Implementation trial II: Clinical outcomes and acceptability of an internet-delivered intervention for anxiety and depression delivered as part of routine care for university students in Australia

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ABSTRACT

Background: University students report high levels of psychological distress, which is a contributor to poorer academic, social and health outcomes. There is increasing interest in the use of internet-delivered psychological treatments in student counselling services as a strategy improving access to psychological care at scale. However, to date, few large-scale prospective effectiveness trials of internet-delivered psychological treatment have been conducted in "real world" settings with university student populations.

Aim: To investigate the effectiveness and acceptability of a brief transdiagnostic internet-delivered cognitive behavioural therapy (iCBT) intervention for anxiety and depression when delivered as part of routine care by the counselling service of an Australian university.

Design: A large, prospective, single-group Phase IV clinical trial.

Method: Students engaging with the university counselling service between 2018 and 2023 ($N = 845$; 8.5% of those presenting to the service) were given the option to receive the intervention based on their clinical needs and preferences. Students completed standardised measures of depression and anxiety severity at pre-treatment, each week of the intervention, and post-treatment. A subsample ($n = 426$) also completed the measures at 3-month follow-up.

Results: Over a 5-year period, 700 students participated in the intervention and 489 provided data at post-treatment. Significant reductions in depression symptoms (% reduction = 27%, Hedges' $g = 0.35$) and anxiety (% reduction = 37%, Hedges' $g = 0.61$) were observed, alongside high levels of satisfaction (>70%) and adherence (68%). Over 50% of students had clinically significant improvements in symptom severity, and symptom deterioration was observed in <15% of students.

Conclusion: The results of the current trial provide support for the effectiveness and acceptability of internet-delivered psychological interventions provided as part of routine care to university students with symptoms of anxiety and depression.

1. Introduction

Young Australians aged 16–24 have the highest 12-month prevalence of a mental health disorder (38.8%) compared to all age groups (21.5%), with anxiety disorders and major depressive episodes being the most prevalent conditions (Australian Bureau of Statistics, 2022). The recent global COVID-19 pandemic has also had a considerable negative impact, with younger people reporting poorer mental health during the pandemic relative to older groups (Zhao et al., 2022). In general, a substantial decline in mental health has been observed in young Australian adults between 2011 and 2020 (Wilkins et al., 2022).

University students appear to be at increased risk as they face the general challenges involved in the transition to adulthood, such as changes in social roles and identity, as well as additional challenges

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related to expectations around academic achievement, developing new social networks, and greater financial burdens due to higher education costs (Campbell et al., 2022). Therefore, unsurprisingly, higher psychological distress has been reported in tertiary students than in age-matched non-students (Cvetkovski et al., 2012). In 2020, university students reported a considerable prevalence of high (32%) to very high (39%) psychological distress (Vernon et al., 2022).

Mental health difficulties in university students can contribute to poor academic performance and attrition (Auerbach et al., 2016; Bruffaerts et al., 2018), and are associated with lower employment and lower economic living standards later in life (Gibb et al., 2010), as well as with an increased risk of suicide (Gili et al., 2019). For these reasons, effective mental health treatment during the university years is essential, and has the potential to improve educational and psychosocial functioning along the lifespan. Reflecting this, the Australian Government Productivity Commission's recent Inquiry Report into Mental Health proposed specific recommendations concerning university students, including the expansion of online mental health services to meet student needs (Productivity Commission, 2020).

The high prevalence of distress, combined with increased help-seeking (LaMontagne et al., 2023), has created heightened need and demand for mental health services among university students, which represents a major challenge to universities and governments (Auerbach et al., 2018). The need to meet this growing demand for services in a timely, accessible, and cost-effective way has encouraged universities to expand the range of supports offered to students, including internet-delivered interventions.

Internet-delivered psychological treatment aims to provide similar mental health information and skills as in-person treatment. However, they do so via a combination of structured online lessons or modules and brief regular contact with a mental health clinician via telephone, or via written secure messages (Andersson and Titov, 2014). A large body of research now indicates that internet-based treatments result in similar outcomes as face-to-face psychological treatment therapy (Hedman-Lagerlöf et al., 2023), and there is now substantial evidence confirming the efficacy, acceptability, and cost-effectiveness of internet-delivered psychological interventions for anxiety and depression in the general adult population (Andrews et al., 2018; Donker et al., 2015; Li et al., 2022; Mitchell et al., 2021). There is also a growing body of evidence for these interventions in young adults (Benjet et al., 2023; Dear et al., 2018; Harrer et al., 2019) and university students more specifically (Oliveira et al., 2023). As such, internet-delivered treatment represents a novel and promising modality for meeting university students' mental health care needs, while assisting universities to meet the increased demand for psychological treatment services.

There is also now growing evidence that internet-delivered treatments can be effectively implemented into routine clinical care for the general adult population in Australia (Titov et al., 2020) and in other countries (Etzelmueller et al., 2020). The evaluation of new treatments in routine care is important because of the diverse needs and preferences as well as complexity of patients often seen in routine care, compared with those in early-stage highly-controlled trials where extensive inclusion and exclusion criteria are often used and treatment delivery is highly protocolised and standardised (Mohr et al., 2017). There are also unique organisational structures, procedures and dynamics within routine care settings, which do not exist within highly controlled clinical trials. Such evaluations (often termed Phase IV trials) are an essential step in clinical trial methodology, helping to establish longer-term benefits and risks in "real world" populations and clinical settings. Reflecting this, not all efforts to provide internet-delivered psychological interventions as part of routine care have been successful to date (e. g., Gilbody et al., 2015; Kenter et al., 2015). Encouragingly however, there has been one routine care report ($N = 1326$) of an internet-delivered treatment for anxiety and depression among university students that found high levels of acceptability, engagement and improvements in anxiety and depression (Dear et al., 2019). However,

there is a need for further replication in different contexts before robust conclusions can be drawn.

The current study is one of two large Phase IV trials that examine the effectiveness and acceptability of an internet-delivered intervention for depression and anxiety in university students when delivered as part of routine care through university counselling services. The two studies employed the same study design and intervention but evaluate it when implemented into different university counselling services (Dear et al., 2024). It was hypothesised that students would demonstrate significant improvements in depression and anxiety severity, low rates of deterioration, and high levels of satisfaction with the intervention at post-treatment. It was also hypothesised that clinical improvements would be maintained at 3-month follow-up.

2. Method

2.1. Participants

Participants were university students who presented to the University of Queensland (UQ) Student Services for counselling or psychological treatment. Eight hundred and forty-five students were offered the intervention, the UniWellbeing Course, between July 2018 and September 2023. Students were eligible if they: (1) Were a current student of the university; (2) Living in Australia; (3) Self-reported symptoms of stress, anxiety, low mood or depression; (4) Wished to receive psychological treatment and to participate in the internet-delivered intervention, and; (5) Were not at imminent risk of suicide. No other exclusion criteria were applied, such as diagnostic criteria or severity cut-offs on questionnaires. Eligibility and suitability were determined through routine clinical assessment rather than structured and protocolised assessment, as employed in controlled clinical trials. Participant flow through the study is presented in Fig. 1. Consistent with standard practice, a modified intent-to-treat protocol was used that excluded participants who did not complete the baseline assessment, and those who did not start the first intervention lesson. As a result, 145 participants were excluded: 118 who did not complete baseline questionnaires (of which three specifically requested to be withdrawn: one due to planned overseas travel, and two who did not specify a reason), 24 who never started treatment, and three students who enrolled in the UniWellbeing Course twice within the same 3-month period (as this was classified as being part of the same occasion of care).

The UQ Counselling Service is a free service offered by the University of Queensland to its students. The service provides a combination of face-to-face, video and telephone counselling and psychological treatment. During the study (2018 to 2023), the service employed approximately 10 full-time equivalent mental health clinicians and was open five days a week between the hours of 8.00am to 5.00pm. It also provided access to an after-hours crisis line. The service opted to implement the intervention in order to reduce barriers to accessing care for students, provide an alternative model of care, and to provide a resource-efficient treatment option to students who did not need or want more intensive treatment.

2.2. Study design

This study employed a prospective longitudinal single-group open trial design. Students completed standardised questionnaires at pre-treatment, each week during the intervention, at post-treatment, and a subgroup also completed questionnaires at 3-month follow-up. The study was approved by the Macquarie University Human Research Ethics Committee and the University of Queensland Human Research Ethics Committee, and the trial was registered with the Australian New Zealand Clinical Trials Registry (ACTRN12618000653268).
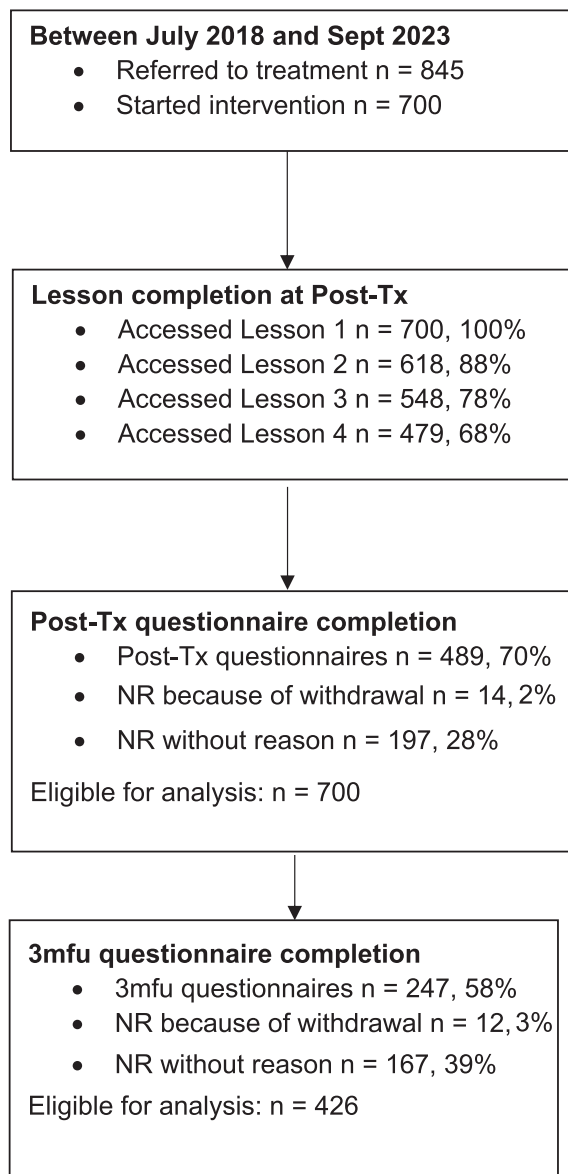
Between July 2018 and Sept 2023
- Referred to treatment n = 845
- Started intervention n = 700

Lesson completion at Post-Tx
- Accessed Lesson 1 n = 700, 100%
- Accessed Lesson 2 n = 618, 88%
- Accessed Lesson 3 n = 548, 78%
- Accessed Lesson 4 n = 479, 68%

Post-Tx questionnaire completion
- Post-Tx questionnaires n = 489, 70%
- NR because of withdrawal n = 14, 2%
- NR without reason n = 197, 28%

Eligible for analysis: n = 700

3mfu questionnaire completion
- 3mfu questionnaires n = 247, 58%
- NR because of withdrawal n = 12, 3%
- NR without reason n = 167, 39%

Eligible for analysis: n = 426

Fig. 1. Participant flow from pre-treatment to 3-month follow-up. NR: non-response; Post-tx: post-treatment; 3mfu: 3-month follow-up.

2.3. Recruitment and enrolment

The UQ Student Services website provides information on the services offered, including the internet-delivered intervention used in the current study. Students first engage with the service in person, or by telephone or email, and are contacted by intake officers who may assist them to book an appointment with a service clinician, or recommend the internet-delivered intervention, particularly if the wait time for counsellor appointments is significant (e.g., more than three weeks). Students can also complete an online intake form and book appointments online themselves. The intake form includes self-rated psychological distress for the past four weeks, current difficulties, a risk assessment, social supports, and therapeutic goals. If the intake form indicates elevated risk, students are contacted by senior service counsellors to assess their needs and provide guided support. The main pathway into the online intervention is through referral by intake officers and service counsellors. At times, counsellors refer students as an addition to traditional counselling. All UQ Student Services staff were given the opportunity to access the internet-delivered intervention through a staff account to build their understanding and confidence in referring students to the intervention. When students express interest in participating in the intervention, an administration officer contacts students to check their suitability and answer any questions they have. Student are subsequently enrolled into the intervention.

Following enrolment, students are sent an email providing essential information about the intervention (e.g., important dates, information about questionnaires, and about contact by a clinician as part of the intervention). On the first day of the intervention, enrolled students receive an automatic system email with login information and instructions for accessing the intervention materials and completing questionnaires.

2.4. Intervention

The internet-delivered treatment used in this trial, the UniWellbeing Course, has been previously described in detail (Dear et al., 2019; Mullin et al., 2015). In brief, it is a transdiagnostic and internet-delivered cognitive and behaviour therapy (iCBT) intervention designed to treat both anxiety and depression symptoms in adults attending university. Given the high level of comorbidity between anxiety and depression, transdiagnostic treatment can increase treatment suitability, efficiency and effectiveness (Newby et al., 2015). The intervention consists of four lessons delivered sequentially over a five-week period. Each lesson is presented as a series of slides and includes didactic information, case stories and examples from students portraying key CBT principles (1. Psychoeducation; 2. Unhelpful thoughts and cognitive challenging; 3. Physical symptoms of depression and anxiety, behavioural activation and relaxation; 4. Behavioural symptoms and graded exposure), together with additional material on related topics, such as managing procrastination and sleep management. Each lesson takes between 15 and 20 min to read. Students also receive regular automatic emails throughout the duration of the intervention regarding the availability of new course materials, with the purpose of reinforcing lesson completion, encouraging skills practice, and normalising common challenges.

In the first week of the intervention, the trained university counsellors contact students by telephone to introduce themselves, and offer a choice of times for weekly contact. The counsellor would then attempt to contact students either via phone at the specified time, or through a secure messaging system that is part of the web platform, based on student preference. The counsellors aimed to help students apply key intervention skills to their own situation, normalise challenges, reinforce progress, and encourage continued access to the intervention and practice of skills. Students were informed that they could contact the counsellor by private message at any time, with the understanding that their counsellor would return contact within 48 h.

The intervention was delivered through a secure software platform, accessible by secure login through the eCentreClinic's website (www.ec entreclinic.org). The eCentreClinic is a specialist research centre at Macquarie University focusing on the development and evaluation of internet-based interventions. The eCentreClinic was responsible for providing access to the treatment via its platform, initial and ongoing training and supervision of service staff, and as-needed advice to the service for the management of the intervention. The integration of the internet-delivered intervention within its model of care, the delivery of the intervention and all aspects of clinical care were managed by the student counselling service.

2.5. Clinicians

The three intervention clinicians were either counsellors or psychologists, with appropriate training for providing mental health services to university students. The clinicians rotated through intervention groups in cycles, whereby only one clinician provided the internet-delivered intervention to any one group, and with a new intervention group commencing approximately every two weeks.

All counselling service clinicians were provided with training around the intervention by two senior clinicians (BFD and BJ), who had significant experience in supporting students through the intervention. Initial training was followed by weekly training and supervision until each counsellor was competent and confident in delivering the iCBT treatment. Ongoing support and supervision was subsequently provided on a monthly basis by a psychologist and clinical supervisor (BJ and AIH).

2.6. Measures

2.6.1. Demographics

Information was collected on the participants' age, gender, marital status, employment status, highest level of education completed, current university enrolment status, whether they were a local or international student, and mental health and help-seeking history (e.g. mental health professional and general practitioner consults, medication use).

2.6.2. Clinical outcomes

Similar to the other trial in this series (Dear et al., 2024), the Patient Health Questionnaire-9 (PHQ-9; Kroenke et al., 2001) and the Generalized Anxiety Disorder-7 (GAD-7; Löwe et al., 2008) were administered initially at pre-treatment, each week of treatment (i.e., weeks 1–5), post-treatment, and at 3-month follow-up. After approximately 2.5 years ($n = 426$ participants), the Patient Health Questionnaire-2 (PHQ-2; Kroenke et al., 2003) and the Generalized Anxiety Disorder-2 (GAD-2; Kroenke et al., 2007) replaced the full-length measures, and the 3-month follow-up was discontinued, to reduce burden on participants. PHQ-2 and GAD-2 scores can be calculated as the sum of the first two items of the PHQ-9 and GAD-7, respectively. Therefore, the primary outcome measures reported for this study are the PHQ-2 and the GAD-2, which were administered to the majority of participants.

The PHQ-2 consists of two items measuring low mood and depression severity. The GAD-2 consists of two items measuring anxiety severity. For both measures, scores range from 0 to 6, with higher scores representing higher symptom severity. For both measures, the following clinical ranges were used: <1: no or minimal symptom severity; 1–2: mild severity; 3–4: moderate severity; 5–6: severe depression or anxiety symptoms. These ranges were used in both trials, as none are available in the literature. However, a score of ≥ 3, representing a moderate or higher range, has been identified as a cut-off for identifying potential major depression on the PHQ-2 or an anxiety disorder on the GAD-2 (Plummer et al., 2016; Richardson et al., 2010; Spitzer et al., 2006); this is consistent with a similar cut-off of ≥ 10, also representing a moderate or higher severity range, for the full measures (Kroenke et al., 2001; Spitzer et al., 2006). These measures were collected at baseline, as well every week during treatment, following the end of treatment, and at 3-month follow-up for a subset of participants, as described above.

2.6.3. Treatment satisfaction and acceptability

Treatment satisfaction and acceptability were collected at post-treatment using a purpose-built measure, the Treatment Satisfaction Questionnaires (TSQ) used in previous studies (Dear et al., 2018; Dear et al., 2019). The TSQ comprises of the following questions: (1) "Overall, how satisfied were you with the course?" (responses are recorded on a 5-point Likert scale, ranging from "Very Satisfied to 'Very Dissatisfied'); (2) 'Would you recommend the course to a friend?' ('Yes'/"No" response); (3) "Was it worth your time doing the course?" ("Yes"/"No" response); (4) How has participating in the course affected your confidence in your ability to manage (i) stress and anxiety? (ii) symptoms of low mood and depression? (iii) your emotional wellbeing while studying at university? (with responses on a 5-point Likert scale, ranging from "Greatly Increased" to "Greatly Decreased").

2.7. Statistical analysis

All analyses were conducted using SPSS v29. Descriptive statistics were calculated for baseline demographic and clinical characteristics. The Multiple Imputation procedure was used to address missing data, accounting for participants' baseline symptom severity and the number of lessons completed, as these variables have been identified as important missing-data mechanisms (Karin et al., 2018a). Clinical outcomes over time were analysed using Generalized Estimating Equation (GEE) models (Hubbard et al., 2010). An unstructured working correlation matrix and maximum likelihood estimation were used, and a Gamma distribution with a log link response scale was specified to address positive skewness in the dependent variable distributions (Karin et al., 2018b).

2.7.1. Clinical outcomes

Change in clinical outcomes between pre-treatment and post-treatment was analysed for the entire sample, and change between pre-treatment and 3-month follow-up was analysed for the subset of participants ($n = 426$) who were followed up to the 3-month time point. Changes in symptoms over time were examined in three ways: (1) average percentage change across time was calculated from the GEE analyses, with 95% confidence intervals (CIs) (Karin et al., 2018b); (2) within-group Hedges' g effect sizes with 95% CIs were calculated using the estimated means derived from the GEE models (within-group Hedges' g is calculated as the difference between means at the two different time points, divided by the pooled standard deviation, with a bias correction factor applied) (Cohen, 1988; Hedges, 1981); (3) the proportion of participants making minor symptom improvements ($\geq$ i.e., $\geq$ 30%), major symptom improvements (i.e., $\geq$ 50%), and meeting criteria for deterioration (i.e., symptom deterioration $\geq$ 30% and a resultant score within the moderate or severe range) (Dear et al., 2019; Hiller et al., 2012).

2.7.2. Subgroup analyses

Clinical outcomes were also analysed within subgroups based on baseline symptom severity. For both depression and anxiety, the percentage change, effect size, and clinical improvement/deterioration (as defined above) were calculated separately for participants reporting mild, moderate, and severe symptoms at baseline.

2.7.3. Satisfaction

Due to their distribution, five-point responses to the TSQ questions were grouped into three categories: (1) "Satisfied"/"Very Satisfied", "Neither Satisfied Nor Dissatisfied", and "Dissatisfied"/"Very Dissatisfied", and (2) "Greatly Increased"/"Increased", "Neither Increased Nor Decreased", and "Decreased"/"Greatly Decreased". Satisfaction data was subsequently analysed as a series of intercept-only logistic regressions, yielding percentages and 95% CI for each of the response categories.

3. Results

3.1. Participant characteristics

Between the study dates, approximately 10,000 students presented to the service for mental health support. Of these, approximately 8.5% were referred to the internet-delivered intervention. Information about participant characteristics is included in Table 1. Similar to the other implementation trial in this series, most participants were women, enrolled full-time, and were local students. A large majority of participants endorsed currently experiencing anxiety and depression, and had previously sought help for their mental health.

Table 1
Sample demographic and clinical characteristics.

Variable	n	%
Gender		
Female	537	76.7%
Male	153	21.9%
Other	8	1.1%
Marital Status		
Single	407	58.1%
Married/De Facto/Relationship	271	38.7%
Separated/Divorced/Widowed	8	1.1%
Other	12	1.7%
Education (Completed)		
Year 12 or less	320	45.7%
Certificate/Diploma	59	8.4%
Undergraduate Degree	227	32.4%
Postgraduate Degree	92	13.1%
University Study Status		
Full Time	598	85.4%
Part Time	82	11.7%
Other	18	2.6%
International Student	284	40.6%
Employment		
Full-time	43	6.1%
Part-time/Casual	334	47.7%
Unemployed	303	43.3%
Other	20	2.9%
Currently experiencing anxiety	638	91.1%
Currently experiencing depression	498	71.1%
Medication for Anxiety/Depression	128	18.3%
GP consult for mental health - lifetime	382	54.6%
GP consult for mental health - past 12 months	307	43.9%
Mental health professional consult - lifetime	539	77.0%
Counsellor	446	63.7%
Psychologist	278	39.7%
Psychiatrist	103	14.7%
Other	19	2.7%
Mental health professional consult - past 12 months	501	71.6%
Counsellor	392	56.0%
Psychologist	172	24.6%
Psychiatrist	56	8.0%
Other	15	2.1%
	M	SD
Age	24.66	6.46
Range	17–64	

Note. Two participants did not provide baseline demographic information.

3.2. Uptake, attrition, adherence and treatment completion

The yearly breakdown in uptake of the intervention was as follows: 41 students in 2018, 184 students in 2019, 171 students in 2020, 103 students in 2021, 105 students in 2022, and 96 students in 2023. Details of participant flow are included in Fig. 1. Seventy percent of students provided data at post-treatment. At 3-month follow-up, 58% of the participants followed up to this time point provided data. Eighty-three percent of referred students started the intervention, and 68% read all four lessons.

3.3. Clinical outcomes

The overall means, standard deviations, percentage changes and Hedges' g effect sizes for the outcomes are shown in Table 2, both overall and by initial symptoms severity. The GEE analysis found a significant overall effect of time for depression (Wald's $X^2 = 205.68$, $p < .001$) and anxiety (Wald's $X^2 = 392.13$, $p < .001$). Pairwise comparisons revealed significant improvements in anxiety and depression severity from pre-treatment to post-treatment ($ps < 0.001$) in the entire sample, and from pre-treatment to 3-month follow-up ($ps < 0.001$) within the sub-sample surveyed to the 3-month time point. No significant changes in symptom severity were found between post-treatment and 3-month follow-up ($p = .306$ for depression, and $p = .259$ for anxiety). Overall, these effects corresponded to a 27% and a 34% reduction in depression and anxiety symptoms, respectively, to post-treatment.

3.4. Clinical significance and deterioration rates

The overall proportions of participants making clinically significant improvements or meeting criteria for deterioration in symptoms at post-treatment are included in Table 3. Overall, 53% of students reported clinically meaningful improvements in depression symptoms, and 56% reported clinically meaningful improvements in anxiety symptoms. Thirteen percent met criteria for deteriorations in depression symptoms, and 10% for deteriorations in anxiety symptoms, at post-treatment.

3.5. Clinical outcomes by initial symptom severity

Mean symptom scores and 95% confidence intervals over time are also shown for each initial symptom severity range in Figs. 2–5. The GEE

Table 2
Means, standard deviations, percentage change and effect sizes overall and by initial symptom severity range.

Outcome	Estimated Marginal Means				Percentage change from pre-treatment		Hedge's g effect sizes from pre-treatment	
	Pre-treatment	Post-treatment	Pre-treatment	3-month follow-up	Post-treatment	3-month follow-up	Post-treatment	3-month follow-up
	$n = 700$	$n = 700$	$n = 426$	$n = 426$	$n = 700$	$n = 426$	$n = 700$	$n = 426$
Depression (PHQ-2)								
Overall	2.72 (1.66)	1.97 (2.09)	2.74 (1.66)	2.05 (1.82)	27% (21%, 34%)	25% (19%, 32%)	0.35 (0.24, 0.46)	0.35 (0.22, 0.49)
Mild (1–2)	1.72 (0.45)	1.61 (1.66)	1.67 (0.47)	1.89 (1.45)	6% (−5%, 18%)	−13% (−26%, −1%)	0.08 (−0.08, 0.24)	−0.18 (−0.39, 0.02)
Moderate (3–4)	3.50 (0.50)	2.31 (1.75)	3.50 (0.50)	2.12 (2.12)	34% (27%, 41%)	39% (28%, 50%)	0.82 (0.63, 1.02)	0.79 (0.55, 1.04)
Severe (5–6)	5.52 (0.50)	2.87 (1.64)	5.48 (0.50)	2.69 (1.50)	48% (42%, 54%)	51% (44%, 57%)	1.94 (1.62, 2.26)	2.22 (1.80, 2.64)
Anxiety (GAD-2)								
Overall	3.48 (1.83)	2.31 (2.16)	3.63 (1.87)	2.27 (2.09)	34% (29%, 39%)	37% (32%, 43%)	0.52 (0.42, 0.63)	0.61 (0.47, 0.74)
Mild (1–2)	1.67 (0.47)	1.57 (1.34)	1.63 (0.48)	1.56 (2.06)	5% (−5%, 16%)	5% (−21%, 31%)	0.08 (−0.11, 0.27)	0.05 (−0.22, 0.31)
Moderate (3–4)	3.57 (0.50)	2.32 (1.93)	3.62 (0.49)	2.24 (1.61)	35% (27%, 42%)	38% (30%, 46%)	0.78 (0.59, 0.97)	1.03 (0.77, 1.28)
Severe (5–6)	5.63 (0.49)	3.20 (1.87)	5.66 (0.48)	3.02 (1.56)	43% (39%, 48%)	47% (42%, 51%)	1.58 (1.37, 1.79)	2.03 (1.76, 2.31)

Note. The 3-month follow-up was discontinued after 2.5 years (n = 426 participants) in order to reduce burden on participants.

Table 3

Proportions making clinically meaningful improvements and proportions meeting criteria for symptom deterioration by initial symptom severity range.

	Post-treatment				3-month follow-up			
	n	Deterioration % (95% CI)	Minor improvement	Major improvement	n	Deterioration % (95% CI)	Minor improvement	Major improvement
Depression (PHQ-2)								
Overall	700	13% (9%, 17%)	8% (6%, 11%)	45% (40%, 51%)	426	6% (4%, 9%)	7% (4%, 10%)	44% (38%, 50%)
Mild (1–2)	309	20% (13%, 27%)	0% (0%, 0%)	40% (34%, 46%)	181	9% (4%, 14%)	0% (0%, 0%)	32% (25%, 39%)
Moderate (3–4)	218	10% (4%, 15%)	17% (11%, 22%)	48% (39%, 56%)	139	5% (1%, 9%)	13% (7%, 19%)	52% (38%, 67%)
Severe (5–6)	110	0% (0%, 0%)	19% (10%, 28%)	57% (46%, 67%)	69	0% (0%, 0%)	20% (6%, 34%)	60% (48%, 73%)
Anxiety (GAD-2)								
Overall	700	10% (7%, 13%)	9% (7%, 12%)	47% (42%, 52%)	426	4% (1%, 7%)	12% (9%, 16%)	49% (42%, 56%)
Mild (1–2)	212	22% (15%, 29%)	0% (0%, 0%)	41% (34%, 47%)	112	8% (−4%, 19%)	0% (0%, 0%)	42% (28%, 56%)
Moderate (3–4)	224	9% (5%, 14%)	13% (8%, 17%)	47% (36%, 57%)	136	4% (−1%, 8%)	17% (10%, 24%)	46% (35%, 56%)
Severe (5–6)	229	0% (0%, 0%)	17% (11%, 22%)	52% (44%, 59%)	154	0% (0%, 0%)	19% (10%, 27%)	57% (48%, 67%)

Note. Percentages rounded to the nearest whole number. Deterioration was defined as an increase in symptoms $\geq$ 30% from baseline and subsequent score within the clinical range (i.e., $\geq$ 3). A minor improvement was defined as a decrease in symptoms $\geq$ 30% to < 50% from baseline. A major improvement was defined as a decrease in symptoms $\geq$ 50% from baseline.

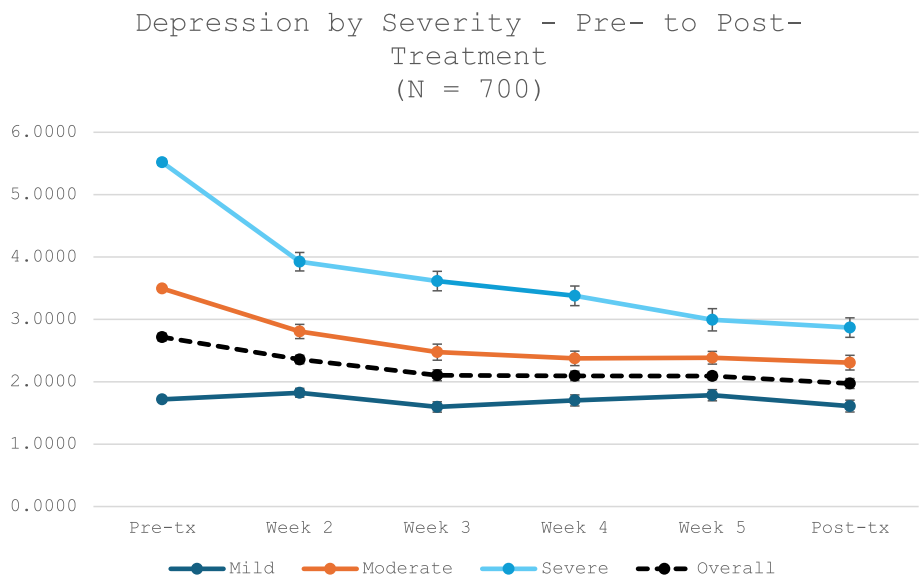**Fig. 2.** Changes in depression severity over time from pre- to post-treatment by baseline depression severity range.
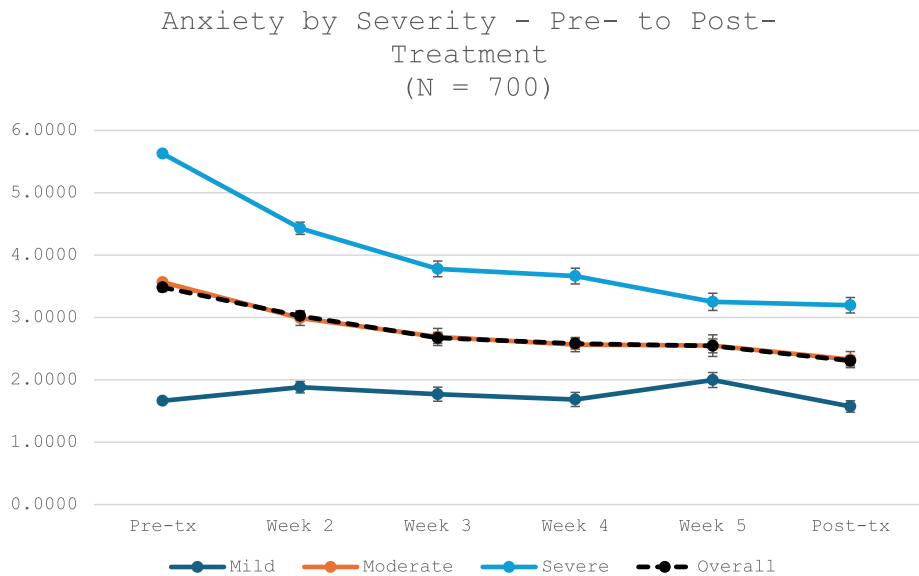

Fig. 3. Changes in anxiety severity over time from pre- to post-treatment by baseline anxiety severity range.

Depression by Severity - Pre-Treatment to
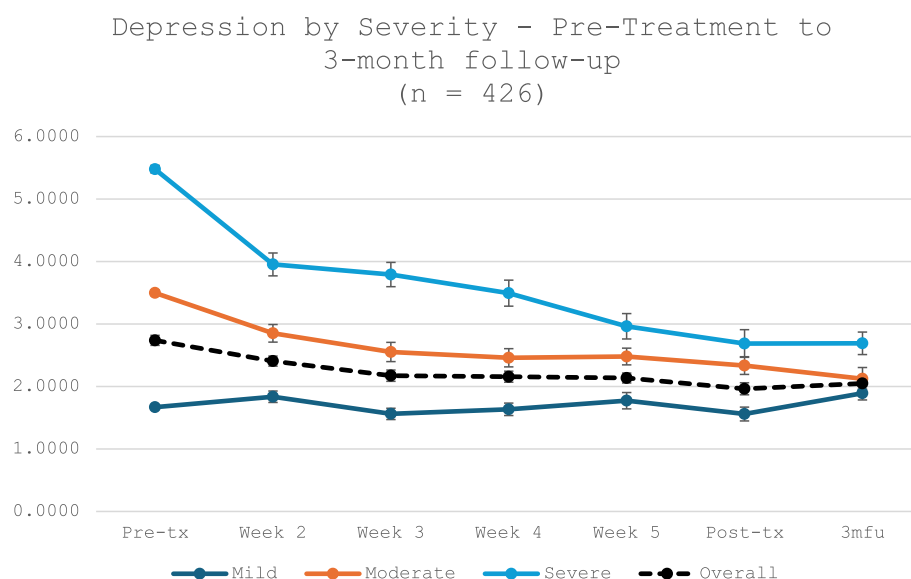3-month follow-up
(n = 426)

Fig. 4. Changes in depression severity over time by baseline depression severity range in the subgroup of participants followed up to 3-months post-treatment.
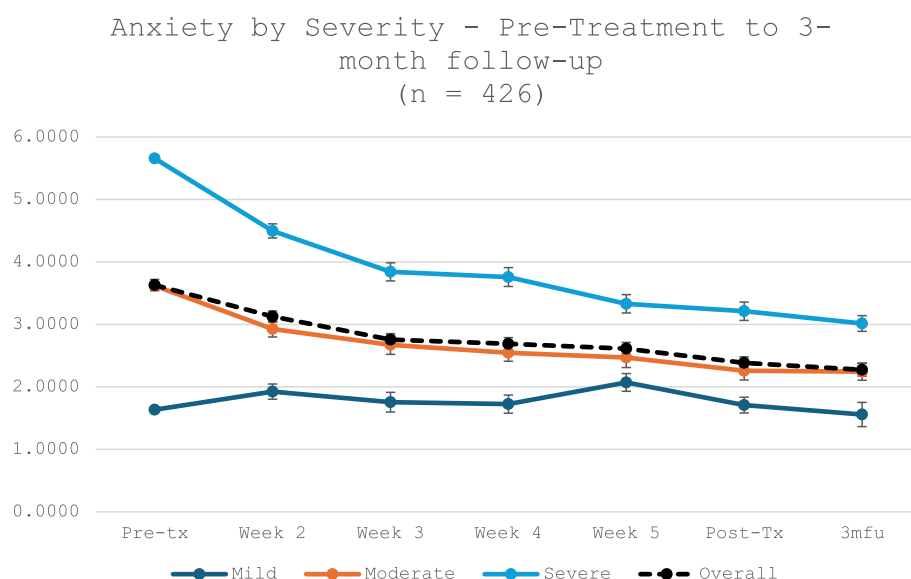
Anxiety by Severity - Pre-Treatment to 3-
month follow-up
(n = 426)

Fig. 5. Changes in anxiety severity over time by baseline anxiety severity range in the subgroup of participants followed up to 3-months post-treatment.

analyses showed significant interaction effects of initial symptom severity range and time for depression symptoms (Wald's $X^2 = 320.36$, $p < .001$) and for anxiety symptoms (Wald's $X^2 = 271.38$, $p < .001$). Pairwise comparisons indicated improvements in depression symptoms from pre- to post-treatment for students with an initial depression severity within the moderate or severe range ($p < .001$), but no changes in symptoms for those with an initial depression severity within the mild range ($p = .220$). Similarly, students with an initial anxiety severity within the moderate or severe range experienced improvements in anxiety symptoms from pre- to post-treatment ($p < .001$), however there were no significant changes in symptoms for students with an initial anxiety severity within the mild range ($p = .265$). This pattern of results was also observed at 3-month follow-up.

3.6. Treatment satisfaction

Seventy-three percent of participants reported they were "satisfied" or "very satisfied" with the intervention; 90% reported that they "would

recommend the intervention to others" and 91% reported that "it was worth their time". Most students also stated that participating in the intervention increased their confidence in being able to manage different aspects of their wellbeing, see Table 4.

4. Discussion

This study examined the effectiveness and acceptability of an internet-delivered CBT intervention following its implementation into the university counselling service of a major Australian university. We found that the intervention is effective and acceptable for university students receiving this treatment as part of routine care. Over the 5 years, 845 were considered for the intervention, of which 700 (82%) started the treatment and 479 (68%) completed the entire treatment. A majority of students reported significant and clinically meaningful reductions in symptoms of depression and anxiety, which were maintained at 3-month follow-up. Deterioration rates were low. Most students stated that they would recommend the intervention to others, and that it was

Table 4
Satisfaction with treatment and self-efficacy in managing symptoms.

Variable	n	%, (95% CI)
Satisfaction		
Very Satisfied/Satisfied	509	73% (68%, 78%)
Neutral	164	23% (18%, 29%)
Dissatisfied/Very Dissatisfied	27	4% (2%, 6%)
Would recommend to others		
Yes	630	90% (87%, 93%)
It was worth my time		
Yes	637	91% (88%, 94%)
Confidence to manage Anxiety		
Greatly Increased/Increased	447	64% (57%, 70%)
Neutral	226	32% (27%, 38%)
Decreased/Greatly Decreased	27	4% (2%, 6%)
Confidence to manage Depression		
Greatly Increased/Increased	573	60% (55%, 64%)
Neutral	260	37% (33%, 42%)
Decreased/Greatly Decreased	23	3% (1%, 5%)
Confidence to manage Wellbeing		
Greatly Increased/Increased	458	65% (61%, 70%)
Neutral	219	31% (28%, 35%)
Decreased/Greatly Decreased	23	3% (2%, 5%)

worth their time, and 73% of students were satisfied or very satisfied with the intervention. Thus, the findings of the current study support the potential of internet-delivered interventions when provided as routine care to university students.

The findings from the current trial mirror those of the other trial in this series (Dear et al., 2024) and a previous trial (Dear et al., 2019) exploring the implementation of internet-delivered interventions for university students. In combination, these trials provide strong evidence for the acceptability and effectiveness of internet-delivered treatment when delivered as a routine treatment option by university counselling services. Young adults are increasingly using online information and support to manage mental health difficulties; however, concerns around the credibility of sources, privacy and confidentiality, and a lack of mental health literacy remain significant barriers (Pretorius et al., 2019a; Pretorius et al., 2019b). Internet-delivered treatments, which incorporate the flexible delivery and emphasise self-management, may overcome some of the help-seeking barriers in university students. Importantly, such interventions also have considerable potential for increasing service capacity, given they are frequently found to require very little clinician time (e.g., 30 to 60 min) per student over a course of treatment (Dear et al., 2019). The findings of the current study support the potential of internet-delivered treatments for university students and provide much-needed "real-world" data from their use in routine care.

Consistent with the related studies (Dear et al., 2019), students with a higher symptom severity at pre-treatment typically experienced larger decreases in symptom severity at post-treatment and 3-month follow-up in the current study. This is consistent with meta-analytic reviews of internet-based interventions in university students which have also noted the effect of baseline symptom severity on outcomes (Harrer et al., 2019; Oliveira et al., 2023). Overall, these results indicate that students with elevated symptoms are more likely to benefit in terms of symptom reductions from internet-delivered psychological interventions, suggesting that these interventions are suitable for those with moderate to severe symptoms. Although students with lower baseline symptom severities did not experience the same level of symptom improvement, potentially due to floor effects, they may have benefitted in ways other than symptom reductions, that were not captured in the current study, such as the prevention of worsening distress, and the acquisition of coping skills. For example, there is evidence to suggest that providing digital mental health interventions to "at risk" groups prevents mental health deteriorations (Read et al., 2021). This less symptomatic group may also benefit from a shorter intervention, such as an ultra-brief, single-session psychological treatment (e.g., (Bisby et al., 2024)). Future research should comprehensively explore the effects of treatment

besides symptom reduction within this group, as well as their treatment preferences.

Consistent with previous studies, there was an interesting difference between overall satisfaction ratings (73% were "satisfied" or "very satisfied") and those reporting the intervention was worth their time and worth recommending (90% of participants). It is possible that the lower overall satisfaction ratings reflect a desire or need for further treatment, a different treatment modality, or different treatment components. Unfortunately, we were unable to track students after completing the intervention to see if they sought or needed further treatment afterwards. Thus, future research examining treatment satisfaction, subsequent care-seeking and longer-term outcomes would be worthwhile, particularly for those with milder symptoms.

The factors likely involved in the success of the current implementation trial are similar to those in the other trials (Dear et al., 2024; Dear et al., 2019). For example, the study used a transdiagnostic intervention that has been developed and carefully evaluated over several years prior to implementation (Dear et al., 2019; Etzelmueller et al., 2020; Mullin et al., 2015). There was also the presence of clinical "champions" (Santos et al., 2022) within the counselling service (i.e., the study clinicians and their managers), who ensured the visibility of the intervention. These have been previously identified by the implementation science field as important components for the successful implementation of digital mental health interventions (Aarons et al., 2011; Graham et al., 2020). Moreover, the intervention was made available as simply another treatment offered through the service, without any specific imperative to use it. This enabled students and clinicians to select the most suitable treatment based on clinical presentation and preference, including enabling decisions about treatment sequencing and blended care where students may participate in the intervention before, alongside or after face-to-face counselling. Future research examining the implementation of similar interventions in different ways across different university counselling settings will be valuable for confirming whether these or other factors are important.

Although the results of the current trial were largely positive, some limitations need to be considered. This trial did not include a control group, therefore it is not possible to determine the proportion of the clinical outcomes attributable to the intervention or other factors, such as time, natural symptom remission or supportive contact with a counsellor. Secondly, the sample was comprised of relatively motivated, treatment-seeking students, 77% of whom had previously sought support from a mental health professional. The sample, similar to other trials (Davies et al., 2014; Ferrari et al., 2022), also consisted of predominantly female students. This indicates that further research is needed focusing on how to engage university students with different characteristics, who may not seek help despite experiencing distress. However, promisingly, in the current study over 40% of the sample comprised of international students. Past research has found that international students under-utilise university counselling services, despite experiencing a need for services (Raunic and Xenos, 2008; Russell et al., 2008). Thus, the current study shows promise in reducing access and use barriers in this group. Another limitation is that, to avoid participant burden and compounding barriers in accessing care, comprehensive data collection and longer-term follow-up was not feasible in the current trial. Limited information was collected about the reasons for not starting or not completing the intervention, limited clinical history data was gathered, and only two brief self-report measures of severity were administered without long-term follow-up. Finally, although all aspects of clinical care were managed by the university counselling service, substantial infrastructure and support was provided by a university research centre specialising in internet-delivered interventions. It is therefore uncertain if similar outcomes would have been obtained without specialist training and support.

Although existing studies of internet-delivered treatment embedded into "real world" settings have shown promising results, key challenges remain and warrant noting. Firstly, initial implementation and

subsequent operation within the university context presents pragmatic obstacles. For instance, the initial start-up costs required for hardware, software, compliant data storage and security, and clinician training represent a substantial barrier, especially in an environment where university support services are under stain. Thus, limited resources may be better spent on maintaining existing services rather than establishing new ones, even if these may have significant advantages over time (Inglis and Cathcart, 2018). Secondly, given the pattern of results observed with respect to demographic factors, symptom improvement, and satisfaction, it is possible that some students may benefit more than others from an internet-delivered intervention; that some students are more likely to seek help through or be referred to this treatment modality; and that not all students' mental health needs are met by this intervention. Hence, it is important to determine who benefits from this treatment modality, and identify those who may need a different or more intensive treatment. Future research focused on these issues will be essential for informing about the true potential of internet-delivered treatments for university students, and the optimal models of care in which these interventions should be situated.

5. Conclusion

The findings of the current trial add to a growing body of evidence that internet-delivered psychological interventions for university students with anxiety and depression are effective and acceptable. They have considerable potential to improve access to psychological care, while also increasing service capacity, when used as part of routine care in university counselling services. Future research is needed to understand who benefits most from these interventions and to evaluate the use of these interventions when provided within different models of care.

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Declaration of competing interest

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