What interventions improve college and university students' mental health and wellbeing? A review of review-level evidence

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Background

According to a survey conducted by the National Union of Students (NUS), 40% of further education (FE) students experienced mental health difficulties during their first year (NUS, 2017). Similarly, across four UK higher education institutions (HEIs), one-third of students reported clinical levels of psychological distress (Bewick et al., 2008). It is, therefore, important for further education institutions (FEIs) and HEIs to offer accessible and effective interventions for their students.

Poor mental health of further and higher education students is a growing public policy concern (Association of Colleges, 2017; Brown, 2018). According to a review of 105 FE colleges in England, 85% of colleges reported an increase in mental health difficulties over a three-year period (Association of Colleges, 2017). More specifically, all colleges reported students experiencing depression and 99% of colleges reported students experiencing severe anxiety with these also being the most prevalent mental health problems among university students (Bayram & Bilgel, 2008; Pereira et al., 2019). These common mental health difficulties are associated with a number of negative outcomes such as academic underperformance and increased risk of dropping out of university (Eisenberg et al., 2009; Hysenbegasi et al., 2005; Unite, 2016). It is common for mental health problems to arise whilst students are acclimatising to their new environment as they face a unique set of stressors such as forming new friendships, managing money and perhaps living away from

home for the first time and adjusting to independent learning. Indeed, a UK cohort study found that levels of psychological distress increase on entering university (Bewick et al., 2010), and recent evidence suggests that the prevalence of mental health problems, including self-harm and suicide, among university students is increasing (Sivertson et al., 2019; Storrie et al., 2010).

Services offered within FEIs and HEIs typically include either individual or group counselling. According to an online survey of UK student counselling services, there was an increase in demand for support services over a three-year period in further education sectors (Broglia et al., 2018). This increased demand is set within a context of a reduction in government funding which has led to closures of student counselling services in FE (Caleb, 2014). Similarly, there has been an increase in the number of students seeking support from university counselling services (Thorley, 2017). Ninety-four percent of Higher Education Institutions (HEIs) reported an increase in demand for their counselling services over the past five years (Thorley, 2017). Despite this increase, the capacity of professional services to offer 1 to 1 support to large numbers of students is limited (Brown, 2018), and there are currently long waiting lists (Gallagher, 2014). Although requests for professional support have increased substantially (Williams et al., 2015), only a third of HEI students with mental health problems seek support from counselling services in the UK (Macskill, 2012). Many students do not seek help due to barriers such as stigma or lack of awareness of services (Hunt & Eisenberg, 2010). Without formal support or intervention, there is a risk of further deterioration.

As a substantial proportion of students do not seek formal help (Macskill, 2012), and given the increase in mental health problems among students (Association of colleges, 2017; Storrie et al., 2010), FEIs and HEIs have recognised the need to move beyond traditional forms of support and provide alternative, more accessible interventions aimed at improving mental health and well-being. Indeed, such institutions present a unique opportunity to identify, prevent, and treat mental health problems because they support multiple aspects of students' lives including academic studies, pastoral and counselling services, and residential accommodation. Although interventions exist to improve general mental health and well-being of college and university students, research on the effectiveness of the various interventions has not been effectively synthesised to date. The aim of this review is to identify which interventions improve college and university students' mental health and well-being. It will address the following review questions:

1. What is the current evidence on interventions to improve the general mental health and well-being of college and university students?
2. What does the evidence tell us about the effectiveness of current interventions, and what interventions are likely to be the most effective?

Methods

Identification of evidence

The following electronic databases were searched from 1999 to the present: MEDLINE, MEDLINE In Process and other Non-Indexed Citations; PsycINFO; Social Science Citation Index; CINAHL Plus. An example of the search strategy (MEDLINE) can be found in Appendix 1. Reference lists of all eligible (included) reviews were hand-searched in order to identify additional relevant reviews. Searches were limited to studies published in English language only. In order to locate evidence most likely to be relevant to the current student and educational context, searches were limited to a 20-year date range (1999 to 2019). To identify evidence most likely to be transferable to UK settings, the searches were limited to evidence from high-income OECD countries only. Manual screening was used to exclude reviews covering interventions in non-high income OECD countries to avoid any potential limitations of database indexing. The review inclusion and exclusion criteria are summarised in Table 1.

Table 1. Review inclusion and exclusion criteria

	Include	**Exclude**
Population, setting	Post-secondary students attending colleges of further education or universities. All age groups including mature students.	Students at other levels of education (e.g., secondary) and settings (e.g., schools).
Intervention	Interventions to improve general mental health and well-being.	Interventions to address specific, pre-existing mental health or neurodevelopmental conditions or difficulties (e.g., attention deficit hyperactivity disorder, or autism).
Comparison	All control or comparator groups, or no control or comparator groups.	n/a

Outcome	All mental health and well-being outcomes.	Non-health or wellbeing outcomes (e.g., educational performance outcomes).
Study design	Review-level empirical studies (including evidence from qualitative, quantitative and/or mixed-method studies).	Primary-level studies (this is where a researcher or a group of researchers have conducted a study).
Publication characteristics	English language publications. Publications between 1999 and (09-05) 2019.	Studies published in other languages. Studies published outside the date range 1999 and (09-05) 2019.

Titles and abstracts of publications were independently screened by two reviewers (JW and AP) based on the inclusion and exclusion criteria outlined in Table 1. Full-text copies of relevant papers were obtained and assessed for inclusion by two reviewers (JW and AP) using the same criteria. Any queries or disagreements were resolved by discussion or by recourse to a third reviewer (RC).

Data extraction

Data from each included review was extracted into pre-designed and piloted forms. Forms were completed by one reviewer (JW) and checked for accuracy by another reviewer (AP). A random selection was considered independently by two people for 20% of the reviews. Data extracted included aims, primary study design, setting/country, type of intervention, comparator (if any), population, outcomes reported, main findings in relation to the review questions, limitations, and conclusions specified by authors.

Assessment of methodological quality

In a review of reviews, the legitimacy of the conclusions drawn is based on the results from the reviews that are included, which in turn are based on the results from the primary studies included in each review. Two key questions, therefore, were answered:

- Was the review undertaken appropriately?
- Was quality assessment of the primary studies included in the review undertaken?

These questions were addressed through the use of an amended version of the AMSTAR tool (Shea, 2007). It should be noted here that we have not excluded reviews based on quality.

Data synthesis

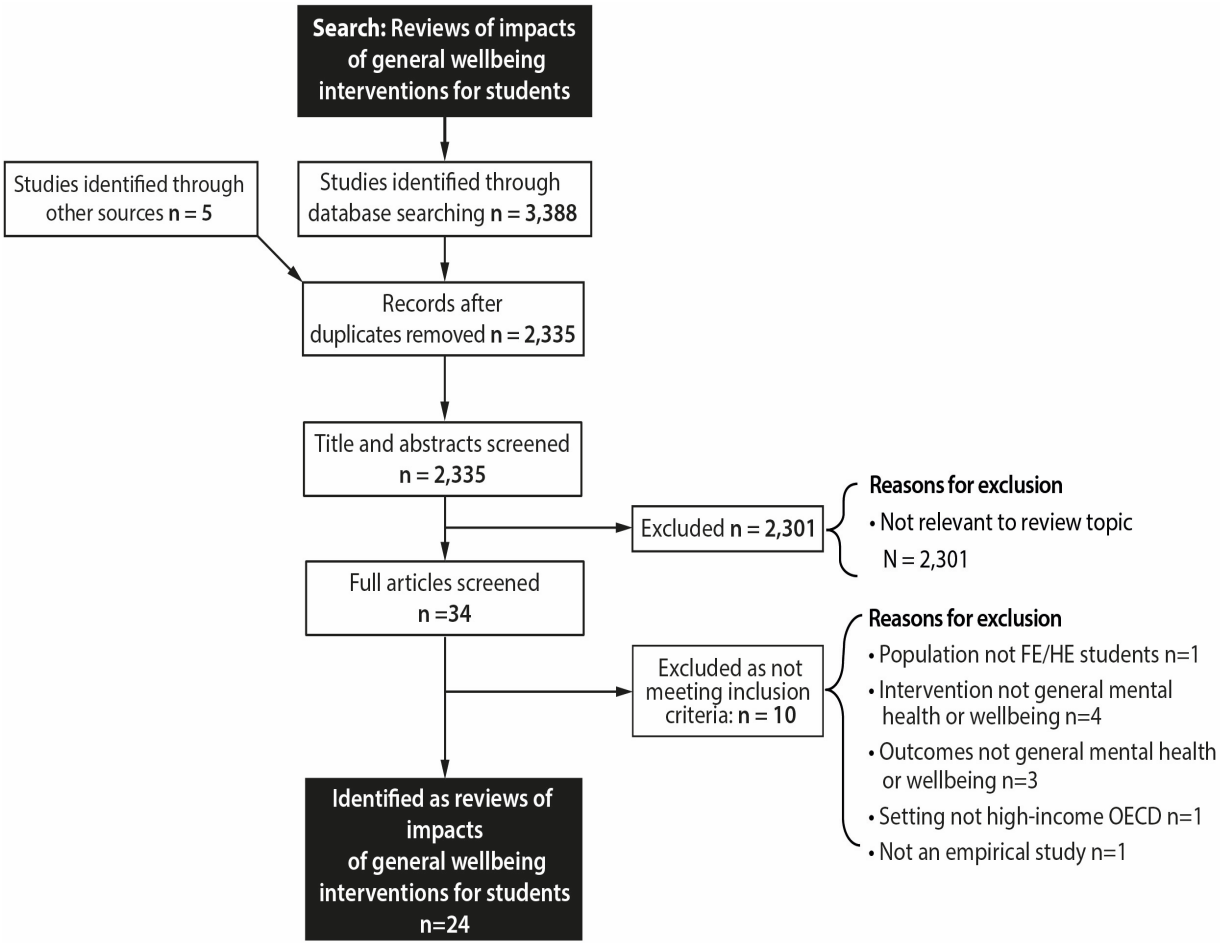
Key findings from the reviews were tabulated and narratively synthesised. Findings were grouped by intervention category, with evidence from higher methodological quality reviews reported first and in greater detail (following Whitehead et al., 2014). Gaps and limitations in the reviews and the underlying body of evidence have been identified were possible.

Results

The review of reviews identified 11 intervention types that had been reviewed. Some reviews focus on only one type of intervention whereas others examined a variety of different interventions separately within the same review; the latter are referred to as 'mixed reviews' in the following section. As several reviews examine a variety of interventions, some information is necessarily repeated in the section that follows.

From an initial 2,333 unique records, 24 publications that met our inclusion criteria were included (see reference list of included reviews). Figure 1 shows the progression of studies through the review process.

Figure 1. PRISMA flow chart of the progression of studies through the review



A list of included reviews is within Appendix 2.

Characteristics of included reviews

The characteristics of included reviews are summarised within Table 2.

Table 2. Characteristics of included reviews

Authors, date	Population, setting (country)	Number of included studies	Intervention	All outcome measures	Overall review findings (relating to general mental health and well-being)	Quality Assessment
Harrer et al. (2018)	Tertiary education students (studying at university, college, or comparable post-secondary higher education)	48	Internet interventions	Depression, Anxiety Stress Sleep problems Eating disorder symptoms Well-being Functioning	Small effects from internet interventions were found on depression, anxiety, and stress. There were, however, no significant effects on well-being.	9
Huang et al. (2018)	University or college students	51	Interventions for common mental health problems such as cognitive-behavioural interventions, mindfulness-based interventions, art, exercise, and peer support.	Depression Anxiety OCD PTSD	Cognitive-behavioural-related interventions led to greater reductions in depression than mindfulness-based interventions and attention/perception modification. Other interventions, however, led to a greater reduction in depression (art, exercise, and peer support). The follow-up (pooled) effect size of cognitive-behavioural related interventions was significant. CBT related interventions were associated	9

					with significant (pooled) reductions in anxiety. The pooled effect of other interventions (peer support and music) and mindfulness, however, for generalised anxiety disorder were associated with greater reductions in anxiety.	
Davies et al. (2014)	Higher education students (undergraduate and postgraduate students)	17	Computer-delivered and web-based interventions	Depression Anxiety Psychological distress Stress	When compared to an inactive control group (receiving no-treatment or on a waiting list), sensitivity meta-analyses showed that interventions significantly improved anxiety, depression, and stress. However, the sensitivity analyses showed no significant effects for anxiety or depression when compared to the active control group (in which participants received materials designed to mimic the time and attention received in the intervention group).	8
Halladay et al. (2019)	Post-secondary students including undergraduate, graduate, college and health professional students	49	Mindfulness-based interventions	Depression Anxiety Perceived stress	When compared to a passive control (receiving no intervention/on waiting list), MBIs were effective in reducing symptoms of depression, anxiety, and perceived stress. There was, however, no significant difference between the MBI intervention group in levels of depression, anxiety or perceived stress when compared when compared to an active control group (receiving health education, relaxation, physical activity, or other approaches including CBT).	8
Harrod et al. (2014)	Students that attended a post-secondary educational institution.	8	Primary suicide prevention interventions	Completed suicide Suicide attempt which was defined as self-injury with intent to die	Classroom-based didactic and experimental programmes were effective in increasing short-term knowledge of suicide and knowledge of suicide prevention. Although gatekeeper training enhanced short-term suicide knowledge in students, there was no evidence of an effect on suicide-related	8

					attitudes or behaviours. The number of student suicides decreased significantly at one university that had implemented an institutional policy restricting student access to laboratory cyanide and mandated professional assessment for suicidal students, when compared to 11 control universities.	
Breedvelt et al. (2019)	Tertiary education students (university, college or other postsecondary higher education)	24	Meditation, yoga, and mindfulness	Depression Anxiety Stress	Moderate positive effects for mindfulness, yoga or meditation-based interventions on symptoms of depression, anxiety, and stress were found.	7
Cuijpers et al. (2016)	College students	15	Psychological therapy	Depression	Psychological therapies such as CBT and behavioural activation therapy were effective in reducing symptoms of depression in college students. Individual therapy was significantly more effective than group therapy.	6
O'Driscoll et al. (2017)	Health and social care undergraduate students	11	Mindfulness-based interventions	Stress Mood Mindfulness levels	Significant differences in depression scores post-intervention, and a significant reduction in stress in the intervention groups when compared to control groups in two studies were found.	7
Bamber and Morpeth (2019)	College students including undergraduate and postgraduate students	25	Mindfulness-based interventions (MBIs)	Anxiety	MBIs reduced anxiety in college students when compared to controls.	6
Conley et al. (2015)	Higher education students (students receiving postsecondary	90	Universal mental health prevention programs: psychoeducational interventions, cognitive-behavioral	Depression Anxiety	Skill-training programmes with supervised practice were significantly more effective than both skill-training programmes without supervised practice and psychoeducation in	6

	education in 2- or 4-year colleges and universities, trade and vocational schools, or various graduate and professional programs such as medical or law school).		interventions, relaxation interventions, mindfulness interventions, meditation, social skills and other (e.g., psychodrama, behavioural contracting)	Stress General psychological distress Social and emotional skills Self-perceptions Interpersonal relationships Academic behaviours and performance	reducing depression, anxiety, stress, and general psychological distress. Relaxation interventions demonstrated the most overall benefit in terms of effectiveness, followed by mindfulness interventions and cognitive-behavioural interventions which did not differ from each other.	
Conley et al. (2017)	Higher education students (college, university, graduate, postgraduate and professional students)	60	Cognitive-behavioral interventions, relaxation interventions, social skills training, general behavioural interventions, social support interventions, mindfulness interventions, psychoeducational interventions, acceptance and commitment therapy interventions, interpersonal psychotherapy programs, other interventions (resilience training intervention and forgiveness training intervention).	Depression Anxiety Anger General psychological distress Socio-emotional skills Self-perceptions Interpersonal relationships Academics Spirituality Substance use Other	Indicated prevention programs are effective in improving both the short-and long-term adjustment of higher education students who are experiencing subclinical levels of symptoms in several areas (e.g., subclinical levels of depression, anxiety, and general psychological distress).	6

Fenton et al. (2018)	Students attending postsecondary institutions in North America	21	Recreation programs such as relaxation (mindfulness or meditation), stress management (yoga or Tai Chi), exercise (pilates), and relationships (animal therapy and expressive writing)	Anxiety Depression Stress Mood (i.e., positive energy, negative arousal)	Recreation programs that emphasise mindfulness, meditation, Tai Chi, yoga, exercise, and animal therapy are effective in reducing perceived stress, anxiety, depression, and negative mood.	6
Fernandez et al. (2016)	University students and staff	19	Structural and/or organizational strategies to promote mental health	Global measures of mental well-being, mental health, wellness or mental health related quality of life. Condition-specific outcome measures (such as depression or anxiety)	Academic-based interventions, to enhance learning and teaching, were found to significantly improve mental well-being.	6
Winzer et al. (2018)	Students in university settings	26	Mental health promoting and mental ill health preventing interventions including CBT, mind-body interventions, and psychoeducation.	Positive mental health (including well-being, coping, locus of control, resilience, self-esteem/self-compassion, stress management, academic achievement or academic performance). Mental ill health (including symptoms of anxiety, symptoms of depression, psychological	CBT-related interventions led to significant (pooled) effects for 3-6 month and 13-18 month follow-ups in sub-group analyses for combined mental ill-health outcomes. They also analysed impacts on combined positive mental health and academic performance at 3-6 months, and found that the interventions had significant effects. Psychoeducation did not lead to significant (pooled) effects on combined mental ill health outcomes at 3-6 months, 7-12 months, or 13-18 month follow-ups.	6

				distress, worry, fatigue, sleeping problems, and perceived stress)		
Conley et al. (2016)	Higher education students (college, graduate, professional)	41	Technology-delivered interventions such as cognitive behavioural interventions, mindfulness interventions, psychoeducational interventions, social skills interventions, relaxation interventions, online support group interventions, and other interventions (such as concreteness training intervention, an emotion perception training intervention, and an interactive gaming intervention).	Depression Anxiety Stress General psychological distress Health Social and emotional skills Self-perceptions Interpersonal relationships Spiritual outcomes	Both universal and indicated TDIs were significantly effective in reducing symptoms of depression, anxiety, and stress. Indicated interventions produced higher overall (mean) improvements than universal interventions.	5
Farrer et al. (2013)	Students attending a tertiary institution such as university, college, or a technical and further education (TAFE) institution	28	Technology-based interventions	Depression Anxiety Stress Examination anxiety Specific phobia Social anxiety Computer-related anxiety	In interventions targeting both depression and anxiety, technology-based CBT was effective in reducing anxiety and depression, although to a lesser degree than traditional therapy with human contact.	5

				Posttraumatic stress Psychological distress Hardiness and acculturation Internet addiction		
Howell and Passmore (2018)	University students	5	Acceptance and Commitment Training, a positive psychological intervention	Well-being Psychological flexibility Depression Anxiety Stress Values Cognitive fusion Acceptance Awareness Life satisfaction Self-esteem Mindfulness Life stress Positive and negative affect Time management Academic	Acceptance and Commitment Training (ACT) was effective in increasing well-being. ACT interventions were also found to reduce depression, anxiety, and stress.	5

				procrastination Neuroticism		
Regehr (2013)	Undergraduate, graduate, and professional students	24	Cognitive, behavioural and/or mindfulness-based techniques	Psychological stress Anxiety Depression Physiological stress responses	Cognitive, behavioural and mindfulness-based interventions focused on stress reduction were effective in reducing the effects of stress, including reducing levels of anxiety and depression.	5
Conley (2013)	Higher education students (students receiving postsecondary education in 2- or 4-year colleges and universities, trade and vocational schools, or various graduate and professional programs such as medical or law school).	74	Universal mental health promotion and prevention programs: psychoeducational interventions, cognitive-behavioral interventions, relaxation interventions, mindfulness interventions, meditation, and others (e.g., psychodrama, behavioural contracting, expressive writing and social skills)	Emotional distress (depression, anxiety, stress, general psychological distress or well-being) Social and emotional skills Self-perceptions Interpersonal relationships Health Academics	Skill-oriented interventions with supervised practice were more effective compared to skill-orientated interventions lacking this element and compared to psychoeducational programs. Mindfulness interventions were found to be the most effective form among the skill-oriented programmes containing supervised practice.	4
Bamber and Schneider (2016)	College students including graduates and undergraduates.	57	Mindfulness-based interventions (MBIs)	Anxiety Stress Mindfulness	Both MBSR and MM were found to significantly reduce symptoms of anxiety and stress.	3
Bonthuys and Botha (2016)	Students	35	Tomatis Method	Self-regulation	The Tomatis Method was found to be effective in increasing well-being.	3

				Well-being		
Miller and Chung (2009)	US college students	4	Cognitive therapy and education intervention	Depression	Brief individual cognitive therapy was found to be effective at reducing mild to moderate depressive symptoms. An intervention using personalised mailed feedback was effective at reducing depressive symptoms.	3
Reavley and Jorm (2010)	Higher education student population	Unknown	Prevention and early interventions (e.g., cognitive behavioural interventions, online support group interventions, educational/personalized feedback interventions, social marketing interventions)	Depression Anxiety Alcohol use	CBT approaches were effective for prevention and early intervention for at least some months following the intervention.	3
Shapiro (2008)	Higher education students	unknown	Meditation (e.g., mindfulness-based meditation such as MBSR).	Stress Anxiety Depression Psychological well-being	Meditation reduces both stress and anxiety and increases psychological well-being.	1

Types of interventions

1. Mindfulness-based interventions

Mindfulness has been described as a practice which involves paying attention on purpose (Kabat-Zinn, 2003). Such interventions are characterised by control of attention, awareness of the present moment, acceptance, and non-judgemental thoughts (Kabat-Zinn, 2003). Mindfulness-based interventions employ techniques developed by Kabat-Zinn (1990) to train the mind to function in a non-judgemental way. There are numerous types of mindfulness-based interventions (MBIs) although the most well-known are mindfulness-based stress reduction (MBSR) and mindfulness-based cognitive therapy (MBCT). MBSR combines mindfulness meditation practices such as focused attention on breath, body-scanning, and pro-social meditation with hatha yoga. MBCT, developed from MBSR, is aimed at reducing depressive symptoms and includes cognitive therapy (Segel et al., 2002).

A total of 11 reviews included MBIs. Four focus solely on MBIs (Bamber & Morpeth, 2019; Bamber & Schneider, 2016; Halladay et al., 2019; O'Driscoll et al., 2017) while MBIs were included in seven mixed reviews (Breedvelt et al., 2019; Huang et al., 2018; Fenton et al., 2018; Conley et al., 2013; Conley et al., 2015; Conleyet al., 2017; Regehr et al., 2013).

2. Psychological interventions including cognitive-behavioural interventions

Cognitive-behavioural interventions focus on changing the thoughts and behaviours contributing to a person's distress. More specifically, CBT interventions focus on the relationships between cognitions, feelings, and behaviours (Beck, 1974), and individuals learn to identify negative automatic thoughts and subject their thoughts to reality testing.

Nine mixed reviews included psychological interventions including cognitive-behavioural interventions (Conley et al., 2013; Conley et al., 2015; Conley et al., 2017; Cuijpers et al., 2016; Huang et al., 2018; Miller & Chung, 2009; Reavley & Jorm, 2010; Regehr et al., 2013; Winzer et al., 2018).

3. Technology-delivered interventions

Technology-delivered interventions are those delivered via a website (internet), university intranet, or mobile phone/tablet technology. Examples of technology-delivered interventions include online Cognitive Behavioural Therapy referred to as iCBT (e.g., Moodgym and Talk to Me), Acceptance and Commitment Therapy (ACT) based interventions

(e.g., ACT on college life), psychoeducation (e.g., BluePages), and iCBT skills training (e.g., COPE).

Four reviews focused solely on technology-delivered interventions (Conley et al., 2016; Davies et al., 2014; Farrer et al., 2013; Harrer et al., 2018).

4. Psychoeducation interventions

Psychoeducation interventions provide information to individuals on a number of topics including stress, coping, and ways to relax.

Three mixed reviews included psychoeducational interventions (Conley et al., 2013; Conley et al., 2015; Winzer et al., 2018).

5. Educational/personalised mail feedback interventions

Educational/feedback interventions provide individuals with feedback about their symptoms and suggest coping methods such as self-help and help-seeking.

Two mixed reviews included educational/personalised mail feedback interventions (Miller & Chung, 2009; Reavely & Jorm, 2010).

6. Recreation programmes

Recreation programmes include meditation, yoga, Tai Chi (meditative martial arts), exercise, and animal therapy interventions. Meditation involves training an individual's attention and awareness to enable them to witness events and experiences as they occur on a moment-to-moment basis. Yoga involves different postures, breathing exercises, meditation, and mantras (Birdee et al., 2008). Tai Chi is a mind-body exercise that originated as a martial art. Animal therapy interventions involve stationing a therapy dog in the common area of a residence hall and inviting students to interact with the therapy dog (e.g., petting and feeding the dog) and other students (Stewart et al., 2014). While Mindfulness can also be considered as a recreation activity, we have treated mindfulness interventions within a distinct category.

One review focused solely on meditation (Shapiro et al., 2008). Four mixed reviews included meditation (Breedvelt et al., 2019; Conley et al., 2013; Conley et al., 2015; Fenton et al., 2018); two mixed reviews included yoga (Breedvelt et al., 2019; Fenton et al., 2018); one mixed review included Tai Chi (Fenton et al., 2018); two mixed reviews included exercise (Huang et al., 2018; Fenton et al., 2018); one mixed review included arts-based interventions (Huang et al., 2018); and one mixed review included animal therapy (Fenton et al., 2018).

7. Relaxation interventions

Relaxation interventions employ strategies such as progressive muscle relaxation, autogenic training, or guided imagery. These interventions involve the pursuit of reduced autonomic arousal. Relaxation is often taught as a stress management technique that can be utilised during stressful situations.

Two mixed reviews included relaxation interventions (Conley et al., 2013; Conley et al., 2015).

8. Acceptance and commitment training interventions

Acceptance and commitment training (ACT) is a behavioural intervention that aims to change the context rather than the content of an individual's psychological experience. ACT interventions focus on six psychological processes: acceptance, cognitive defusion, being present, self-as-context, values, and committed action (Hayes, 2004).

One review focused solely on acceptance and commitment training interventions (Howell & Passmore, 2018).

9. Setting-based interventions

The setting-based model recognises that health is determined by an individual's environmental, economic, social, organisational, and cultural circumstances, and thus aims to improve the environment in which a person lives, studies or works. Setting-based approaches are therefore concerned with the structural and organisational factors that impact health as opposed to focusing on individual risk factors (Dooris, 2009). Setting-based approaches include policies (e.g., institutional plans defining procedures and guiding action), social marketing (e.g., disseminating key messages about mental health through social media, emails, posters and events), strategies to improve the built environment, and academic- and curriculum-based strategies (e.g., changing the grading system to pass/fail and changing the curriculum to a student-centred, problem-based curriculum).

One review focused solely on setting-based interventions (Fernandez et al., 2016).

10. Suicide-prevention interventions

Suicide-prevention interventions that target students without known suicide risk include classroom-based instructional programs comprising experiential and didactic components, an institutional policy restricting access to lethal means, gatekeeper training programmes,

peer support programmes, screening to identify suicide risk factors before development of suicidal ideation or behaviour, and suicide awareness campaigns.

One review focused solely on suicide-prevention interventions (Harrod et al., 2014).

11. Tomatis Method

The Tomatis Method is a self-regulation intervention. More specifically, it has been described as a "sound stimulation and educational intervention that improves listening" (Tomatis, 1996, p.197).

One review included the Tomatis method (Bonthuys & Botha, 2016).

Other interventions

A number of other interventions were included in mixed reviews such as mind-body interventions (Winzer et al., 2018), attention-perception modifications (Huang et al., 2018), and social marketing (Reavley & Jorm, 2010). However, these studies reported null effects. The details of these reviews are not reported here, although they can be identified in the reference section.

Setting (country) and population

Only two reviews specify the country in which interventions took place (e.g., Fenton et al., 2018; Miller & Chung, 2009). In their review, Fenton and colleagues included studies that sampled students attending post-secondary institutions in North America. Similarly, Miller and Chung included studies that sampled US college students.

Most reviews included studies conducted on higher education students (Conley et al., 2013; Conley et al., 2015; Conley et al., 2017; Davies et al., 2014; Reavley & Jorm, 2010; Shapiro et al., 2008). Two reviews included studies conducted using higher education students defined as students receiving post-secondary education in 2- or 4-year colleges and universities, trade and vocational schools, or various graduate and professional programs such as medical or law school (Conley et al., 2013; Conley et al., 2015). Conley et al. (2017) defined this group as college, university, graduate, postgraduate and professional students whereas Davies et al. (2014) define HE students as undergraduate and postgraduate students.

Two reviews make reference to tertiary institutions (e.g., Farrer et al., 2013; Harrer et al., 2018). Both reviews provide similar examples of tertiary institutions (e.g., university or

college), although Farrer et al. (2013) also include a technical and further education (TAFE) institution as an example. Similarly, Breedvelt et al. (2019) included studies conducted using tertiary education students defined as university, college, or other postsecondary higher education students.

Three reviews included studies conducted on college students (Bamber & Morpeth, 2019; Bamber & Schneider, 2016), and two of these reviews defined college students as undergraduate and postgraduate students (Bamber & Morpeth, 2019; Bamber & Schneider, 2016). Similarly, two reviews included studies conducted using undergraduate, graduate, and professional students (e.g., Halladay et al., 2019; Regher et al., 2013), whereas other reviews included studies that were conducted on students studying particular degrees (e.g., health and social care undergraduate students; O'Driscoll et al., 2017). Last, some reviews include university or college students without providing examples (e.g., Cuijpers et al., 2016; Fernandez et al., 2016; Howell & Passmore, 2018; Huang et al., 2018; Winzer et al., 2018).

Outcomes

The general mental health and well-being outcomes included in the reviews were:

- **anxiety** (Bamber & Morpeth, 2019; Bamber & Schneider, 2016; Breedvelt et al., 2019; Conley et al., 2013; Conley et al., 2015; Conley et al., 2017; Conley et al., 2016; Davies et al., 2014; Farrer et al., 2013; Fenton et al., 2018; Fernandez et al., 2016; Halladay et al., 2019; Harrer et al., 2018; Howell & Passmore, 2018; Huang et al., 2018; Reavley & Jorm, 2010; Regehr et al., 2013; Shapiro, Brown, & Austin, 2008; Winzer et al., 2018),
- **depression** (Breedvelt et al., 2019; Conley et al., 2013; Conley et al., 2015; Conley et al., 2017; Conley et al., 2016; Cuijpers et al., 2016; Davies et al., 2014; Farrer et al., 2013; Fenton et al., 2018; Fernandez et al., 2016; Halladay et al., 2019; Harrer et al., 2018; Howell & Passmore, 2018; Huang et al., 2018; Miller & Chung, 2009; Reavley & Jorm, 2010; Regehr et al., 2013; Shapiro et al., 2008; Winzer et al., 2018),
- **stress** (Bamber & Schneider, 2016; Breedvelt et al., 2019; Conley et al., 2013; Conley et al., 2015; Conley et al., 2016; Davies et al., 2014; Farrer et al., 2013; Fenton et al., 2018; Halladay et al., 2019; Harrer et al., 2018; Howell & Passmore, 2018; O'Driscoll et al., 2017; Regehr et al., 2013; Shapiro et al., 2008; Winzer et al., 2018),

- **general psychological distress** (Conley et al., 2013; Conley et al., 2015; Conley et al., 2017; Conley et al., 2016; Davies et al., 2014; Farrer et al., 2013; Winzer et al., 2018),
- **well-being** (Conley et al., 2013; Fernandez et al., 2016; Harrer et al., 2018; Howell & Passmore, 2018; Shapiro et al., 2008; Winzer et al., 2018),
- **mood** (Fenton et al., 2018; O'Driscoll et al., 2017),
- **suicide-related outcomes** such as knowledge of suicide prevention, suicide-related attitudes or behaviours, and number of suicides (Harrod et al., 2014).

Examples of other health-related outcomes also measured include mindfulness, socio-emotional skills, self-perceptions, interpersonal relationships, and sleep problems.

Overview of quality of included reviews

The AMSTAR quality assessment scores for the reviews ranged from 1 (Shapiro et al., 2008) to 9 (Harrer et al., 2018; Huang et al., 2018) out of a maximum of 11. Based on the AMSTAR grading, the reviews were either lower, moderate, or higher methodological quality. The results of the methodological quality assessment are summarised in Table 3.

Table 3. Results of methodological Quality Assessment

Review	Methodological quality criteria												QA banding
	1. 'apriori' design provided	2. duplicate study selection and data	3. comprehensive literature search	4. grey literature and all languages included	5. list of studies (included and excluded)	6. characteristics of the included studies	7. scientific quality of the included studies assessed	8. scientific quality used appropriately in formulating conclusions	9. appropriate methods used to combine the findings	10. likelihood of publication bias assessed	11. conflict of interest stated for review	**Total score** (out of 11)	
Harrer et al. (2018)	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	9	**Higher methodological quality reviews**
Huang et al. (2018)	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	9	
Davies et al. (2014)	Y	N	Y	Y	N	N	Y	Y	Y	Y	Y	8	
Halladay et al. (2019)	Y	Y	Y	Y	N	Y	Y	Y	Y	CA	N	8	
Harrod et	Y	Y	Y	N	Y	Y	Y	Y	Y	N	N	8	

al. (2014)													
Breedvelt et al. (2019)	Y	Y	N	N	N	Y	Y	Y	Y	Y	N	7	
O'Driscoll et al. (2017)	Y	Y	Y	N	N	Y	Y	Y	NA	N	Y	7	
Bamber & Morpeth (2019)	Y	Y	N	N	N	N	N	Y	Y	Y	Y	6	**Moderate methodological quality reviews**
Conley et al. (2015)	Y	Y	Y	N	N	Y	N	N	Y	N	Y	6	
Conley et al. (2017)	Y	Y	Y	N	N	Y	N	N	Y	Y	N	6	
Cuijpers et al. (2016)	Y	CA	CA	N	N	Y	Y	Y	Y	Y	N	6	
Fenton et al. (2018)	Y	CA	Y	Y	N	Y	Y	N	N/A	N	Y	6	
Fernandez et al.	Y	Y	N	N	N	Y	Y	Y	NA	N	Y	6	

(2016)													
Winzer et al. (2018)	Y	CA	Y	N	N	N	Y	Y	Y	N	Y	6	
Conley et al. (2016)	Y	CA	CA	N	N	Y	N	N	Y	Y	Y	5	
Farrer et al. (2013)	Y	Y	N	N	N	N	Y	Y	NA	N	Y	5	
Howell & Passmore (2018)	Y	CA	N	N	N	Y	CA	Y	Y	Y	N	5	
Regehr et al. (2013)	Y	CA	N	N	N	Y	Y	N	Y	N	Y	5	
Buchanan (2012)	Y	N	Y	Y	N	Y	N	N	N/A	N	N	4	
Conley et al. (2013)	Y	CA	CA	N	N	Y	N	N	Y	N	Y	4	
Bamber & Schneider (2016)	Y	CA	Y	N	N	Y	N	N	NA	CA	N	3	

Bonthuys & Botha (2016)	Y	CA	N	N	N	Y	Y	N	NA	N	N	3	**Lower methodological quality reviews**
Miller & Chung (2009)	Y	CA	N	N	N	Y	N	N	NA	N	Y	3	
Reavley & Jorm (2010)	Y	CA	N	N	N	N	Y	Y	NA	N	N	3	
Shapiro et al. (2008)	Y	N	N	N	N	N	N	N	NA	N	N	1	

Note: Y = Yes, N = No, CA = Can't Answer (insufficient information).

Source: Adapted from Shea (2007)

Findings of included reviews

Findings are grouped into evidence themes (1 to 11). Within each evidence theme, evidence from the higher quality reviews is reported first and in more depth.

The term 'significant' is used, for brevity, to indicate findings that were statistically significant ($p \leq 0.05$) unless stated otherwise. Logistical constraints (time and resources) and a desire to make reporting as concise and accessible as possible, prevent the reporting of non-significant effects.

1. Mindfulness-based interventions

A systematic review and meta-analysis of Randomised Controlled Trials (RCTs) of different interventions for common mental health problems in university and college students found that MBIs were effective in reducing both depression and generalized anxiety disorder (Huang et al., 2018). This was graded as a higher methodological quality review. In their meta-analysis, the authors found evidence that MBIs led to statistically significant reductions in depression (pooled effect size: -0.52, 95% CI: -0.88 to -0.16). However, art, exercise and peer support interventions (-0.76, 95% CI: -1.19 to -0.32), and cognitive-behavioural related interventions (-0.59, 95% CI: -0.72 to -0.45) led to greater reductions. They found no evidence that the effects of MBIs on depression were sustained over time (i.e., not statistically significant at follow up). They also found evidence that MBIs significantly reduced anxiety (-0.49, 95% CI: -0.84 to -0.15) but, again, other interventions such as peer support and music (-0.84, 95% CI: -1.19 to -0.49) and CBT related interventions (-0.39, 95% CI: -0.55 to -0.22) led to greater reductions.

Another systematic review and meta-analysis of RCTs examined the effectiveness of MBIs for mental health outcomes in post-secondary students (Halladay et al., 2019). This was graded as a higher methodological quality review. Pooling data from 20 studies, Halladay et al. (2019) found evidence that MBIs significantly ($p<0.05$) reduced symptoms of depression (Standardised Mean Difference [SMD] -0.49, 95% CI: -0.68 to -0.30), anxiety (SMD -0.53, 95% CI: -0.78 to -0.29), and perceived stress (SMD -0.39, 95% CI: -0.50 to -0.27) when compared to a passive control group (receiving no intervention/on waiting list). There was, however, no significant difference between the MBI intervention group in levels of depression, anxiety or perceived stress when compared to an active control group receiving health education, relaxation, physical activity, or other approaches including CBT.

Halladay et al. (2019) also analysed the impacts of different lengths of intervention. They found that there was no significant difference in effects, for depressive symptoms,

anxiety and stress, between brief and longer interventions. They also analysed the impact of traditional compared to adapted interventions (i.e., Mindfulness-Based Stress Reduction [MBSR] versus Mindfulness-Based Cognitive Therapy [MBCT] versus other or adapted MBIs), and found that MBCT (SMD: -1.21, 95% CI: -1.76 to -0.66) was more effective than both MBSR (SMD = -0.44, 95% CI: -0.72 to -0.16, p=0.01) and other MBIs (SMD = -0.29, 95% CI: -0.45 to -0.12, p<0.01). MBSR and other MBIs produced similar non-significant effects (p=0.35). When compared to no intervention, MBCT was found to be the most effective type of MBI.

Studies examining whether effects were sustained over time (follow-up studies) were split by type of intervention. Halladay et al. (2019) found that MBCT interventions demonstrated sustained reductions in depression one month after (post-) intervention in two studies with a total of 64 participants (Mean Difference [MD] of the Beck Depression Inventory -5.06, 95% CI: -6.52 to -3.59). Other MBIs did not demonstrate sustained reductions in depression at one month or 2-3 months post-intervention in three studies (with a total of 374 participants), although reductions in depression were found at 4-5 months post-intervention in two studies (with a total of 191 participants; SMD -0.43, 95% CI: -0.72 to -0.14). MBCT interventions also demonstrated sustained reductions in anxiety symptoms at both 1-month in two studies (with a total of 66 participants; MD on Beck Anxiety Inventory [BAI] -7.12, 95% CI: -8.23 to -5.97) and 6 months in two studies post-intervention (a total of 65 participants; MD on BAI -5.95, 95% CI: -10.78 to -1.13). Other MBIs demonstrated significant reductions 1-month post-intervention in one study (with a total of 33 participants; MD Hamilton Anxiety Scale -9.50, CI: -17.27 to -1.73).

A systematic review of evidence that included both randomised and non-randomised controlled trials explored the effects of MBIs on depression and stress in undergraduate health and social care students (O'Driscoll et al., 2017). This was graded as a higher methodological quality review. A meta-analysis was not possible due to the heterogeneity (diversity) of studies. Within the included studies, they found significant differences in depression scores post-intervention, and a significant reduction in stress in the intervention groups when compared to control groups in two studies (p = 0.019; p = <0.001 respectively, in Danilewitz et al., 2016; Song & Lindquist, 2015).

Bamber and Morpeth (2019) conducted a systematic review and meta-analysis of evidence on the effects of MBIs on anxiety in college students. This was graded as a moderate methodological quality review. A number of primary study designs were included:

primary studies with two-group comparisons (e.g., MBI versus control) and studies with pre-test and post-test analysis of MBI (one-group MBI). They found MBIs significantly reduced anxiety, compared to no-treatment controls (0.56, 95% CI: 0.42 to 0.70, p<0.001). MBI groups' pre and post intervention comparisons showed large significant reductions in anxiety. There was, however, a small but significant reduction in control group anxiety pre/post comparisons. They also found that higher numbers of sessions increased the effects of MBIs (Q=6.79, df=1, p=0.0092), with more sessions leading to greater reductions in anxiety.

Fenton et al. (2018) conducted a systematic review of evidence on the impacts of different recreation programmes, including MBIs, on mental health outcomes in post-secondary students in North America. This was graded as a moderate methodological quality review. Randomised controlled trials, non-randomised with control, and non-randomised no control studies were all included. They found that mindfulness interventions reduced depression, anxiety, stress, and negative mood.

Conley et al. (2015) conducted a review and meta-analysis of evidence on the impact of universal mental health prevention programmes including MBIs for higher education students. This was graded as a moderate methodological quality review. The review included two study designs: quasi-experimental and random designs. They found that skill-training programmes with supervised practice were significantly more effective than both skill-training programmes without supervised practice and psychoeducation in reducing depression, anxiety, stress, and general psychological distress. Conley and colleagues found that relaxation interventions demonstrated the most overall benefit in terms of effectiveness, followed by mindfulness interventions and cognitive-behavioural interventions which did not differ from each other.

Regehr et al. (2013) conducted a review and meta-analysis of evidence on the effectiveness of preventative interventions in reducing mental health outcomes in university students. This was graded as a moderate methodological quality review. They included two study designs in their review and meta-analysis: randomised and parallel cohort designs. Regehr et al. (2013) found that mindfulness-based interventions which focussed on stress reduction significantly reduced symptoms of anxiety and depression. In their meta-analysis, mindfulness-based interventions were assessed for their impact on anxiety. They found that mindfulness-based interventions led to significant improvements, compared to control groups (SDM -0.73, 95% CI: -1.00 to -0.45).

Conley et al. (2013) reviewed evidence on the effectiveness of 83 (controlled) universal promotion and prevention interventions. This was graded as a lower methodological quality review. They explored whether skill-orientated interventions were more effective with or without supervised skills practice. The authors also examined the effectiveness of different strategies employed in skill-oriented interventions such as cognitive-behavioural interventions, mindfulness interventions, relaxation interventions, and meditation in two study designs: quasi-experimental and random designs. They found that skill-oriented interventions were more effective with supervised practice, and that supervised skills practice interventions reduced depression, anxiety, and stress. They found mindfulness interventions to be the most effective form among the skill-oriented programmes containing supervised practice. Mindfulness interventions were significantly more effective in comparison to other interventions (the proportion of all significant post-intervention outcomes combined was 78.8% for mindfulness, in comparison to psychoeducation [12.5%], cognitive behavioural [43.4%], relaxation [27.1%], meditation [13%], and other interventions [21.9%]).

Bamber and Schneider (2016) explored the effects of MBIs such as Mindfulness Based Stress Reduction (MBSR) and Mindfulness Meditation (MM) on mental health outcomes including anxiety and stress in college students. This was graded as a moderate methodological quality review. In their review, they included a number of different study designs including RCTs, quasi-experimental pre/post test, quasi-experimental repeated measures, non-randomised cohort-controlled, non-randomised waitlist controlled, course evaluation, and AB single subject designs. Both MBSR and MM were found to significantly reduce symptoms of anxiety and stress.

One additional mixed review explored the combined effects of mindfulness together with yoga and meditation (e.g., Breedvelt et al., 2019). This review has been summarised under recreation programmes (no. 6) below.

2. Psychological interventions including cognitive-behavioural interventions

Huang et al. (2018) conducted a systematic review and meta-analysis of RCT evidence on the effectiveness of interventions for common mental health difficulties in university and college students. They found that cognitive behavioural therapy (CBT) had significant positive effects on depression and generalized anxiety disorder. Meta-analysis results showed that cognitive-behavioural-related interventions led to greater reductions in depression (-0.59, 95% CI: 0.72 to 0.45) than mindfulness-based interventions (-0.52, 95% CI: 0.88 to 0.16) and

attention/perception modification (-0.46, 95% CI: 1.06 to 0.13). However, other interventions (art, exercise, and peer support) led to a greater reduction in depression (-0.76, 95% CI: 1.19 to 0.32). The follow-up (pooled) effect size of cognitive-behavioural related interventions (-0.75, 95% CI: 0.95 to 0.54) had a greater significant effect.

CBT related interventions were associated with significant (pooled) reductions in anxiety (-0.39, 95% CI: 0.55 to 0.22). The pooled effect of other interventions (peer support and music; -0.84, 95% CI: 1.1 to 0.49) and mindfulness (-0.49, 95% CI: 0.84 to 0.15), however, for generalised anxiety disorder were associated with greater reductions in anxiety (-0.39, 95% CI: 0.55 to 0.22) compared to CBT.

Winzer et al. (2018) conducted a systematic review and meta-analysis to assess whether the effects of mental health promotion and mental ill-health prevention interventions were sustained over time. This was graded as a moderate methodological quality review. They found that CBT-related interventions led to significant (pooled) effects for 3-6 month and 13-18 month follow-ups in sub-group analyses for combined mental ill-health outcomes (-0.40, 95% CI-0.64 to 0.16; -0.30, 95% CI: -0.51 to 0.08, respectively). They also analysed impacts on combined positive mental health and academic performance at 3-6 months, and found that the interventions had significant effects (pooled effect size: 0.52, 95% CI: 0.06 to 0.98).

Cuijpers et al. (2016) carried out a meta-analysis of evidence that examined the effectiveness of different forms of psychological treatment, such as CBT and behavioural activation therapy (BAT), for addressing symptoms of depression in college students. This was graded as a moderate methodological quality review. They found a large overall (pooled) effect of the therapies versus controls ($g = 0.89$, 95% CI: 0.66 to 1.11). They also found that individual therapy was significantly more effective than group therapy ($p = 0.003$) but that type of treatment (CBT, BAT, or other) was not significantly associated with the size of effect.

In their review and meta-analysis of the impact of universal mental health prevention programmes for higher education students, Conley et al. (2015) found that skill-training programmes with supervised practice such as cognitive-behavioural interventions, mindfulness interventions, relaxation interventions, and meditation significantly reduced depression, anxiety, stress, and general psychological distress. Programmes without supervised practice were significantly less effective. Comparing the effectiveness of different interventions overall, they also found that relaxation interventions were the most effective

(mean effect size: 0.55, 95% CI: 0.41 to 0.68), followed by CBT interventions (0.49, CI: 0.40 to 0.58), MBIs (0.34, CI: 0.19 to 0.49), meditation (0.25, CI: 0.02 to 0.53), then psychoeducational interventions (0.13: CI: 0.06 to 0.21).

In their review and meta-analysis of evidence on the effectiveness of preventative interventions in reducing mental health outcomes in university students, Regehr et al. (2013) found that cognitive and behavioural interventions focusing on stress reduction significantly reduced symptoms of anxiety and depression. In their meta-analysis, cognitive-behavioural interventions were assessed for their impact on anxiety. They found that cognitive-behavioural interventions (SDM -0.77, 95% CI: -0.97 to -0.57) led to significant improvement, compared to control groups.

Conley et al. (2013) examined the effectiveness of different strategies employed in skill-oriented interventions such as cognitive-behavioural interventions, mindfulness interventions, relaxation interventions, and meditation. Conley and colleagues found that interventions with supervised skills practice reduced depression, anxiety, and stress. Mindfulness interventions were found to be the most effective (78.8%) form of intervention among the skill-oriented programmes containing supervised practice, followed by cognitive-behavioural interventions (55.8%) which performed significantly better than relaxation (28.9%, OR = 3.11, $p<0.01$) and meditation (19.4%, OR = 5.26, $p<0.001$) interventions.

Reavley and Jorm's (2010) review of evidence on the prevention and early intervention for mental health problems in higher education students found that CBT approaches are effective for prevention and early intervention. They also reported that these approaches are effective for at least some months following the CBT intervention. The authors did not, however, report the primary study designs they included in the review. This was graded as a lower methodological quality review.

In a literature review of studies of depression and treatment outcomes among US college students, brief individual cognitive therapy was found to be effective at reducing mild to moderate depressive symptoms (Miller & Chung, 2009). This finding was based on only one RCT, however. This was graded as a lower methodological quality review.

3. Technology-delivered interventions

Harrer et al. (2018) systematically reviewed and performed a meta-analysis of evidence on the impacts of internet interventions on symptoms of common mental health problems, well-being and functional outcomes among university students. This was graded as a higher methodological quality review. Small effects from internet interventions were found on

depression (*g* = 0.18, 95% CI: 0.08 to 0.27), anxiety (*g* = 0.27, 95% CI: 0.13 to 0.40), and stress (*g* = 0.20, 95% CI: 0.02 to 0.38). There were, however, no significant effects on well-being. The effects were higher for interventions that were based on CBT principles.

Similarly, Davies et al. (2014) reviewed evidence on the effectiveness of computer-delivered and web-based interventions in improving depression, anxiety, and psychological well-being in higher education students. This was graded as a higher methodological quality review. When compared to an inactive control group (receiving no-treatment or on a waiting list), sensitivity meta-analyses showed that interventions significantly improved anxiety (Pooled SMD −0.56; 95% CI: −0.77 to −0.35, $p<0.001$), depression (SMD −0.43; 95% CI: −0.63 to −0.22, $p<0.001$), and stress (SMD −0.73; 95% CI: −1.27 to −0.19, $p=0.008$). The sensitivity analyses showed no significant effects for anxiety or depression, however, when compared to the active control group (in which participants received materials designed to mimic the time and attention received in the intervention group). Sensitivity analyses also showed no significant difference between the computer and web-based intervention for anxiety or depression when compared to comparison interventions that included a face-to-face version of the intervention, a web-based stress management intervention, another computer-based CBT program, and an online support group.

Conley et al. (2016) conducted a meta-analytic review of evidence on the impact of universal and indicated technology-delivered interventions (TDIs) targeting mental health outcomes in higher education students, including randomized and quasi-experimental study designs. This was graded as a moderate methodological quality review. Universal interventions are aimed at students without any pre-existing mental health problems whereas indicated interventions are aimed at students who meet criteria for mild to moderate levels of mental health problems or have acknowledged an existing mental health problem such as depression or anxiety. They found that both universal and indicated TDIs were significantly effective in reducing symptoms of depression, anxiety, and stress. Indicated interventions produced higher overall (mean) improvements (0.37, CI: 0.27 to 0.47, $p<0.001$) than universal interventions (0.19, CI: 0.11 to 0.28, $p<0.001$). Both universal (0.21, CI: 0.11 to 0.31, $p<0.001$) and indicated (0.39, CI: 0.29 to 0.50, $p<0.001$) skill-training interventions led to significant improvements. Interventions without skill training were, however, only significant among indicated interventions (0.25, CI: 0.01 to 0.49, $p=0.042$). Three of the 22 universal interventions, and eight of the 26 indicated interventions, assessed outcomes at follow-up (ranging between 13 to 52 weeks, and 2 to 26 weeks, respectively). Both universal and indicated interventions sustained significant positive effects on mental

health outcomes at follow up (0.30, CI: 0.06 to 0.54, p=0.015; 0.49, CI: 0.31 to 0.67, p<0.001, respectively).

Farrer et al. (2013) systematically reviewed evidence on the effectiveness of technology-based interventions for mental health outcomes in tertiary students. This was graded as a moderate methodological quality review. They included both randomized controlled trials and randomized trials (equivalence trials). In interventions targeting both depression and anxiety, they found that technology-based CBT was effective in reducing anxiety and depression, although to a lesser degree than traditional therapy with human contact.

4. Psychoeducational interventions

In their review of RCTs, Winzer et al. (2018) explored whether the effects of mental health interventions (e.g., psychoeducational interventions) for students in higher education were sustainable over time. They did not find significant (pooled) effects on combined mental ill health outcomes at 3-6 months, 7-12 months, or 13-18 month follow-ups. They reported no superior effect of psychoeducational intervention. However, the 3-6 month and 13-18 month follow-up were both only based on one study.

When Conley et al. (2015) reviewed evidence on the impact of universal prevention programmes for higher education students, they found that skill-training programmes with supervised practice were significantly more effective than both skill-training programmes without supervised practice and psychoeducation interventions in reducing depression, anxiety, stress, and general psychological distress. The overall (mean) effect size (ES) for interventions with supervised practice (0.45, CI: 0.39 to 0.52, p<0.001) and for psychoeducational interventions (0.13, CI: 0.06 to 0.21, p<0.001) differed significantly from zero. For interventions without supervised practice, however, there was no significant difference. Psychoeducational interventions yielded significant effects for several mental health related outcomes including anxiety, stress, and general psychological distress (ESs>0.13). However, these interventions did not yield significant effects for depression, social and emotional skills, or interpersonal relationships. Psychoeducational interventions were found to be less effective than relaxation interventions, cognitive-behavioural interventions, mindfulness interventions, and meditation. Although interventions with supervised skills practice produced a significant positive effect averaged across all types of outcomes at follow-up (0.28, CI: 0.16 to 0.40), psychoeducational interventions did not.

In their 2013 review, Conley et al. explored whether skill-oriented interventions that included supervised skills were more effective than psychoeducational programmes. They found that psychoeducational programmes were not as effective as preventive interventions for higher education students.

5. Educational/personalised feedback interventions

In their review of prevention and early intervention for mental health issues in higher education students, Reavely and Jorm (2010) reported mixed findings on the effectiveness of educational/personalised feedback interventions.

Miller and Chung (2009) explored treatment for depression and found that an intervention using personalised mailed feedback was effective at reducing symptoms of depression. This finding was only based on one study, however.

6. Recreation programmes

In their review of RCTs on the effectiveness of interventions for common mental health difficulties, Huang et al. (2018) found that recreational interventions including exercise, art and peer support were effective treatments for depression and anxiety in the students. Although both CBT and MBIs were found to be effective, other interventions (i.e., art, exercise, and peer support) showed larger effects for both depression and generalized anxiety disorder.

When exploring the combined effects of yoga, meditation, and mindfulness on depression, anxiety, and stress in tertiary education students, Breedvelt et al. (2019) found moderate positive effects for yoga, meditation, and mindfulness on symptoms of depression, anxiety, and stress. They found no significant differences in subgroup analysis when they compared the effectiveness of yoga, mindfulness meditation, and MBSR. A small number of the included studies (N=6) provided long-term follow-up data which ranged from 1 to 24 months. The (pooled) effect at follow-up was found to be small to medium ($g = 0.39$, 95% CI: 0.17 to 0.61). This was graded as a higher methodological quality review.

Fenton et al. (2018) reviewed evidence on the impacts of recreation programmes such as mindfulness, meditation, Tai Chi, yoga, exercise, and animal therapy on mental health outcomes in post-secondary students in North America. They included a number of different primary study designs: non-randomised with control, non-randomised no control, and RCTs. They found that mindfulness, yoga, meditation, exercise, and animal therapy all reduced depression, anxiety, stress, and negative mood.

The review of evidence on the impact of universal mental health prevention programmes by Conley et al. (2015) found that meditation interventions were more effective than psychoeducational interventions but less effective than relaxation, cognitive-behavioural and mindfulness interventions.

The review by Conley et al. (2013) also examined the relative effectiveness of different approaches used in skill-oriented interventions, including cognitive-behavioural, mindfulness, relaxation, and meditation. They reported that mindfulness interventions were more effective than cognitive-behavioural interventions, relaxation interventions, and meditation; and found that cognitive-behavioural interventions were more effective than both meditation and relaxation interventions which did not differ significantly from each other.

Shapiro et al. (2008) reviewed evidence on the impacts of meditation on mental health outcomes in higher education students, and found that meditation reduces both stress and anxiety and increases psychological well-being. Most of the research reviewed examined mindfulness-based meditation. This was graded as a lower methodological quality review.

7. Relaxation

In their review of universal mental health prevention programmes for higher education students, Conley et al. (2015) found relaxation interventions to be the most effective. In contrast, Conley et al (2013) examined the relative effectiveness of different strategies used in skill-oriented interventions including cognitive-behavioural, mindfulness, relaxation and meditation, and found that mindfulness interventions and cognitive-behavioural interventions were more effective than relaxation interventions, and that meditation and relaxation interventions did not differ significantly from each other.

8. Acceptance and Commitment Training (ACT) interventions

Howell and Passmore (2018) conducted a review and ('initial') meta-analysis on the impacts of ACT interventions for university student wellbeing. This was graded as a moderate methodological quality review. They included randomized controlled experimental designs. Their meta-analysis showed a small significant (pooled) effect on well-being (d=0.29, 95% CI: 0.11 to 0.47, p=0.008) when assessed with the Well-Being Manifestations Measure Scale (Massé et al, 1998). ACT interventions were also found to reduce depression, anxiety, and stress.

9. Setting-based interventions

Fernandez et al. (2016) conducted a systematic review of evidence on the mental well-being impacts of setting-based interventions for university students. This was graded as a moderate methodological quality review. They included experimental (e.g., RCT) and observational (e.g., controlled trial without randomisation, pre-post/before and after, and time series) study designs. Academic-based interventions, to enhance learning and teaching, were found to significantly improve mental well-being.

10. Suicide prevention interventions

Harrod et al. (2014) conducted a systematic review of evidence on the effects of prevention interventions for suicide, suicidal behaviour, and knowledge and attitudes about suicide. This was graded as a higher methodological quality review. They included a number of primary study designs: randomised controlled trials, controlled before-and-after studies (CBAs), controlled interrupted time series studies, and interrupted time series studies. In three RCTs, they found that classroom-based didactic and experimental programmes were effective in increasing short-term knowledge of suicide and knowledge of suicide prevention. They also found that although gatekeeper training enhanced short-term suicide knowledge in students (in four CBAs), there was no evidence of an effect on suicide-related attitudes or behaviours. In another CBA, the number of student suicides decreased significantly at one university that had implemented an institutional policy restricting student access to laboratory cyanide and mandated professional assessment for suicidal students, when compared to 11 control universities.

11. Tomatis Method

Bonthuys and Botha (2016) reviewed evidence on the impacts of the Tomatis Method for self-regulation ('the ability of an individual to monitor and evaluate progress towards a specific purpose') compared to alternative self-regulation approaches. This was graded as a lower methodological quality review. They included randomized controlled trials, quasi-experimental, and survey study designs. The Tomatis Method was found to be effective in increasing well-being.

Other evidence

Conley et al. (2017) conducted a meta-analysis of evidence on the impacts of indicated prevention programmes for various forms of early-identified mental health problems such as sub-threshold depression and anxiety symptoms. Although they report significant effects,

they provided insufficient information on the type of interventions to be included in the above intervention categories.

Four reviews that fell just sort of meeting our inclusion criteria (Galbraith & Brown, 2011; McConville et al., 2016; Shiralkar et al.,, 2013; Wasson et al., 2016) focused on stress reduction interventions for healthcare students (e.g., nurses, doctors). As these students are functioning in a different environment in which they are exposed to work-based stressors, we suggest that this distinct body of evidence should be subject to its own review.

Discussion

Summary of main findings

This review of reviews identified a range of interventions for student mental health and well-being, including mindfulness-based interventions, technology-delivered interventions, cognitive-behavioural interventions, psychoeducation interventions, recreation programmes, relaxation interventions, educational/personalised mail feedback interventions, acceptance and commitment training interventions, setting-based interventions, suicide-prevention interventions, and the Tomatis method.

Mindfulness-based interventions, CBT, and technology-delivered interventions all appear to be effective when compared to a passive controls (receiving no intervention). There is some evidence to suggest that the effects of CBT-related interventions are sustained over time. Recreation programmes were also found to be effective. In one high quality review, while both CBT and MBIs were found to be effective, other interventions (i.e., art, exercise, and peer support) were found to be more effective.

The review of reviews only located single reviews of evidence on acceptance and commitment training interventions (Howell & Passmore, 2018), setting-based interventions (Fernandez et al., 2016), and suicide prevention interventions (Harrod et al., 2014) where these interventions were all shown to be effective. However, it should be noted that some of the reviews (e.g., Howell & Passmore, 2018) only included a small number of studies with small sample sizes, meaning their findings should be viewed with some caution.

The review-level evidence suggests that psychoeducation interventions are not as effective as other intervention forms such as mindfulness-based interventions, cognitive-behavioural interventions, relaxation interventions, and meditation. In addition, the effects of psychoeducation interventions do not appear to sustain over time.

Limitations in the review of reviews

The review was limited in a number of ways. First, the searches were limited to studies published in English language. Synthesis of evidence published in other (non-English) languages is desirable. This would require multilingual searches (to identify grey literature evidence in particular) and sophisticated translation of technical documents. These requirements lie beyond the logistical constraints of most reviews. Second, the searches were limited to a 20-year date range (1999 to 2019). However, we aimed to identify interventions that are most relevant to modern student populations and contexts and so this date range was deemed appropriate.

Gaps, strengths and limitations in the body of evidence

We identified a notable gap in the existing body of review level evidence on interventions for students attending HE colleges in UK settings. We recommend therefore that a systematic review be conducted in this area to identify primary level studies.

There were a large number of reviews on mindfulness and cognitive-behavioural interventions whereas review level evidence was limited in relation to other intervention types. We therefore recommend that primary studies examining the efficacy of acceptance and commitment training interventions, suicide-prevention interventions, and setting-based interventions for HE and FE students are conducted.

Country and setting of the underlying evidence was not specified in most reviews. It is likely that a substantial portion of the evidence is from US institutions, as this is typical for most evidence on health and wellbeing interventions and impacts. There was also a critical shortage of information on who delivered the interventions. In addition, some of the reviews (e.g., Howell & Passmore, 2018) included a small number of studies each with small sample sizes.

The included reviews only reported findings on positive/beneficial effects of interventions. The underlying primary studies may have only attempted to assess efficacy and not the potential broader impacts of interventions. This is an important omission in both the primary literature or the reviews. Interventions aiming for beneficial outcomes can often lead to unintended, adverse impacts for some participants. Primary and secondary research (including reviews) should attempt to identify adverse impacts so they can be eliminated or ameliorated, in accordance with a 'first do no harm' principle.

Another important limitation in the included reviews was that they did not consider the distribution of impacts (inequalities) within or across population subgroups including by socio-economic status, age, gender, disability, and sexuality. As it is entirely possible that some interventions may work better for some people than for others, an evidence base that is more nuanced in terms of individual differences and differential impacts could underpin the tailoring of interventions to suit particular student characteristics leading, in time, to more suitable and effective interventions associated with nuanced, evidence-based delivery strategies.

None of the reviews included evidence on wider social determinants of (student) health and well-being interventions, despite there being a large body of evidence supporting the efficacy and appropriateness of such interventions in many other contexts. For example, the living environment including physical surroundings and social spaces environment seem likely to be important generic determinants of student wellbeing (Bagnall et al, 2018). Examples include quality and accessibility of accommodation, and social relationships.

Although there were limitations in the strength of evidence with regard to some of the study designs, the search identified a large number of systematic reviews and meta-analyses.

Implications for research

Future reviews

It is important for future reviews to state where the studies were conducted in order to assess transferability. Future reviews should follow Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) / PRISMA-Equity Extension guidelines in order to improve reporting standards (Moher et al., 2009; Welsh et al., 2012). This would include reporting key basic descriptive information on countries, settings, and population sub-groups.

Future primary intervention research

Future primary and review-level studies should pay attention to data collection, disaggregation, stratification and analysis of the distribution of impacts of interventions by population sub-groups, including socioeconomic, gender, ethnic, age, and disability groups (Pennington et al., 2018). LGBTQ+, cultural, and faith backgrounds may also be important factors to consider.

Future work in this area should focus on the wider determinants of student health and well-being. Moving beyond mindfulness and CBT, there are wider psychological interventions which have been shown to be effective in other populations. In addition to psychological interventions, there are also wider social determinant interventions which may be particularly important such as financial and debt management, quality and cost of student accommodation, sense of belonging to the student body and to the institution (including homesickness, place attachment, and loneliness), and the competitive versus cooperative ethos of the learning environment. Preparing students while in school or college for the transition into university may be beneficial, and evaluations of this would be useful. Although it may be beneficial to teach students how to manage money whilst at university, it might also be necessary for governments and educational institutions to revisit tuition fees and accommodation costs for university students.

As the transition from school or college into university is a period of significant change, greater communication between schools, colleges, and universities is needed, and a joined-up approach between schools, colleges, and universities would be beneficial in order to achieve continuity of support. For example, universities could receive more information from schools or colleges on their students' needs and any difficulties they may have encountered. This information could be provided, with the consent from the student, to universities for information, and an evaluation of this would be necessary. Similarly, joined up working between universities and mental

health services is urgently needed. More specifically, an integrated approach between universities and the NHS is required where there are clear referral pathways and shared protocols. This should be monitored and evaluated. FE and HE institutions cannot themselves offer clinical-level care and support and, with support services so stretched, there is a clear need to improve communications and pathways from educational organisation-led support through to the local specialist mental health services. A bespoke post-secondary student focussed pathway could provide a way forward to address these escalating, unmet needs.

Implications for policy

Interventions to support general student mental health and well-being can be effective. To date, most reviews have explored treatment and prevention of common mental health difficulties rather than the promotion of positive mental health and this is an important omission. Similarly, interventions addressing wider determinants such as students' living environment were not explored in the review-level evidence. Interventions to address these wider determinants, and evaluation that notes the distribution of impacts, are urgently required.

Conclusion

The review-of-reviews located a large body of evidence on specific interventions such as mindfulness and cognitive-behavioural interventions. The evidence suggests that these interventions can effectively reduce common mental health difficulties in the higher education student body. Evidence on other types of intervention was, however, limited. Currently, it is not, therefore, possible to determine and rank which interventions work best, where and for whom, as this would require a larger body of evidence on certain intervention types, and comparative studies or reviews. The included reviews made no consideration of the distribution of the impacts of interventions (inequalities) for population sub-groups (e.g., by age, gender, ethnicity, and socio-economic status); which is most probably a reflection of limitations in the current primary-level evidence. In addition, no evidence on upstream determinants of student mental health and well-being was located. A good quality primary evidence-base examining these areas needs to be developed and then systematically reviewed before confident conclusions can be drawn about what works best to sustain positive mental health and wellbeing in today's diverse and growing post-secondary student population.

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Appendices

Appendix 1. Sample search strategy (MEDLINE)

MEDLINE, MEDLINE In Process and Other Non-indexed Citations. Ran via OVID.

Nº	Terms
1	(university student* OR undergraduate student* OR postgraduate student* OR college student* OR tertiary student* OR higher education OR tertiary education).ti,ab.
2	(mental OR wellbeing OR well-being OR depress* OR anxi* OR stress* OR resilience OR wellness OR coping OR mindfulness OR cognitive OR behavioural OR meditation).ti,ab.
3	(review OR synthes* OR meta-analysis OR overview).ti,ab.
4	AND 1-3
5	Limit 4 to English Language, Humans, 1999 to current

Appendix 2. List of included reviews

Bamber, M.D., & Morpeth, E. (2019). Effects of mindfulness meditation on college student anxiety: A meta-analysis. *Mindfulness, 10*, 203-214.

Bamber, M.D., & Schneider, J.K. (2016). Mindfulness-based meditation to decrease stress and anxiety in college students: A narrative synthesis of the research. *Educational Research Review, 18*, 1-32.

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Appendix 3. Data extraction template

Author and Year	
Title	
Research/review question/s	
Review aim, review objectives	
Review inclusion criteria	
Databases searched, date range	
Number of primary studies included	
Qual, quant and/or mixed-method	
Primary study designs	
Population	
Location, setting/s	
Intervention type/s	
Outcomes measured	
Synthesis method	
Findings	
Conclusions	
Limitations in the review identified by authors	
Author identified gaps and limitations in the evidence base, recommendations for future research	
Source: Adapted from Pennington et al., 2017	

Appendix 4: Quality Assessment template

	Yes	No	Can't answer	Not applicable
1. Was an 'a priori' design provided? The research question and inclusion criteria should be established before the conduct of the review.				
2. Was there duplicate study selection and data extraction? There should be at least two independent data extractors and a consensus procedure for disagreements should be in place.				
3. Was a comprehensive literature search performed? At least two electronic sources should be searched. The report must include years and databases used (e.g., Central, EMBASE, and MEDLINE). Key words and/or MESH terms must be stated and where feasible the search strategy should be provided. All searches should be supplemented by consulting current contents, reviews, textbooks, specialized registers, or experts in the particular field of study, and by reviewing the references in the studies found.				
4. Was the status of publication (i.e. grey literature) used as an inclusion criterion? The authors should state that they searched for reports regardless of their publication type. The authors should state whether or not they excluded any reports (from the systematic review), based on their publication status, language etc.				
5. Was a list of studies (included and excluded) provided? A list of included and excluded studies should be provided.				
6. Were the characteristics of the included studies provided? In an aggregated form such as a table, data from the original studies should be provided on the participants, interventions and outcomes. The ranges of characteristics in all the studies analyzed e.g., age, race, sex, relevant socioeconomic data, disease status, duration, severity, or other diseases should be reported.				
7. Was the scientific quality of the included studies assessed and documented? 'A priori' methods of assessment should be provided.				
8. Was the scientific quality of the included studies used appropriately in formulating conclusions? The results of the methodological rigor and scientific quality should be considered in the analysis and the conclusions of the review, and explicitly stated in formulating recommendations.				
9. Were the methods used to combine the findings of studies appropriate? For the pooled results, a test should be done to ensure the studies were combinable, to assess their homogeneity (i.e., Chi-squared test for homogeneity). If heterogeneity exists a random effects model should be used and/or the clinical appropriateness of combining should be taken into consideration (i.e., is it sensible to combine?).				
10. Was the likelihood of publication bias assessed? An assessment of publication bias should include a combination of graphical aids (e.g., funnel plot, other available tests) and/or statistical tests (e.g., Egger regression test, Hedges-Olken).				
11. Was the conflict of interest included? Potential sources of support should be clearly acknowledged in both the systematic review and the included studies.				

Adapted from Shea (2007)