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This article investigates the psychological well-being of students from all faculties across their undergraduate degree from pre-registration to semester two of year three at one UK university. Data were collected on seven occasions, with 66% of students who began their studies between 2000 and 2002 taking part in the project. Psychological well-being was assessed using the General Population Clinical Outcomes in Routine Evaluation (GP-CORE). Results show that greater strain is placed on well-being once students start university compared to pre-university levels. Levels of strain are generally highest during semester one, with significant reduction in levels of distress from semester one to semester two being observed in both year one and year three. At no time did levels of distress fall to pre-registration levels. Given these results show university to be a time of heightened distress, there is a need to ensure that students receive the support necessary throughout their studies to enable them to successfully complete their degree course, enabling them to negotiate the transition to university and then ultimately into the workforce.

Keywords: university student; psychological well-being; mental health

Introduction

Levels of psychological distress within the university population are cause for concern (Rosal et al. 1997; Monk 1999; Stewart-Brown et al. 2000; Adlaf et al. 2001; Cotton, Dollard, and de Jonge 2002; Jessop, Herberts, and Solomon 2005; Bewick et al. 2008). Changes in UK higher education, namely the abolition of student grants in favour of student loans and the introduction of tuition fees, have resulted in students' lives becoming increasingly pressurised. The Heads of University Counselling Services (1999) have highlighted the impact of increasing levels of psychological disturbance amongst students in higher education.

Research has reported heightened levels of psychological distress within the university student population. Both UK (e.g. Roberts et al. 2000; Stewart-Brown 2000) and international (e.g. Adlaf et al. 2001) students report higher levels of distress when compared to their non-student peers. Studies suggest that UK students fare worse than their European counterparts (e.g. Jessop, Herberts, and Solomon 2005). This said, it is clear that across the world levels of psychological distress amongst the

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student population are worrying (e.g. Bayram and Bilgel 2008; Song et al. 2008; Uner et al. 2008).

The Royal College of Psychiatrists (2003) called for a greater understanding of the psychological well-being of students, as they found a distinct lack of evidence documenting how (if at all) the well-being of UK students alters throughout their degree course. Since this call, evidence documenting the levels of psychological distress in the UK student population has been growing. Much of this evidence is cross-sectional in nature, and therefore cannot explain changes across time. What this evidence does suggest is the heightened levels of psychological distress found during the 1990s have not dissipated. For example, a recent small-scale study of students enrolled at a university-based general practice reported high levels of anxiety (48%) and lower but significant levels of depression (10%) as measured by the Hospital Anxiety and Depression Scale (Shiels, Gabbay, and Exley 2008). The authors of this study did acknowledge that there is still a need for a larger study which investigates changes in psychological well-being across time.

As well as an interest in how psychological well-being changes across time, there is a body of work investigating how internal and external factors might impact on the mental health of students. For example, financial concerns and/or debt have been found to be a predictor of worse mental health (e.g. Roberts et al. 2000; Cooke et al. 2004; Jessop, Herberts, and Solomon 2005). Without an understanding of the ebb and flow of psychological well-being across the degree course, it has been difficult to contextualise these findings within the wider context. Currently we have a limited understanding of how a student's psychological well-being may change across time, and therefore it is difficult to hypothesise how factors such as finances, stress, socio-economic status, life goals and social support may mediate psychological well-being across time. A more complete understanding of how psychological well-being changes across time would also benefit efforts to develop effective interventions that can assist students as they negotiate the transition from school to university and ultimately to post-university life.

There are a couple of studies which have attempted to address the issue of changes in psychological distress across time within the UK student population; these studies, however, have not surveyed students throughout all years of their undergraduate degree (Andrews and Wilding 2004; Cooke et al. 2006). A strength of these studies was the inclusion of pre-registration data collection, allowing an assessment of how students' psychological well-being altered during the transition to university. In both instances the studies indicate that a greater strain is placed on well-being once students start university, compared to levels preceding entry. They do not, however, include a measurement of psychological well-being during students' final year, and therefore it is difficult to extrapolate the levels of distress felt by students as they prepare for life after completion of their undergraduate degree.

While, within North America, data sets have facilitated an epidemiological approach to investigating student mental health (e.g. Blanco et al. 2008), such information is not currently available within the UK. Indeed, the majority of existing UK data has been gathered using one-off cross-sectional surveys. The few UK studies that have surveyed students across time have not sampled at each semester of the undergraduate degree course. In addition, the current evidence is limited as many studies have focused on students from a narrow range of disciplines (e.g. Rosal et al. 1997), have included relatively small numbers of students (e.g. Rosal et al. 1997; Jessop, Herberts, and Solomon 2005), have not included pre-university levels of distress (e.g.

Monk and Mahmod 1999), and have surveyed students at one time-point (e.g. Roberts et al. 2000; Adlaf et al. 2001).

The current study looked to address some of these issues by investigating the psychological well-being of undergraduate students from all faculties of one university across their degree course, from pre-registration to semester two of year three. It thereby aimed to track temporal changes of psychological well-being in students. That is, we wanted to assess the psychological well-being of students via a design which collected baseline data on students prior to their arriving at university, utilising a standardised measure sensitive to change and derived from a measure in widespread use. We then aimed to investigate their psychological well-being across three academic years in order to provide a fuller understanding of the changes in psychological well-being over time, by administering a survey at two time-points during each of three years.

Method

Data set

Data were drawn from the UNIversity Quality of Life and Learning (UNIQoLL) data set collected at a large Russell Group university in the UK (Audin, Davy, and Barkham 2003). The University has an undergraduate population of around 22,000 students. The majority of students are White/White British (≈ 90%). Approximately 45% of the undergraduate student population identify themselves as Christian, with approximately 40% stating they have no religion. There are more women than men within the undergraduate population (approximately 60:40 split), and approximately 90% of undergraduates are under 21 years of age when entering university. The majority of undergraduate students reside in halls of residence during their first year before moving into privately rented shared accommodation in year two. From 2000 till 2006 UNIQoLL carried out a series of surveys examining students' perceptions of university life, covering a variety of issues, including psychological well-being, alcohol consumption, use of student services and perceptions of the learning environment.

Prospective full-time undergraduate students were sent a pen and paper questionnaire with their registration pack before they started university (T1). Thereafter, these students received a pen and paper or electronic questionnaire via their university department in semester one (autumn) and semester two (spring) during the three years of their undergraduate course. For this article, data from three complete cohorts were used (i.e. students began their studies between 2000 and 2002 and were followed throughout three years of their degree course).

In each survey students were asked to provide their student identification number. Where valid student identification numbers were available student responses could be linked across time if students responded to more than one survey. While the content of each survey differed across each time-point, questions pertaining to psychological well-being were consistently asked throughout.

Measure

All surveys included the General Population Clinical Outcomes in Routine Evaluation (GP-CORE; Sinclair et al. 2005), a general population version of the Clinical Outcomes in Routine Evaluation Outcome Measure (CORE-OM; Barkham et al.

2001, 2005; Evans et al. 2002). The GP-CORE comprises 14 items, drawn from the CORE-OM which contains 34 items, tapping the domains of subjective well-being, symptoms (anxiety, depression and physical problems), life functioning and risk. The GP-CORE includes items from all domains excluding risk. It includes one depression ('I have felt unhappy') and one anxiety ('I have felt tense, anxious or nervous') item. The current study used the general population (GP) version of the CORE-OM because it is seen as more appropriate for a student population (Sinclair et al. 2005; Barkham et al. 2006). All items were scored from 0 to 4, with the most negative answer scoring 4 and the most positive answer scoring 0. Item scores were totalled and divided by 14, yielding a mean item score of between 0 and 4. Paralleling procedures in reporting findings using the CORE-OM, the GP-CORE mean score was multiplied by 10 yielding a score from 0 to 40, and referred to as a student's general score. The term general score contrasts with the term clinical score used for the CORE-OM (for details see Leach et al. 2006). Lower scores on the GP-CORE indicate lower levels of psychological distress. The psychometric properties of the GP-CORE as measured in a student population have been reported elsewhere (see Sinclair et al. 2005), and showed the GP-CORE to have good reliability, to distinguish between clinical and non-clinical populations, and to correlate with the CORE-OM in the order of 0.90 to 0.95. Previous UK studies have successfully used GP-CORE to measure psychological well-being within the student population (Cooke et al. 2004, 2006).

Participants

In total 66% (*n* = 24,234) of students who began their studies between 2000 and 2002 took part in the UNIQoLL project. Of these, 16,460 (68%) provided complete GP-CORE data on at least one occasion.

Most students only participated in one survey per academic year (*cross-sectional* data set, *n* = 14,555 surveys). Where students responded to all surveys within an academic year (T1–T2–T3 or T4–T5 or T6–T7) the linking process provided an opportunistic *longitudinal* data set for examining changes in psychological well-being during the year (year one *n* = 1085, year two *n* = 187, year three *n* = 476). Students who completed all surveys for more than one year were excluded from this longitudinal data set in order to achieve independence across the years (*n* = 157).

Demographic information was available for those students who provided valid student identification numbers (approximately two-thirds). Of these students 58% (*n* = 7153) were women. Ninety-four per cent (*n* = 11,588) were from the UK. The mean age at year one was 19.43 ± 2.84 years (*n* = 11,883). The majority of participants (89%; *n* = 10,946) were white. Participants were drawn from all university faculties, with the largest percentages from Joint Honours (15%; *n* = 1918), Arts (14%; *n* = 1680), Biological Sciences (12%; *n* = 1444), Performing Arts (11%; *n* = 1395) and Medicine and Health (11%; *n* = 1363). The demographics of participants were similar to those of the wider student population.

Data analysis

To analyse the longitudinal samples, repeated measures analysis of variance (ANOVA) was employed to investigate the change in psychological well-being (i.e. CORE-GP general score and scores on the anxiety and the depression item) during the academic year. To test for differences between men and women students, sex was

added to the ANOVA model. When significant differences were found in year one, *a priori* mean comparison tests were used to flag up which of the three time-points were different from each other. Year differences in psychological well-being (GP-CORE general score, depression, anxiety) were investigated within the cross-sectional sample using multivariance analysis of variance (MANOVA). For the purposes of this analysis the independent variable was time, and GP-CORE general score, depression score and anxiety score were the dependent variables.

At each time-point differences between the cross-sectional sample and the relevant longitudinal sample were investigated using independent *t*-tests. Sex differences within the total sample were investigated using independent *t*-tests.

Throughout the article data-points are given as mean ($\pm$ 1 standard deviation). For all statistical tests the significance level was set to 5% ($p < .05$).

Results

Changes in GP-CORE general scores across time

Overall, psychological well-being in undergraduate students decreased over the course of their study, with GP-CORE general scores in year three showing about a 100% increase compared to pre-registration, and about a 30% increase compared to year one (Figure 1). Changes in psychological well-being were largest between pre-registration and semester one, year one, and between year two and year three (Table 1, Figure 1).

During their first year at university, students' psychological well-being changed significantly over time (Table 1, Figure 1). Psychological well-being decreased significantly from pre-registration to semester one, and then slightly increased again in semester two (Table 1, Figure 1). This pattern was similar for women and men (time by sex, F = 0.26, df = 1.63, 1594.49, $p = .72$).

In year two students' psychological well-being was slightly but significantly poorer during semester two compared to semester one. However, women showed a different pattern from men (time by sex, F = 5.32, df = 1, 165, $p = .02$). Whereas men students showed a significant decrease in psychological well-being over time (T4 12.00 $\pm$ 6.06; T5 14.86 $\pm$ 5.73; paired sample *t*-tests $t = -3.66$, df = 61, $p < .001$), in women students psychological well-being did not significantly differ between semester one and two (T4 14.34 $\pm$ 6.14; T5 15.02 $\pm$ 5.82 $t = -1.21$, df = 104, $p = .23$).

In year three students' psychological well-being was again slightly but significantly poorer during semester two compared to semester one (F = 7.35, df = 1, 328, $p < .01$). During year three this pattern was similar for men and women (time by sex F = 0.19, df = 1, 328, $p = .66$).

In general the cross-sectional data showed similar results across time to those of the longitudinal data, with the exception of T2, T5 and T7, where the cross-sectional data set had a significantly higher mean when compared to the relevant longitudinal data.

Changes in anxiety scores across time

In general, anxiety levels peaked during semester one of each year; year three students in the longitudinal sample provided an exception to this trend as their scores peaked in semester two (Table 2, Figure 2).

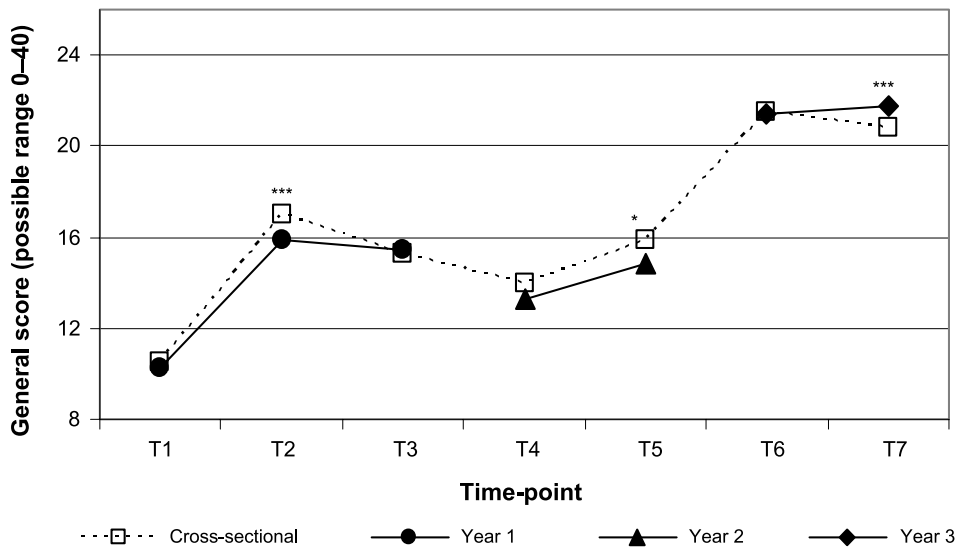Table 1. GP-CORE general scores for each sub-sample across time.[1]

Time-point	Cross-sectional sample (n = 14,555)			Longitudinal samples								
	Mean	(SD)	n	Year 1 (n = 1085)		Year 2 (n = 187)		Year 3 (n = 476)		t	df	p
				Mean	(SD)	Mean	(SD)	Mean	(SD)			
T1	10.47	(5.28)[a]	8679	10.22	(5.29)[a]					−1.48	9762	.14
T2	16.97	(6.38)[b]	3652	15.90	(6.58)[b]					−4.76	1734.89[3]	**<.001**
T3	15.26	(6.34)[c]	3191	15.43	(6.70)[c]					0.71	1788.82[3]	.48
T4	13.93	(5.87)[d]	892			13.26	(6.09)[a]			−1.40	1077	.16
T5	15.87	(6.28)[e]	1941			14.87	(5.75)[b]			−2.25	231.06	**.03**
T6	21.54	(3.41)[f]	1415					21.43	(3.40)[a]	−0.60	1889	.55
T7	20.79	(3.49)[g]	1836					21.77	(2.95)[b]	6.22	853.39[3]	**<.001**
F	1687.89			496.51[2]		13.40		4.40				
df	6, 21599			1.63, 1763.63		1, 186		1, 475				
p	<.001			<.001		<.001		.04				

[1]Figures reported are for all participants including those for whom demographic information was unavailable.
[2]Greenhouse-geisser adjustment.
[3]Equal variances not assumed.
Notes: The last three rows give the test results of MANVOA (cross-sectional sample) and repeated measures ANOVA (longitudinal samples). Different letters in the same column indicate statistically significant differences across time points ($p < .05$) using *a priori* mean comparison test. The last three columns give the test results of the student *t*-test testing for differences between the cross-sectional sample and the corresponding longitudinal sample (significant differences are indicated in bold).

Figure 1.   Students' GP-CORE general scores at each time-point by sample.

Anxiety scores changed little during the first year, with a slight increase from pre-registration to semester one, and a slight decrease from semester one to two. This pattern was similar for men and women students (time by sex: F = 0.12, df = 1.99, 1948.37, p = .89).

In the first semester of year two, anxiety levels had risen by nearly 50% compared to the previous year. However, anxiety levels dropped considerably again in semester two. No significant time by sex interaction was observed (F = 3.43, df = 1, 165, p = .06).

In the first semester of year three, anxiety levels rose again compared with the last semester of the previous year, but again decreased considerably in semester two. During this last year women and men showed a different pattern (time by sex: F = 6.74, df = 1, 328, p = .01); anxiety did not differ between semester one and two for females (T6: 20.80 ± 10.17; T7: 20.90 ± 11.97) but significantly increased for males (T6: 21.32 ± 10.78, T7 25.89 ± 12.29; t = −3.45, df = 128, p < .001).

In general, the cross-sectional data showed similar results across time to those of the longitudinal data, with the exception of T5 and T7, where the cross-sectional data set had a significantly lower mean when compared to the relevant longitudinal data.

Changes in depression scores across time

Depression scores were significantly lower than the anxiety scores at each time point (Figure 2; MANOVA T1 (F = 936.89, df = 1, 9762, p < .01), T2 (F = 531.07, df = 1, 4735, p < .01), T3 (F = 268.71, df = 1, 4286, p < .01); T4 (F = 393.44, df = 1, 1080, p < .01), T5 (F = 62.14, df = 1, 2126, p < .01), T6 (F = 677.59, df = 1, 1889, p < .01), T7 (F = 92.54, df = 1, 2310, p < .01)).

Overall, depression scores increased slightly but steadily over time, with depression scores by the end of year three being nearly twice as high as during pre-registration

Table 2. GP-CORE anxiety scores for each sub-sample across time.[1]

| | Cross-sectional sample | | | Longitudinal samples | | | | | | | | |
| | (n = 14,555) | | | Year 1 (n = 1085) | | Year 2 (n = 187) | | Year 3 (n = 476) | | | | |
Time-point	Mean	(SD)	N	Mean	(SD)	Mean	(SD)	Mean	(SD)	t	df	p
T1	15.41 [a]	(10.26)	8679	14.95 [a]	(10.14)					−1.41	9762	.16
T2	16.09 [b]	(10.84)	3652	15.68 [a]	(10.49)					−1.12	4735	.27
T3	14.30 [c]	(11.26)	3191	13.81 [b]	(11.17)					−1.24	4274	.22
T4	20.99 [d]	(11.19)	892			22.19 [a]	(10.73)			1.35	1077	.18
T5	15.02 [a,c]	(11.06)	1941			19.14 [b]	(10.59)			4.89	2126	**<.001**
T6	21.39 [d]	(11.30)	1415					21.03 [a]	(10.70)	−0.60	1889	.55
T7	19.18 [e]	(13.55)	1836					22.65 [b]	(12.35)	5.34	797.63[3]	**<.001**
F	130.04			12.52[2]		14.45		5.56				
df	6, 21599			1.99, 2152.85		1, 186		1, 475				
p	<.001			<.001		<.001		.02				

[1]Figures reported are for all participants including those for whom demographic information was unavailable.
[2]Greenhouse-geisser adjustment.
[3]Equal variances not assumed.
Notes: The last three rows give the test results of MANVOA (cross-sectional sample) and repeated measures ANOVA (longitudinal samples). Different letters in the same column indicate statistically significant differences across time points (*p* < .05) using *a priori* mean comparison test. The last three columns give the test results of the student *t*-test testing for differences between the cross-sectional sample and the corresponding longitudinal sample (significant differences are indicated in bold).
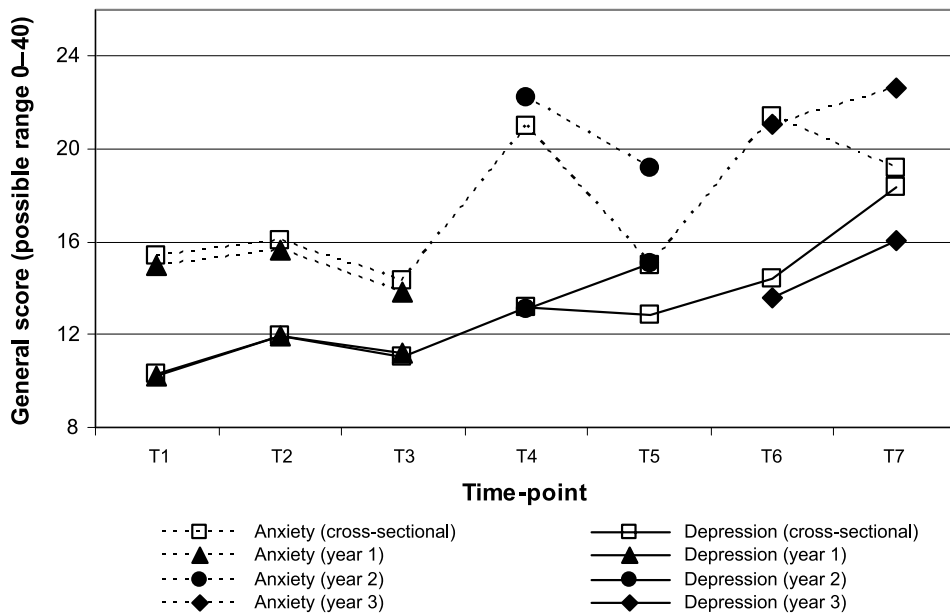
Figure 2.   Students' GP-CORE anxiety and depression item scores at each time-point within the longitudinal and cross-sectional samples.

(Table 3, Figure 2). During all three years women showed a similar pattern to men (time by sex: year one: $p = .91$, year two: $p = .67$, year three: $p = .58$).

In general the cross-sectional data showed similar results across time to those of the longitudinal data, with the exception of T5 and T7. The cross-sectional data set had a significantly lower mean when compared to the relevant longitudinal data at T5, and a higher mean when compared at T7.

Sex differences at each timepoint

In general no significant differences ($p > .05$) were observed between the sexes with regard to GP-CORE general scores, depression or anxiety. There were three exceptions: (1) women (15.35 ± 6.51) had a significantly higher GP-CORE general score than men (14.91 ± 6.50) at T3 ($t = 2.12$, df $= 3809$, $p = .034$); (2) men (21.85 ± 13.86) had a significantly higher anxiety score than women (19.23 ± 12.94) at T7 ($t = -3.68$, df $= 1323.39$, $p < .001$); and (3) men (19.23 ± 12.79) had a significantly higher depression score than women (17.45 ± 12.46) at T7 ($t = -2.71$, df $= 14.56$, $p = .007$).

Discussion

These results suggest a worsening of psychological well-being across the degree course. A greater strain is placed on students' psychological well-being at all times after starting university compared with the period of time immediately preceding entry. Levels of strain are generally highest during semester one, with significant reduction in levels of psychological distress from semester one to semester two being observed in both year one and year three. At no time, however, does the level of psychological distress fall to pre-registration (i.e. T1) levels. It is perhaps surprising

Table 3. GP-CORE depression scores for each sub-sample across time.[1]

Time-point	Cross-sectional sample (n = 14,555)			Longitudinal samples								
	Mean	(SD)	N	Year 1 (n = 1085)		Year 2 (n = 187)		Year 3 (n = 476)		t	df	p
				Mean	(SD)	Mean	(SD)	Mean	(SD)			
T1	10.27	(9.03)[a]	8679	10.18	(8.95)[a]					−0.31	9762	.76
T2	11.92	(10.27)[b]	3652	11.95	(9.91)[b]					0.11	4735	.92
T3	11.01	(9.44)[c]	3191	11.21	(9.57)[b]					0.59	4274	.56
T4	13.15	(9.63)[d]	892			13.10	(13.10)[a]			−0.06	1077	.95
T5	12.84	(9.67)[a,c]	1941			15.03	(15.03)[b]			2.95	2126	**<.01**
T6	14.38	(9.78)[d]	1415					13.55	(9.51)[a]	−1.62	1889	.11
T7	18.35	(12.66)[e]	1836					16.05	(11.82)	−3.73	781.60	**<.001**
F	197.43			15.22		5.35		15.41				
df	6, 21599			2, 1083		1, 186		1, 475				
p	<0.001			<0.001		0.02		<0.001				

[1]Figures reported are for all participants including those for whom demographic information was unavailable.

[2]Greenhouse-geisser adjustment.

[3]Equal variances not assumed.

Notes: The last three rows give the test results of MANVOA (cross-sectional sample) and repeated measures ANOVA (longitudinal samples). Different letters in the same column indicate statistically significant differences across time points ($p < .05$) using *a priori* mean comparison test. The last three columns give the test results of the student *t*-test testing for differences between the cross-sectional sample and the corresponding longitudinal sample (significant differences are indicated in bold).

that levels of psychological distress are at their highest during semester one, especially given that the majority of students sampled take their examinations at the end of semester two. The current results suggest that there are multiple points in the degree course where students are experiencing heightened levels of psychological distress and may benefit from further support/intervention.

In line with other research findings (Andrews and Wilding 2004; Cooke et al. 2006), these results suggest that university is predominately an anxiety-provoking rather than a depressive time. This said, levels of depression appear to be at their highest during the final year; further investigation, using standardised measures of depression, is needed in order to understand this effect fully. Indeed, given the increasing pressure placed on graduates as they seek graduate jobs in a highly competitive market, one which is seeing record numbers of graduates, it would be prudent for support and interventions to be in place to assist students as they negotiate this transition to adult working life.

Interestingly, the current research found few differences in levels of psychological distress, anxiety and depression between the sexes. This is contrary to other evidence that would suggest that women students have heightened levels of psychological distress when compared to their male peers (e.g. Cooke et al. 2006; Bayram and Bilgel 2008; Bewick et al. 2008; Song et al. 2008). While the current research provides some evidence that these historical differences may be dissipating within the UK, it would be prudent to investigate if this finding can be replicated within other UK student samples before concluding that differences between the sexes in levels of psychological distress are no longer the norm within the student population.

In terms of strengths and limitations, the current study investigated changes in psychological well-being in a university-wide UK student population, across all three years of their undergraduate degree, and included participants from all faculties. The combination of longitudinal and cross-sectional samples, the latter including many participants, was a valuable methodological feature. However, it is important to note that 5232 participants (36%) in the cross-sectional sample responded to more than one of the seven surveys, meaning that the data at each time-point were not completely independent. Although the demographic characteristics of both the longitudinal and cross-sectional samples were representative of the student population as a whole, it is possible that the behaviour of students who chose repeatedly not to respond may be different from those that engaged. In addition, GP-CORE includes only one depression item and one anxiety item. Therefore, while this provided an indication of possible levels of depression and anxiety within the population, future studies would benefit from including a standardised measure of these dimensions in order to more accurately, and comprehensively, assess both depression and anxiety within this population.

The current research shows that university is a time of heightened psychological distress. Given reports that conventional services (e.g. referral to counselling) may not be sufficient for some students (Brandon and Payne 2002), future research would benefit from investigating if students are currently receiving the support they require to enable them to successfully complete their degree course. Importantly, these results show fluctuations in psychological well-being, indicating that, far from being a stable decline, students' mental health ebbs and flows throughout the degree course. This suggests that throughout their studies students would benefit from support that can better equip them to negotiate their academic journey in preparation for their lives post-graduation. In particular, these results suggest that students may benefit from

some preparatory support during their second year, and from the development of some form of brief intervention that can help them manage their mental health and well-being in year three. At very least universities should be aware of the additional strain felt by some students as they approach the end of their third year, and have mechanisms in place to ensure they can provide support in a timely manner.

Acknowledgements

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