cent, female, 8.8 per cent; suicidal thoughts – male, 17.1 per cent, females, 20.5 per cent; suicide attempts – male 3.4 per cent, female 4.6 per cent. These figures show a nearly matching prevalence as for the German medical students.

In 2009, a study was undertaken as a multi-school study, involving 2193 medical students and interns across American universities. Their study included; year level of study, gender and ethnicity. One point that stood out from this study was the significant difference in the area of suicidal ideation, between the Australian survey and this American study (20 per cent compared to 6.6 per cent),

however the authors commented that 10 per cent of students had not responded to the suicidal ideation question.[19] If this is indicative of not wishing to alert the authors to this, could suggest that the total could be as high as 16.6 per cent.

In the area of depression, the authors grouped this into (1) probable major depression (12 per cent) and (2) mild to moderate depression (9.2 per cent). Depression was reported significantly higher in the first two years, with the second year being the highest reported period. Another interesting anomaly in the data related to the fourth year students. Fourth year students were reported with the lowest rate of depression (5 per cent), yet the highest rate of suicidal ideation (9.4 per cent) and interns reported the lowest rate of depression (11.9 per cent) and suicidal ideation (3.9 per cent).

Overall, with minor differences, the rates of reported depression were similar to the previous studies and it is possible that the rate of suicidal ideation may be just lower than the Australian study. Again, all of the reported data shows a pattern that is significantly higher than the general population.

The 2018 study by Alsalhi et al.,[8] went a step beyond other studies, where they looked at not only at levels of stress amongst medical students, but also at areas that were associated with that stress. Their study targeted 500 students, of which 460 returned completed questionnaires. They reported that female students reported being stressed at a significantly higher level (57.4 per cent) than their male counterparts (45 per cent). Although they comment that the different stressors (GPA, age, marital status, study year, residency, income level or smoking status) where not statistically significant, the data did show some interesting trends. Looking at their data it can be seen that students who lived at home reported less perceived stress (48.2 per cent) than those who lived on campus (50 per cent) and much less than those who had private accommodation (61.8 per cent). (This supports the study by Muhammad, et al.,[5] discussed earlier.) Single students also reported lower levels of perceived stress (48.8 per cent) than married students (66.7 per cent). Interestingly their study showed that students older than 22 years of age reported lower levels of perceived stress (47.5 per cent) than students who were 22 years old or less (50 per cent); where the BeyondBlue[14] survey reported that there was a greater risk of depression / psychological distress for students older than 26 years.

Erschens et al.,[12] also looked for areas causing stress to the medical students that they surveyed. Their study had 1,425 participants who were drawn from four distinct groups comprising high-school graduates planning to study medicine; first-year medical students; medical students in their third, sixth, or ninth semester; and students during their final year. As discussed earlier they looked at two groups of stressors 'private' or 'training related'. They also added other training related stressors to match specific activities of the different groups. This included areas focusing on the beginning of medical training (timetabling, topics dealing with diseases, dying and death, contact with academics and contact with other medical students) for first semester students and for final year students they mainly related to initial clinical studies (contact with medical supervisors, contact with other students in practical year, contact with patients, contact with nurses and contact with colleagues).

They reported the results from the PSQ-20 as being the percentage above normal stress. What they found, was significant peaks of perceived stress being reported by students in their first year as medical students and again in their first year of clinical activities. They also reported that there was stress reported above the normal levels across all years, with the premedical students reporting only 9.8 per cent; while 27.3 per cent of students in their initial medical training reported higher than normal levels of stress. They also, report that female students perceived more stress than their male counterparts.

The key stressors identified in this study were:
Training related: selection and performance pressure, time management and work styles, missing consultation and support.
Private stressors: conflicts with family and friends as well as their living situation.

Additional to the stressors described in the studies above, there was also a situation that was described during the 1980's and 1990's, commonly referred to as Medical students' syndrome. Baars[20] explained that when medical students encounter instruction on diseases, death and dying they would regularly become caught up in 'experiencing' the disease itself as a form of hypochondria. Hodges,[21] in his literature review, said that this aliment first appeared and was described in the 1960's. He goes on to state this syndrome was present in approximately 70 to 80 per cent of students.

Discussion

Unlike what was discussed by Rosal et al.,[6] it appears that the mental health picture for medical students has a negative impact from the start of their medical training. The study by Alsalhi,[8] provides a snapshot that clearly shows and explains the mental health picture for medical students, as well as capturing the key stressors. Table 1 captures the results from several studies in relation to perceive stress, depression, anxiety, suicide ideation and risk of depression and psychological distress. The findings from the various studies are mutually supportive in the following points:

- All medical students have a higher rate of perceived stress, depression, anxiety and suicide ideation than the general, age related population.
- Female students are far more likely to be affected by perceived stress and are at a greater risk of depression and psychological distress.
- Female, Indigenous, Hispanic and African American students suffer higher levels of depression than their peers and are at higher risk of psychological distress.
- Depression seems to affect first and second year students at a higher rate than third and fourth year students, although there appears to be an increase during internship.
- The most disturbing statistic is the rate of suicide ideation. The World Health Organization[22] conducted community surveys in 21 countries (n>100,000 individuals) and found that the 12-month prevalence of suicidal ideation was approximately 2 per cent. Goebert et al.,[19] reported a rate of up to 16.6 per cent and BeyondBlue[14] reported 20 per cent.

Table 2 shows stressors that have been supported by the studies. The key ones appear to be:

- Gender (female)
- Residency (living away from home)
- Marital status (married)
- Year of study (initial year being the most significant)

These studies and other information obtained from the literature also add details to other stressors, including year content specific stressors:

- All students
  - missing consultation and support
  - selection and performance pressure
  - time management and work styles
  - conflicts with family and friends
- Initial years
  - beginning of medical training
  - topics dealing with diseases, dying and death
  - contact with academics
  - contact with other medical students
- Later years
  - contact with medical supervisors
  - contact with other students in practical year
  - contact with patients
  - contact with nurses
  - contact with colleagues

Conclusion

Although not as clear and specific, as I had first envisaged, this study has identified that all medical students are at significantly higher risk of perceived stress, depression, anxiety, suicide ideation and risk of depression and psychological distress.

It has identified specific gender and ethnic groups who are in the higher risk groups, as well as specific stressors, that are the main contributors to these mental health problems. If universities and medical schools consider these key points, they should be able to plan processes to develop greater resiliency in students. This could include program guides that prepare students for what they will be presented with and ways to manage, should the content / activity start to overwhelm them. These would be well placed to be presented to students prior to commencing studies / changing from pre-clinical to clinical etc.

Currently the main studies into this area are based in individual universities, with larger studies including several institutions within a country. I believe that a wider study, using the same measurement tools, across a number of countries – looking at not only the levels of stress amongst medical students, but the stressors responsible, should be undertaken, so that a much clearer picture of this problem can evaluated.

Limitations of this study

It should be noted that this study has been a meta-analysis of previous studies, all of which utilised the same or similar mental health assessment tests (as outlined in the Method of this article). As discussed in the conclusion of this article, further studies with an expanded field of review would likely give a much clearer and more precise view of this area.

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CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

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ETHICS COMMITTEE APPROVAL

Oceania University of Medicine deemed that ethics committee approval was not required as this was a retrospective cohort study, using data from previous studies.

Table 1: Perceived stress, depression, anxiety, suicide ideation and risk of depression and psychological distress

	Perceived stress	Depression	Anxiety	Suicidal ideation	Risk of depression / psychological distress
First year medical students					
Heinen, I., et al[1]	F >M, 10hr+ work > no work or <10hr work	18.40%	11.50%		
	Sig > general pop	Sig > general pop	Sig > general pop		
Goebert, D.A., et al[19]		23.80%		6.60%	
Alsalhi, A., et al[8]	63.60%				
Erschens, R., et al.[12]	27.3% > normal				
Second year medical students					
Heinen, I., et al (2017)[1]	< 1st year students but > age related norm				
	Sig > general pop				
Goebert, D.A., et al[19]		24.50%		6.60%	
Alsalhi, A., et al[8]	47.20%				
Erschens, R., et al.[12]	13.9% > normal				
Third year medical students					
Goebert, D.A., et al[19]		19.90%		5.80%	
Alsalhi, A., et al[8]	48.10%				
Fourth year medical students					
Goebert, D.A., et al[19]		5%		9.40%	
Alsalhi, A., et al[8]	43.40%				
Erschens, R., et al. (2018)[11]	26.0% > normal				
Internship					
Goebert, D.A., et al[19]		11.90%		3.90%	
Alsalhi, A., et al[8]	49%				
Erschens, R., et al.[12]	18.6% > normal				
Medical students general					
BeyondBlue.org[14]	Significantly > than general population	18%	14%	20%	Significantly > for female, indigenous and >26 years
Goebert, D.A., et al[19]		21.20%		6.6% (16.6%)	Significantly greater for Indigenous / African American
		Significantly greater for female / Indigenous / Hispanic / African American			
Alsalhi, A., et al[8]	49.30%				
	Females (57.4%) > than males (45%)				

Table 2: Impact of general stressor types

		Impact
Stressors	Gender	Females significantly reported higher levels of perceived stress (57.4%) to males (45%)[8,1,12,14,19]
	Residency	Students who lived at home reported much less perceived stress (48.2%) than those who lived on campus (50%) and those who had private accommodation (61.8%).[8,12,]
		Living situation was a strong private stressor.[11]
	Marital status	Single students also reported lower levels of perceived stress (48.8%) than married students (66.7%).[8]
	Year of study	Reported perceived stress significantly higher than general population.[1,8,12,14,19]
		Highest stress levels in first year and generally consistently raised in later years.[1,8]
		Students in their fourth year, where there was a peak, close to the first year levels. Also supports the overall rating higher than the general population.[8]