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Mental distress in Australian medical students and its association with housing and travel time

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ABSTRACT

To investigate the association between mental distress in medical students and their accommodation and time spent commuting to their study sites. An anonymous online survey of students enrolled in the Faculty of Medicine at the University of Sydney, Australia, measuring mental distress levels (Kessler-10), housing circumstances, travel time and demographics. Mental distress was significantly higher in females, younger students, international students, those who were renting as opposed to living in their family homes or their own homes, and in those who had longer travel times to their sites of study. Accommodation circumstances and travel times are factors associated with mental distress which can be altered, unlike gender and age. Universities should look into ways to provide affordable accommodation and more of it to medical students, nearer to their sites of study. In addition, orientation programmes and university support and counselling services should take accommodation, travel duration, age, gender and whether a student is international or domestic into account when supporting students and emphasize strategies to manage these sources of stress.

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INTRODUCTION

Previous studies show high prevalence rates of mental distress and disorders in university students [1-3]. A recent Australian study found 83.9% of university students had elevated levels of mental distress (Kessler-10 (K-10) scores ≥ 16), with 19.2% probably having a serious mental illness (K-10 ≥ 30) [1]. Internationally, medical students around the world are no exception [2-6], with nearly half of the medical students surveyed in a large US study perceiving themselves as highly stressed [7] and in Australia, one study reported 44% of medical students were psychologically distressed (K-10 ≥ 22) [3]. There are similar findings in Asia, where nearly half of the medical students surveyed in a

Malaysian study exhibited emotional disorders [8] and nearly half of the medical students in a Thai study reported being stressed (Suanprung Stress Test scores ≥ 42) [9].

Mental distress has a significant detrimental impact on students' studying, functioning, quality of life, relationships [2] and academic performance [10,11]. Stallman found that 19.2% of university students enrolled at one Australian university had been unable to fully execute their daily study tasks on an average of 10 days out of the previous four weeks due to mental distress (K-10 ≥ 30) [1]. Previous studies into tertiary students' mental health have focused on gender,

personal and family history of mental illness, age, burnout, suicidal ideation and academic achievements. Few studies examined financial circumstances, very few investigated student housing and, to date, no studies have investigated the impact of travel time on mental distress.

Mental distress is more prevalent in low-income populations [12]. Australian university students who reported being under financial stress were twice as likely to screen positive for a mental illness than students without financial stress [1]. Also in Australia, working longer hours has been associated with lower grades in university nursing students [13]. In medical students internationally, poorer mental health was associated with problems paying bills and working longer hours outside the university [14], financial concerns were associated with burnout [6] and in one study, students reporting financial difficulties were at least three times more likely to suffer from depression [10]. Mental distress in medical students has been associated with students' perceptions of having poor or very poor financial status [4] or increasing anticipated debt on graduation [15]. In French medical students, having an income below the normal monthly cost for a student's accommodation, in combination with not living in the family home, is associated with an increased risk of suffering from Major Depressive Disorder [2]. A lack of financial resources is also a barrier for students when seeking treatment for mental health disorders [16].

Few studies have assessed the association between mental health and accommodation in medical students and, so far, the results are inconclusive. Norwegian students living alone have significantly higher levels of mental distress than students who were cohabiting [17]. Studies from Pakistan and Sri Lanka suggest that living at home is associated with lower levels of mental distress than living in university or rented accommodation [18,19]. In Australia, students living with their partners, children or parents, or in university accommodation are less likely to have high or very high distress levels as compared with students living alone or in other off-campus settings [1]. However, no association was found between accommodation type and mental distress in Iranian medical students [4] and there was no association between the number of people living in the student's residence and mental disorders in the USA [20].

This study aims to examine how socio-economic and demographic factors, travel duration and living arrangements are associated with mental stress and distress in Australian university students.

METHODS

This study is part of an ongoing project investigating sources of mental distress in medical students.

Participants

All participants were students enrolled in Sydney Medical School (SMS), the graduate medical program of the University of Sydney (total enrolment=1,168) [21].

Tools

Kessler-10 (K-10)

Mental distress was measured using the K-10 scale. The K-10 has been widely used internationally [1,5,12] and measures non-specific psychological distress in the previous 30 days [22]. It yields a score between 10 and 50 points and the higher the total score, the higher the level of psychological distress.

The K-10 has excellent internal consistency (Cronbach's alpha=0.93) and has good discrimination for severe cases of mental illness as defined by Global Assessment Functioning scores (area under curve = 0.955), and for anxiety and mood disorders, and non-affective psychosis as diagnosed by the Structured Clinical Interview for DSM-IV (area under curve=0.876) [22].

Demographic data

Demographic data included: age; gender; year of enrolment; category of student (domestic/international); course enrolment (full time/part time); and having children. Socio-economic factors included accommodation type (family home, own residence or renting); number of people living at the same residence; travelling time to site of academic study; paid work; and type of financial support during their studies.

Design

Data was collected via an anonymous online survey. Electronic bulletins containing the link to the survey were sent to all students enrolled at SMS on six occasions over six months. Participation in the study was voluntary and because of the survey's anonymous nature, answering the survey was taken as an indication of consent. At the end of the survey, participants were given the opportunity to enter a lucky-draw to win one of 50 cinema tickets as compensation for the time spent completing the survey.

Statistical analyses

Statistical analyses were conducted using IBM SPSS Statistics (versions 19 and 20, 2010 and 2011: Armonk,

New York). Responses were excluded if they did not contain measurable values or if they were implausible. Multiple linear regression of K-10 scores with backwards elimination was undertaken against age; amount of money spent on alcohol during the past four weeks; doing paid work; gender; having dependent children; type of accommodation during the study semester; number of bedrooms in the residence; number of people also living in the residence; preclinical versus clinical stage; receiving economic support from family; whether the student studied full/part time; time spent on independent studying per week; and total travel time to site of study. We tested four interaction terms: having dependent children x time spent on independent studying; number of people also living in one's residence x number of bedrooms; receiving economic support from family or domestic partner x the time spent on independent studying; and doing any paid work x time spent on independent studying.

Ethical approval

This study was approved by the Human Research Ethics Committee of the University of Sydney and conducted in accordance with the ethical standards laid down in the Declaration of Helsinki [23].

RESULTS

Five hundred and twenty-four Graduate Medical Programme (GMP) students responded to the survey, with 497 completing the K-10, providing a response rate of 42.6% (Table 1).

Table 2 shows mean K-10 scores, travel time, housing type and sources of income. "Other" income sources included student loans, bank loans and savings. Thirty-one students (6.5%) stated they had loans to support them through medical school and 37 (7.7%) relied fully or partially on savings. Nearly four-fifths of students

needed to travel to get to their site of study, with travel times ranging from 7 minutes to 2½ hours. Twenty-four students (4.6% of all respondents), stated that they had dependent children.

In the four weeks prior to the survey, 79.7% of the participants stated having used alcohol and 6.1% had used other recreational drugs.

Kessler-10 multiple linear regression model

Table 3 shows the student profile of K-10 scores compared with Australian population data [24]. Table 4 shows the final regression model for K-10 scores. Gender, age, travel time, accommodation type and domestic versus international student status were significant. A more detailed analysis of accommodation type was conducted via recoding of dummy variables: rented accommodation was associated with higher K-10 scores, both compared with living in the family home (partial regression coefficient= -2.42, 95% CI [-3.90, -0.93], t=3.20, df=464, p=0.001) and in own accommodation (partial regression coefficient=2.42, 95% CI [-4.55, -0.29], t=2.24, df=464, p=0.03). There was no difference in K-10 scores between those living their own accommodation and those living in their family home (partial regression coefficient= -0.005, 95% CI [-2.34, 2.33], t=-0.004, df=464, p=1).

Stage of course (pre-clinical versus clinical), number of other people living at the residence and number of bedrooms at the residence were not significant predictors of K-10, but were retained as variables of interest. None of the interaction terms were significant. Receiving economic support from family (t= -1.10; df=462; p=0.3) was not associated with the K-10 scores, nor were average time spent on independent studying (t=1.48; df=463; p=0.1), having dependent children (t=0.86; df=461; p=0.4) or the amount of money spent on alcohol per month (t=0.07; df=459; p=0.9).

Table 1. Demographic profile of study sample, compared with the profile of enrolled GMP students [21].

| Year of enrolment | Mean age (years) (SD)* | Total students (%) | | Males (%)† | | Domestic (%)‡ | | |
|-------------------|------------------------|--------------------|----------|--------------|----------|---------------|----------|----------|
| | | Study sample | Enrolled | Study sample | Enrolled | Study sample | Enrolled | |
| Pre-clinical | 1 st | 24.24 (4.1) | 165 (32) | 327 (28) | 81 (49) | 186 (57) | 125 (81) | 260 (80) |
| | 2 nd | 25.45 (3.6) | 139 (27) | 277 (24) | 66 (47) | 145 (52) | 101 (82) | 221 (80) |
| Clinical | 3 rd | 25.88 (2.9) | 121 (23) | 294 (25) | 50 (42) | 155 (53) | 96 (85) | 242 (82) |
| | 4 th | 27.14 (3.5) | 98 (19) | 327 (28) | 42 (43) | 186 (57) | 76 (84) | 260 (80) |
| Total | 25.48 (3.7) | 524 | 1168 | 239 (46) | 398 (83) | | | |

*n=524 †n=523 ‡n=480

Table 2. Kessler-10 scores, time spend travelling, time spent studying, housing situation, amount of money spent on alcohol and type of financial support.

| | n | Mean (SD) |
|---|------|----------------|
| Total K10 Score | 497 | 20.24 (6.38) |
| Hours per week spent doing work related to medical school (incorporating time spent on face to face teaching, independent studying and clinical placements) | 481 | 48.98 (15.66) |
| Number of people also living in one's residence | 479* | 7.21 (32.90) |
| Number of bedrooms in residence | 479* | 7.50 (32.47)** |
| Total travel time to site of study (Minutes) | 479 | 39.21 (33.17) |
| Amount of money spent on alcohol/week for students who reported consuming alcohol (AUS\$) | 382 | 26.78 (26.38) |
| | | (%) |
| Accommodation type during study semester | | |
| The family home | 142 | (30) |
| Rental | 298 | (62) |
| Own residence | 41 | (8.5) |
| Need to travel from residence to site of study | | |
| Yes | 376 | (78) |
| No | 105 | (22) |
| Financial support through studies* | | |
| Supported by family or domestic partner | 287 | (60) |
| Paid work | 223 | (46) |
| Scholarship | 86 | (18) |
| Student allowance | 222 | (46) |
| Other | 83 | (17) |

*Multiple responses could be chosen.

**Some respondents lived in dormitories: 14 reported more than 10 bedrooms at their place of residence. A maximum of 286 rooms was reported.

Table 3. Student levels of distress compared with Australian population data (16-85 years) [24].

| Level of distress (K-10 range) | Male | | Female | | Total | |
|--------------------------------|-----------|-----------------|-----------|-----------------|-----------|-----------------|
| | Students | Aust population | Students | Aust population | Students | Aust population |
| Low (10-15) | 73 (32%) | 75% | 63 (24%) | 67% | 136 (27%) | 71% |
| Medium (16-21) | 73 (32%) | 18% | 101 (38%) | 21% | 175 (35%) | 20% |
| High (22-29) | 71 (31%) | 5.2% | 69 (26%) | 8.5% | 140 (28%) | 6.9% |
| Very high (30-50) | 13 (5.7%) | 2.0% | 33 (12%) | 3.1% | 46 (9.3%) | 2.6% |

Table 4. Final regression model for Kessler-10 scores.

| Variable | Partial coefficients | regression 95% CI | t ₄₆₄ | P |
|--|----------------------|-------------------|--------------------------|--------|
| Number of people also living in one's residence | -0.01 | -0.32, 0.29 | -0.08 | 0.9 |
| Number of bedrooms in residence | 0.01 | -0.30, 0.32 | 0.06 | 1 |
| Doing paid work (reference=no) | 0.94 | -0.24, 2.11 | 1.57 | 0.1 |
| Student type (reference=domestic) | 2.09 | 0.46, 3.73 | 2.51 | 0.01 |
| Gender (reference=male) | 1.35 | 0.20, 2.50 | 2.30 | 0.02 |
| Age (Years) | -0.17 | -0.34, -0.007 | -2.05 | 0.04 |
| Stage of study (reference=preclinical) | 0.64 | -0.55, 1.83 | 1.05 | 0.3 |
| Total travel time to site of study (Minutes) | 0.05 | 0.03, 0.07 | 4.57 | <0.001 |
| Type of residence during semester (rental, family home or own residence) | | | F _{2,464} =6.45 | 0.002 |

(F(10,464)=4.56, p<0.001).

DISCUSSION

To our knowledge, this is the first study to investigate the association between travel time and mental distress in university students. The amount of time spent travelling to the site of study was significantly associated with K-10 scores, both before and after controlling for age, gender and stage of course. Even though the change in K-10 scores per minute of travel time was small (0.05 points), the longest travel time reported was 150 minutes, which predicts a six point increase in K-10 score. This is more than 10% of the maximum score of the K-10 scale. Thus, long travel times may have considerable impact on student distress levels. Other studies support an association between stress and travelling or commuting. Hansson et al's [25] recent study on Swedish workers concluded that commuting, especially when using public transport for more than 30 minutes one way, was weakly but significantly associated with stress, sleep disturbance and exhaustion. Among urban American commuters using public rail transportation, longer commuting times were associated with both increased perceived stress and higher levels of salivary cortisol [26]. The effects of travelling and commuting on both mental and physical health need to be further investigated, particularly among students.

Living in the family home or living in one's own accommodation were associated with lower mental stress than living in rented accommodation, consistent with some previous studies [1,19]. Students who are renting may face greater financial stress as well as more crowded and less optimal conditions than students living in the family home or in their own residences, although in the present study, we did not find a significant association between distress and the number of people living at participants' residences. There may also be uncertainty associated with tenure. International students appear particularly vulnerable, where 77 out of the 82 international students who participated in the present study rented accommodation. This vulnerability regarding accommodation and finances was recently highlighted in the Australian general media [27].

Undertaking paid work was not significantly associated with higher K-10 scores. We had hypothesized that doing paid work may indicate poor financial status and that the time "lost" while working would increase distress levels. We were not able to explore the relationship between hours spent in paid work and K-10 scores, which may be more pertinent, as too few students reported this information. The lack of association between paid work and K-10 scores may indicate that paid work was too crude a measure of financial need or potential time lost. Other potential explanations include: some students may not do paid

work regularly; the money earned from paid work may reduce distress; or that working has a relaxing effect and counteracts distress felt due to other causes. Future studies should examine the relationship between time spent working and mental stress in medical and/or university students. Receiving economic support from one's family was not associated with less mental stress. We hypothesized that financial support from the students' families would reduce stress, as students had an economic safeguard if encountering unforeseen economic hardships. The extent of this support was not quantified in our surveys and it is possible that the amount of economic support received could significantly predict K-10 scores. It is also possible that students may feel they are an economic burden on the family, which may cause distress in itself. Future studies should also investigate the impact of undertaking loans to finance medical school attendance, as this is another potential economic stress factor. Comparison with international student populations is potentially informative, as the funding system for tertiary students in Australia differs from that of the USA and other countries.

Previous studies show inconsistencies in the relationship between gender and distress. Mental distress was greater in females in our study sample than in males, which is consistent with a number of previous studies [1,4,28] and with Australian population data [24]. However, the difference in mean K-10 scores between males and females, while statistically significant, was less than two points out of the possible maximum 50, so the clinical importance of gender difference is likely minimal. Other studies also report minimal or no gender differences in stress [3,5]. Younger age was significantly associated with higher K-10 scores and agrees with Stallman's study [1] of Australian university students, where students aged below 35 years were nearly twice as likely to report increased distress. This could be indicative of increasing resilience with age.

In our study, being an international student was associated with higher K-10 scores. However, international students scored an average of only 2.09 points more than domestic students when all other factors were controlled for. This difference is unlikely to be of clinical importance and two previous Australian studies on students from various disciplines did not find any difference in K-10 scores between domestic and international students [1,3]. We found no difference between preclinical and clinical course stages, and previous studies have produced inconsistent conclusions regarding the impact of stage of course on mental stress and wellbeing [5,20,29].

The individual partial regression coefficients for gender, age, domestic versus international status, living arrangements and travel time, while significant, resulted in small absolute differences in K-10 scores, unless there were long travel times or large differences in age. However, the combination of all these factors yields a large contribution to the K-10. The profile for the individual likely to be in greatest mental distress is that of a young female international student who is renting and has long travel times. Hypothetically, this student, if aged 20 and needed to travel 150 min to study, would have an average K-10 score 10.17 points higher than a 30 year old male domestic student who lives in his own accommodation or in the family home and does not need to travel. This represents a substantial 20% of the maximum K-10 score. While our results suggest students should live in their own home or in their family home if possible to reduce distress, the advantage may be lost if doing so results in longer travel duration. Further, medical students at the clinical stage, who may be required to travel to different clinical placements, may face varying travel times.

The mean K-10 score (20.24) of our participants is considerably greater than the reported Australian population mean (14.5) [30], in both males and females. In our study, only 27.4% had low distress levels compared with 71.1% in the general population. Notably, more than a third of the students reported high or very high levels of distress, compared with 9.5% of the general population. Our results suggest Australian medical students are indeed more distressed than the general population and this finding is consistent with previous international studies. Since K-10 scores correlate with mental disorder diagnoses [24], reducing stress could have considerable implications on the mental health of medical students.

Our study is not without limitations. As a cross-sectional study, it cannot discern whether living conditions and travel time cause mental distress, or whether the distress precedes students finding themselves in these financial, travel and living circumstances. Further, this study was conducted in medical students at an urban university in Australia and our results may not be applicable to student populations from different faculties or in countries where higher education is run on different financial frameworks, have different residential models, or have student populations with different socio-economic profiles. For example, South Korean medical students had low prevalence rates of depression at 9.4% and there was no difference in their levels of depressive symptoms according to their living arrangements, financial difficulties, or whether they had received treatment [31].

In summary, the typical profile of a student who would be at greatest risk of mental distress is of a young female international student who rents accommodation and needs to commute long distances to her place of study. Orientation and pastoral care programs and university student support services should direct extra attention and resources to address these factors when assisting students. While factors such as gender and age cannot be changed, strategies to improve access to affordable accommodation close to sites of study are recommended and may help reduce student distress. Future studies should investigate students studying courses other than medicine and in different countries. Such studies should collect detailed data on the amount of financial support a student receives from their family and paid work, and the types of support services students find most valuable in this regard should also be examined.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

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