

FIT FOR WORK? COMPARATIVE MENTAL HEALTH OF BUILT ENVIRONMENT UNDERGRADUATES

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High rates of occupational stress make mental health a critical issue in the built environment (BE) sector. Research has shown that some aspects of mental health, like burnout, continue over from student days into the workplace. Employers and educators should be concerned then that global evidence shows that the mental health of millennial students, born 1980-1999, is deteriorating. Therefore it is important to understand more fully the mental health of future BE professionals before they enter the workforce. Although mental health has been studied in numerous undergraduate disciplines including engineering, science, IT, medicine and law, it is not known whether these results can be generalised to BE students. This study explored the mental health of 410 Millennial undergraduate BE students in a large metropolitan university. The DASS-21 Depression, Anxiety and Stress scales were used to enable a comparison with six previously published studies on undergraduate mental health. Means and standard deviations were calculated and the scores were classified into categories ranging from 'normal' (no disorder) to 'extremely severe' using established population norms for the measurement scale. Generally the sample of BE students showed a greater incidence of normal mental health and a lower percentage of mental health disorders than other university disciplines. However, it is still a matter of concern that one in four in the BE sample experienced either depression or stress, or both. Of even greater concern is that four in ten students experienced an anxiety disorder. These findings have implications for both educators and employers as mental health problems at university can carry over into the workplace. As the construction industry is known for its high number of stressors and poor mental health, it is important that mental health issues, especially high levels of anxiety, are identified early in the talent supply chain and that interventions are undertaken at university to produce more mentally fit graduates.

Keywords: anxiety, built environment students, depression, mental health, stress

INTRODUCTION

Relatively little is known about the mental health of future construction management professionals studying at university. Previous research on construction students has focussed on two main areas: student burnout (Lingard, Yip, Rowlinson, and Kvan, 2007; Moore and Loosemore, 2014); and more recently, student resilience and wellbeing (Turner, Scott-Young and Holdsworth, 2017). Burnout refers to a student's negative disengagement as a result of chronic emotional, interpersonal, study, and/or work demands (Schaufeli, Salanova, González-Romá and Bakker, 2002). Lingard *et al.*, (2007) and Moore and Loosemore (2014) found that burnout was high in

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Australian construction student samples, especially for those who juggled paid work with study. Burnout was also found in a lesser degree in construction students in Hong Kong due to high demands from studying and concern about the local economy (Lingard *et al.*, 2007). More recently, Turner *et al.*, (2017) explored built environment students' resilience capability to adapt to environmental stressors. They found that although resilience was related to better levels of student wellbeing, many built environment students displayed a deficit in maintaining perspective, a cognitive skill necessary for weathering stressful events and recovering from disruptions and set-backs. Despite these studies, very little is known about construction students' mental health in terms of the prevalence and severity of the most common societal types of mental disorders: depression, anxiety and stress (Bitsika, Sharpley and Melhem, 2010). This study fills that gap. Due to the stressful nature of the construction industry (Bowen, Govender and Edwards, 2014; Leung, Chan and Cooper, 2015), it is important for construction educators to better understand the mental health profile of their students in order to build their wellbeing to prepare them for the known challenges they will encounter in their future professional careers (Leung *et al.*, 2015).

Recent reports from across the industrialised world suggest that the mental health of the current university student cohort known as Millennials and born between 1982 and 2000 (Howe and Strauss, 2008) is the worst of any age cohort and is steadily declining. Mental illness has been growing among Millennials in Britain (NHSDigital, 2016), Australia (Mission Australia, 2016), and in the US (American Psychological Society, 2017), particularly among young women (Hawley *et al.*, 2016). Depression increased in the US Millennial cohort between 2005 and 2014 (Mojtabai, Olfson and Han, 2016) and their stress has also increased over recent years, with money and work the major contributors (American Psychological Association, 2017). Although this generation is more likely to engage in stress-relieving activities, 30% believe they do not adequately manage their stress (American Psychological Association, 2017). Moreover, the incidence of self-harm in this age cohort has been growing around the world. Self-harm in male Millennials in the UK doubled between 2007 and 2014 and trebled to almost 20% of females (NHSDigital, 2016). Similar concerning behaviour has been recorded in the US (American Psychological Association, 2017). The rise in mental disorders in the Millennial generation is a disturbing development for both academics and employers as mental health disorders are known to impair the ability to perform the normal routine activities required by study and work (Searle, 2017) and can cause students to dropout (Van Brunt, 2008).

In the past two decades, research has documented declining levels of mental health across all age groups. According to the World Health Organisation (WHO) (2017) "the burden of mental disorders continues to grow with significant impacts on health and major social...and economic consequences in all countries of the world".

Approximately 17% (one in six) of English adults reported symptoms of a common mental disorder in 2014 (National Health Group Digital (NHGDigital), 2016). A national study of mental health and wellbeing in the Australian population found a slightly higher incidence, with one in five Australians aged 16-85 having experienced some form of mental disorder in the previous twelve months (Australian Bureau of Statistics (ABS), 2008). Although the prevalence of mental health disorders in all age groups has been increasing globally (WHO, 2017), the incidence of disorders is greatest in the Millennial generation (NHGDigital, 2016; Mission Australia, 2017; American Psychological Association, 2017). In Australia,

Millennials experienced more mental health disorders than older age groups, with approximately one in four 16-24 year olds (26%) and 25-34 year olds (25%) experiencing some form of disorder (Australian Bureau of Statistics (ABS, 2008).

Depression is now the most common health disorder, whose incidence has risen by more than 18 percent since 2005. There are now an estimated 300 million sufferers world-wide (WHO, 2017). Depression is an emotional disorder which involves a negative disturbance in mood (ABS, 2008). “Depression is characterized by sadness, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, tiredness, and poor concentration. Sufferers may also have multiple physical complaints with no apparent physical cause. Depression can be long-lasting or recurrent, substantially impairing people’s ability to function at work or school and to cope with daily life. At its most severe, depression can lead to suicide” (WHO, 2017).

In contrast to the world trend, anxiety disorders are the most common mental illness in Australia, experienced by 14.4% of Australians, while only 6.2% Australians suffer from depression (ABS, 2008). Anxiety disorders involve feelings of tension, nervousness or distress, which can prompt individuals to fear or avoid stressful situations that evoke these negative emotions (ABS, 2008). In Australia, people with anxiety disorders report taking an average of 4.4 days sick leave per month (ABS, 2008) and anxiety disrupts sufferers’ social lives and close personal relationships (Searle, 2017).

Stress disorders also affect a substantial proportion of the world’s population. Surveys in the US report that the rising incidence of stress is negatively impacting adult health and wellbeing (American Psychological Association, 2017). Stress is defined as “a state of persistent arousal and tension with a low threshold for becoming upset or frustrated” (Lovibond and Lovibond, 1995). In one longitudinal UK survey, Millennials reported higher average stress levels than any other generation, and more Millennials reported that their stress has increased from the previous year (Edwards, 2017).

Females generally experience a greater prevalence of psychological distress than males. The Australian Bureau of Statistics’ (2008) national survey found that in a twelve-month period, women (22%) reported experiencing higher rates of mental disorders than men (18%). More women experienced anxiety disorders (18%) compared to 11% of males. More women (7.1%) experienced depression compared to 5.3% of men. Younger women aged 16-24 were approximately twice as likely to experience affective disorders (8.4%) compared to 4.3% of same-aged males. In the slightly older group aged 25-34 years, women were nearly twice as likely to experience anxiety disorders (12%) than males the same age (ABS, 2008). Similar gender-related trends were found in England, with more adult women aged 16 and over (19%) experiencing common mental disorders than men (12%) and with more severe symptomology (10% compared to 6%) (NHGDigital, 2016). In the US also, women’s stress levels are higher than men’s (American Psychological Association, 2017).

AIM

Although scant attention has been paid to the mental health of built environment students, research in other disciplines like medicine, law (Larcombe *et al.*, 2016), and nursing (Storrie, Ahern and Tuckett, 2010) has found that university students

experience higher incidences of depression, anxiety and stress than their peers in the general population (Larcombe *et al.*, 2016). However, it is not known whether these results can be generalised to students studying built environment degrees. In fact, Larcombe *et al.*, (2016) argue that the impact of field of study on mental health been under-researched. Therefore, this study aims to explore the prevalence and severity of depression, anxiety and stress in undergraduate students studying construction-related degrees. The three specific research questions are:

- What is the mental health profile of students studying undergraduate degrees in the built environment?
- How are demographic characteristics such as gender and international student status related to student mental health?
- How does the prevalence and level of mental disorders compare with other disciplines of university study?

METHODS

Sampling Strategy

A purposive sampling strategy was employed. Millennial students studying an undergraduate degree in a Built Environment school in a large metropolitan university in Australia were invited to participate in the study. The survey was administered in two waves, in Semester 2 of 2014 and Semester 1 of 2015. To maintain environmental consistency, students were surveyed in Week 7 of their twelve week semester. A 15 minute pen and paper survey was administered as part of a course-related activity. On completion of the survey, students were invited to voluntarily place their anonymous survey in a box by the door as they left the room. This resulted in a 90% return rate from those surveyed. Independent sample *t*-tests were conducted to check if the demographic variables for the Wave 1 and Wave 2 samples were similar. The means of the demographics for both semesters of the first and final year samples did not statistically vary, indicating that the two semester waves of each year level could be combined to form a single sample.

Data Instrument and Analysis

The DASS21 survey, a 21 item shortened form of the original DASS-42 scale (Lovibond and Lovibond, 1995) was used to measure participants' incidence and level of depression, anxiety and stress. As the DASS instrument has been widely used around the globe, its use in the current study allows for the comparison of the mental health of BE undergraduate students with the population norms for same age group and with the findings from studies of other disciplines at other universities across the world. The Depression, Anxiety and Stress subscales consist of seven items each and each subscale exhibits high reliability (Henry and Crawford, 2005). The response format is a 4-point Likert scale, with higher scores reflecting a higher level of depression, anxiety and stress. Each subscale is made up of seven items that are summed to compute a score. The Depression subscale contains items like "I found it difficult to work up the initiative to do things", "I felt down-hearted and blue", and "I felt I wasn't worth much as a person". Items in the Anxiety subscale include "I was aware of dryness of my mouth", "I experienced trembling (e.g., in the hands)", and "I was worried about situations in which I might panic and make a fool of myself". The Stress subscale contains items like "I found it difficult to relax", and "I tended to over-react to situations". Cronbach's Alpha scores showed that all three subscales

demonstrated satisfactory reliability and internal consistency in the current sample (Depression = 0.83, Anxiety = 0.79, and Stress = 0.83).

Participants

Of the 410 respondents, 179 (43.8%) were first year students, 5 (1.2%) were in their second year, 24 (5.9%) were in their third year, while 183 (44.7%) were fourth/final year students. Almost one quarter (101; 24.7%) of the sample were female. Most of the sample (309; 76.1%) were aged 24 or younger and 17.8% (72) were international students. The majority of the sample (308; 68.3%) worked part time, with 133 (43.1%) students employed in the construction industry.

Mental Health Profile of Students

As recommended by Lovibond and Lovibond (1995), the results of this study's shortened DASS-21 measure were multiplied by two to make them comparable to the 42-item version of the scale (DASS-42) to enable a direct comparison of the current findings with extant university studies (e.g. Larcombe *et al.*, 2016). The sample size for each of the subscales differs as some surveys had missing data and those subscales were subsequently removed. Using the clinical cut-off points provided by the scale developers (Lovibond and Lovibond, 2011), the scores for each subscale were classified as 'normal', 'mild', 'moderate', 'severe', or 'extremely severe' and the frequencies and percentages of each level of disorder were calculated (see Table 1). As explained in Crawford *et al.*, (2011), the ranges for each level of the three DASS subscales varies.

Almost three quarters of the current sample (74%) scored in the normal range for depression (0-9) and for stress (0-14) (75.3%), indicating that students' overall level of perceived depression and stress fell within the normal ranges for the general population. That is, the majority of BE students were not depressed or stressed. However, a substantial number of built environment students did experience some form of psychological distress. One quarter of the students experienced depression or stress (ranging from mild to extremely severe). For anxiety, fewer students (61.3%) recorded scores in normal range (0-7), even though as previously noted, the sample mean still fell within the normal range ($M=6.81$, $SD=7.08$). Almost 40% of students did experience some level of anxiety disorder (ranging from mild through to extremely severe). Ten percent of the sample experienced mild depression, 16.7% reported symptoms of mild anxiety and 9.6% experienced mild stress. A further 9.6% of the sample experienced moderate levels depression, anxiety or stress. Approximately 5.8% of the sample experienced severe-extremely severe depression, while 6.3% experienced severe-extremely severe stress. Almost 12% experienced severe-extremely severe anxiety.

Table 1: Prevalence and severity levels of student mental health

Category	Depression		Anxiety		Stress	
	N	%	N	%	N	%
Normal	282	74.0	242	61.3	300	75.3
Mild	40	10.4	66	16.7	37	9.6
Moderate	37	9.6	41	10.4	35	9.0
Severe	12	3.2	17	4.4	19	5.4
Extremely Severe	10	2.6	29	7.5	3	0.9

Demographic differences in mental health

The results were then analysed to examine the prevalence of mental health disorders in relation to the demographic categories of gender and international student status. Independent samples *t*-tests were performed to test the significance of the DASS-42-equivalent mean differences in each of the three mental health disorders (depression, anxiety, and stress) according to these two characteristics. There was no significant difference between male ($M=6.43$, $SD=7.14$) and female ($M=6.28$, $SD=6.27$) means for depression, with both means falling within the normal range (0-8). However, gender differences were noted for both anxiety and stress. Female students experienced significantly more anxiety (Mean=7.98, $SD=6.86$, $t(363) = -2.34$, $p=0.02$) and more stress (Mean=11.51, $SD=8.89$, $t(363) = -2.30$, $p=0.02$) than males (Mean=6.05, $SD=6.60$; Mean=9.23, $SD=7.69$ respectively). The scale means for stress fell within the normal range (0-14) for both genders. While both genders' means fell within the normal range for anxiety (0-7.99), the female mean (7.98) was at the upper end of the cut-off.

Students from other countries experienced significantly higher levels of depression (Mean=8.32, $SD=7.81$; $t(364) = 2.44$, $p=0.01$) than local students ($M=5.99$, $SD=6.69$). They also experienced higher levels of anxiety (Mean=9.59, $SD=7.86$; $t(364) = 4.11$, $p=.0001$). Although the mean for stress for international students (Mean=11.37, $SD=8.56$) was higher than that for local students (Mean=9.42, $SD=7.89$), this difference ($t(364) = 1.7$, $p=0.08$) was only significant at the 10 per cent level. The means of all three disorders fell within the normal range for both international and local students, but the mean of anxiety for international students (7.86) fell on the high end of the normal range (8-10).

BE students' mental health compared with other disciplines

As previously noted, the results of each DASS-21 subscale (depression, anxiety, and stress) were multiplied by two to make this study comparable to the DASS-42 scores for six existing studies of mental health in different academic disciplines in Australia, USA, Hong Kong and Turkey. A comparison of the mean scores for each study and their classification ranging from 'normal' (no disorder) to 'extremely severe' are shown in Table 2. The current sample of BE students showed a greater incidence of normal mental health and a lower incidence of mental health disorders than any other discipline.

Table 2: Comparison of mental health means with extant studies

Study	Country	N	Depression	Anxiety	Stress
Current study	Australia	451	6.5 (normal)	6.9 (normal)	9.9 (normal)
Wong <i>et al.</i> , (2006)	Hong Kong	7915	8.7 (normal)	9.4 (mild)	14.0 (normal)
Bayram and Bilgel (2008)	Turkey	1617	10.0 (mild)	9.8 (mild)	14.9 (mild)
Townes <i>et al.</i> , (2011)	Australia	295	10.1 (mild)	7.5 (mild)	13.0 (normal)
Osman <i>et al.</i> , (2012)	USA	410	7.7 (normal)	6.4 (normal)	11.1 (normal)
Larcombe and Fethers (2013)	Australia	316	9.2 (mild)	7.4 (mild)	14.4 (mild)
Larcombe <i>et al.</i> , (2016)	Australia	5061	10.2 (mild)	8.2 (mild)	13.7 (normal)

DASS-21 means were multiplied by 2 to make them comparable to DASS-42 means (Lovibond and Lovibond, 1995)

DISCUSSION

Although university student mental health has been studied in numerous undergraduate disciplines, until now, it has not been known whether these results can

be generalised to students undertaking an undergraduate degree in the built environment discipline. This study was designed to fill the gap in knowledge about the prevalence and severity of depression, anxiety and stress in built environment students. The findings confirm that as in other fields of university study, mental health issues are of serious concern in the built environment student population. The first question focused on identifying the mental health profile of built environment students. One in four students had experienced depression and stress ranging from mild through to extremely severe over the previous two weeks, a finding that is consistent with the level of disorders reported in their peers not attending university (ABS, 2008). More students (one in three) had experienced disordered levels of anxiety over that same time period. The finding of a greater prevalence of anxiety in comparison to the other two disorders is consistent with Australian general population findings (ABS, 2008) and with previous studies of university students (e.g. Bitsika *et al.*, 2010; Bewick *et al.*, 2010). The present study confirms that for some students, studying at university is marked by the experience of psychological distress, and more particularly of anxiety.

The second research question explored whether the demographic characteristics of gender and international status were associated with the incidence of mental health in BE students. For depression, there were no statistically significant differences between male and female students in terms of the prevalence or severity of depressive symptoms, with the majority of students reporting normal levels of functioning. This result differs from other studies which have found that a higher proportion of females experience depression (ABS, 2008). However, the gendered findings of female BE students experiencing significantly higher levels of anxiety and stress than males were consistent with other research in Australia (ABS, 2008) and the US (American Psychological Association, 2017).

International students experienced significantly worse levels of mental health than local students, reporting higher depression, anxiety and distress. As the number of international students studying in overseas universities is increasing, this finding alerts educators to pay special attention to fostering the wellbeing of such students who are far away from their normal social support systems. Taken together, these results indicate that similar to the extant research on other university disciplines, a substantial proportion of Millennial built environment students were suffering from some form of emotional distress, with female and international students the most vulnerable of all.

The third research question explored how the mental health of built environment students compared with students in other disciplines of university study. When compared with six other studies, built environment students experienced a lower incidence of mental health issues. This study was not able to determine why the built environment sample displayed a better mental health profile than students in the comparison disciplines, but the finding indicates the need for further research.

Although the built environment students in this sample generally experienced better mental health than students in other fields, it is still a matter of concern that one in four in this sample experienced either depression or stress, and two in five students experienced an anxiety disorder. Female built environment students are particularly at risk of developing anxiety and stress disorders, while international students have a greater risk of developing all three emotional disorders of depression, anxiety and stress. These findings should be of concern to academics as mental disorders are

known to impair students' daily functioning and subsequent academic performance, and these students are more likely to drop out of university study (Van Brunt, 2008).

CONCLUSIONS

This research contributes to the understanding of the mental health of students undertaking studies in the built environment. The results confirmed that studying at university can be a psychologically distressing time for many students. The findings suggest the need for further research to better understand the causes of student distress, especially for female and international students. Future research could employ student interviews to gain a more in-depth understanding of the factors which impact upon students' mental health. Further research can also explore whether built environment students are receiving sufficient support and attention to their emotional needs. Research is also needed to identify which resources can be important for fostering good mental health and for alleviating students' anxiety and stress.

The sample of this study was limited to built environment students in one Australian university and hence the results are not able to be generalised to students in other universities or countries. Further research in other contexts is therefore recommended. Despite these limitations, this study adds new knowledge to the under-researched topic of the mental health of students undertaking higher education studies of the built environment. This research offers new insights into the prevalence and nature of the mental disorders that these students experience and identifies targeted areas for the improvement of student mental health.

The findings of this study have implications for educators in the built environment disciplines. Early detection and support can benefit students who experience psychological disorders. Educators can be trained to identify students with mental health issues so that students can be referred to university counselling services for support. In addition, targeted programs for addressing anxiety and stress through raising emotional awareness and developing coping strategies would better equip built environment students with skills for adapting to stress.

The results also suggest that built environment departments should consider developing a coherent strategy that provides mental health interventions for females and international students identified as demographic groups at greater risk of developing mental disorders. As the construction industry is known for its high number of stressors and poor mental health, it is imperative that mental health issues, especially high levels of anxiety, are identified early in the talent supply chain and that interventions are undertaken at university to produce more mentally fit graduates.

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