Mental disorders among university students in Australia:

Web-based cross-sectional survey

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Declaration

1. *I hereby certify that the work embodied in this thesis is the result of original research and has not been submitted for a university degree or other similar qualification to any other University or Institution.*

2. *The work in this thesis was carried out under the supervision of Associate Professor Kypros Kypri, Centre for Clinical Epidemiology & Biostatistics, School of Medicine and Public Health, The University of Newcastle and Associate Professor Jenny Bowman, School of Psychology, The University of Newcastle, Australia.*

3. *The conduct of this research was approved by the University of Newcastle Human Research Ethics Committee, approval number H-2009-0366.*

4. *I hereby certify that a section of the work embodied in this thesis includes a co-authored published paper of which I am a joint author. My supervisor's signature appears below attesting to my contribution to the joint publication.*

Signed:…… *Date:…….*

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Signed:…… *Date:…….*

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Abstract

Purpose: To identify variables associated with common mental disorders in an Australian university population.

Background: A systematic literature review was conducted to identify research on prevalence and risk factors associated with depression, anxiety, eating and alcohol disorders in university students. The review identified 1200 studies of which 36 met our inclusion criteria. Depression and anxiety disorders were identified as the most prevalent disorders in this group. The main risk factors reported for student mental disorders were: being a woman, being homosexual or bisexual, growing up in a family with low socio-economic status, current financial difficulty and being a man for alcohol disorders.

Methods: We invited all Australian based students from a large public university (N=24,209) to participate in a web-based Student Mental Health Survey. Outcome measures included the Primary Health Questionnaire depression, anxiety, and eating disorders modules, and the Alcohol Use Disorders Identification Test. Explanatory variables of interest included gender, age, year of study, degree type, financial means, parental education, domestic/international status and sexual orientation. Multiple logistic regression analysis was used to estimate independent associations with the four outcomes.

Results: Complete responses were received from 6044 students (25%). Proportions reporting depression, anxiety, eating disorders and harmful drinking were 8%, 13%, 14% and 8% respectively, while 30% had at least one of these disorders. The groups with the highest rates of disorder were women, 25–34 year olds, students on low

income, and homosexual or bisexual students. Parental education was not associated with disorder, and nor was an international/domestic status.

Conclusions: This is the first study examining mental disorders in a population-based university sample in Australia. Groups in particular need are women, students on low incomes and homosexual or bisexual students. Given increasing student numbers and participation of students from lower socio-economic backgrounds, policy is urgently needed to promote better mental health in the population, to routinely identify vulnerable students, and to intervene early. A national longitudinal study examining mental health across multiple institutions with oversampling of high risk groups is recommended based on the findings and limitations of this study. There is also need for further research and development of electronic programs which are cost-effective and preventative in nature, as a first response in a stepped care approach to mental health on campuses.

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1. Introduction: Mental health of university students

The prevalence of mental health disorders experienced by tertiary students is receiving increasing attention from policy makers and researchers, particularly in North America. It has been postulated that student populations in Australia have higher rates of mental health problems than the general population (Stallman, 2010), and that the rates of mental disorders among students are increasing (Gallagher, 2009). Research has demonstrated that alcohol use and abuse in university students increases the risk of secondary health problems (Hallet et al., 2012; Hingson et al., 2005). For some mental disorders there is good evidence that the rates found in university students are higher than their peers in the general population (Dawson et al., 2004; Kypri et al., 2005; Slutske, 2005).

The median age of tertiary students in Australia is 22 (DEEWR, 2011). Considered in light of evidence that over 75% of mental disorders have their onset between the ages of 16–24 (ABS, 2008), this suggests that mental health disorders among university students is an area worthy of investigation and intervention. Tragedies at several US universities in which students with probable mental disorders have committed homicide or suicide, and the acknowledgement that universities provide an excellent opportunity to engage young adults proactively in mental health initiatives, have influenced an increased interest in student mental health.

1.1 Systematic review

A systematic search of the literature was conducted on 19 June 2012 using the PubMed database. The search was limited to studies conducted in the past ten years, and the search terms included: alcohol use disorder, harmful drinking, depression, anxiety,

eating disorder, tertiary student, college student and university student. The Boolean logic for the search is presented below.

Search (((((((alcohol use disorder*[Title/Abstract]) OR harmful drinking[Title/Abstract]) OR depression[Title/Abstract]) OR anxiety[Title/Abstract]) OR eating disorder[Title/Abstract]) AND tertiary student*[Title/Abstract]) OR college student*[Title/Abstract]) OR university student*[Title/Abstract]

Several papers were also included by reviewing reference lists and locating relevant citations.

1.2 Systematic review inclusion criteria

A total of 1200 abstracts were retrieved and reviewed. Studies were included if they met the following criteria:

1) the population studied was tertiary students;

2) the outcomes of interest were either depression, anxiety, eating disorders or alcohol use disorders;

3) the sample was randomly drawn;

4) the study was reported in English;

5) the population was drawn from more than one faculty of the entire student population, or of either men or women; and

6) the study reported a prevalence estimate or an estimate of association between an explanatory variable and one of the outcome variables.

Table 1. Flow chart of systematic literature review

1200 studies identified through online PubMed database search and abstracts screened

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1120 studies excluded due to not meeting inclusion criteria

- 173 excluded due to not being random sample
- 346 excluded due to not measuring variables of interest
- 568 excluded due to sample not being from appropriate population
- 33 excluded due to not being in English

⇓

80 studies identified for retrieval of full paper

⇓

44 studies excluded on closer inspection

- 15 excluded due to not being random sample
  11 excluded due to not measuring variables of interest
- 18 excluded due to sampling not being from appropriate population

⇓

36 studies identified as meeting inclusion criteria and included in review

1.3 Methodological issues

The criteria for a study to produce valid estimates of prevalence and identification of risk factors included: having a clearly defined population of interest, drawing a random sample of individuals from a sampling frame including all members of the population, achieving a good response rate, accounting for nonresponse bias, using validated measures of the variables of interest, and using appropriate statistical tests. Of the 1200 studies identified in the search, most had major flaws in one or more of the above criteria, such as often studying convenience samples, not reporting response rates, and using unvalidated measures of mental disorders. Of the 36 studies included in the detailed literature review, 13 suffered substantial limitations in one or more of these criteria but are included with appropriate qualification because they cover disorders, populations or exposures not adequately covered in the higher quality literature.

Examples of studies with methodological limitations include that conducted by Garlow et al. (2008), who surveyed 729 students in three universities in the United States. The response rate was only 8%, thus making the possibility of non-response error too high to rely on their data as a representation of the prevalence of depression in the population of interest. Nicodimos et al. (2009) sampled nine colleges in Ethiopia with 2708 participants completing the PHQ-9 (Spitzer et al., 1999). In this study, 5.5% of men and 11.5% of women were found to have moderately severe depression. However, they did not report their response rate, making it difficult to accurately interpret the role played by error or response bias and limiting the generalisability of this study in the wider context of reviewing student mental health and correlates. Kiriike et al. (1988) investigated binge eating in students, but used a questionnaire they had developed and which was not standardised, this influencing the ability to compare

results in this study to others in the field. This thesis will focus on the studies that used robust methods and reported enough details of their study for them to be appropriately scrutinised.

1.4 Findings

The 36 studies identified in the systematic literature review which are included in this thesis have been summarised in Tables 2–6. They have been grouped into longitudinal and cross-sectional studies and organised by disorder. Longitudinal studies of risk factors for depression, anxiety, eating disorders and alcohol use disorders are summarised in Table 2. Table 3 summarises cross-sectional studies of depression. Table 4 summarises cross-sectional studies of anxiety. Table 5 summarises cross-sectional studies of eating disorders. Table 6 summarises cross-sectional studies of alcohol disorders.

The final literature review of the 36 studies which met our inclusion criteria identified the following information. Seven studies used comprehensive diagnostic interviews. The age range of participants was 17–37 years, although several studies did not state their age range other than that the participants were over a certain age (usually 18). Eight of the studies did not state a response rate. Of the studies that did state their response rate, 21 had a response rate over 50%, and 13 had a response rate over 80%. Three of the studies were national epidemiological studies carried out investigating numerous variables of which the data included student status, and this allowed researchers to examine relevant data on this population. Twenty-two of the studies were conducted at only one university and 21 investigated correlates of mental health disorders in students. Fourteen of the studies took place in the United States, six in Turkey, three in the UK, three in Spain, two in multiple countries, two in Ethiopia, and one in each of Iran, India, Egypt, Lebanon, Portugal and Japan. None of the studies was

conducted in Australia. Overall the literature review identified a range of international studies which investigated mental disorders in students. The studies identified used varying methodologies and a broad range of explanatory variables.

Table 2. Longitudinal studies of risk factors for depression, anxiety, eating disorders and alcohol use disorders

Study	Disorder or symptoms measured	Instrument/ measure	Country	Random sample	N	Age range	Participation Rate, prevalence	Follow-up time points, prevalence	Risk factors
Depression									
Zivin et al. (2009)	Current depression symptoms (Major depressive episode or Dysthymia or Depression NOS)	PHQ-9	USA	Yes	2843	18+	56.6%	2 years n = 763 27%	Any mental disorder at baseline: OR = 1.8 Depression OR = 2.8 Eating Dx OR = 1.8 Self rated perceived need for assistance with mental health or emotional difficulties in past 12 months: OR = 2.0
Andrews & Wilding (2004)	Possible or probable presence of a clinically meaningful depressive condition	HADS	UK	Yes	676	18+	76%	2.5 years n = 351 39%	Financial difficulties at baseline OR = 3.2 Personal illness at baseline OR = 3.2
Anxiety									
Zivin et al. (2009)	Current anxiety symptoms (Generalised anxiety or panic disorder in the past four weeks)	PHQ-9	USA	Yes	2843	18+	56.6%	2 years n = 763 27%	Anxiety disorder at baseline: OR = 3.1 Eating disorder at baseline: OR = 1.8 Suicidal thoughts at baseline: OR = 2.9 Self rated perceived need for assistance with mental health or emotional difficulties in past 12 months: OR = 2.1
Andrews & Wilding (2004)	Possible or probable presence of a clinically	HADS	UK	Yes	676	18+	76%	2.5 years n = 351	Relationship difficulties at baseline OR = 2.3

	meaningful anxiety condition							39%	
Eating Disorders									
Zivin et al. (2009)	Symptoms of eating disorder (Probable eating disorder)	SCOFF PHQ-9	USA	Yes	2843	18+	PR = 56.6% (n= 2843) Prevalence = 18% (SCOFF 2+)	2 years later N = 763 (15% of original sample) Prevalence = 19% (SCOFF 2+)	Depression at baseline = OR 1.83 for eating dx 2 years later Eating dx at baseline = OR 13.44 for eating dx 2 years later Self rated perceived need for assistance with mental health or emotional difficulties in past 12 months = OR 1.75 for eating dx 2 years later
Heatherton et al. (1995)	Bulimia Nervosa Symptoms	EDI	UK	Yes	901		PR= 75% (n= 901) W = 7.2% M = 1.1%	10 years later n = 799 PR = 66.6% W = 5.1% M = 0.4%	Not stated
Alcohol									
Jennison (2004)	Alcohol abuse disorder & Alcohol dependence disorder	Quantity / frequency of drinking questions	USA	Yes	1972	19–37	NS Prev at baseline 21.8% =	10 years n = 1505 M: 22% alcohol	Men: Unmarried OR = 2.9 Women: Unmarried OR = 3.7

							frequent binge drinkers in past month	dependence W: 14% alcohol dependence	

NOS = Not otherwise specified

Table 3. Cross-sectional studies of depression

Study	Disorder or symptoms measured	Measure	Country	Population group	N	Age range years	Response rate	Prevalence	Risk factors
Arslan et al. (2009)	Major Depressive Disorder symptoms	BDI (Turkish) SF-36	Turkey	3 faculties Engineering & architecture, science & literature, & economics	822	17–30	81%	21.8% (2 week) M: 24% W: 20%	Family history of depression OR = 1.7 Facial acne OR = 1.6 Physical impairment (visual, hearing, orthopaedic, other) OR = 2.0 Smoking habit OR = 1.9 Any alcohol use OR = 1.4 Future occupational pre-occupation OR = 1.7
Bostanci et al. (2005)	Major Depressive Disorder symptoms	BDI (Turkish)	Turkey	4 faculties Economics, engineering, education, arts & social sciences	489	NS	NS	26.2% M: 28% W: 24%	Low socio-economic status Poor school performance
Deykin et al. (1987)	Major Depressive Disorder (DSM III Criteria)	DIS	USA	2 colleges	424	16–19	42%	6.8% (lifetime)	Alcohol abuse OR = 3.6
Eisenberg & Chung (2012)	Depressive symptoms (probable depressive disorder)	PHQ-2	USA	15 colleges	8488	NS	44%	19% (12 month)	Reports on correlates of treatment only
Ibrahim et	Major Depressive	ZDS	Egypt	4 faculties	988	NS	83%	37% (moderate	Faculty (science OR = 1.9, education OR = 1.4, commerce OR = 1.8) compared to medical

al. (2011)	Disorder symptoms	PHQ						depression symptoms)	students Father's occupation non professional (professional occupation of father OR = 0.6) Low family income (high income family OR = 0.6) Having own room in family home (>2 people per room in family home OR = 0.6)
Sahoo & Khess (2010)	Major Depressive Disorder	DASS-21 MINI	India	5 universities – men	405	17–22	81%	M: 12% (MINI)	Not stated
Vazquez & Blanco (2008)	Major Depressive Episodes	SCID-CV Munoz Mood Screener	Spain	1 university	554	18–34	99%	8.7% M: 5.3% W: 10.4%	Not stated
Vazquez et al. (2011)	- MDD* (single episode) - MDD* (recurrent) - Dysthymic disorder - Mood disorder caused by medical condition	SCID CV	Spain	Universities of Northern Spain - Women	1043	17–37	99%	W: 9%	Not stated

	- Substance-induced mood disorder - Mood disorder NOS								
Blanco et al. (2008)	- Major depressive disorder - Dysthymia - Bipolar disorder	AUDADIS-IV	USA	Nationally representative sample	2188	18-24	81%	Major depressive disorder 7.0% - Any mood disorder 10.6% (12 month)	Risk factors for psychiatric disorders (lost a steady relationship, being widowed, divorced or separated)
Eisenberg et al. (2007)	- Major depressive episode symptoms - Dysthymia - Depression NOS	PHQ-9	USA	1 university	2843	18 +	57%	11.4% (UG) 9.5% (PG) M: 10.8% (UG) 8.7% (PG) W:11.9% (UG) 10.5% (PG)	Bisexual identification OR = 3.9 Current financial struggles OR = 1.64 Grew up in low income family OR = 2.88
Dawson et al. (2005)	- Major Depressive Disorder - Dysthymia	AUDADIS-IV	USA	Nationally representative sample	2658	18-29	81%	MDD 10.0%	Any mood disorder relative to lifetime abstainers OR = 2.4
Steptoe et	Depressive	BDI	23 countri	1-3 universities in	16,923	17–30	>90%	M: 4.4%	Women OR = 1.16

al. (2007)	symptoms		es	each country				W: 4.8%	Low family wealth OR = 1.42 Low sense of control over important things in one's life OR = 2.33 Living in a more affluent country OR = 1.2 Living in a country with a more individual culture OR = 0.74
El Ansari et al. (2011)	Clinically Relevant Depression Symptoms	M-BDI	UK	7 universities	3705	NS	80%	20.6%	Engaging in moderate (OR = 0.64) or vigorous (OR = 0.59) physical activity reduced odds of depression
Mahmoud et al. (2012)	Clinically Relevant Depression Symptoms	DASS-21	USA	1 university	508	18–24	32%	29% = depressed	(No odds ratios provided but states following two variables were significant risk factors) Maladaptive coping Life satisfaction
Nicodimos et al. (2009)	Major Depressive Episode Symptoms (last two weeks)	PHQ-9	Ethiopia	9 colleges	2708	NS	NS	M: 15.8% moderate depression 5.5% moderately severe depression W: 25.3% moderate depression 11.5% moderately severe depression	History of witnessing parental violence OR for men = 3.02, OR for women = 2.42

Garlow et al. (2008)	Major Depressive Episode Symptoms (last two weeks)	PHQ-9	USA	3 schools	729	NS	8.1%	16.6% = moderately severe depression 6.6% = severe depression	Not stated
Terasaki et al. (2009)	Major Depressive Episode Symptoms (last two weeks)	PHQ-9	Ethiopia	Men at 9 colleges	1176	NS	NS	6.4% = moderately severe depression 2.3% = severe depression	High outward anger expression OR = 3.23 compared to students with low outward anger expression
O'Donnell et al. (2006)	Clinically Relevant Depression Symptoms	BDI - SHORT	24 countries	1–3 universities per country	15,748	17–30	>90%	M: 16.5% W: 20% (BDI $\geq$ 8)	Non drinkers OR = 1.2, Heavy drinkers OR = 1.3 when both are compared with moderate drinkers
Bayram & Bilgel (2008)	Clinically Relevant Depression Symptoms	DASS-42 (Turkish)	Turkey	1 university	1616	17+	NS	8.1% = severe to extremely severe depression M: 8.4% = severe to extremely severe W: 7.8% = severe to extremely severe	Not stated

MDD* = Major depressive disorder

Table 4. Cross-sectional studies of anxiety

Study	Disorder or symptoms measured	Country	Population group	N	Age range, years	Response rate	Measure	Prevalence	Risk factors
Vazquez et al. (2011)	- Panic disorder w/out agoraphobia - Panic disorder with agoraphobia - Specific phobia - Social phobia - Obsessive compulsive disorder - Posttraumatic stress disorder - Generalised anxiety disorder - Anxiety disorder NOS	Spain	Women – universities of Northern Spain	1043	17–37	99%	SCID-CV	W: any anxiety disorder = 9.7%	Not stated
Blanco et al. (2008)	- Panic disorder - Social anxiety disorder - Specific phobia	USA	Nationally representative sample	2188	18–24	81%	AUDADIV –DSM-IV	Any anxiety disorder =11.9% (12 month)	Risk factors for psychiatric disorders(lost a steady relationship, being widowed, divorced or separated)

	- GAD								
Eisenberg et al. (2007)	- Panic disorder - GAD (symptoms in the past 4 weeks)	USA	Large public university	2843	18 +	56.6%	PHQ-9	Any anxiety = 3.7% (UG), 3.3% (PG), M: 2.0% (UG)2.1% (PG) W: 5.4% (UG) 4.7% (PG)	Women OR = 2.4 Current financial struggles OR = 2.9 Grew up in low income family OR = 3.0
Ghaedi et al. (2010)	Social phobia	Iran	1 university – 3 faculties	202	19–27	NS	SF-36 SPIN SIAS (Iranian)	Social phobia = 36%	Not stated
Dawson et al. (2005)	- Panic disorder - Social anxiety disorder - Specific phobia - Generalised anxiety	USA	National survey	2658	18–29	81%	AUDADIS-IV	Any anxiety disorder = 9.7% (12 month)	Alcohol dependence OR = 2.2 for specific phobia reference to lifetime abstainers
Gultekin & Dereboy (2011)	Social phobia	Turkey	1 university	700	NS	81%	LSAS	Social phobia =22%	Not stated
Bayram & Bilgel (2008)	Clinically Relevant Anxiety Symptoms	Turkey	1 university	1616	17+	NS	DASS-42 (Turkish)	21% = severe to extremely severe anxiety M: 20% = severe to extremely severe W: 22% = severe to extremely severe	Not stated

Table 5. Cross-sectional studies of eating disorders

Study	Disorder or symptoms measured	Measure	Country	Population group	N	Age range, years	Response rate	Prevalence	Risk factors
Sepulveda et al. (2010)	Unhealthy Eating Patterns Associated with eating disorder	EDI-2 SCL-90-R	Spain	1 university	2551	NS	55%	Unhealthy eating patterns associated with ED: Men 14.8% Women 20.8%	Men: Dieting OR = 4.3 Interpersonal sensitivity OR = 3.97 Higher self-esteem reduced risk of unhealthy eating behaviours OR= 0.81 Women: Body dissatisfaction OR = 1.06 Higher self-esteem reduced risk of unhealthy eating behaviours OR=0.89
Sanlier et al. (2008)	Symptoms of eating disorders	EAT – 40 (Turkish)	Turkey	1 university	610	17–23	NS	Eating disorders = 22.8%	Not stated
Kiriike et al. (1988)	Binge eating & Bulimia nervosa symptoms	Binge eating related behaviours questionnaire	Japan	2 colleges	456	18–21	NS	Binge-eating, self-induced vomiting or purging = 2.9%	Not stated
Kugu et al. (2006)	Bulimia Nervosa & Binge Eating Disorder	EAT – 40 (Turkish) SCID - I	Turkey	1 university	980	18–24	98%	2.2% (21) had eating dx. (18 women)	Childhood emotional abuse OR = 12.31
Hart &	Bulimia	Eating	USA	1 university	234	NS	NS	Bulimia = 5%	Not stated

Ollendick, (1985)	Nervosa & Binge Eating symptoms	behaviour questionnaire Eating disorders Inventory						Binge eating = 69%	
Baptista et al. (1996)	Probable Bulimia Nervosa	Self response questionnaire	Portugal	1 university	786	NS	50%	3% probable dx of Bulimia	Not stated
Vazquez et al. (2011)	- Anorexia Nervosa - Bulimia Nervosa - Eating Disorder NOS	SCID-CV	Spain	Universities of North West Spain - women	1043	17-37	99%	W: 0.9% = eating dx	Not stated
Eisenberg et al. (2011)	Eating disorder symptoms	SCOFF	USA	1 university	2822	18+	56%	W: (3+ on SCOFF) 13.5% U/G 9.3% P/G M: (3+ on SCOFF) 3.6% U/G 3.1% P/G	No adjusted estimates of association reported
White et al. (2011)	Bulimia Nervosa, Binge Eating	WMQ	USA	Public university – three time points, 1995,	Time 1 = 493 Time	NS	Time 1 = 49% Time 2 =	Total eating disorders Time 1 = 18.5%	Not stated

	Disorder & Eating Disorder Not Otherwise Specified			2002 & 2008	2 = 272 Time 3 = 641		18% Time 3 = 21%	W: 23.4% M: 7.9% Time 2 = 20.4% W: 23.6% M: 15.8% Time 3 = 30.5% W: 32.6% M: 25%	
Heatherton et al. (1995)	Bulimia Nervosa Symptoms	EDI	UK	Selective university – two time points, 1982 & 1992	Time 1 = 901 Time 2 = 799	NS	Time 1 = 75% Time 2 = 67%	Time 1 W = 7.2% M = 1.1% Time 2 W = 5.1% M = 0.4%	Not stated

Table 6. Cross-sectional studies of alcohol disorders

Study	Disorder or symptoms measured	Measure	Country	Random sample	N	Age Range years	Response rate	Prevalence	Risk Factors
Dawson et al. (2005)	- Alcohol abuse disorder - Alcohol dependence disorder	AUDADIS-IV	USA	National survey	2658	18–29	81%	Alcohol abuse 7.7% Alcohol dependence 10.9% (12 month)	Not stated
Ehlke et al. (2012)	Alcohol Dependence	DSM-IV AUD	USA	50 states	4605	18–22	76%	8.8% = Alcohol dependent	Not stated
Slutske (2005)	Alcohol Dependence & Alcohol Abuse Disorders	Interview	USA	National survey	6352	19–21	73%	M: 8% dependent W: 5% dependent M:16% abuse dx W: 9% abuse dx	Not stated
Karam et al. (2004)	Alcohol Dependence	DIS- III DIS- IV	Lebanon	2 universities	1851	16+	93.5%	1991:Alcohol dependence = 2.9% 1999: Alcohol dependence = 5.3% (n = 1837)	1991: No belief in God compared to a belief in God, OR = 3.4, Never practiced religious faith compared to regularly practicing faith, OR = 4.2 1999: No belief in God OR = 3.3 Rather regularly practice faith OR = 8.4, Occasionally practice faith OR = 11.6, Rarely practice faith OR = 18.6 Never practice faith OR = 39.4; all compared

									to regularly practicing faith Arguing with parents several times per week OR = 2.49, arguing with parents every day OR = 3.57, compared rarely or never arguing with parents Getting into fights one or two times in the previous 12 months OR = 1.81, getting into fights 3 times or more in the previous 12 months OR = 2.1, compared to never getting into fights Being involved in theft from shops one or two times in the previous 12 months OR = 2.74, being involved in theft form shops 3 times or more in the previous 12 months OR = 5.5

OR = Odds Ratio, NA = Not assessed, UG= Undergraduate students, PG = Postgraduate students, M= Men, W= Women

1.5 Longitudinal studies of student mental disorders

Three longitudinal studies were identified in the systematic review, two of which were conducted in the United States and one in the United Kingdom. The more recent study was a web based longitudinal study at a public university in the USA with 2843 participants aged 18+ (Zivin et al., 2009). The study investigated rates of depression, anxiety, eating disorder symptoms and their correlates using the measures PHQ-9 (Spitzer et al., 1999) and the SCOFF (Morgan et al., 1999). The baseline participation rate was 57%, and two years later 27% of the original sample were screened again (n=763). Rates of depression at baseline were 15%, and two years later 13%. Rates of anxiety at baseline were 5%, and two years later 7%. Rates of eating disorder symptoms at baseline were 18%, and two years later 19%. It should be noted that the cut off used on the SCOFF measuring eating disorder symptoms was 2+, which is quite sensitive. Other studies have used 3+ (Eisenberg et al., 2011).

To adjust for non-response error Zivin et al. (2009) developed weighted averages, reported as being representative of the full group of students who were eligible for the follow-up survey. This study showed that mental health problems persisted, with 60% who had a problem at baseline still having it two years later. The finding of high rates of depression, anxiety and eating disorder symptoms, and that anxiety and eating disorders worsen over time, highlight the need for mental health support for students. Although it is important to note the likely attrition bias in this study, with only 27% of the original sample completing the study at time point two, this is one of the better studies identified in the literature review.

An earlier longitudinal study by Andrews and Wilding (2004) in a UK university with 676 participants had a response rate of 76% at time point 1 and 39% at

time point 2 (n=351). Using the HADS (Zigmond & Snaith, 1983) they found rates of depression of 1% and 4%, 2.5 years later. A fourfold increase in reported rates of depression suggests that further investigation into mental disorders is warranted in this population. This study also identified that financial difficulty made a significant independent contribution to depression, and that relationship difficulties independently predicted anxiety (Andrews & Wilding, 2004).

A third longitudinal study conducted in the USA by Jennison (2004) used data from a national health survey (n=1972) and examined alcohol disorder prevalence and risk factors for alcohol disorders 10 years apart. The age range was 19–37. Unfortunately, the baseline data only included the prevalence of binge drinking, which was 22%. The study showed that10 years later (n=1505) 22% of men and 14% of women were alcohol dependent. They reported that being unmarried was a risk factor for alcohol dependence for both men and women, as was binge drinking in college for later alcohol dependence.

These three longitudinal studies show evidence that for university students mental disorders persist over time (Zivin et al., 2009), mental disorder prevalence may be increasing, increasing rates of mental disorders are linked to financial difficulty (Andrews & Wilding, 2004), and binge drinking and being unmarried ten years after leaving university increased risk of alcohol dependence (Jennison, 2004). However, changes in the short time frames in the Zivin et al. (2009) and Andrews and Wilding (2004) studies cannot be confidently separated from cohort effects or maturation. To determine increasing prevalence a series of cross-sectional studies with good response is required. Our understanding of causal factors remains limited, and there appears to be a limited body of sound research investigating causes of mental disorders in tertiary students. Apart from these three longitudinal studies, the remaining research identified

in our literature review that met our inclusion criteria was cross-sectional, and this is discussed below.

1.6 Cross-sectional studies of student mental disorders

The cross-sectional survey is a relatively quick and inexpensive method for identifying variables associated with mental disorders that may be causally related (that is, risk factors) to these outcomes, although a key weakness of such studies is that they do not allow us to establish the temporal sequence between the hypothesised exposure and outcome, a key criterion for causal inference. The literature review identified 33 cross-sectional studies with varying methods. Those that used comprehensive diagnostic interviews, such as the MINI or SCID, usually reported lower prevalence than studies relying on screening measures alone. This was due to screening measures having higher rates of false positives as per their design purposes. Much of the research conducted on university students has used screening measures rather than diagnostic interviews, probably for reasons such as efficiency and cost and to encourage a large enough sample to participate.

1.6.1 Depression

Depression is one of the most common mental disorders among students and therefore one of the most widely researched disorders. Of the 20 cross-sectional studies on depression that were reviewed, 12 reported prevalence rates close to 10%, while eight reported prevalence rates closer to 20%.

Arslan et al. (2009) investigated health related quality of life and depression. In a study of a random sample of 822 students across three faculties of a Turkish university, with an 81% response rate, the current prevalence based on the Beck Depression Inventory (BDI) of mood disorders was 21% (24% for men and 20% for

women) (Arslan et al., 2009). In another study of a random sample of Turkish university students, the rates of depression using the BDI were 26% (28% of men and 24% of women) (Bostanci et al., 2005). In a further study on Turkish students by Bayram and Bilgel (2008) using the DASS-42-Turkish translation on a sample of 1616 students (response rate not stated), 8.4% of men and 7.8% of women were found to have severe to extremely severe symptoms of depression. Reporting depression prevalence higher in men than women is not typical of either university students or the general population. It is worth noting that these are the only three studies in this review finding higher prevalence of depression in men than women. The fact that they share the country in which they were conducted may suggest cultural factors played a role in the rates found.

In a large study conducted in the United States on 8488 students, with a 44% response rate using the PHQ-2 (Spitzer et al., 1999), which is a brief screen of depression symptomatology, 12 month rates of depression were found to be 19% (Eisenberg & Chung, 2012). Eisenberg et al. (2007) conducted a comprehensive online study using the PHQ-9, a screen that asks questions corresponding with the DSM-IV-TR (APA, 2000) criteria for depression. Of the 2843 students from a large public university that took part there was a response rate of 57%. The researchers reported prevalence of depression in undergraduate and postgraduate students at 11% and 10% respectively. Male undergraduate and female undergraduate rates were 11% and 12% respectively, and male and female postgraduate rates were 9% and 11%. The differences between undergraduate and postgraduate and male and female students were all quite small. These two studies, one using an abbreviated version of the same measure, found rates of depression with an almost two fold difference between them. It is of note that using similar methods, in the same country, by the same researchers can lead to significantly different outcomes.

Ibrahim et al. (2011) conducted a study on 988 students from four faculties of a university in Egypt exploring the relationship between socio-economic status and depression. They used the Zagazig (Fawzi et al., 1982) depression scale and PHQ (Spitzer et al., 1999) and had a response rate of 83%. They reported prevalence of depression among students of 37%. These rates are up to eight times the rates found in some studies and double several other studies. While the scales used have good sensitivity, they are screens, which may have impacted on the rates, and further investigation of such high rates seems warranted. In a study conducted on 405 male Indian students, with a 81% response rate using the DASS-21 (Lovibond & Lovibond, 1995) and MINI psychiatric interview (Sheehan et al., 1998), men were found to have rates of depression of 12%. These rates are commensurate with those for depression in similar studies in western countries.

In a comprehensive study with a 99% response rate, using a structured diagnostic interview (SCID-CV) conducted on 554 students in Northern Spain, Vazquez and Blanco (2008) reported depression prevalence of 8.7% overall, with 5.3% for men and 10.4% for women. The depression prevalence being twice as high in women is of particular interest in these findings. This study had sound methodologies due to its excellent response rate and the use of a full diagnostic interview to assess participants. Vazquez et al. (2011) conducted a study with an exclusively female sample from universities in Northern Spain, using the SCID-CV and with a sample of 1043 and a 99% response rate. They found a prevalence of depression of 9% in women, similar to the rates found in 2008 study (10.4%). These two studies are of particular note in understanding prevalence of depression in female students, at least in Spain. To date they are the most thorough and comprehensive studies conducted, but whether these rates generalise to North America and Australia is unclear.

In a nationally representative epidemiological study in the United States using a comprehensive diagnostic interview (AUDADIV-DSM-IV), information was gathered on student mental disorder, among other variables, with an 81% response rate. Blanco et al. (2008) examined the data from this survey on prevalence of depression in students. They reported 12 month prevalence of depression in students of 7%. The study used sound methods and its national representativeness combined with using a full diagnostic interview make its results noteworthy.

Similar results were found by Dawson et al. (2005) in a large national survey conducted in the United States that examined a variety of mental disorders and their relationship with depression (response rate 81%). Using a comprehensive diagnostic interview (AUDADIS-IV), they reported prevalence of depression to be 10%. This result is similar to the prior mentioned studies using similar methodologies.

Steptoe et al. (2007) conducted a large international study comprising students from 23 countries, with one to three universities sampled in each country. Response rates were over 90% and their sample consisted of 16,923 subjects between the ages of 17–30. The Beck Depression Inventory (BDI) was used to screen for depression. They reported prevalence of depression in men and women at 4.4% and 4.8% respectively. The advantages of this study include that it was large, had an excellent response rate and was sampled from numerous countries. Notwithstanding the results from this study, as comprehensive as it is, may lead to some of the differences between countries being lost in a large sample which includes participants from numerous countries. Further, it is interesting that the reported rates of depression in this study were close to half the prior mentioned studies' rates, despite this study using a screen and the prior using diagnostic interviews (Blanco et al., 2008; Dawson et al., 2005; Vazquez & Blanco, 2008; Vazquez et al., 2011). This uncertainty about the actual prevalence of depression

among students is further confounded when considering a study by O'Donnell et al. (2006) that included 24 countries and 15,748 participants. Using the short version of the BDI they found rates of depression in men of 16.5% and in women of 20%. Again this study used a screening measure, albeit a shorter version of the one used by Steptoe et al. (2007), yet the reported rates of depression were four times those of the Steptoe et al. findings. This pattern is continued in a UK study (El Ansari et al., 2011) conducted across seven universities with 3705 participants and an 80% response rate using the Modified Beck Depression inventory. Reported prevalence of depression was 21%. While there is a developing body of methodologically sound evidence based research emerging on student mental disorder rates, there still seems to be unexplained variables impacting on our knowledge base.

Much of the mental health data on students has been collected in the United States. Several factors must be considered when interpreting findings from the United States. Cultural norms and expectations, socio-economic status, access to university and racial background have all been found to have an impact on education participation and are to likely impact on any epidemiological data reported on rates of mental disorders. Further, alcohol has been linked to mental disorders as a risk factor (Jennison, 2004; Karam et al., 2004), and different countries have different laws regarding its use. The United States prohibits alcohol use in many states before the age of 21, and several Middle Eastern countries outlaw alcohol use altogether. The role of alcohol and the impact of different cultures and laws surrounding its use and effect on research are important considerations in understanding data on student mental health.

Prevalence of depression in university students has been found to vary depending upon the study, the measure used, the country it is conducted in and how sampling was conducted. The consistency in the reviewed literature varies, with

prevalence rates of depression varying between 1% to 37%. The studies with the best methodologies suggest the prevalence of depression in students is closer to 10% (Blanco et al., 2008; Dawson et al., 2005; Vazquez & Blanco, 2008). The most common associations with depression identified in the literature review are the links between being a woman, low socio-economic status and financial difficulty and depression.

1.6.2 Anxiety

In the Blanco et al. (2008) study, 12% of students were found to have had an anxiety disorder in the past 12 months. Vazquez et al. (2011) reported 9.7% of students with an anxiety disorder, as did Dawson et al. (2005). In a study on 700 Turkish students with an 81% response rate using the LSAS, Gultekin and Dereboy (2011) found rates of social phobia of 22%.

The reported prevalence of anxiety for undergraduates and postgraduates in the Eisenberg et al. (2007) study were 3.7% and 3.3% respectively. Male undergraduate and postgraduate rates were both 2% and female undergraduate and postgraduate rates were 5.4% and 4.7%. These rates were less than half those found by Blanco et al. (2008), Vazquez et al. (2011) and Dawson et al. (2005), all studies in which a comprehensive diagnostic interview was used. This is of note as screening measures, as used by Eisenberg et al. (2007), usually return higher rates.

In a study on Turkish students by Bayram and Bilgel (2008) using the DASS-42-Turkish translation (Lovibond & Lovibond, 1995) on a sample of 1616 (response rate not stated), 21% were found to have severe to extremely severe anxiety, 20% of men were found to have severe to extremely severe anxiety, and 22% of women were found to have severe to extremely severe anxiety. These rates are higher than most of the previously stated studies. This may be due to the low specificity of the screen,

although the Eisenberg et al. (2007) study used a screening measure, albeit a different one, and the rates found in that study were much lower. This may have been due to the PHQ-9 also requiring a qualifier for impact on functioning (as per DSM-IV diagnostic requirements) which the DASS does not ask for.

The reported prevalence of anxiety ranges from 2% to 22%. This is a large range as per the depression data for the same population. The two largest and most comprehensive studies, Vazquez et al. (2011) and Dawson et al. (2005), both reported a rate of 9.7% of students experiencing a current anxiety disorder. These studies most likely provide us with the best current prevalence estimate of anxiety disorders in students, with the variation in the literature suggesting true prevalence may lie between 5% and 10%.

1.6.3 Eating disorders

In a study published in 2011 (White et al.), rates of eating disorders were measured at three time points using the WMQ (Mintz et al., 1997). At time point one there was a 49% response rate (n=493) and prevalence of eating disorders of 18.5%. At time point two, seven years later, response rate was 18% (n=272) and prevalence was 20%, at time point three, six years after time point two and 13 years after time point one, response rate was 21% (n=641) and prevalence was 31%. While this was not a longitudinal study, it maintained the same measure and procedures at three different time points at the same university. It is of interest that it reports a significant increase in prevalence of eating disorders. Further, this study also reported on the difference in prevalence of eating disorders between men and women. At time point one prevalence for men and eating disorders was 7.9%, at time point two 15.8% and at time point three 25%. These measured increases are very large and worthy of further investigation.

However, the low response rates in this study suggests caution is required in interpreting its findings.

A recent North American study by Eisenberg et al. (2011) sampled 2822 students with a 56% response rate using the SCOFF (Morgan et al., 1999). They reported women undergraduate and postgraduate prevalence of eating disorder symptoms (3+ on SCOFF) at 13.5% and 9.3% respectively. Rates among male undergraduates and postgraduates were 3.6% and 3.1% respectively. That women were found to have three to four times the symptoms of men is a finding that warrants further examination, firstly by conducting a study that uses comprehensive diagnostic interviews, and secondly by looking at the differences between groups and what is influencing these differences. There are still significant gaps in the literature in these areas.

Another study examined eating disorder prevalence at the same UK university at two assessment points ten years apart (Heatherton et al., 1995). At time point one there was a sample of 901 participants (75% response rate). Using the EDI (Garner et al., 1983) the researchers found 7% of women and 1% of men with eating disorders. Ten years later there were 700 participants, with 67% response rate, and they found 5% of women and 0.4% of men had eating disorders.

In a study with a 98% response rate conducted on 980 Turkish university students using the EAT-40-Turkish translation (Garner et al., 1979) and the SCID, 2.2% were found to have an eating disorder (Kugu et al., 2006). This study had excellent methodology due to its high response rate and use of a diagnostic interview. The previously reported Vazquez et al. (2011) study, which had the similarities of a high response rate and use of a diagnostic interview, found eating disorder rates of 0.9% in women.

Baptista et al. (1996) conducted a study using a self report questionnaire on 786 Portuguese students at one university with a response rate of 50%. They reported 3% of their sample had probable bulimia nervosa. A Turkish study (Sanlier et al., 2008) examined 610 students using a Turkish translation of the EAT-40 (no response rate reported) and reported rates of eating disorders of 23%.

The better studies reporting eating disorder prevalence among students suggest levels within the range of 1% to 3% (Kugu et al., 2006; Vazquez et al., 2011) and higher rates in females than males (Heatherton et al., 1995). However the varying prevalence reported makes it difficult to understand whether rates are changing among university students. There is some evidence, albeit limited, that suggests prevalence of eating disorders is increasing and that this increase is larger for men than for women (White et al., 2011).

1.6.4 Alcohol

Harmful alcohol use among university students is an important public health issue due to the strong links between harmful drinking, mental disorder and secondary risks following drinking (Hallet et al., 2012). Students are often at a developmentally important stage due to their age, in terms of both brain development and social development. University is also for many, particularly in the United States, a time when they experiment socially with alcohol.

Dawson et al. (2005) reported 12 month prevalence of alcohol abuse at 7.7% and alcohol dependence at 10.9% among university students. Ehlke et al. (2012), in a survey which included students from 50 American states with 4605 participants aged between 18–22 and a 76% response rate, used a comprehensive clinical interview for alcohol use disorders (DSM-IV AUD) and reported 8.8% of students as alcohol dependent. A national survey which gathered data including level of alcohol use by 6352 students

aged 19–21 (response rate 73%) was reported on by Slutske (2005). It found 8% of men and 5% of women dependent on alcohol and 16% of men and 9% of women with alcohol abuse disorder. As previously mentioned, Jennison (2004) conducted a longitudinal study which reported the rate of binge drinking at 22%; 10 years later, 22% of men and 14% of women were alcohol dependent. These rates are high in comparison to the other studies reported.

A study conducted at two universities in Lebanon at two time points, the second eight years after the first (Karam et al., 2004), had 1851 participants, a 94% response rate and used a diagnostic interview. It reported rates of alcohol dependence of 2.9% and 5.3% eight years later. This study must be considered in the context in which it was conducted, Lebanon being a unique country in regards to alcohol. Alcohol is legal, yet the majority of Lebanon's population are Muslim and according to religious beliefs do not consume alcohol. The study sought its sample from two different universities, one in which the majority of the population was Muslim and one in which it was not. The uniqueness of this study makes it an important contribution, but also requires caution in the comparison of results due to the unique circumstances in Lebanon regarding alcohol.

The prevalence of alcohol disorder in students varies significantly across the studies reported. The most commonly reported range is 8% to 15% of students having an alcohol use disorder (Dawson et al., 2005; Ehlke et al., 2012; Slutske, 2005). It has also been demonstrated that students have higher levels of alcohol use disorders (abuse rather than dependence) than their peers (Hallet et al., 2012; Slutske, 2005). Alcohol disorders are one of the more researched areas in student mental health.

1.6.5 Summary of prevalence studies

The prevalence of depression found in this literature review ranged from 1% to 37%, prevalence of anxiety disorders ranged from 2% to 22%, prevalence of alcohol use disorders was 2.9% to 22%, and prevalence of eating disorders was 0.9% to 25%. Rates reported for prevalence of mental disorders in students vary significantly, which makes reaching consensus on prevalence difficult. And although we are able to estimate with reasonable certainty the approximate range of prevalence of disorders among students, there is a lack of evidence based research on mental disorders in Australian university students. Not one study on student mental health met the inclusion criteria for the systematic review carried out for this study.

1.7 Risk factors

In the 36 papers reviewed, 29 separate risk factors were identified for mental disorders in students. Correlates of disorders, reported via adjusted odds ratios (AOR), are referred to in this review as risk factors. Only statistically significant adjusted odds ratios are reported. For the purpose of providing a summary, similar risk factors with different names across studies were grouped, for example, outward expression of anger (Terasaki et al., 2009) and arguing with parents (Karam et al., 2004). Sixteen of the papers reviewed did not report on or provide tables of correlates, while the remaining 21 papers provided adjusted odds ratios.

The most commonly reported risk factor among the 21 papers that reported adjusted odds ratios was low socio-economic status (SES). Low SES was reported by five separate studies as a risk factor for various mental disorders. For purposes of reporting, those papers that identified low family income and familial financial difficulty were also included in the low SES category.

Low SES was found to be a risk factor for depression in a study of a random sample of Turkish university students (Bostanci et al., 2005). Bostanci and colleagues studied 489 students across four faculties (response rate not reported). Those with a low socio-economic status had an odds ratio of having a depressive disorder of 1.9 and students from a middle socio-economic background had an odds ratio of 1.6, compared to those from a high socio-economic background.

Ibrahim et al. (2011) conducted a study of 988 students from four faculties of a university in Egypt, exploring the association between socio-economic status and depression. They used the Zagazig (Fawzi et al., 1982) depression scale and PHQ (Spitzer et al., 1999) and had a response rate of 83%. They reported that having a family with a high income decreased the risk of depression (AOR = 0.6) compared to a family with a low income.

In an international study (23 countries) with a large data set (n=16923) using the BDI, Steptoe et al. (2007) reported low family wealth had an adjusted odds ratio of 1.4 compared to high family wealth, low sense of control over important things in one's life (AOR 2.3), and living in a more affluent country an adjusted odds ratio of 1.2, in regards to students experiencing depression. Also of note is that they found living in a collective culture to be a risk factor for depression and that individual cultures were found to be protective (AOR 0.7). It appears extra responsibility for one's family may not be protective and being able to look after oneself without having to consider the needs of a family reduces the risk of experiencing a depressive episode.

Eisenberg et al. (2007) estimated adjusted odds ratios of 2.9 for depression and 3.0 for anxiety in students who had grown up in families who were 'poor, not enough to get by' compared to those who grew up in families where 'finances weren't really a

problem'. Low SES is a risk factor for mental disorders in the general public (ABS, 2008) and the above studies suggest that low SES also increases the risk of students experiencing depression and anxiety.

Alcohol use and abuse were grouped together in the review of risk factors. Four studies reported either alcohol use or abuse as a risk factor for mental disorders. One study (O'Donnell et al., 2006) reported abstaining from alcohol relative to drinking at any level as a risk factor for mental disorders.

Arslan et al. (2009), in a study of a random sample of 822 students across three faculties of a Turkish university (81% response rate), using the BDI, reported that any alcohol use increased the odds of having depression (AOR 1.4) compared to those who did not drink alcohol. In a small study across two colleges in the United States, Deykin et al. (1987) reported alcohol abuse as a risk factor for depression (AOR 3.6). This study was limited in that its age range was very prescriptive (16–19), the response rate was 42% and the sample consisted of only 424 participants. In the O'Donnell et al. (2006) study across 23 countries, non-drinkers (AOR 1.2) and heavy drinkers (AOR 1.3) were at increased risk of depression when compared to moderate drinkers. The study by Dawson et al. (2005) reported on a national sample with an 81% response rate and found alcohol dependence increased the odds by 2.2 for a specific phobia compared to lifetime abstainers from alcohol.

Karam et al. (2004) examined risk factors for alcohol disorders, in particular religious beliefs and practices. They reported that no belief in God, compared to a belief in God, increased the odds of having an alcohol use disorder by 3.4 in 1991 and 3.3 in 1999. Never practising religious faith compared to regularly practising religious faith increased the odds by 4.2 times in 1991 and 39.0 in 1999 of an alcohol use disorder.

Those who rather regularly practised faith (AOR 8.4), occasionally practised faith (AOR 11.6), rarely practised faith (AOR 18.6) or never practised faith (AOR 39.4) had much larger odds of having an alcohol use disorder compared to those who regularly practised religious faith. They also explored arguing with one's parents several times per week (AOR 2.4) and arguing with one's parents every day (AOR 3.6) as risk factors for alcohol disorders, compared to rarely or never arguing with parents. Getting into fights one or two times in the previous 12 months (AOR 1.8) and getting into fights three times or more times in the previous 12 months (AOR 2.1) both increased the odds of having an alcohol use disorder compared to never getting into fights. Being involved in theft from shops one or two times in the previous 12 months (AOR 2.7) and being involved in theft from shops three times or more in the previous 12 months (AOR 5.5) also increased the odds of students having an alcohol use disorder compared to students who had not been involved in incidents of theft in the past 12 months.

The data on alcohol use disorders contains several messages. Two of the studies reporting it as a risk factor for mental disorders are from the United States, although one had significant methodological limitations (Deykin et al., 1987). The third study only linked alcohol dependence to social phobia. The Turkish study (Arslan et al., 2009) found that any use of alcohol was a risk factor for depression. The most methodologically sound study reporting alcohol as a risk factor (O'Donnell et al., 2006) reported non-drinkers and heavy drinkers at greater risk of depression compared to moderate drinkers. The evidence suggests that harmful alcohol use is a risk factor for mental disorders in students, particularly depression and anxiety.

Gender was reported by several studies as a risk factor for mental health disorders. Eisenberg et al. (2007) reported women were at greater risk (OR 2.3) for anxiety disorders than men. Steptoe et al. (2007), in their 23 country study, found that

females were at slightly higher risk for depression than men (1.2). Blanco et al. (2008) reported men with overall higher rates of psychiatric disorders than women. This last result is likely to be influenced by the much higher rates of alcohol disorders in men than women. Hallett et al. (2012) reported men as having a significant adjusted odds ratio of 2.1 compared to women of being dependent on alcohol.

Longitudinal research has identified several risk factors that are stable over time. Having a mental health disorder increases risk for having a mental disorder at a later time point (Zivin et al., 2009), and self-rated perceived need for mental health support (Zivin et al., 2009) and financial difficulties each increased the odds of having a mental disorder at a later point in time (Andrews & Wilding, 2004). Eisenberg et al. (2007) reported that current financial struggles increased the odds of having depression (AOR 1.6) and anxiety (AOR 2.9). Andrews and Wilding (2004) reported that financial difficulties at baseline increased the odds of having depression at follow-up (AOR 3.2). Zivin et al. (2009) identified self-rated perceived need for assistance with mental health or emotional difficulties in the past 12 months as risk factors for depression (AOR 2.0), anxiety (AOR 2.1) and eating disorders (AOR 1.8) at two-year follow-up.

Andrews and Wilding (2004) reported that relationship difficulties increased the risk of anxiety disorders (AOR 2.3). Eisenberg et al. (2007) reported students who were bisexual had much higher odds of having depression (AOR 3.9) than students who were heterosexual. Being unmarried was reported by Jennison (2004) in her ten year longitudinal study as a risk factor for alcohol dependence for both men (AOR 2.9) and women (AOR 3.7). Blanco et al. (2008) found that having lost a steady relationship, or being widowed, divorced or separated, increased overall risk of having a psychiatric disorder in students.

Arslan et al. (2009) found that preoccupation with one's future employment among students (students being very career focused) increased their odds of depression by 1.7. This is particularly interesting as linking study to future career goals is an often used strategy to assist with motivation by counsellors working with students struggling with their university studies.

A Turkish study (Kugu et al., 2006) with a very high response rate screened with the EAT-40 and then used the SCID to diagnose eating disorders. It reported students who experienced childhood emotional abuse had substantially increased risk of experiencing an eating disorder (AOR 12.0) compared to students who had not experienced emotional abuse.

In regards to protective factors, El Ansari et al. (2011) explored the role of exercise and depression and reported that engaging in moderate (AOR 0.6) or vigorous (AOR 0.6) physical activity reduced the odds of depression in comparison to those who did not engage in regular physical activity.

1.7.1 Summary of risk factors

The research base available suggests that being a woman, being from a low SES background, experiencing financial difficulty, experiencing a relationship ending, being homosexual or bisexual and being a man (for alcohol disorders) are risk factors for mental disorders in students. The links that exist are less clear than what is known about risks in the general population, despite the majority of this population being in the age group most at risk for onset of mental health disorders. There is also a gap in the evidence base surrounding risk factors for mental health disorders in Australian students as a population.

This systematic review revealed that the research into student mental disorders has several gaps. However, there are also areas where we have good information regarding student mental health. Depression rates of students appear to be around 10%, anxiety rates slightly below 10%, eating disorder rates around 2%, and alcohol use disorders in the vicinity of 13%. Risk factors for students experiencing mental disorders appear similar to their non-student peers, including: being a woman, being a man (for alcohol disorders), being homosexual or bisexual, harmful drinking, experiencing a relationship ending, being from low SES and experiencing financial difficulty. When understanding this evidence base, we must take into consideration that much of the research is from the United States, which due to cultural and educational differences does not necessarily generalise well to Australia. Further, the research contains several studies which have methodological issues affecting their ability to accurately report on the current state of mental disorders among students. The systematic review revealed that there were no studies which investigated the prevalence and correlates of mental disorders in Australian university students. The studies that do exist on student mental health in Australia were excluded from this review as they did not use representative samples or did not investigate mental disorders but rather psychological distress (Leahy et al., 2010; Stallman, 2008; Stallman, 2010; Stallman & Schochet, 2009).

2. Aim of current study

Given the gap in the research evidence, particularly the lack of population-based Australian data, a study was undertaken to identify variables associated with four high prevalence disorders, namely: depression, anxiety, eating disorder and alcohol use disorders at an Australian university.

2.1 Hypotheses derived from systematic review

1) Undergraduate and postgraduate students will have similar risk for mental disorders.
2) Students from low socio-economic backgrounds will be at increased risk of anxiety and depressive disorders compared to those from higher socio-economic backgrounds.
3) Bisexual students will be at greater risk for mental disorders than heterosexual students.
4) Women will have increased risk for depression, anxiety and eating disorder compared to men.
5) Men will be at greater risk for alcohol use disorder than women.
6) There is limited literature on international students. Discussion with psychologists from the Student Counselling Service of The University of Newcastle suggested that international students have more consultations per head than local students. Accordingly we expect that international students will have a higher risk of the first three disorders and lower risk of alcohol use disorders given previous research showing that Australian students have higher rates of hazardous drinking and alcohol dependence than international students (Hallett et al., 2012).

3. Manuscript

Pages 48 – 72 are a manuscript of a paper accepted for publication on 16 August 2012 in the peer reviewed journal, *Social Psychiatry and Psychiatric Epidemiology*. This manuscript provides an outline of the methodology of the research conducted

(The extended discussion of this study continues on page 73)

Risk factors for mental disorder among university students in Australia:

Findings from a web-based cross-sectional survey

Abstract

Purpose: To identify variables associated with common mental disorders in an Australian university population.

Methods: We invited all Australia-based students from a large public university (N=24,209) to participate in a web-based Student Mental Health Survey. Outcome measures included the PHQ depression, anxiety, and eating disorders modules, and the Alcohol Use Disorders Identification Test. Explanatory variables of interest included gender, age, year of study, degree type, financial means, parental education, domestic/international status, and sexual orientation. Multiple logistic regression analysis was used to estimate independent associations with the four outcomes.

Results: Complete responses were received from 6,044 students (25%). Proportions reporting depression, anxiety, eating disorders, and harmful drinking were 8%, 13%, 14%, and 8% respectively, while 30% had at least one of these disorders. The groups with the highest rates of disorder were women, 25–34 year-olds, students on low

income, and homosexual or bisexual students. Parental education was not associated with disorder, and nor was being an international/domestic status.

Conclusions: This is the first study examining mental disorders in a population-based sample in Australia. Given increasing student numbers and participation of students from lower socio-economic backgrounds, policy is urgently needed to promote better mental health in this population, to routinely identify vulnerable students, and to intervene early. Groups in particular need are women, students on low incomes, and homosexual or bisexual students.

Key words: University, Students, Mental Health, Depression, Alcohol, Disorder.

The burden of disease from mental disorders is large and increasing in Australia(1). Findings from the latest National Mental Health Survey suggest that 20% of the population suffer a mental disorder in any 12 months and most disorders have their peak prevalence among young people(2). The 12-month prevalence of any mental disorder was 26% among 16-24 year-olds and 25% among 25-34 year-olds(2).

University students are a large subgroup in whom the prevalence of certain mental disorders has been found to be particularly high in Europe and North America. Irregular sleep patterns, academic pressures and living away from home for the first time may exacerbate the risk of mental illness.

In a study of female university students in Northern Spain the prevalence of current substance use, mood, and anxiety disorders was 15%, 12%, and 10%, respectively(3). In a large US university the prevalence of depression in undergraduates was 14% in both men and women(4). In a subset of this sample who were followed up, the four week prevalence of anxiety disorders was estimated to be 4% at baseline and 7% two years later(5).

In the USA, estimates of current eating disorder prevalence range upwards from 19% (6) to as high as 33% of female students(7). In contrast, in a large Spanish study only 0.9% female students had an eating disorder(3). These differences may partly reflect the use of different measurement instruments across studies.

A substantial body of literature has documented the high prevalence of alcohol use disorders among university students in many countries(8). Harmful drinking and alcohol dependence have been found to be more prevalent among university students than their non-student peers(9-11). There is considerable attention being paid by researchers and policy makers to the effects of the university environment, particularly

the ready availability (12) and vigorous promotion (13) of alcohol on and around campuses; and to population strategies for identifying and intervening early with high-risk individuals(14).

In the study by Vasquez et al(3), being financially independent, experiencing violence from men, having no social support and low esteem, each independently increased the odds of women having mental disorders. In the US college setting students aged over 25 years have been found to be at lower risk of having depression relative to 18-22 year olds(4, 15).

Financial difficulty has been identified in several studies as a risk factor for mental disorder among students. US students experiencing financial difficulty have been found to have three times the risk of depression and anxiety compared to students who reported their financial situation to be comfortable (4). Financial difficulties have also been found to increase the risk of depression two years later among British tertiary students(16). In a study of US students, Weitzman (17) reported that students who suffered financial hardship while growing up and whose parents had poorer education were at greater risk of having a mental disorder compared to students from more affluent backgrounds. A recent Egyptian study has also reported a positive association between familial financial hardship and depression in students(18). Students of non-heterosexual orientation have been found to be at greater risk of mental disorder than their heterosexual peers (4, 19) and bisexual students are at greatest risk(19).

There have been no Australian population based epidemiological studies of the type reported in Europe and North America. Previous research in Australia has focused on selected groups including those attending health services(20, 21), counselling services(22), and specific schools(23). In a web survey at two large Australian

universities (response rates 5% and 12%), psychological distress—as opposed to disorder—was measured using the Kessler 10 (24) and 19% of respondents had scores in the *very high* range (30-50). Stallman reports that only 3% of the general population score in this range(24). Correlates of very high psychological distress included being a full-time student, financial stress, being 18-34 years old and being female(24).

In 2008, the Australian Government initiated a review of Australian higher education resulting in the Bradley Report(25). The report recommended an increase in the proportion of 25-34 year olds who hold a bachelor's degree from 30% to 40% by 2020. It also recommended that by 2020, 20% of undergraduates should be from a low socioeconomic background, up from 16% in 2009.

The Australian tertiary education system is currently being placed under an increased load as these recommendations are implemented. Substantially larger numbers of students will be entering the system, many of whom will be poorly equipped for university study and perhaps more vulnerable to mental illness.

The aim of this study was to identify risk factors for high prevalence disorders, namely, depression, anxiety, eating disorder and harmful drinking in a population based sample of university students.

Methods

Design

The study was a cross-sectional web-based survey of a large university population.

Participants

Participants were students who had been enrolled for more than four weeks in a degree course at the University of Newcastle, Australia, and who agreed to complete a web-based survey.

Procedure

Eligible students were invited to participate during Week 5 of Semester 2, in August 2010. They were sent a short e-mail message describing the study, including a hyperlink to the survey website (http://smhs.heroku.com/). Students were sent reminder emails 10 and 23 days later. Those who responded after the second reminder were considered late responders for the purpose of studying non-response bias(26). The methods were based on web-based survey procedures developed over the last decade (27) to examine alcohol consumption, mental health and a range of other health issues in national samples of university students in New Zealand(26). There is evidence that more candid responses are obtained via computerised questionnaires than via pen-and-paper(28).

Questionnaire

The hyperlink took participants to a website including questions on demographic characteristics and the Primary Care Evaluation of Mental Disorders Patient Health Questionnaire (PHQ)(29). The PHQ identifies current mental health disorders, including, depressive, anxiety, eating and alcohol use disorders in accordance with DSM IV criteria(30).

PHQ scores have been shown to be highly correlated with mental health disorder diagnoses performed by a mental health professional in a variety of populations(31). This measure was recently used by Eisenberg et al. (4)in a study examining the mental health of college students in the USA. Spitzer et al. (29)conducted a validation study of the PHQ in primary care patients finding good sensitivity (73%) and excellent specificity (98%) in identifying major depression. They report sensitivity and specificity of the PHQ Generalised Anxiety Disorder scale of 63% and 97% and sensitivity and for the Panic Disorder Scale of 81% and 99% respectively.

The Alcohol Use Disorders Identification Test (AUDIT) is a 10-item questionnaire developed by the WHO with sensitivity of 92% and specificity of 94% for identifying adults with hazardous or harmful drinking (AUDIT)(32). It has been used in many studies including national web-based surveys of university students(14). We included a question on smoking status and current smokers were presented with the Fagerstrom Test for Nicotine Dependence(33). Demographic questions were drawn from the Australian Mental Health Survey 2007(2), and the survey reported by Eisenberg and colleagues(4). Further questions examined mental health service needs and utilisation which will be examined in a separate paper. Participants were offered the opportunity to enter free text regarding their experience of completing the questionnaire. On the final page were presented contact details for a range of services, including the Student Health Service, Beyond Blue, and the Alcohol Helpline.

Analysis

We estimated non-response bias under the assumption of the Continuum of Resistance Model(34). The model is based on the observation that non-respondents in health surveys

tend to most resemble late respondents, i.e., those who participate only after considerable effort has been exerted by the research team (e.g., via multiple contacts)(35). A typical approach to studying non-response bias is to undertake intensive follow-up of non-respondents and to compare estimates with those obtained using standard survey procedures(36).

An alternative is to compare respondents and non-respondents in surveys imbedded within larger studies(37). The approach has not been applied to mental health surveys. Here we examined the prevalence of each disorder according to whether the participant responded early (before the second e-mail reminder) or late (after the second e-mail reminder)(26). It should be noted that response propensity weighting is problematic where the effects of non-response vary by study parameter which has been shown to occur in a number of studies(38, 39). The implications of these findings are that estimating the degree of possible non-response error and discussing the effects on the inferences of interest is preferable to adjusting prevalence or parameter estimates which may in fact introduce error.

For the main analyses, i.e. the identification of risk factors for each mental disorder, simple and multiple logistic regression analyses were conducted for each of the outcome variables and odds ratios were adjusted for all variables in the model presented. Analyses were conducted in SPSS Version 19.

Results

Of 24,209 students who met the inclusion criteria and were invited to participate, 6,379 (26%) commenced the survey and 6,044 completed it (25% response rate).

Non-response bias

The proportion of women among respondents (66%) is greater than that in the population from which we drew the sample (57%). The mean age of the participants (27.0 years) is nearly identical to that of the population from which the sample was drawn (26.9 years). Of the 6044 participants who completed the survey, 5873 (92.1%) responded before the second reminder and 506 (7.9%) responded after it. An analysis of possible non-response bias is shown in Table 1. Relative to early respondents, a lower proportion of late respondents had depression, anxiety, and eating disorders but differences were non-significant. A greater proportion of late respondents had harmful drinking but the difference was non-significant.

The socio-demographic characteristics of the sample are summarized in Table 2. Table 3 presents proportions with each of the disorders. Table 4 shows the results of logistic regression analyses for each disorder with adjustment for potential confounders (all of the other variables shown in the table).

Depression

There were significantly increased odds of depression in women, 25-34 year-olds, domestic students, undergraduates, students with a Healthcare Card (i.e., with low incomes), those not in paid employment, and students who identified themselves as homosexual or bisexual.

Anxiety

There were significantly higher odds of anxiety in women, 25-34 year-olds, students with a Healthcare Card and students who identified themselves as homosexual or bisexual.

Eating Disorders

The odds of eating disorders were significantly higher among women, 25-34 year-olds and 45+ year-olds, domestic students, students with a Healthcare Card, students who worked more than 11 hours per week in paid work and students who identified themselves as bisexual.

Harmful drinking

The odds of harmful drinking were significantly higher among men, 17-24 year-olds, students born in Australia or New Zealand, students who spent more than 20 hours per week in paid work, and students who identified themselves as bisexual. For the purpose of comparison with other studies, 33% of the sample scored ≥8 on the AUDIT, which is indicative of *hazardous drinking*, i.e., drinking that substantially increases the risk of harmful outcomes(32).

Discussion

A greater proportion of women had depression, anxiety and eating disorders, while men were more likely to be harmful drinkers. Sexual orientation, and in particular, bisexuality, was associated with anxiety, depression, eating disorders, and harmful drinking. Undergraduates were more likely to experience mental health disorders than postgraduates. International students did not have a higher risk of any of the disorders relative to domestic students.

The primary limitation of the study is the cross-sectional design which does not permit inferences about possible causal relations between the explanatory variables and disorders of interest, despite our efforts to control for a range of potential confounders in multivariate models. We therefore limit our inferences to association by way of generating hypotheses about cause-effect relations that may be studied with a longitudinal design, where the temporal sequence of reputed risk and outcome can be established.

The low response rate precludes confident estimation of prevalence given the likelihood of selective non-response. Students who did not participate may have a higher or lower prevalence of disorder than those who responded. The data summarised in Table 1, in which point estimates for late respondents are lower for depression, anxiety, and eating disorders, and higher for harmful drinking, suggest that the non-response bias commonly evident in health behaviour surveys (e.g.,(26)) may, if anything, operate in the opposite direction in a study of mental health. In health behaviour surveys, individuals with the risk behaviour (e.g., smokers or heavy drinkers) tend not to participate, causing under-estimation of the prevalence of these behaviours(26). Our result for harmful drinking, while non-significant, was consistent

with this body of evidence. The point estimates for the other three disorders (which are not risk behaviours as such) were lower for late respondents, suggesting that individuals with mental health problems may be more inclined to participate in these types of surveys. Accordingly, we would be over-estimating the prevalence of disorders if the mental health of non-respondents in fact resembles that of late respondents. It is of course possible that the distribution of non-respondents is bimodal, with the healthiest and sickest members of the population being least likely to respond, each group for their own reasons(40). There would be value in careful investigation of reasons for non-response in mental health surveys, to complement the evidence base that is developing for health behaviour surveys and thereby better inform the estimation of population prevalence and other parameters(41).

Socio-economic status is difficult to investigate in the tertiary education setting given that educational attainment is a defining feature of the construct. Many students from lower socio-economic background will change their position on obtaining a degree and probably also increase their income. In contrast, those who drop out of university may have poor mental health outcomes. Here we used two indicators of socio-economic status: parents' educational attainment and the student's possession of a government Healthcare Card. These reflect aspects of the family of origin, a relatively stable potential influence on mental health, and the more temporally limited financial means of the student, a potentially strong proximal influence on mental health(16).

We focused only on disorders known to be common among university students (4) and which account for a large proportion of the disease burden (1) to minimise respondent burden, given evidence showing that survey length is negatively associated with response rate(42). It should be noted that some serious disorders, including

schizophrenia and bipolar disorder, have a typical age of onset in early adulthood and there would be value in estimating their prevalence in this population group.

A strength of the study is the use of an anonymous computerised questionnaire, a strategy shown to increase the candour of reporting stigmatised conditions and behaviours(28). This is particularly relevant due to the stigma often associated with mental health problems(43). In addition, given the stigma associated with discussing sexuality for many people, the anonymity of the survey may have provided conditions more conducive to accurate reporting than other commonly used modalities, in particular, face-to-face or telephone interview.

The mean age of students in this sample of 27 years, while representative of this particular university, is older than the Australian university student population whose median age is 22(44). The University of Newcastle is situated in a city and surrounding region of approximately 500,000 people where primary industries have included coal mining and steel production. In the 1990s and early 2000s steel production and related heavy industry in the region shrank considerably such that large numbers of workers had to retrain. This may have increased enrolments in tertiary study thereby increasing the mean age of students. While the older age and more working class character of this population makes it less representative of the Australian university population, it offers greater capability for examining the role of these important socioeconomic variables in student mental health.

Students with a Healthcare Card were more likely to experience depression, anxiety, and eating disorders. Having a Healthcare Card is indicative of current financial assets and income, and the results are consistent with those of a longitudinal study of UK students showing that financial difficulty worsened the mental health of

students(16). Parental level of education was not associated with any of the disorders we studied. This appears to conflict with findings in the Australian general population in which people from lower socio-economic backgrounds measured via employment status, level of education, and income, are also found to have a higher prevalence of mental disorders than people from higher socio-economic backgrounds(2). The findings arguably offer comfort for education and social policy makers in that the more distal and unmodifiable legacy of low parental education may be relatively unimportant as long as students are provided with sufficient financial means (e.g., via a Healthcare Card and similar benefits) to help cope with the demands of university.

We found that 8% of undergraduates were drinking at harmful levels and 33% were drinking at hazardous levels. The prevalence of hazardous drinking (defined as a score of ≥8 on AUDIT) was similar to that estimated (35%) in a 2007 web-based survey of a large undergraduate sample at another Australian university(45). In contrast, a 2002 web-based survey of New Zealand university students (response rate 82%) found that 65% of students were hazardous drinkers by the same definition(9). The risk factors identified in this study are similar to those in the previous Australian research where men had higher odds of alcohol dependence and a higher prevalence of hazardous drinking than women(45).

Our results indicate that women are at twice the odds of having an eating disorder, a gender difference previously reported in the literature(7). Unexpectedly, 25-34 year olds and those over 45 years of age were at higher risk of having an eating disorder than 17-24 year olds.

Perhaps the most striking and consistent findings were that students who identified as homosexual or bisexual had up to three times the odds of having mental

disorders, compared with heterosexual students. This is consistent with other studies of non-student and student populations. In the USA, Oswalt & Wyatt (19) examined the association between mental health and sexual orientation in a multi-campus national sample (n=27454, response rate 23%). They asked students about prior diagnoses and feelings and behaviours related to mental health and found that gay, lesbian, bisexual or *unsure* students were more likely to have mental disorders than heterosexual students.

An unexpected result of our study was that international students were at similar or lower risk than domestic students for all disorders, which is contrary to the impressions of student health service providers who observe that international students suffer considerable distress and present with more severe symptoms than domestic students (personal communication Director, Student Health Service, University of Newcastle, 15 February 2012). This may reflect selection bias in presentations to campus health services, particularly given that domestic students often have alternative services to call on, including, in many cases, a family GP whom they have seen throughout childhood and adolescence. Alternatively or additionally, it may reflect less willingness among international students to disclose illness, even in an anonymous survey.

There is limited evidence concerning the efficacy of early intervention programs for mental health disorders among tertiary students, with the exception of alcohol use disorders, for which there is systematic review evidence showing effectiveness of screening and brief intervention programs(46-48). Examples of such programs include THRIVE(49), in which all students are sent an e-mail inviting them to complete a brief survey including the AUDIT screening instrument. Students who screen positive for hazardous drinking are then provided with more detailed assessment of their drinking and personalised feedback and advice. Students receiving this intervention are shown to

reduce their alcohol consumption and are more likely to seek help for their drinking(14). There is urgent need for studies in which students are routinely screened for depression and anxiety and offered inexpensive web-based intervention as the first response in a stepped care approach.

Guidelines have recently been released for tertiary education institutions “to facilitate improved educational outcomes for students with a mental illness”(50). The establishment of the guidelines was based on expert advice rather than empirical research in the student population. Accurate prevalence rates of mental health disorders in Australian university students, including less common disorders and behavioural risk factors, are urgently needed along with clinical trials of low cost interventions for depression and anxiety. In addition, there would be value in conducting a national longitudinal study examining the mental health of a large cohort of Australian university students across multiple institutions, including campuses in metropolitan and regional areas, with oversampling of high-risk subgroups, namely students on low incomes, and gay, lesbian and bisexual students.

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Ethical approval

The protocol for the research project has been approved by the Human Research Ethics Committee the University of Newcastle, approval no: H-2009-0366. The research has been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki. All subjects provided informed consent prior to their inclusion in the study and participant anonymity has been preserved.

Conflict of interest

The authors declare they have no conflict of interest.

Table 1. Proportion with disorder by response latency

	All respondents	Early respondents	Late respondents	Absolute difference (Late – Early)
Depression (N=6163)[a]	8.0% (n = 492)	8.1% (n = 464)	6.1% (n = 28)	-2.0% p = 0.113
Anxiety (N=6128)[a]	12.6% (n = 774)	12.8% (n = 725)	10.7% (n = 49)	-2.1% p = 0.190
Eating disorder (N=6068)[a]	13.8% (n = 838)	13.9% (n = 779)	13.0% (n = 59)	-0.9% p = 0.614
Harmful drinking (N=6206)[a]	8.1% (n = 505)	8.0% (n = 460)	9.7% (n = 45)	+2.7% p = 0.207
Any of the above	29.8% (n = 1850)	29.9% (n = 1717)	28.6% (n = 133)	-1.3% p = 0.554

[a] Number of participants that answered the questions

Table 2. Sociodemographic characteristics of the sample

	Women (n = 4221)	Men (n = 2158)	All (n = 6379)
Age			
Mean (SD)	26.9 (9.7)	25.6 (8.8)	26.5 (9.4)
Degree Type			
-Undergraduate - n (%)	3621 (87%)	1828 (85%)	5449 (86%)
- Postgraduate – n (%)	546 (13%)	320 (15%)	866 (14%)
Year of Study			
1 - n (%)	1504 (36%)	725 (34%)	2229 (35%)
2	971 (23%)	528 (25%)	1499 (24%)
3	886 (21%)	433 (20%)	1319 (21%)
4	482 (11%)	243 (11%)	725 (11%)
5-9	346 (8%)	215 (10%)	561 (9%)
10 +	32 (1%)	13 (1%)	46 (1%)
Student Type			
- Domestic	3767 (94%)	1846 (90%)	5613 (93%)
- International	236 (6%)	195 (10%)	431 (7%)
Socio-economic Status			
- Have a Health Care Card	2131 (51%)	1251 (58%)	3381 (53%)
- Parent with highest educational level			
1) Didn't complete year 10	72 (2%)	35 (2%)	107 (2%)
2) Completed year 10	924 (22%)	388 (18%)	1312 (21%)
3) Completed year 12	149 (4%)	76 (4%)	225 (4%)
4) Other post school qualification eg; trade, diploma, TAFE	448 (11%)	251 (12%)	699 (11%)
5) Completed university degree	2592 (62%)	1397 (65%)	3989 (63%)
Country of birth			
- Australia or NZ	3672 (87%)	1792 (83%)	5464 (86%)
- Other than Aust or NZ	549 (13%)	366 (17%)	915 (14%)
Hours in paid work			
- 0	1440 (34%)	786 (36%)	2226 (35%)
- 1 – 5	320 (7%)	135 (6%)	455 (7%)
- 6 – 10	628 (15%)	312 (15%)	940 (15%)
- 11 – 20	1016 (24%)	416 (19%)	1432 (22%)
- 20+	817 (19%)	509 (24%)	1326 (21%)

Table 3. Proportions of the sample with depression, anxiety, eating disorder or harmful drinking

	Depression	Anxiety	Eating disorder	Harmful drinking
Gender				
Male	5.7% (118/2080)[a]	7.9% (163/2069)	9.5% (195/2056)	13.4% (280/2095)
Female	9.2% (374/4083)	15.1% (611/4059)	16.0% (643/4012)	5.5% (225/4111)
Age				
17 – 24	7.6% (288/3777)	11.7% (438/3756)	13.3% (496/3723)	9.1% (346/3801)
25 – 34	9.4% (121/1281)	16.1% (205/1271)	15.2% (191/1254)	9.0% (116/1293)
35 – 44	8.1% (52/641)	11.8% (75/638)	13.2% (83/631)	3.4% (22/645)
45+	6.7% (31/464)	12.1% (56/463)	14.8% (68/460)	4.5% (21/467)
Student Type				
Domestic students	8.2% (462/5610)	13.1% (733/5613)	14.4% (802/5579)	8.4% (469/5613)
International students	4.9% (21/431)	8.4% (36/431)	7.0% (30/430)	4.4% (19/431)
Degree Type				
Undergraduate	8.5% (445/5264)	13.0% (682/5235)	14.1% (730/5185)	8.7% (459/5300)
Postgraduate	5.0 % (42/836)	9.6% (80/830)	11.8% (97/821)	4.7% (40/843)
Year of Study				
1	10.1% (217/2147)	13.8% (293/2128)	13.8% (291/2109)	8.5% (185/2166)
2	8.5% (124/1457)	12.3% (178/1451)	13.3% (190/1431)	8.5% (124/1465)
3	5.3% (67/1274)	11.7% (148/1269)	14.0% (176/1260)	7.6% (97/1281)
4	7.9% (55/694)	13.9% (96/689)	14.6% (99/680)	8.7% (61/698)
5 +	4.9% (29/591)	10.0% (59/591)	13.9% (82/588)	6.4% (38/596)
Country of birth				
Australia or NZ	8.2% (437/5299)	13.2% (697/5275)	14.5% (755/5222)	8.7% (465/5333)
Other	6.4% (55/864)	9.0% (77/853)	9.8% (83/846)	4.6% (40/873)
Health Care Card				
No	6.8% (197/2897)	11.5% (332/2882)	13.2% (378/2854)	7.7% (225/2917)
Yes[b]	9.0% (295/3266)	13.6% (442/3246)	14.3% (460/3214)	8.5% (280/3289)
Parent with highest education				
Completed degree	7.8% (205/2622)	12.1% (315/2605)	13.2% (334/2528)	8.1% (214/2638)
Other post school qualification[c]	7.9% (117/1475)	13.2% (193/1463)	13.3% (192/1446)	9.7% (144/1487)
Completed year 12	6.5% (38/585)	11.7% (68/582)	13.8% (80/578)	7.0% (41/587)
Completed year 10	8.0% (83/1037)	12.5% (129/1034)	15.3% (156/1019)	8.3% (87/1046)
Didn't complete year 10	11.4% (35/308)	16.9% (52/308)	16.6% (51/307)	4.5% (14/311)
Hours in paid work				
0	9.3% (199/2141)	13.7% (291/2129)	12.6% (266/2107)	7.6% (165/2160)
1 – 5	6.5% (29/447)	10.3% (46/445)	12.3% (54/440)	5.1% (23/449)
6 – 10	6.5% (59/901)	11.7% (105/896)	12.8% (114/890)	7.4% (67/906)
11 – 20	7.3% (101/1390)	13.0% (179/1382)	15.7% (215/1368)	9.3% (130/1397)
20+	8.1% (104/1284)	12.0% (153/1276)	15.0% (189/1263)	9.3% (120/1294)
Sexual Orientation				
Heterosexual	7.1% (396/5557)	11.9% (659/5560)	13.3% (735/5529)	7.7% (426/5560)
Homosexual	13.0% (21/162)	19.1% (31/162)	18.0% (29/161)	13.6% (22/162)
Bisexual	20.6% (66/320)	24.4% (78/320)	21.5% (68/317)	12.5% (40/320)
Drinking status (AUDIT)				
Non drinker	12.1% (142/1172)	15.3% (178/1164)	15.5% (179/1154)	-
Moderate drinker	6.3% (184/2940)	11.2% (329/2925(	10.8% (312/2888)	-
Hazardous drinker	6.5% (101/1549)	11.1% (172/1544)	15.7% (241/1534)	-
Harmful drinker	8.4% (28/333)	14.3% (47/329)	19.6% (64/327)	-
Possibly alcohol dependent	21.9% (37/169)	28.9% (48/166)	25.5% (42/165)	-

[a]Total number with disorder/number who answered questions, [b]Met means tested criteria for government health care card, [c]e.g., trade, diploma, TAFE certificate

Table 4. Risk factors for depression, anxiety, eating disorder and harmful drinking

	Depression AOR (95% C.I)[a]	Anxiety AOR (95% C.I)	Eating Disorder AOR (95% C.I)	Harmful Drinking AOR (95% C.I)
Gender				
Male 33.8 %	1 reference	1 reference	1 reference	1 reference
Female 66.2%	1.83 (1.45 - 2.30)	2.26 (1.86 – 2.74)	2.12 (1.77 - 2.55)	0.38 (0.31 - 0.46)
Age				
17 – 24	1 reference	1 reference	1 reference	1 reference
25 – 34	1.30 (1.01 – 1.67)	1.62 (1.32 – 1.97)	1.26 (1.03 – 1.54)	1.02 (0.80 - 1.31)
35 – 44	1.08 (0.77 – 1.53)	1.09 (0.82 – 1.46)	1.07 (0.80 – 1.42)	0.45 (0.28 – 0.72)
45+	0.92 (0.58 – 1.46)	1.20 (0.84 – 1.71)	1.47 (1.06 – 2.03)	0.66 (0.40 – 1.11)
Student Type				
Domestic students	1 reference	1 reference	1 reference	1 reference
International students	0.63 (0.35 – 1.14)	0.82 (0.50 – 1.33)	0.56 (0.34 – 0.91)	0.72 (0.37 – 1.39)
Degree Type				
Undergraduate	1 reference	1 reference	1 reference	1 reference
Postgraduate	0.61 (0.41 – 0.91)	0.70 (0.52 – 0.95)	0.83 (0.63 – 1.11)	0.65 (0.44 – 0.97)
Year of Study				
1	1 reference	1 reference	1 reference	1 reference
2	0.91 (0.71 – 1.16)	0.93 (0.76 – 1.15)	0.96 (0.78 – 1.18)	0.95 (0.74 – 1.23)
3	0.53 (0.39 – 0.71)	0.87 (0.70 – 1.09)	1.04 (0.84 – 1.29)	0.85 (0.64 – 1.11)
4	0.85 (0.61 – 1.17)	1.08 (0.83 – 1.40)	1.14 (0.88 – 1.47)	0.99 (0.72 – 1.36)
5+	0.64 (0.41 – 0.99)	0.78 (0.55 – 1.09)	1.14 (0.84 – 1.54)	0.85 (0.56 – 1.27)
Country of birth				
Australia or NZ	1 reference	1 reference	1 reference	1 reference
Other	0.89 (0.60 – 1.33)	0.65 (0.51 – 0.84)	0.88 (0.64 – 1.19)	0.65 (0.41 – 1.03)
Health Care Card				
No	1 reference	1 reference	1 reference	1 reference
Yes[b]	1.37 (1.11- 1.69)	1.29 (1.09 – 1.52)	1.09 (0.95 – 1.27)	1.07 (0.87 – 1.30)
Parent with highest education				
Completed university degree	1 reference	1 reference	1 reference	1 reference
Other post school qualification[c]	0.91 (0.71 – 1.16)	0.97 (0.79 – 1.19)	0.91 (0.75 – 1.11)	1.15 (0.91 – 1.46)
Completed year 12	0.79 (0.55 – 1.14)	0.90 (0.67 – 1.20)	0.99 (0.75 – 1.29)	0.76 (0.53 – 1.10)
Completed year 10	0.95 (0.71 – 1.26)	0.92 (0.73 – 1.16)	1.04 (0.83 – 1.29)	1.10 (0.83 – 1.44)
Didn't complete year 10	1.26 (0.82 – 1.92)	1.26 (0.88 – 1.79)	1.13 (0.80 – 1.61)	0.75 (0.41 – 1.37)
Hours in paid work				
0	1 reference	1 reference	1 reference	1 reference
1 – 5	0.70 (0.46 – 1.08)	0.76 (0.54 – 1.07)	0.99 (0.71 – 1.36)	0.61 (0.38 – 0.98)
6 – 10	0.77 (0.56 – 1.06)	0.88 (0.68 – 1.14)	1.07 (0.84 – 1.37)	0.87 (0.63 – 1.19)
11 – 20	0.82 (0.63 – 1.08)	0.99 (0.80 – 1.23)	1.28 (1.04 – 1.58)	1.21 (0.93 – 1.56)
20+	1.13 (0.85 – 1.49)	1.02 (0.81 – 1.29)	1.28 (1.03 – 1.61)	1.33 (1.01 – 1.75)
Sexual Orientation				
Heterosexual	1 reference	1 reference	1 reference	1 reference
Homosexual	2.05 (1.25 – 3.39)	1.92 (1.26 – 2.94)	1.48 (0.95 – 2.29)	1.54 (0.95-2.48)
Bisexual	2.89 (2.12 – 3.95)	1.93 (1.44 – 2.58)	1.62 (1.21 – 2.19	1.82 (1.27 – 2.62)
Drinking status (AUDIT)				
Non drinker	1 reference	1 reference	1 reference	-
Moderate drinker	0.49 (0.39 – 0.63)	0.68 (0.56 – 0.84)	0.61 (0.50 – 0.76)	-
Hazardous drinker	0.50 (0.38 – 0.67)	0.72 (0.56 – 0.91)	1.02 (0.82 – 1.28)	-
Harmful drinker	0.64 (0.41 – 1.02)	0.96 (0.66 – 1.40)	1.46 (1.04 – 2.04)	-
Possibly alcohol dependent	2.14 (1.59 – 3.55)	2.41 (1.61 – 3.60)	2.08 (1.39 – 3.13)	-

[a]Adjusted odds ratio for all variables in table (95% Confidence Interval), [b]Met means tested criteria for government health care card, [c] e. g., trade, diploma, TAFE certificate

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4. Extended discussion

4.1 Summary of findings

Women had a higher prevalence of depression, anxiety and eating disorder, while men were more likely to be harmful drinkers. Sexual orientation, and in particular bisexuality, was associated with anxiety, depression, eating disorders and harmful drinking. Undergraduates were more likely to experience mental disorders than postgraduates. International students did not have a higher risk of any of the disorders relative to domestic students.

The literature review suggested that we would find little difference between undergraduate and postgraduate students (Eisenberg et al., 2007). The review suggested we would find students from low socio-economic backgrounds with increased levels of mental disorders (Andrews & Wilding, 2004), bisexual students with higher rates of mental disorders than heterosexual students (Eisenberg et al., 2007) and women with higher rates of most mental disorders (O'Donnell et al., 2006; Vazquez & Blanco, 2008). Following consultation with mental health staff at the university, we also postulated that international students would be at higher risk of mental disorders.

The study initially set out to examine the prevalence and risk factors for mental disorders among students. However, due to the Privacy Act the university was unable to provide permission to write to students individually and send personalised reminders, methods known to increase response (Edwards et al., 2002). The aim of the study was modified to identifying risk factors for student mental disorders. We have provided proportions of students with disorders, but they should not be considered to be prevalence estimates (Rothman & Greenland, 1998).

4.2 Findings relating to each hypothesis

1) The findings from this research did not support the hypothesis that undergraduate and postgraduate students would have similar risk for mental disorders. Undergraduate students had higher prevalence of all four disorders with the largest difference being for harmful dinking (UG = 8.7%, PG = 4.7%). Postgraduate students were at lower risk for all four types of disorders with adjusted odds ratios being significant for all except eating disorders.

2) Lower socio-economic status a risk factor for mental disorder.

Students with health care cards, one of our measures of low socio-economic status, had higher prevalence levels of all four disorders. Adjusted models showed that they were at increased risk of depression and anxiety compared to those without health care cards. In contrast, parents' level of education did not increase risk for mental health disorders.

3) Bisexual students will be at greater risk for mental disorders than heterosexual students.

Bisexual students had higher prevalence than homosexual and heterosexual students of depression, anxiety and eating disorder. Bisexual students had higher levels of harmful drinking than heterosexual students. Bisexual and homosexual students had higher levels of all disorders in comparison with heterosexual students. Homosexual students had higher risk of experiencing depression and anxiety than heterosexual students. Bisexual students were at increased adjusted risk for all disorders in comparison to heterosexual students.

4) Women will have increased risk for depression, anxiety and eating disorder compared to men.

Women were found to have significantly higher levels of depression, anxiety and eating disorder than men, and were at increased risk for depression, anxiety and eating disorder compared to men.

5) Men will be at greater risk for alcohol use disorder than women.

Men (13.4%) had significantly higher levels of harmful drinking than women (5.5%) and were at greater risk than women for alcohol use disorders.

6) We expect that international students would have a higher risk of the first three disorders and lower risk of alcohol use disorders.

International students had lower prevalence of all disorders measured in comparison to local students. International students did not have increased risk of mental disorders, and in contrast to clinicians' expectations, they were at lower risk of all disorders compared to local students; however, only the association with eating disorders was statistically significant.

5. Interpretation of the findings of the current study in relation to the literature review

5.1 Depression prevalence and risk factors

Empirical research has found that the prevalence of depression among university students varies between 1% and 37%. For example, a study conducted in the United States using similar methodology to the current study found rates of depression for male undergraduate and postgraduates of 11% and 9%, and female undergraduate and postgraduates of 12% and 11% respectively (Eisenberg et al., 2007). Consistent with

others studies, we found higher rates of depression (8.5%) for undergraduates when compared to postgraduates (5%). However, our study found postgraduates had significantly lower prevalence of depression. Our study also supported the findings in the literature that women have higher risk of depression than men (Steptoe et al., 2007; Vazquez & Blanco, 2008). Women were found to have close to twice the adjusted odds ratio (AOR 1.83) compared to men of having depression. The reason for this increased risk, or why men have lower risk for depression than women, has been debated and researched in the general population. One possible explanation is that men are not necessarily at decreased risk of depression, but may express depression in different ways to women (Brownhill et al., 2005). Alternative explanations have included socialisation and biological differences (Addis, 2008). Accordingly, methods for diagnosing depression in men may be flawed.

Twelve of the studies reviewed had rates of depression close to 10%, with the rest reporting much higher rates. Our study was at the lower end of this continuum, with male prevalence of depression of 5.7% and female of 9.2%. The age group with the highest prevalence of depression were 25–34 year olds (9.4%), while first year students had the highest prevalence of depression. One possible explanation for this finding is that first year students are required to adjust to an adult learning model markedly different from high school. Interestingly, ‘the literature’ uncovered only a small amount of evidence for first year students being at increased risk for mental health disorders (Bayram & Bilgel, 2008). It is likely that our literature review inclusion criteria excluded evidence supporting first year students being at higher risk for mental disorders.

A finding consistent with the literature is that students with low SES were found to have higher rates of depression (9%) compared to those without a health care card

(6.8%) (our indicator of low SES). Low SES has been found to increase risk for mental disorders for students (Andrews & Wilding, 2004). Students who did not work for an income (9.3%) and students who worked more than 20 hours per week (8.1%) returned higher prevalence of depression than those who worked part time (6.5% to 7.3%). Vazquez et al. (2011) hypothesised that the higher prevalence of depression experienced by females with higher incomes may be due to longer hours at work, which increased responsibilities and pressures and reduced time available to study.

Consistent with findings reported by Eisenberg et al. (2007), our study found students who indicated they were homosexual were at increased risk of depression (AOR 2.05) and students who indicated they were bisexual were at even higher risk (AOR 2.89), compared to students who indicated they were heterosexual. This pattern of results was similar for the other three disorders examined. We have little conclusive evidence about why this group of students have such an increased risk of mental disorder. Jorm et al. (2002) reported the distinction between homosexual and bisexual young adults as an important one. They hypothesised that higher rates of mental disorders in bisexual young adults in the general population, who were often grouped with homosexual young adults in research, skewed the data on rates of mental disorders in the homosexual population by attributing disorder to the homosexual group incorrectly. Theories of why bisexual students have higher rates than homosexual students include that bisexual students are less likely to feel as though they fit in and may feel alienated from both homosexual and heterosexual peer groups (Jorm et al., 2002).

Unlike previous studies (ABS, 2008), younger age did not play as large a role in risk for depression. Indeed, 25–34 year olds (AOR 1.3) were found to be at increased risk of depression when compared to 17–24 year olds. The literature reports that 75% of

mental disorders in Australia have their onset in the 16–24 year old group (ABS, 2008). As depression is one of the most common disorders in university students, we expected this group to have the highest prevalence of depression, notwithstanding that the mean age of students at the University of Newcastle is 27, considerably higher than the median age of students in Australia (22). As age range affects how universities target and implement interventions, verifying the accuracy of this result and assessing whether it is a consistent finding is a necessary recommendation.

Postgraduates (AOR 0.61) were at lower risk than undergraduates for depression. This finding is inconsistent with the study by Vazquez et al. (2011) of female mental disorders that found postgraduate students at higher risk of mental disorder than undergraduates, although the association was not significant. In another study examining psychological distress in female college students, Vazquez et al. (2012) reported undergraduate students with higher levels of shyness, embarrassment and greater distress in social interactions compared to postgraduate students. There is limited research investigating the differences between undergraduate and postgraduate students. If we consider postgraduates to be less likely to have a mental disorder as per the results of the current study then it may be that postgraduates, having already completed a degree, are possibly more motivated to succeed as they have chosen to return to university. Their age and life experience may also work as protective factors. However, discussions with counselling service staff revealed that postgraduate students often present with serious mental health disorders which seem to be exacerbated by the isolation and increased responsibility they often carry in regards to family and financial responsibilities. It could be that there are different groups of postgraduate students: those who continue studying straight after their undergraduate studies, often in the age range of 22–24, and still living with their parents and with little responsibilities, and a

second group that includes those who return to study after entering the workforce. This latter group often have more responsibilities both financially (mortgages) and family wise (children), which may add significantly to pressure and stress experienced while studying. They are also often working full time while completing a degree. These hypotheses are yet to be verified empirically.

First year students had the highest odds of having depression compared to other years of study. The group with the lowest odds of depression compared to first year students were third year students. This difference is hypothesised to be due to third year students having more experience at managing the competing demands of university and their responsibilities outside of university. It is also likely that third year students have developed the skills required to succeed at university. This is consistent with research by Cooke et al. (2006) who found that first year students had increased levels of strain placed on their wellbeing. Interestingly, in our study the differences between risk levels and year of study were significant only for depression. The other disorders did not have as large a difference and the risk levels were all non-significant between different years of study.

The other group of students who were at increased risk of depression were fifth year students. With few degrees lasting five years, it is likely that these are either part time students or students who have struggled and subsequently fallen behind in their studies. It would be worth investigating this group further to see what other information we can obtain that could guide universities' responses to students at risk for depression.

Students who reported having a government-issued health care card were found to have a higher risk for depression (AOR 1.37) than those without. This finding is consistent with prior research that those from low socio-economic background and/or experiencing financial difficulty are at higher risk for depression (Andrews & Wilding,

2004). The Andrews and Wilding (2004) study is one of the few longitudinal studies in this area. This risk factor has also been found in the non-studying population in regard to risk for mental disorders (ABS, 2008). It could be argued that a lack of financial means is particularly challenging for students as it requires them to obtain employment, which can take away from available time to study. With the Australian Government increasing the participation rate in tertiary studies of those from low socio-economic backgrounds, these findings are crucial considerations in the future planning of mental health service delivery for universities.

Students who drink alcohol at harmful levels have been found to be at higher risk of mental disorders (Dawson et al., 2004; Kypri et al., 2005; Slutske, 2005). Our study replicated these findings, with harmful alcohol shown to be a risk factor for depression. Those who did not drink were at higher risk for depression than moderate or hazardous drinkers. The highest risk group for depression were dependent drinkers. It is of interest than non-drinking students were at higher risk for depression than hazardous drinkers. One possible explanation is that alcohol use is a quasi developmental social rite of passage in Australian university students, and those who do not consume alcohol are more likely to be socially isolated which itself is a risk factor for depression. Several studies have documented the high rates of alcohol consumption among university students (Hallet et al., 2012; Slutske, 2005), suggesting this phenomenon, which normalises heavy alcohol consumption, may be having a large indirect social impact on students, including those who do not drink alcohol.

The risk factors for depression presented in this study indicate a need for universities to continue to examine, develop and attempt to prevent and treat this disorder. The significant impact depression has on students and their ability to complete their studies warrants a better understanding so as to inform our response to this

disorder. It is heartening that the current research found rates consistent with and at the lower end of the spectrum when compared to international studies. However, the rates are still of concern and more could be done to counter depression in students. There is strong evidence about who is at risk for depression. Despite this, a recent study reported that only 10% of Australian students with problems accessed counselling services on campus (Reavley et al., 2011). This suggests there may be more work for universities to do regarding outreach, engagement and accessibility of these services for students.

5.2 Anxiety prevalence and risk factors

Women were found to have almost twice the rate of anxiety disorders compared to men. Women having higher risk of anxiety disorders is consistent in the literature (Eisenberg et al., 2007), although the rates found in our study were at the higher end of rates previously reported. The adjusted odds ratio for women compared to men for anxiety was 2.26. Domestic students had significantly higher rates of anxiety than international students and this large difference was the opposite of what we expected. There is little research on international students studying abroad or on international student groups in Australia. Rosenthal et al. (2006) examined psychological distress in international students studying in Australia and reported little change in distress levels of international students once they commenced studies in Australia, although a minority of international students experienced significant difficulty. International students are estimated to contribute up to $16 billion per year to the Australian economy (Australian Education International, 2011). The impact they have on university student support services has been reported as significant in personal conversations with campus health staff. However, findings from this study may contribute to minimising interest into research on international students as they have not been identified as an at risk group.

Undergraduates experienced higher levels of anxiety compared to postgraduates, and first and fourth year students had the highest rates. Yet none of the findings regarding year of study were significant for risk of anxiety, an intriguing result as initial hypotheses were that students who were newer to university methods of learning and assessment would find the adjustment anxiety provoking. The literature supports this hypothesis with Cooke et al. (2006) reporting first year students with increased risk of anxiety.

Students born in a country other than Australia or New Zealand were found to have lower risk for anxiety (AOR 0.65). The difference in anxiety prevalence between those with a health care card and those without was small, yet followed the theme of students experiencing financial difficulty with higher levels of mental disorder (Andrews & Wilding, 2004). Those with a health care card had a significant odds ratio of 1.29 compared to those without a card of having anxiety. The literature is clear on the increased risk for those with financial difficulty for depression; however, the evidence is less compelling for anxiety. Notwithstanding, Andrews and Wilding (2004) reported an increased risk of social phobia for those with financial difficulty. Students who did not engage in paid employment had the highest prevalence of anxiety compared to those who did work. This relationship, similar to depression, seems to suggest that it might be that mental disorders or factors contributing to them affect students' ability to engage in paid work, or that work is itself a protective factor for anxiety. However, the differences between the adjusted odds ratios for these variables were not significant. There is strong evidence in the general population regarding the debilitating effects of anxiety and depression on occupational domain (Mintz et al., 1992) and it is likely this relationship also holds for students with these disorders. However the impact studying has on these disorders and ability to engage in a career, particularly in the short term, would be worth

investigating. Further longitudinal study would be worthwhile to investigate if those who experience anxiety and depression increase their chances of being able to engage in employment when they graduate, and whether or not achieving a degree plays a role in this.

Sexual preference significantly influenced risk of anxiety. Students who self identified as heterosexual had rates of anxiety of 11.9%, students who identified as homosexual were found to have rates of 19.1% and students who identified as bisexual had rates of 24.4%. Significant adjusted odds ratios were found to be 1.92 for homosexual students and 1.93 for bisexual students compared to heterosexual students. These differences are large. Levels of anxiety among non-drinking students were second only to those which the AUDIT (Saunders et al., 1993) identified as possibly dependant drinkers. Research has shown that of those who drink heavily a percentage who suffer social anxiety use alcohol to manage their anxiety (Kushner et al., 1990). More than a quarter of those who were found to be possibly dependent drinkers experienced significant levels of anxiety, and with this group having an adjusted odds ratio of 2.41 compared to non-drinkers of having an anxiety disorder, the link between anxiety and alcohol is of particular interest in further research and policy development.

5.3 Eating disorder prevalence and risk factors

As with depression and anxiety, women were found to have significantly increased risk (AOR 2.12) for eating disorder when compared to men. The rates (16% women, 9.5% men) found in this study are quite high. Eisenberg et al. (2011) reported eating disorder symptoms (3+ SCOFF) in 13.5% of female undergraduates and 3.6% of male undergraduates. These findings likely follow the hypothesis mentioned in the literature review regarding screening measures being very sensitive to eating disorder symptomatology and likely returning high rates of false positives. In comparison, a

study using a full diagnostic interview (Vazquez et al., 2011) found only 0.9% of female students to have an eating disorder. Although we should be cautious and not overstate the levels found in our study, it is consistent with the literature that women are at higher risk for eating disorder than men.

The group with the highest prevalence of eating disorder was the 25–34 year old group (15.2%), and the second highest age group was the 45+ year old age group (12.1%). The 17–24 year age group, that is, the group in which we expected to see the highest rates of eating disorder, was found to have prevalence of 13.3%, very close to the 35–44 year olds with 13.2%. In regards to risk, the 45+ (AOR 1.47) and 25–34 age groups (AOR 1.26) were found to have significantly higher risk levels than the 17–24 year old group. These results differ from what was expected. It could be that younger participants who took part in the survey did not report accurately, due to the stigma and sensitive nature of eating disorders and concerns about confidentiality. However, this hypothesis is not consistent with Turner et al. (1998), who reported that web based surveys increased accurate reporting of sensitive information involving possible stigma. Other reasons may be the age range of the sample, with this university having a higher mean age (27) than the norm for Australian universities, which may have impacted on these findings.

International students, as with other disorders, were found to have significantly lower risk of eating disorder. Hours in paid work increased risk of eating disorders if students worked over 11 hours. Students who were homosexual or bisexual had higher rates of eating disorder and bisexual students had higher risk than heterosexual students of eating disorder.

Eating disorders are notoriously difficult to treat and often experienced co-morbidly with other disorders (Eisenberg et al., 2011). The impact of an eating disorder

on a student's ability to successfully undertake their studies is likely to be quite debilitating. The measure used in this study was a very basic screen and the rates reported are more likely to represent symptoms, rather than true disorder. These results are reported with caution at this point. Further investigation into this group of disorders in Australian university students is urgently required.

5.4 Alcohol disorder prevalence and risk factors

Moderate drinkers (AOR 0.61) were less likely than non-drinkers to have an eating disorder and harmful (AOR 1.46) and possibly dependent drinkers (AOR 2.08) were at increased risk of an eating disorder. The only disorders that women experienced lower risk of were alcohol disorders. Men were at almost three times the risk of alcohol disorders; 17–24 year olds and 25–34 year olds were the heaviest drinkers and most at risk of an alcohol disorder, drinking at almost three times the rate of the other age groups. Domestic students consumed alcohol at much higher rates than international students. Undergraduates consumed alcohol at higher rates than postgraduates and had a higher adjusted odds ratio (AOR 0.65). There were small differences between alcohol consumption rates and year of study and none of the odds ratios were significant. Those born in Australia or New Zealand had higher rates of harmful drinking than those born elsewhere, which corresponds with prior research (Hallet et al., 2012). Those with a health care card drank at marginally higher levels than those without and there was little difference between these two groups after multivariate adjustment. This contrasts with depression and anxiety, for which having a health care card was a risk factor. The difference may reflect the dampening effect of lower disposable income on alcohol consumption. Consistent with this is the finding that students with the lowest risk of harmful drinking were those who worked 1–5 hours per week. Students who worked over 20 hours per week had the highest risk of harmful drinking. Homosexual students

had the highest prevalence of harmful drinking (13.6%), however bisexual students had the highest odds ratio (1.82) compared to heterosexual students. The difference in the prevalence of harmful drinking between heterosexual (7.7%) and bisexual and homosexual students is large and an area that policy makers and student services should pay particular attention to.

The literature review suggested that students are more likely to receive a diagnosis of alcohol abuse than their non-college attending peers (Blanco et al., 2008). Drinking behaviours in university students is an area where targeted intervention is necessary. There have been trials of cost-effective electronic brief interventions with students that have found significant positive outcomes (Tait & Christensen, 2010). These types of interventions suit students, a group that is computer literate and has good access to the internet.

6. Limitations of the research

The primary limitation of the study was its cross-sectional design which did not permit inferences about possible causal relations between the explanatory variables and disorders of interest, despite our efforts to control for a range of potential confounders in multivariate models.

The study was limited also by the privacy act and the university not being able to provide the researchers with contact details of students. This restricted our ability to send personalised pre-notice letters and email reminders. With a response rate of 25%, our prevalence estimates are likely to be biased by selective non-response. Our analysis of possible non-response bias found a lower proportion of late respondents had depression, anxiety and eating disorders, but differences were non-significant. A greater proportion of late respondents had harmful drinking but the difference was non-

significant. As discussed in the manuscript section of this thesis, our result for harmful drinking was consistent with the body of evidence suggesting that individuals with the risk behaviour (e.g. heavy drinkers) tend not to participate in studies, causing under-estimation of the prevalence of these behaviours (Kypri et al., 2011). It is of note that late responders had lower proportions of depression, anxiety and eating disorders. It may be that non-response operates in the opposite direction in a study of mental health, that is, individuals with mental disorders may be more inclined to participate in these type of surveys. Accordingly, we would be overestimating the prevalence of disorders if the mental health of non-respondents in fact resembles that of late respondents. It is also possible that the distribution of non-respondents is bimodal, with the healthiest and sickest members of the population being least likely to respond (Torvik et al., 2012). There would be value in careful investigation of reasons for non-response in mental health surveys, to complement the evidence base that is developing for health behaviour surveys and thereby better inform the estimation of population prevalence and other parameters (Lundberg et al., 2005).

The study used a well validated screen that has been used in this population previously (PHQ-9) (Spitzer et al., 1999), however this was not a diagnostic interview. At best this measure provided us with estimates that, due to its design for primary health care settings and screening for mental disorders, were likely to be overestimates. The differences in prevalence between studies which use screens such as the PHQ and studies which use diagnostic interviews is generally consistent in that screens return higher rates of false positives.

We only investigated the most common disorders in this group, however, the risk for most mental disorders in this group is high. Assessing for all the disorders for which this group is at risk would be ideal. For example, bipolar disorder and

schizophrenia were not examined, yet both commonly have their onset in the age group that is most common in students. We also did not investigate suicidal ideation which has been shown to be common in this cohort (Eisenberg et al., 2007).

7. Implications for clinical practice and public policy

This research supported the findings of the evidence base regarding the increased risk of mental disorders experienced by students from low socio-economic backgrounds. This is of particular relevance to the current situation of the Australian tertiary education system. The Bradley Report (Bradley et al., 2008), commissioned by the Australian Government, emphasised the importance of increasing the participation rate of disadvantaged students. Government policy has responded by providing financial incentives to universities that increase their numbers of disadvantaged students. It is paramount that universities invest in the development of evidence based mental health policy and infrastructure to enable adequate service provision given the impact these changes are likely to have both on the demographics of those attending universities and on student support services. The consequences of universities not planning for a changing population could have a significant negative impact on university retention rates and rates of degree completion. Further, increased rates of tragic (and often avoidable) occurrences such as suicide could be a risk confronting universities that have increasing levels of enrolment of disadvantaged students but have not adequately responded to the increased demand this may place on student support services.

Improved screening of students for mental health disorders in Australia is an implication of this research. We have little data on student mental health compared to the United Sates.

With improvements in technology and students' high levels of computer literacy, there is a need for further research and development of electronic ('e') programs, which are cost-effective and preventative in nature, as a first response in a stepped care approach to mental health on campuses. There is good evidence supporting the efficacy of such programs (Kypri et al., 2009).

The findings that moderate and hazardous drinkers' adjusted odds ratios for depression and anxiety were lower than non-drinkers is an interesting outcome of this study. It would seem that moderate to hazardous drinking may be a norm for socially well functioning students in Australia and that students outside of this group are at increased risk of anxiety and depression. An implication of this finding is that a group of students who traditionally might not be targeted with interventions, non-drinkers, require a thoughtful response from student services and universities in regards to mitigating the risks identified. While the rate of harmful drinking in this population is high and requires addressing, conversely those who are likely to not receive support from interventions targeting those who drink also require a response due to their increased risk.

8. Suggestions for future research

There is opinion expressed in the literature that rates of mental health disorders may be increasing among students. At this point there is not strong evidence to support this claim with respect to Australia. Our research has highlighted that there is a lack of evidence regarding the prevalence and risk factors for mental disorders in Australian university students. Despite this lack of evidence, the current study suggests a similar set of risk factors to those identified in US studies. A national longitudinal study examining mental health across multiple institutions with oversampling of high risk groups is recommended based on the findings and limitations of this study. Further, this research would aid in developing low cost treatment interventions for this group. There already exist several evidence based effective treatments for alcohol disorders that are low cost and available online (Kypri et al., 2009). There is a need for further research and evidence based development of such treatment modalities for the other identified risk factors for mental health disorders in students. Students are a technologically capable group who are well placed to utilise such brief interventions.

The differences between men and women in eating disorder risk and whether male rates of eating disorder are increasing at faster rates than women, as reported by White et al. (2011), is a phenomenon that was beyond the scope of this study, but is an important direction for future research. Eating disorders are difficult to treat and have large impacts on functionality. This reported possible increase in eating disorders warrants further investigation.

9. Conclusions

Australian university students share many of the same mental disorder risk factors as their international peers. The research undertaken for this thesis, the first of its kind investigating mental disorders in a population of university students in Australia, supports prior international research that women, those from disadvantaged backgrounds, those having financial difficulties, males for alcohol disorders, and bisexual and homosexual students, are at increased risk for mental disorders. It is also validates the assertion that students experience significant mental health problems.

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Appendix 1 – Ethics approval

HUMAN RESEARCH ETHICS COMMITTEE

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

Notification of Expedited Approval

To Chief Investigator or Project Supervisor:	**Assoc Prof Kypros Kypri**
Cc Co-investigators / Research Students:	**Mr David Said** **Associate Professor Jennifer Bowman**
Re Protocol:	**Service utilisation, prevalence and risk factors for mental health disorders in Australian university students aged 18-24**
Date:	**05-Feb-2010**
Reference No:	**H-2009-0366**
Date of Initial Approval:	**05-Feb-2010**

Thank you for your **Response to Conditional Approval** submission to the Human Research Ethics Committee (HREC) seeking approval in relation to the above protocol.

Your submission was considered under **Expedited** review by the Chair/Deputy Chair.

I am pleased to advise that the decision on your submission is **Approved** effective **05-Feb-2010**.

For Noting

Questionnaires:

1. With regard to the Alcohol Audit, please ensure that participants with low exposure to alcohol are able to complete and exit the survey after question 3.

2. In relation to the Fagerstrom Nicotine Dependence Questionnaire, please ensure that someone who has never smoked is able to complete and exit the survey after only one question.

In approving this protocol, the Human Research Ethics Committee (HREC) is of the opinion that the project complies with the provisions contained in the National

Statement on Ethical Conduct in Human Research, 2007, and the requirements within this University relating to human research.

Approval will remain valid subject to the submission, and satisfactory assessment, of annual progress reports. *If the approval of an External HREC has been "noted" the approval period is as determined by that HREC.*

The full Committee will be asked to ratify this decision at its next scheduled meeting. A formal *Certificate of Approval* will be available upon request. Your approval number is **H-2009-0366**.

If the research requires the use of an Information Statement, ensure this number is inserted at the relevant point in the Complaints paragraph prior to distribution to potential participants You may then proceed with the research.

Conditions of Approval

This approval has been granted subject to you complying with the requirements for *Monitoring of Progress*, *Reporting of Adverse Events*, and *Variations to the Approved Protocol* as detailed below.

PLEASE NOTE:
In the case where the HREC has "noted" the approval of an External HREC, progress reports and reports of adverse events are to be submitted to the External HREC only. In the case of Variations to the approved protocol, or a Renewal of approval, you will apply to the External HREC for approval in the first instance and then Register that approval with the University's HREC.

- ***Monitoring of Progress***

Other than above, the University is obliged to monitor the progress of research projects involving human participants to ensure that they are conducted according to the protocol as approved by the HREC. A progress report is required on an annual basis. Continuation of your HREC approval for this project is conditional upon receipt, and satisfactory assessment, of annual progress reports. You will be advised when a report is due.

- ***Reporting of Adverse Events***

1. It is the responsibility of the person **first named on this Approval Advice** to report adverse events.
2. Adverse events, however minor, must be recorded by the investigator as observed by the investigator or as volunteered by a participant in the research. Full details are to be documented, whether or not the investigator, or his/her deputies, consider the event to be related to the research substance or procedure.
3. Serious or unforeseen adverse events that occur during the research or within six (6) months of completion of the research, must be reported by the person first named on the Approval Advice to the (HREC) by way of the Adverse

Event Report form within 72 hours of the occurrence of the event or the investigator receiving advice of the event.

4. Serious adverse events are defined as:
    - Causing death, life threatening or serious disability.
    - Causing or prolonging hospitalisation.
    - Overdoses, cancers, congenital abnormalities, tissue damage, whether or not they are judged to be caused by the investigational agent or procedure.
    - Causing psycho-social and/or financial harm. This covers everything from perceived invasion of privacy, breach of confidentiality, or the diminution of social reputation, to the creation of psychological fears and trauma.
    - Any other event which might affect the continued ethical acceptability of the project.

5. Reports of adverse events must include:
    - Participant's study identification number;
    - date of birth;
    - date of entry into the study;
    - treatment arm (if applicable);
    - date of event;
    - details of event;
    - the investigator's opinion as to whether the event is related to the research procedures; and
    - action taken in response to the event.

6. Adverse events which do not fall within the definition of serious or unexpected, including those reported from other sites involved in the research, are to be reported in detail at the time of the annual progress report to the HREC.

- ***Variations to approved protocol***

If you wish to change, or deviate from, the approved protocol, you will need to submit an *Application for Variation to Approved Human Research*. Variations may include, but are not limited to, changes or additions to investigators, study design, study population, number of participants, methods of recruitment, or participant information/consent documentation. **Variations must be approved by the (HREC) before they are implemented** except when Registering an approval of a variation from an external HREC which has been designated the lead HREC, in which case you may proceed as soon as you receive an acknowledgement of your Registration.

Linkage of ethics approval to a new Grant

HREC approvals cannot be assigned to a new grant or award (i.e., those that were not identified on the application for ethics approval) without confirmation of the approval from the Human Research Ethics Officer on behalf of the HREC.

Best wishes for a successful project.

Associate Professor Alison Ferguson
Chair, Human Research Ethics Committee

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Linked University of Newcastle administered funding:

Funding body	Funding project title	First named investigator	Grant Ref

Appendix 2 – Screen shots of web questionnaire

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

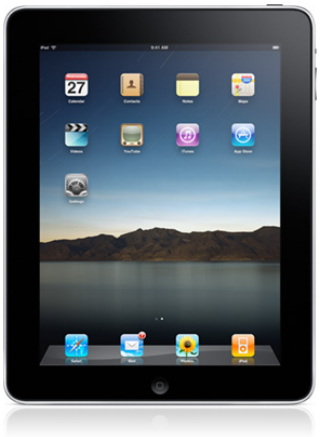
Dear Student,

Welcome to the Student Mental Health Survey.

This survey is confidential and is being conducted independently of the university administration by researchers in the Schools of Medicine and Public Health and Psychology. It will take about 15 minutes to complete. Please answer questions as honestly as possible. One of the proposed outcomes of this study is to gain a better understanding of students' mental health and what support, if any, they access and need at university.

If you would like to find out more information about the survey you can access our Participant Information Statement here.

Thank you for taking part in this important research. As a token of our appreciation for your time, upon completion of the survey, participants will be invited to enter the draw to **win an Apple iPad**.



Researchers:

Associate Professor
Kyp Kypri

Associate Professor
Jenny Bowman

David Said

To commence the survey please click the Start Survey button below

Start Survey

Complaints about this research

This project has been approved by the University of Newcastle's Human Research Ethics Committee (Approval No. H-2009-0366).

Should you have any concerns about your rights as a participant in the research, or if you have a complaint about the manner in which the research is conducted, you may contact the researchers on the details provided above. If an independent person is preferred, please contact the University's Human Research Ethics Officer via the Research Office, The Chancellery, The University of Newcastle, University Drive, Callaghan NSW 2308, Australia, telephone (02) 49216333, email Human-Ethics@newcastle.edu.au.

Demographic Data

Dear student, questions in this survey belong to different validated instruments so the time periods they are asking about vary, please be careful of the different time periods in each question.

Below are some questions concerning your demographic details.

Age

Gender ○ Male ○ Female

Country of birth:

Hours of paid work per week:

Do you have a health care card? (government issued) ○ Yes ○ No

Which year of university study are you in?

Please specify if you are an undergraduate or postgraduate student:

For each of your parents please indicate their gender and level of education.

Parent 1:

○ Male ○ Female ○ No parent/guardian

* *or equivalent*

Parent 2:

○ Male ○ Female ○ No parent/guardian

* *or equivalent*

Continue »

How You've Been Feeling in the Past 4 Weeks

These questions concern how you have been feeling over the past 4 weeks. Choose the response that best represents how you have felt.

1. During the last 4 weeks, about how often did you feel tired out for no good reason?

- None of the time
- A little of the time
- Some of the time
- Most of the time
- All of the time

2. During the last 4 weeks, about how often did you feel nervous?

- None of the time
- A little of the time
- Some of the time
- Most of the time
- All of the time

3. During the last 4 weeks, about how often did you feel so nervous that nothing could calm you down?

- None of the time
- A little of the time
- Some of the time
- Most of the time
- All of the time

4. During the last 4 weeks, about how often did you feel hopeless?

- None of the time
- A little of the time
- Some of the time
- Most of the time
- All of the time

5. During the last 4 weeks, about how often did you feel restless or fidgety?

- None of the time
- A little of the time
- Some of the time
- Most of the time
- All of the time

6. During the last 4 weeks, about how often did you feel so restless you could not sit still?

- None of the time
- A little of the time
- Some of the time
- Most of the time
- All of the time

7. During the last 4 weeks, about how often did you feel depressed?

- None of the time
- A little of the time
- Some of the time
- Most of the time
- All of the time

8. During the last 4 weeks, about how often did you feel that everything was an effort?

- None of the time
- A little of the time
- Some of the time
- Most of the time
- All of the time

9. During the last 4 weeks, about how often did you feel so sad that nothing could cheer you up?

- None of the time
- A little of the time
- Some of the time
- Most of the time
- All of the time

10. During the last 4 weeks, about how often did you feel worthless?

- None of the time
- A little of the time
- Some of the time
- Most of the time
- All of the time

Continue »

Your Alcohol Consumption

The following questions relate to your use of alcohol.

We understand that it can be difficult to remember exactly. Please give your best estimate for each answer.

1. How often do you have a drink containing alcohol?

2. How many Standard Drinks containing alcohol do you have on a typical day when you are drinking? (Please refer to the Standard Drinks guide on the left)

3. How often do you have 6 or more Standard Drinks on one occasion?

4. During the past year, how often have you found that you were not able to stop drinking once you had started?

5. During the past year, how often have you failed to do what was normally expected of you because of drinking?

6. During the past year, how often have you needed a drink in the morning to get yourself going after a heavy drinking session?

7. During the past year, how often have you had a feeling of guilt or remorse after drinking?

8. During the past year, have you been unable to remember what happened the night before because you had been drinking?

9. Have you or someone else been injured as a result of your drinking?

10. Has a relative or friend, doctor or other health worker been concerned about your drinking or suggested you cut down?

Continue »

Your Mood and Physical State in the Past 4 Weeks

1. During the last **4 weeks**, how much have you been bothered by any of the following problems?

	Not bothered	Bothered a little	Bothered a lot
a. Stomach pain	○	○	○
b. Back pain	○	○	○
c. Pain in your arms, legs, or joints (knees, hips, etc.)	○	○	○
d. Menstrual cramps or other problems with your periods	○	○	○
e. Pain or problems during sexual intercourse	○	○	○
f. Headaches	○	○	○
g. Chest pain	○	○	○
h. Dizziness	○	○	○
i. Fainting spells	○	○	○
j. Feeling your heart pound or race	○	○	○
k. Shortness of breath	○	○	○
l. Constipation, loose bowels or diarrhoea	○	○	○
m. Nausea, gas or indigestion	○	○	○

2. Over the last **2 weeks**, how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half the days	Nearly every day
a. Little interest or pleasure in doing things	○	○	○	○
b. Feeling down, depressed, or hopeless	○	○	○	○
c. Trouble falling or staying asleep, or sleeping too much	○	○	○	○
d. Feeling tired or having little energy	○	○	○	○
e. Poor appetite or overeating	○	○	○	○
f. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	○	○	○	○
g. Trouble concentrating on things, such as reading the newspaper or watching television	○	○	○	○
h. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	○	○	○	○
i. Thoughts that you would be better off dead or of hurting yourself in some way	○	○	○	○

Continue »

3. Questions about anxiety.

	No	Yes
a. In the last **4 weeks**, have you had an anxiety attack — suddenly feeling fear or panic?	○	○
b. Has this ever happened before?	○	○
c. Do some of these attacks come suddenly out of the blue – that is, in situations where you don't expect to be nervous or uncomfortable?	○	○
d. Do these attacks bother you a lot or are you worried about having another attack?	○	○

4. Think about your last bad anxiety attack.

	No	Yes
a. Were you short of breath?	○	○
b. Did your heart race, pound, or skip?	○	○
c. Did you have chest pain or pressure?	○	○
d. Did you sweat?	○	○
e. Did you feel as if you were choking?	○	○
f. Did you have hot flashes or chills?	○	○
g. Did you have nausea or an upset stomach, or the feeling that you were going to have diarrhea?	○	○
h. Did you feel dizzy, unsteady, or faint?	○	○
i. Did you have tingling or numbness in parts of your body?	○	○
j. Did you tremble or shake?	○	○
k. Were you afraid you were dying?	○	○

5. Over the last **4 weeks**, how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half the days
a. Feeling nervous, anxious, on edge, or worrying a lot about different things.	○	○	○
b. Feeling restless so that it is hard to sit still.	○	○	○
c. Getting tired very easily.	○	○	○
d. Muscle tension, aches, or soreness.	○	○	○
e. Trouble falling asleep or staying asleep.	○	○	○
f. Trouble concentrating on things, such as reading a book or watching TV.	○	○	○
g. Becoming easily annoyed or irritable.	○	○	○

Continue »

6. Questions about eating.

	No	Yes
a. Do you often feel that you can't control what or how much you eat?	○	○
b. Do you often eat, within any **2-hour** period, what most people would regard as an unusually large amount of food?	○	○
c. Has this been as often, on average, as twice a week for the last **3 months**?	○	○

7. In the last **3 months** have you often done any of the following in order to avoid gaining weight?

	No	Yes
a. Made yourself vomit?	○	○
b. Took more than twice the recommended dose of laxatives?	○	○
c. Fasted — not eaten anything at all for at least 24 hours?	○	○
d. Exercised for more than an hour specifically to avoid gaining weight after binge eating?	○	○

	No	Yes
8. If you checked "YES" to any of these ways of avoiding gaining weight, were any as often, on average, as twice a week?	○	○
9. Do you ever drink alcohol (including beer or wine)?	○	○

10. Have any of the following happened to you more than once in the last **6 months**?

	No	Yes
a. You drank alcohol even though a doctor suggested that you stop drinking because of a problem with your health.	○	○
b. You drank alcohol, were high from alcohol, or hung over while you were working, going to school, or taking care of children or other responsibilities.	○	○
c. You missed or were late for work, school, or other activities because you were drinking or hung over.	○	○
d. You had a problem getting along with other people while you were drinking.	○	○
e. You drove a car after having several drinks or after drinking too much.	○	○

11. If you checked off any problems on this questionnaire, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

- ○ Not difficult at all
- ○ Somewhat difficult
- ○ Very difficult
- ○ Extremely difficult

Continue »

Questions Related to Smoking

1. Would you describe yourself as being?

2. Have you smoked any tobacco, even part of a cigarette, in the last seven days?

○ Yes ○ No

3. How soon after you wake up do you smoke your first cigarette?

4. Do you find it difficult not to smoke in places where smoking is not allowed, like at the library or at the movies?

○ Yes ○ No

5. Which cigarette would you be the most unwilling to give up?

○ the first one in the morning
○ any other

6. How many cigarettes a day do you smoke?

7. Do you smoke more during the first hours in the morning than during the rest of the day?

○ Yes ○ No

8. Do you smoke when you're ill and in bed all day?

○ Yes ○ No

Continue »

Knowledge and Use of Mental Health Services

1. Have you attended the University counselling service in the past **4 weeks**?

○ Yes ○ No

2. Have you attended the University counselling service in the past **12 months**?

○ Yes ○ No

3. If yes, on how many occasions in the past **12 months**?

4. Has there been a time when you thought you would benefit from mental health support/counselling but have not accessed it?

○ Yes ○ No

5. Has it ever been suggested to you that you have counselling?

○ Yes ○ No

6. Have you attended any workshops run by the counselling service?

○ Yes ○ No

7. Have you accessed online information about mental health issues? (eg; University counselling service website, Beyond Blue website, Black Dog Institute website)

○ Yes ○ No

8. Have you accessed the University of Newcastle health service for mental health/emotional support?

○ Yes ○ No

9. How would you describe your knowledge of Newcastle University's mental health services?

10. If you are aware of mental health services on campus, how did you find out about them?

11. Are there any specific reasons why you wouldn't access the university mental health services if you required them in the future?

12. Would you prefer to use mental heath services external to the university if you required them?

○ Yes ○ No

13. If yes can you tell us why?

14. Are you currently accessing mental health support?

15. How often has your academic performance been affected in the last **12 months** by mental health or emotional difficulties?

16. How many classes or other academic obligations in the **past 12 months** have you missed due to mental health or emotional difficulties?

17. Are you on any medications for anxiety, depression or sleep?

○ Yes ○ No

18. If yes, can you list their names below?

19. Are you an international student?

○ Yes ○ No

20. How would you describe your sexual orientation:

21. Are there any further points you would like to make regarding mental health services on campus or how we could improve student access to mental health support?

Continue »

To go into the draw to win an Apple iPad please leave your contact details below. The draw will be random. Once you submit your responses your personal details will immediatly go into a different database and will not be stored with your responses so your responses remain anonymous. Once the draw for the iPad has taken place all contact details will be destroyed. You can only take part in the draw once - please don't fill out the survey more than once as it will not increase your chances of winning of the iPad and will adversely affect the data.

Contact details:

Continue »

Thank you for participating in this survey.

In case you or someone you know would like help, the university counselling service can be contacted on 4921 5801 during business hours. You can obtain further information from their website.

If you or someone you know requires immediate support you can contact Lifeline, a 24 hour telephone counselling service, on 13 11 14.

The following weblinks provide accurate and useful information on mental health issues:

1. Beyondblue
2. The Blackdog Institute
3. Australian Drug Information Network

If you have any questions, would like to make a complaint or would like to discuss this survey you can contact the lead researcher, Dr Kypros Kypri by e-mail, or by phone: 4913 8231.

Complaints about this research

This project has been approved by the University of Newcastle's Human Research Ethics Committee (Approval No. H-2009-0366).

Should you have any concerns about your rights as a participant in the research, or if you have a complaint about the manner in which the research is conducted, you may contact the researchers on the details provided above. If an independent person is preferred, please contact the University's Human Research Ethics Officer via the Research Office, The Chancellery, The University of Newcastle, University Drive, Callaghan NSW 2308, Australia, telephone (02) 49216333, email Human-Ethics@newcastle.edu.au.

Appendix 3 – Details of survey pilot

Pilot of Survey

A pilot survey to test functioning of the website questionnaire, data output and to get feedback on the survey content was conducted in June 2010. Peers in the Doctorate of Clinical Psychology degree were asked to participate to support my research. 27 peers piloted the survey. They were provided instructions not to answer the questions as themselves, but as a fictitious student. They were asked to review and provide feedback on typographical errors, the flow of the survey, question order, and any questions or important areas they thought the survey hadn't addressed regarding students' mental health. They were asked to be frank and open in their feedback. As fellow students and doctoral researchers they had all been trained in research methodology and were currently conducting their own research.

The feedback was generally positive. Several suggestions were provided on; layout, technical aspects of how the website logic worked and suggestions on how to ask personal details such as age, cultural background and sexuality. The suggested changes were incorporated into the survey after discussion amongst the researchers. The survey was trialled several further times by the researchers before being finalised in July 2010.

Appendix 4 – Participant information statement

Information Statement

Assoc Prof Kypros Kypri
School of Medicine and Public Health
David Maddison Clinical Sciences Building
University of Newcastle, 2300
Tel: (02) 4913 8231
Kypros.kypri@newcastle.edu.au

Students Mental Health & Access to Support
Document Version 1: dated 27/10/09

You are invited to participate in the research project identified above which is being conducted by Assoc Prof Kypros Kypri, Senior Research Fellow, School of Medicine and Public Health and Associate Professor Jenny Bowman, School of Psychology at the University of Newcastle. The research is part of David Said's studies as a student in the Doctor of Clinical Psychology Program at the University of Newcastle.

Why is the research being done?
The purpose of the research is to better understand the levels of emotional and mental health difficulties students experience and what help students access when they are having these difficulties. The research aims to improve knowledge in this area to help improve services for students.

Who can participate in the research?
We are seeking students aged between 18 – 24 years who are enrolled at the University of Newcastle. Your name was randomly selected from the university enrolment database.

What choice do you have?
Participation in this research is entirely your choice. Only those people who give their informed consent will be included in the project. Whether or not you decide to participate, your decision will not disadvantage you. The researchers will be working independently of the university administration, so your participation or non participation will not be identifiable to the university administration in any manner.

If you do decide to participate, you may withdraw from the project at any time without giving a reason.

What will you be asked to do?
If you agree to participate, you will be asked to complete a confidential web questionnaire about how you have been feeling in the last four weeks, your demographic details, questions about using university services and open questions providing you with the opportunity to give feedback on what students would benefit from in regards to managing emotional and mental health stress whilst at university. All participants will go into the draw to win an iPAD.

How much time will it take?
The questionnaire should take less than 20 minutes to complete.

***What are the risks and benefits of participating*?**
We anticipate the direct benefits to students by participating will be to increase awareness of mental health services available to them. A risk may be that in answering questions about mental health it may remind you of a difficult time you may have had in the past.

How will your privacy be protected?
We will use your name and address solely for the purpose of inviting you to participate. Any information collected by the researchers which might identify you will be stored securely and separately from the raw data and will only be accessed by the researchers to conduct the prize draw for the iPAD. This will take place once all the data has been collected. Once this prize draw has been conducted all identifying data will be destroyed. Your answers to the questionnaire will be stored separately and without identifying information. Raw data will be retained for at least 5 years after the last of any scientific papers arising from the study. Data will be stored on an encrypted hard drive at the lead researcher's office at the University of Newcastle. There will be no means of identifying this data, it will only consist of a set of numbers and comments.

How will the information collected be used?
The information obtained will be used to provide advice to universities, in research papers and as a part of a thesis for David Said's Doctor of Clinical Psychology degree. Individual participants will not be identified in any reports arising from the project.

It is expected that participants be offered at least a summary of the results written in lay language

***What do you need to do to participate*?**
Please read this Information Statement and be sure you understand its contents before you consent to participate. If there is anything you do not understand, or you have questions, contact the researcher.

If you would like to participate, please click on the hyperlink below which will take you to an online questionnaire. This will be taken as your informed consent to participate.

Further information
If you would like further information please contact Assoc Prof Kypros Kypri on Kypros.kypri@newcastle.edu.au from whom potential participants can obtain further information about the project.
Thank you for considering this invitation.

Kypros Kypri
Senior Research Fellow
School of Medicine and Public Health
University of Newcastle

David Said
Doctor of Clinical Psychology Candidate
School of Psychology University of Newcastle

Complaints about this research

This project has been approved by the University's Human Research Ethics Committee, Approval No. **H-2009-0366**.

Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to the Human Research Ethics Officer, Research Office, The Chancellery, The University of Newcastle, University Drive, Callaghan NSW 2308, Australia, telephone (02) 49216333, email Human-Ethics@newcastle.edu.au.

Appendix 5 – Confirmation of acceptance of paper

Ref.: Ms. No. SPPE-D-12-00242R1

Risk factors for mental disorder among university students in Australia: Findings from a web-based cross-sectional survey

Social Psychiatry and Psychiatric Epidemiology

Dear Assoc Prof Kypri,

I am pleased to be able to tell you that your work has now been accepted for publication in Social Psychiatry and Psychiatric Epidemiology.

It was accepted on 16-08-2012.

Thank you for submitting your work to this journal.

With kind regards

Hélène Verdoux
Editor
Social Psychiatry and Psychiatric Epidemiology

Appendix – 6

Instructions for authors: *Social Psychiatry and Psychiatric Epidemiology*

Manuscript Submission

Submission of a manuscript implies: that the work described has not been published before; that it is not under consideration for publication anywhere else; that its publication has been approved by all co-authors, if any, as well as by the responsible authorities – tacitly or explicitly – at the institute where the work has been carried out. The publisher will not be held legally responsible should there be any claims for compensation.

Permissions

Authors wishing to include figures, tables, or text passages that have already been published elsewhere are required to obtain permission from the copyright owner(s) for both the print and online format and to include evidence that such permission has been granted when submitting their papers. Any material received without such evidence will be assumed to originate from the authors.

Online Submission

Authors should submit their manuscripts online. Electronic submission substantially reduces the editorial processing and reviewing times and shortens overall publication times. Please follow the hyperlink "Submit online" on the right and upload all of your manuscript files following the instructions given on the screen.

Title Page

The title page should include:

The name(s) of the author(s)
A concise and informative title
The affiliation(s) and address(es) of the author(s)
The e-mail address, telephone and fax numbers of the corresponding author

Abstract

Please provide a structured abstract of 150 to 250 words which should be divided into the following sections:

Purpose (stating the main purposes and research question)
Methods
Results
Conclusions

Keywords

Please provide 4 to 6 keywords which can be used for indexing purposes.

Text Formatting

Manuscripts should be submitted in Word.

Use a normal, plain font (e.g., 10-point Times Roman) for text.
Use italics for emphasis.
Use the automatic page numbering function to number the pages.
Do not use field functions.
Use tab stops or other commands for indents, not the space bar.
Use the table function, not spreadsheets, to make tables.
Use the equation editor or MathType for equations.
Save your file in docx format (Word 2007 or higher) or doc format (older Word versions).

Word template (zip, 154 kB)

Manuscripts with mathematical content can also be submitted in LaTeX.

LaTeX macro package (zip, 182 kB)

Headings

Please use no more than three levels of displayed headings.

Abbreviations

Abbreviations should be defined at first mention and used consistently thereafter.

Footnotes

Footnotes can be used to give additional information, which may include the citation of a reference included in the reference list. They should not consist solely of a reference citation, and they should never include the bibliographic details of a reference. They should also not contain any figures or tables.

Footnotes to the text are numbered consecutively; those to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data). Footnotes to the title or the authors of the article are not given reference symbols.

Always use footnotes instead of endnotes.

Acknowledgments

Acknowledgments of people, grants, funds, etc. should be placed in a separate section before the reference list. The names of funding organizations should be written in full.

Citation

Reference citations in the text should be identified by numbers in square brackets. Some examples:

1. Negotiation research spans many disciplines [3].

2. This result was later contradicted by Becker and Seligman [5].

3. This effect has been widely studied [1-3, 7].

Reference list

The list of references should only include works that are cited in the text and that have been published or accepted for publication. Personal communications and unpublished works should only be mentioned in the text. Do not use footnotes or endnotes as a substitute for a reference list.

The entries in the list should be numbered consecutively.

Journal article Gamelin FX, Baquet G, Berthoin S, Thevenet D, Nourry C, Nottin S, Bosquet L (2009) Effect of high intensity intermittent training on heart rate variability in prepubescent children. Eur J Appl Physiol 105:731-738. doi: 10.1007/s00421-008-0955-8 Ideally, the names of all authors should be provided, but the usage of "et al" in long author lists will also be accepted: Smith J, Jones M Jr, Houghton L et al (1999) Future of health insurance. N Engl J Med 965:325–329
Article by DOI Slifka MK, Whitton JL (2000) Clinical implications of dysregulated cytokine production. J Mol Med. doi:10.1007/s001090000086
Book South J, Blass B (2001) The future of modern genomics. Blackwell, London
Book chapter Brown B, Aaron M (2001) The politics of nature. In: Smith J (ed) The rise of modern genomics, 3rd edn. Wiley, New York, pp 230-257
Online document Cartwright J (2007) Big stars have weather too. IOP Publishing PhysicsWeb. http://physicsweb.org/articles/news/11/6/16/1. Accessed 26 June 2007
Dissertation Trent JW (1975) Experimental acute renal failure. Dissertation, University of California

Always use the standard abbreviation of a journal's name according to the ISSN List of Title Word Abbreviations, see

www.issn.org/2-22661-LTWA-online.php

For authors using EndNote, Springer provides an output style that supports the formatting of in-text citations and reference list.

EndNote style (zip, 2 kB)

Authors preparing their manuscript in LaTeX can use the bibtex file spbasic.bst which is included in Springer's LaTeX macro package.

All tables are to be numbered using Arabic numerals.
Tables should always be cited in text in consecutive numerical order.

For each table, please supply a table caption (title) explaining the components of the table.
Identify any previously published material by giving the original source in the form of a reference at the end of the table caption.

Footnotes to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data) and included beneath the table body.

Ethical standards

Manuscripts submitted for publication must contain a statement to the effect that all human studies have been approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki. It should also be stated clearly in the text that all persons gave their informed consent prior to their inclusion in the study. Details that might disclose the identity of the subjects under study should be omitted.

The editors reserve the right to reject manuscripts that do not comply with the above-mentioned requirements. The author will be held responsible for false statements or failure to fulfill the above-mentioned requirements.

Conflict of interest

Authors must indicate whether or not they have a financial relationship with the organization that sponsored the research. This note should be added in a separate section before the reference list.

If no conflict exists, authors should state: The authors declare that they have no conflict of interest.

Appendix 7 – PHQ-9 scoring

Scoring the PHQ-9 (Spitzer et al., 1999)

Depression

The PHQ – 9 measures depression in several categories. To meet the depression threshold in this study we required students to meet the minimum requirements of the measure, that is; question 2 a or b were more than half the days and at least 2 questions of question 2 c-i were more than half the days, except i was only required to be several days to meet this cut-off. The PHQ-9 scoring criteria refers to this cluster of answers as "other depression syndromes".

Anxiety

The PHQ-9 measures "panic syndrome" and "other anxiety syndromes".

To meet panic syndrome participants were required to answer "yes" to all (a-d) in question 3 and four more "yes" answers from questions 4a-k.

To meet "other anxiety syndrome" participants were required to answer "more than half the days" to Question 5a and three or more of Question 5b-g.

Eating disorder

The PHQ-9 measures symptoms of the eating disorders bulimia nervosa and binge eating disorder. To meet the bulimia cut-off they were required to answer "yes" to question 6a -c and question 8. To meet the binge eating disorder criteria they were required to answer "yes" to question 6a-c.

Permission was granted by the licensee to use this screen in a web based version.

Appendix 8 – AUDIT scoring

Alcohol use disorders identification test (AUDIT) (Saunders et al., 1993)

Scoring

- Scoring 1 – 7 = on the AUDIT was indicative of *moderate drinking*
- Scoring 8-14 on the AUDIT was indicative of *hazardous drinking*
- Scoring 15 - 19 on the AUDIT was indicative of *harmful drinking*
- Scoring ≥ 19 on the AUDIT was indicative of *alcohol dependence*