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Interventions to reduce burnout in students: A systematic review and meta-analysis

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Abstract
Burnout is common among students and can negatively influence their motivation, performance, and wellbeing. However, there is currently little consensus regarding how to intervene effectively. Consequently, we provide the first systematic review and meta-analysis of studies examining the effectiveness of interventions aimed at reducing burnout in students. A systematic literature search returned 17 studies (10 randomized controlled trials and 7 quasi-experimental trials), which included 2,462 students from secondary and tertiary levels of education. These studies used a range of interventions (e.g., mindfulness, rational emotive behavior therapy, cognitive behavioral therapy). When the effects were aggregated across interventions, there was evidence for their effectiveness in reducing total burnout (g^{+} = 0.90, p = .02, 95% CI: [0.04, 1.75], k = 14). However, we also found evidence for moderation and nonsignificant effects when certain symptoms, designs, and intervention-types were examined. The strongest evidence for effectiveness was for randomized controlled trials, rational emotive behavior therapy, and mindfulness-based interventions. This review provides initial evidence for the efficacy of interventions in reducing burnout in students, but we note that a more systematic examination of particular intervention types, especially those designed to target the organisational-level, would be useful, and to have the most impact in informing policy, so too are studies examining the cost effectiveness of such interventions.

Keyword Burnout · Exhaustion · Students · Mental health · Intervention · Review

Introduction

Student wellbeing is of growing concern to teachers, parents, and policymakers. This is because students appear to be increasingly susceptible to a range of mental and physical health problems, including depression, loneliness, and anxiety (e.g., Duffy et al., 2019; Twenge et al., 2018). One particular indication of poor mental wellbeing in a school

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context is burnout. Burnout not only negatively affects student mental health, but also has further negative consequences for achievement and motivation (e.g., Madigan & Curran, 2021; Ribeiro et al., 2018; Walburg, 2014). These effects may have only been exacerbated as a function of the COVID-19 pandemic (e.g., Salmela-Aro et al., 2022). As a consequence, in the present study, we provide the first systematic review and meta-analysis of studies examining interventions aimed at reducing burnout in students. We hope our findings will provide a basis from which to inform relevant policy and practice intending to safeguard student wellbeing.

Burnout

The concept of burnout came to prominence in the mid-1970s. It was introduced to reflect observations of gradual exhaustion, cynicism, and loss of commitment in human services professionals (Maslach & Jackson, 1981). Theorized to arise as a result of chronic work stress, burnout was defined as a multidimensional syndrome comprising three symptoms. These symptoms are exhaustion (feelings of being emotionally overextended and exhausted by one's work), cynicism (a cynical and impersonal response toward recipients of one's care), and reduced efficacy (no longer feeling competent and successful at one's work; Maslach et al., 1986). Much work has since explored complimentary theoretical approaches (e.g., Job Demands-Resources Theory; Bakker & de Vries, 2021) and clarified burnout's distinctiveness from other wellbeing issues (e.g., depression; Meier & Kim, 2022). This work has also explored many negative outcomes associated with burnout, of which the most notable include interpersonal conflict, attrition, and reduced performance (Alarcon, 2011; Madigan & Kim, 2021a; Taris, 2006). The latter has even been found to be a function of other peoples' burnout (e.g., teacher burnout leading to worse student performance; Madigan & Kim, 2021b).

Burnout affects individuals in a range of contexts but appears to be particularly common in education. In this regard, students themselves appear to be especially vulnerable to burnout. Although not formally considered work, the activities that students undertake for education share many similarities with those undertaken in work contexts (Schaufeli et al., 2002). For example, they attend classes and complete structured activities with specific goals in mind (e.g., gaining credits, passing a course, obtaining a degree). Accordingly, burnout can be contextualized to the academic domain for students. In this manner, student burnout represents a multidimensional syndrome of exhaustion from studying, cynicism directed towards one's study, and reduced efficacy in relation to academic work (Salmela-Aro et al., 2009; Schaufeli et al., 2002).

Like in other work contexts, burnout in students has been linked to many outcomes. In this regard, it appears that burnout comes with several significant costs for students' mental health. These costs include an increased likelihood of depression, more frequent suicidal ideation, and more intense feelings of anxiety (Walburg, 2014). Burnout will also negatively affect students' motivation. This includes the thwarting of basic psychological needs and resulting shifts from autonomous to more controlled forms of motivation (Cazan, 2015; Rehman et al., 2020; Zhang et al., 2013). It is also possible that students' self-worth and self-esteem will be negatively affected (Dyrbye et al., 2008; IsHak et al., 2013; Walburg, 2014). Finally, burnout will affect how students behave in the classroom. Such changes include increased apathy, more disruptive behaviours, and even absence from the classroom altogether (Schramer et al., 2019; Walburg, 2014). Combined, these changes can result in impaired student achievement (Madigan & Curran, 2021).

Interventions to reduce burnout

Given the many ways in which burnout can affect individuals across a variety of contexts, a growing body of work has sought to develop and test interventions aimed at reducing burnout symptoms. These interventions have been informed by various theoretical perspectives, including those originally proposed by Maslach and colleagues (e.g., Awa et al., 2010). Interventions have, therefore, been designed to target factors at the individual level (e.g., delivering stress management training) as well as at the organizational level (e.g., changing working hours; Maslach et al., 2012). In regards to specific examples of such interventions, in addition to traditional cognitive behavioral therapy techniques such as stress management and relaxation, developments from what is known as the third wave of cognitive behavioral therapy including mindfulness have been employed. The former techniques are based around changing underlying cognitive processes and patterns which in turn lead to more adaptive behaviours (e.g., Shafran et al., 2009), while the latter relates to the ability to stay attuned to the present in a non-judgmental manner, rather than ruminating about the past or worrying about the future (Kabat-Zinn, 2003).

There is evidence to suggest that interventions can indeed be effective in reducing burnout. For example, a review of interventions in physicians showed that they decreased burnout by approximately 10%, with both individual and organizational interventions being effective (West et al., 2016). The same is true for interventions with other medical professionals (e.g., nurses; Lee et al., 2016). Similarly, a review of the interventions for teacher burnout found small but significant reductions in total burnout, exhaustion, and reduced efficacy (Iancu et al., 2018). Finally, there is direct evidence for the effectiveness of burnout interventions in academic contexts. Specifically, a number of systematic reviews have shown that interventions can reduce burnout in medical residents (individuals practicing medicine under supervision; see e.g., Walsh et al., 2019), and that these are primarily based around duty hour restrictions (e.g., Williams et al., 2015).

What is currently unclear, however, is whether such interventions work for undergraduate and postgraduate students, and also for those in secondary education. This is particularly important because the conditions and experiences of students in these domains will likely differ substantially from those in medical contexts. For example, there will be differences in the hours worked, a different emphasis of training (theoretical vs. practical and field-based), and, especially for secondary students, differences in the type of tasks required of them (e.g., Honney et al., 2010). In addition, interventions (and how these are implemented) are likely to vary substantially too (e.g., duty hours do not apply; Busireddy et al., 2017). Yet, there is evidence that the performance, motivation, and wellbeing consequences for those engaged in undergraduate and postgraduate programs are just as severe (e.g., Madigan & Curran, 2021). There are also likely to be differences in working conditions and associated burnout interventions in comparison to occupations more broadly (see e.g., West et al., 2016). Collectively, these issues highlight the importance and necessity of effective student-focused burnout interventions.

The present study

Although intervention studies to reduce burnout in secondary, undergraduate, and postgraduate students have previously been conducted (e.g., Bresó et al., 2011), there has been no systematic summary of these studies. Moreover, we currently do not know what types

of interventions have been employed, and perhaps more importantly, whether interventions are effective for these students. It is against this background that the present study aims to provide the first systematic review and meta-analysis of interventions aimed at reducing burnout in students. In doing so, given the strength of evidence they provide, we also focus on controlled trials. We first summarize the literature to identify what has been done so far and then conduct a meta-analysis to determine the interventions' effectiveness. We then aim to discuss the implications for policy and practice.

Method

Literature search

Following relevant recommendations (Page et al., 2021), we began with an extensive computerized literature search of the following psychology and education databases: PsychARTICLES, PsycINFO, MEDLINE, Education Abstracts, Educational Administration Abstracts, and ProQuest Dissertations. The following search terms were used: (burnout OR exhaustion OR depersonalization OR cynicism OR "reduced efficacy" OR "professional accomplishment") AND (student) AND (intervention OR trial OR program OR treatment OR training OR workshop OR experiment OR RCT). The search was conducted in January 2023, and to be inclusive as possible we specified no explicit start date for the search. We included grey literature (theses, dissertations, conference presentations) in an attempt to reduce publication bias. As well as conducting this standardized search, we conducted an exploratory search on GoogleScholar and we also scanned the reference lists of relevant reviews, book chapters, and journal articles.

Inclusion criteria

We included studies in the present review if they: (a) included at least one treatment condition aimed at reducing burnout (either the primary or secondary outcome of the intervention); (b) included a control group; (c) measured burnout as an outcome; (d) examined students; (e) were published in English; (f) were a published journal article, thesis, dissertation, or conference presentation; (g) included a sample that was independent (not included in more than one study); and (h) included a sample of students outside the medical discipline.

Data extraction

We then reviewed studies in full and in order to summarize these studies, the following data were extracted: (a) publication information (authors/year), (b) *n* for experimental group, (c) *n* for control group, (d) instructional environment/level (secondary or tertiary),[1] (e) measure of burnout, (f) study design, (g) mode of delivery, (h) intervention duration, (i)

[1] This broad classification was based on UNESCO's International Standard Classification of Education (2012): Secondary (subject-oriented curriculum and employment relevant skills; e.g., high school) and Tertiary levels (intermediate and advanced academic and professional skills, knowledge and competencies; e.g., university).

intervention type, and (j) the main findings. Two authors then extracted the data. We calculated inter-rater reliability using Cohen's Kappa (McHugh, 2012). Disagreements were resolved via a consensus among authors with reference to the original material.

Risk of bias

We then provided an assessment of the quality of studies. Here, we followed the assessment process outlined by Iancu et al. (2018) which was based on the Cochrane Collaboration tool (Higgins & Green, 2011). Studies were assessed against the six criteria proposed in this tool (i.e., sequence generation, allocation concealment, blinding of outcome assessor, incomplete outcome data, selective outcome reporting, and other potential threats to validity). For each of these criteria, studies were rated as having a low risk of bias, high risk of bias, or unclear risk of bias. Like Iancu et al., we computed three scores representing the total number of criteria on which each study was classified as having a low, high, or unclear risk of bias.

Meta-analytic procedures

In addition to summarizing the studies, we also assessed the effectiveness of burnout interventions for students by means of meta-analysis. In doing so, we examined posttest between group effect sizes (experimental vs. control group). Effect sizes were calculated for each study for each of the following outcome measures: (1) total burnout, (2) exhaustion, (3) cynicism, and (4) reduced efficacy. For those studies that did not report a total burnout score, the average of burnout effect sizes for a given study was used (see Dreison et al., 2018).

Following the recommendations of Lipsey and Wilson (2001), we used random-effects models to derive effect sizes and confidence intervals, as these models allow generalization beyond the present set of studies to future studies (Schmidt et al., 2009). An effect is significant ($p < 0.05$) if its 95% confidence interval does not include zero. In addition, to ensure statistical independence, each study contributed no more than one effect size per analysis (Lipsey & Wilson, 2001). We conducted the analyses using Meta-Essentials (Suurmond et al., 2017).

The analyses were based on Hedges' g (Borenstein et al., 2009). Hedge's g corrects for small samples and results in a less biased estimates compared to Cohen's d (Borenstein et al., 2009). Moreover, it is also possible to interpret Hedge's g in much the same way as Cohen's d: with a g of 0.20 considered small, 0.50 considered medium, and 0.80 considered large (Cohen, 1992). We used means, standard deviations, and sample sizes to calculate g.

We report the total heterogeneity of the meta-analytic effect sizes (Q^T), which provides an indication of whether the variance of the meta-analytic effect size is greater than that which would be expected from sampling error. The degree of inconsistency in the observed relationship across studies (I^2) was also calculated. Values of 25%, 50%, and 75% are indicative of low, medium and high levels of heterogeneity (Higgins & Thompson, 2002).

Where substantial levels of heterogeneity were found, we conducted subgroup analyses. These analyses centered around the heterogeneity explained by any categorization in the data (Q^B). When Q^B is statistically significant there are differences between categories in terms of their effect sizes. Specific differences can be examined by comparing the overlap between 95% confidence intervals for effect sizes.

Finally, we assessed studies for publication bias. Tests of publication bias examine whether studies with statistically significant results are more likely to be published than non-statistically significant results (Rothstein et al., 2005). To do so, we first examined Rosenthal's (1979) fail-safe number. This number should be greater than 5 $k+10$ (where k is the number of effect sizes; Rosenthal, 1979). Then, we calculated Egger's regression intercept that regresses the effect size on the reciprocal of its standard error (Egger et al., 1997). If no publication bias is present, the 95% confidence interval of Egger's regression coefficient includes zero.

Results

We begin by providing the results of the search and selection process we then provide an overview of the characteristics of the included studies. This includes the design of the studies, the samples recruited, the measures of burnout that were used, and an evaluation of the quality of the studies. We then provide an overview of the interventions. Finally, we report the findings of the meta-analyses. Table 1 provides further details for each study.

Study selection

Our search returned 1,294 studies. Once duplicates were removed and abstracts were screened for relevance, 43 studies remained. These studies were then further assessed using the inclusion criteria. When we reviewed full texts, studies were excluded because they did not measure burnout ($n=14$), did not include an intervention ($n=4$), did not include a control group ($n=3$), repeated data published elsewhere ($n=1$), or included insufficient information ($n=4$). These criteria therefore resulted in the final inclusion of 17 studies. We have provided an overview of this process in Fig. 1. The extracted data can be found in Table 1. The average value of Cohen's Kappa across all coded data was 0.92 indicating an excellent level of inter-rater reliability.

Study designs

Ten of the studies adopted randomized controlled trials and seven studies adopted quasi-experimental trials. In addition, all studies were published journal articles.

Student samples

A total of 2,462 students were recruited across the present studies, of which 1,301 (range = 8–522, median = 30) were in the experimental groups, and 1,161 (range = 6–512, median = 32) in the control groups. In regard to which educational levels the students were recruited from, 15 of the studies were from tertiary settings (13 from undergraduate levels, and two from postgraduate levels) and two studies were from secondary settings.

Measures of burnout

In the 17 studies included in the present review, ten studies used the Maslach Burnout Inventory–Student Survey (Maslach et al., 1996). Three studies used the Student

Table 1 Studies examining interventions to reduce burnout in students

Study	*N* exp	*N* con	Level	Burnout measure	Design	Mode of delivery	Duration	Intervention	Main Findings	Risk of bias		
										High	Low	Unclear
Bresó et al. (2011)	21	23 (control group #1) 27 (control group #2)	Tertiary	MBI-SS (E and C)	Quasi experimental design	In-person, individual	4 × 2-h, over 4 months	Cognitive behavioral therapy intervention (aimed at enhancing self-efficacy) (including activity schedules and records of dysfunctional thoughts, formulating alternative thoughts, and testing these alternatives in behavioral assignments)	E and C significantly reduced in intervention group compared to healthy control (but not stressed control)	2	2	2
Charbonnier et al. (2022)	46	68	Tertiary	MBI-SS	Quasi experimental design	Online	8 weeks	Psychoeducation on stress, learning strategies, managing worry and uncertainty, emotion and stress regulation strategies (eight modules, each with two 10-min videos with information, tools, student experiences, and quizzes)	No significant change at pre-post Significant increase in EE in control group, but not in intervention group	2	3	1
Clarkson et al. (2019)	8	6	Tertiary	MBI-SS	Quasi experimental design	In-person	5 weeks	Mindfulness-based stress reduction intervention	No significant change at pre-post. Trend to decrease at 12 months	2	3	1

Table 1 (continued)

Study	*N* exp	*N* con	Level	Burnout measure	Design	Mode of delivery	Duration	Intervention	Main Findings	Risk of bias		
										High	Low	Unclear
de Vibe et al. (2013)	58	54	Tertiary	MBI-SS (total)	Randomized controlled trial	In-person, group	6 weekly × 1.5-h sessions; 6-h one-off session, over 7 weeks; and 30 min daily home practice	Mindfulness-based stress reduction intervention (physical and mental exercises aimed at increasing mindfulness experiences, didactic teaching on mindfulness and stress, and group reflections on mindfulness practice)	No significant differences compared to control group[a]	0	4	2
Ezenwaji et al. (2019)	26	26	Tertiary	OLBI-S (E and Diseng.)	Randomized controlled trial	In-person, group (8–9 students)	2 sessions per week, over 12 weeks (3 h each)	Rational emotive behavior therapy/coaching (targeting unhelpful beliefs by recognizing, assessing and implementing choices and new skills and techniques)	E and Diseng. significantly decreased over the intervention compared to control	2	3	1
Ezeudu et al. (2020)	15	15	Tertiary	OLBI-S (total)	Randomized controlled trial	In-person	10 weeks	Rational emotive behavior therapy (cognitive, behavioral and emotive techniques to refute and change irrational thoughts, views, and beliefs)	Total burnout significantly decreased over the intervention compared to control	1	4	1

Table 1 (continued)

Study	*N* exp	*N* con	Level	Burnout measure	Design	Mode of delivery	Duration	Intervention	Main Findings	Risk of bias		
										High	Low	Unclear
Fang et al. (2021)	16 (Reward) 29 (Approach)	18	Tertiary	SBI	Randomized controlled trial	Phone	1 week	Reward = designed to increase pleasant, rewarding behavior (students identified pleasant or rewarding behaviours and were tasked with completing at least one such behavior per day, which were monitored daily) Approach = designed to help students approach important goals that they have been avoiding due to emotion (fear, stress, sadness) (students identified any such activities and were tasked with completing one such challenging activity per day, and were monitored daily)	Total burnout significantly decreased in Approach condition compared to control	1	3	2

Table 1 (continued)

Study	*N* exp	*N* con	Level	Burnout measure	Design	Mode of delivery	Duration	Intervention	Main Findings	Risk of bias		
										High	Low	Unclear
Igbokwe et al. (2019)	46	41	Tertiary	OLBI-S (E and Diseng.)	Randomized controlled trial	In-person	2 × 80 min per week, over 10 weeks	Rational emotive behavior therapy (students identified stressors, irrational beliefs, and negative thoughts, engaged in in cognitive, emotive and behavioral techniques, including homework assignments)	E and Diseng. significantly decreased over the intervention compared to control	0	4	2
Lo et al. (2021)	64	60	Tertiary	MBI	Quasi experimental design	In-person	8 × 2.5 h/week	Mindfulness-based stress reduction intervention (experiential elements [e.g., meditation, mindful stretching] and didactic elements [e.g., identifying patterns of thoughts and feelings])	Total burnout, EE and depersonalization significantly reduced over the intervention compared to control	2	3	1

Table 1 (continued)

Study	*N* exp	*N* con	Level	Burnout measure	Design	Mode of delivery	Duration	Intervention	Main Findings	Risk of bias		
										High	Low	Unclear
May et al. (2019)	30 (biofeedback) 30 (HIIT)	30	Tertiary	SBI	Randomized controlled trial	In-person	3 × 20–25 min per week, over 4 weeks	Biofeedback intervention — stress reduction strategies and biofeedback technologies (attention focusing, resonant breathing, and positive emotion induction strategies) High intensity interval training (10 × 60-s cycling bouts with 60-s recovery; at approximately 90% of age predicted maximum heart rate)	Total burnout significantly decreased in biofeedback intervention group compared to control (and HIIT intervention)	1	4	1

Table 1 (continued)

Study	*N* exp	*N* con	Level	Burnout measure	Design	Mode of delivery	Duration	Intervention	Main Findings	Risk of bias		
										High	Low	Unclear
Modrego-Alarcon et al. (2021)	93 (Mindfulness) 93 (Mindfulness + VR)	94	Tertiary	MBI-SS	Randomized controlled trial	In-person, group (15–16 students)	6 × 90 min/week (Mindfulness) 6 × 75 min/week (Mindfulness + VR)	Mindfulness-based stress reduction intervention (combination of theory and practice concerning mindfulness and self-compassion) Mindfulness-based stress reduction with VR environments (the addition of mindfulness/self-compassion exercises conducted through VR)	Total burnout (Mindfulness) significantly lower than active control and Mindfulness + VR programme at 6-month follow-up Total burnout (Mindfulness + VR) significantly lower than active control at 6-month follow-up	0	4	2
Noh et al. (2020)	21	17	Secondary	MBI-SS	Quasi experimental design	In-person, group	8 × 45-min	Motivation-based academic group psychotherapy/psychoeducation (each session was designed to address components of students' academic motivation including coping skills, academic efficacy, and intrinsic motivation)	No significant differences compared to control	2	2	2

Table 1 (continued)

Study	*N* exp	*N* con	Level	Burnout measure	Design	Mode of delivery	Duration	Intervention	Main Findings	Risk of bias		
										High	Low	Unclear
O'Driscoll et al. (2019a)	19	33	Tertiary	MBI-SS	Quasi experimental design	Online	4 × 1-h online classes, and 20-min daily practice	Mindfulness-based stress reduction intervention (including reflections, exercises including meditation, stress reduction, and thought awareness and reappraisal)	Inefficacy significantly reduced in intervention group compared to control	2	4	0
O'Driscoll et al. (2019b)	51	48	Tertiary	MBI-SS	Quasi experimental design	In-person	4 × 2-h	Mindfulness-based stress reduction intervention (didactic, meditation, and group activities associated with attitudes, breathing, and pleasant and unpleasant events)	No significant differences compared to control	3	2	1
Ogbuanya et al. (2019)	62	62	Tertiary	MBI-SS	Randomized controlled trial	In-person	20 × 90 min, over 12 weeks	Rational emotive behavior therapy (increase students' awareness of beliefs and thoughts and aid students to overcome unhelpful, self-defeating, and emotionally disturbing thoughts and feelings)	Total burnout significantly reduced in intervention group compared to control	2	3	1

Table 1 (continued)

Study	*N* exp	*N* con	Level	Burnout measure	Design	Mode of delivery	Duration	Intervention	Main Findings	Risk of bias		
										High	Low	Unclear
Rosales-Ricardo & Ferreira (2022)	26 (aerobic) 25 (strength)	27	Tertiary	MBI-SS	Randomized controlled trial	In-person, group	3 sessions/week × 1-h, over 16 weeks	Aerobic physical exercise (jogging, walking, or cycling, with warm-up, exercise and recovery periods) Strength training exercise (push-ups, abdominal exercises, and high bar leg squats, with warm-up, exercise and recovery periods)	EE showed largest reduction pre-post for the Aerobic exercise group (but no significance tests reported) RE showed the largest reduction pre-post for the strength-training exercise group	1	4	1
Vuori et al. (2008)	522	512	Secondary	SBI	Randomized controlled trial	In-person, group	15-h total, over 4–5 days	Towards working life (promote transition from school and mental health) (increase preparedness for transitions and careers and teach strategies to do so; focusing on self-efficacy and involved active teaching and learning including problem-solving exercises)	Overall, no effect Reduced total burnout who had learning difficulties and initially at risk of burnout	0	4	2

MBI-SS = Maslach Burnout Inventory-Student Survey. SBI = School Burnout Inventory. OLBI-S = Oldenburg Burnout Inventory-Student Version. MBI = Maslach Burnout Inventory. C = Cynicism. E = Emotional exhaustion. RE = Reduced efficacy. Diseng. = Disengagement. Exp = experimental. Con = Control

[a]The findings are based on a larger sample which also included medical students

Burnout Inventory (Salmela-Aro et al., 2009). Three studies used the Oldenburg Burnout Inventory–Student Version (Reis et al., 2015) and one study used the original Maslach Burnout Inventory (Maslach et al., 1986). We have summarized this information in addition to including evidence for reliability of each measure (Cronbach's alpha) in Table 2. Overall, all measures had at least some evidence for their reliability in the student samples (alpha > 0.70; Nunnally, 1978), with only a couple of instances where alpha fell below this accepted threshold.

Risk of bias

An overview of study quality ratings is presented in Table 1. On the whole, based on meeting at least three of the criteria, there were five studies that appeared to be at a low risk and twelve studies that appeared to be at low-to-high risk.

Intervention outcomes

We now summarize specific intervention types. In doing so, we elaborate on what they were, how they were delivered, and their associated effectiveness (see also Table 1 for specific details for each study).

Mindfulness-Based Stress Reduction Mindfulness relates to the ability to stay attuned to the present, rather than ruminating about the past or worrying about the future. A total of six interventions adopted this approach (two randomized controlled trials, four quasi-experimental studies; Clarkson et al., 2019; de Vibe et al., 2013; Lo et al. 2021; Modrego-Alarcon et al., 2021; O'Driscoll et al., 2019a; O'Driscoll et al., 2019b). The majority were delivered in person (5/6) and ranged from 4 to 8 weeks in length. 50% were effective in reducing at least one burnout symptom. Those that were effective were typically longer in duration (on average 1.5 h per week for 6 weeks) and adopted a range of delivery methods (in person, group, and online). Effect sizes were typically medium-sized ($g = 0.30$–0.70).

Rational Emotive Behavior Therapy Rational emotive behavior therapy seeks to identify, challenge, and restructure irrational beliefs that are believed to underpin a negative pattern of behavior. Four studies followed this approach (all randomized controlled trials; Ezenwaji et al., 2019; Ezeudu et al., 2020; Igbokwe et al., 2019; Ogbuanya et al., 2019). All interventions were delivered in person and were either 10 or 12 weeks in duration (and approximately 20 sessions in total). All interventions were effective in reducing either total burnout or its symptoms with very large effect sizes ($g > 2.00$). We note here that all samples were recruited based on high initial burnout levels, which may help explain the very large effects in these studies.

Psychoeducation Four studies adopted interventions that could be considered psychoeducational (systematic and structured knowledge transfer) (two randomized controlled trials and two quasi-experimental studies; Charbonnier et al., 2022; Fang et al., 2021; Noh et al., 2020; Vuori et al., 2008). They were all delivered in a range of formats (online, phone, in person) and ranged from 1 to 8 weeks in duration. Half the Interventions were effective. Total burnout was reduced compared to the control for an intervention designed to helps students approach important goals (that they had been avoiding; Fang et al., 2021) and for an intervention promoting skills for the transition from school, specifically in individuals with learning difficulties (Vuori et al., 2008). Effect sizes were medium-sized ($g = 0.65$).

Exercise Two studies utilized exercise as part of the intervention strategy (both randomized controlled trials; May et al., 2019; Rosales-Ricardo & Ferreira, 2022). May et al. (2019) compared 4-weeks high intensity interval training to biofeedback and control conditions. Biofeedback resulted in reduced burnout compared to the control with a large effect size ($g > 1.0$). Rosales-Ricardo and Ferreira (2022) compared aerobic exercise (low intensity) to strength training both for 16 weeks (3 times per week). Burnout symptoms reduced following the exercise intervention but not compared to the control group.

Cognitive Behavioral Therapy (CBT) CBT refers to strategies based around changing underlying cognitive processes and patterns. One study adopted this approach adopting a quasi-experimental design (Bresó et al., 2011). The intervention specifically used CBT principles to enhance self-efficacy (one's belief in one's capacity). A total of 4 sessions over 4 months, delivered in person, resulted in reduced burnout symptoms compared to a healthy control group (but not a stressed control group) with small-to-medium effect sizes ($g = 0.30$).

Meta-analytic findings

Overall Effect Sizes Effects sizes for each study can be found in Table 3. The findings of the meta-analysis can be found in Table 4. Interventions appeared to be effective in reducing total burnout ($g^+ = 0.90$; $p = 0.02$, 95% CI: [0.04, 1.75]; $k = 14$; $Q^T = 228.34$; $I^2 = 94.31\%$). There was however less evidence for their effectiveness in relation to exhaustion ($g^+ = 0.47$; $p = 0.06$, 95% CI: [-0.03, 0.97]; $k = 9$; $Q^T = 33.10$; $I^2 = 75.83\%$), cynicism ($g^+ = 0.51$; $p = 0.33$, 95% CI: [-0.69, 1.71]; $k = 9$; $Q^T = 80.54$; $I^2 = 90.07\%$), and reduced efficacy ($g^+ = 0.37$; $p = 0.28$, 95% CI: [-0.59, 1.32]; $k = 5$; $Q^T = 20.53$; $I^2 = 80.51\%$).

Moderation Analysis An examination of the total heterogeneity of the meta-analytic effects suggested that there was substantial moderation. We therefore conducted moderation analyses based on the study design (randomised controlled trial versus quasi-experimental trial) and the type of intervention. The results of these analyses are presented in Tables 5 and 6. For total burnout, studies adopting a randomised controlled design showed larger effects ($g^+ = 1.60$; $p = 0.03$, 95% CI: [0.16, 3.03]) than studies adopting a quasi-experimental design ($g^+ = 0.23$; $p = 0.001$, 95% CI: [0.09, 0.37]). The only other significant effect was for quasi-experimental designs for exhaustion ($g^+ = 0.26$; $p < 0.001$, 95% CI: [0.15, 0.37]). For total burnout, studies employing REBT showed larger effects ($g^+ = 4.42$; $p < 0.001$, 95% CI: [3.20, 5.64]) than mindfulness ($g^+ = 0.27$; $p < 0.001$, 95% CI: [0.19, 0.35]), psychoeducation ($g^+ = 0.22$; $p = 0.37$, 95% CI: [-0.27, 0.71]), and exercise ($g^+ = 0.79$; $p = 0.06$, 95% CI: [-0.03, 1.62]). The only other significant effect was for mindfulness for exhaustion ($g^+ = 0.32$; $p < 0.001$, 95% CI: [0.22, 0.43]).

Publication Bias Results of publication bias analyses can be found in Table 4. For the majority of effects there was little evidence for publication bias (e.g., Egger's intercept was nonsignificant). There was some evidence specifically for reduced efficacy where both Rosenthal's fail-safe number and Egger's intercept were indicative of publication bias. The findings for reduced efficacy should therefore be interpreted with caution.

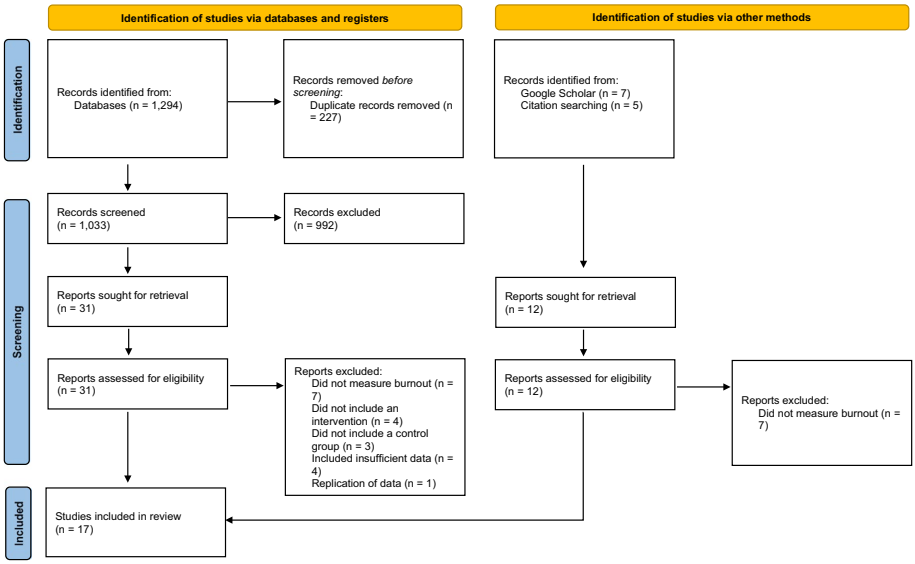

Fig. 1 Preferred reporting items for systematic reviews and meta-analyses (PRISMA) diagram illustrating study selection process

Table 2 Burnout measures and associated reliability estimates from each study

Burnout measure	Study used	Cronbach's Alpha
Maslach Burnout Inventory–Student Survey	Bresó et al. (2011)	.70-.85
	Charbonnier et al. (2022)	.77-.86
	Clarkson et al. (2019)	-
	de Vibe et al. (2013)	.90
	Modrego-Alarcon et al. (2021)	.85-.88
	Noh et al. (2020)	.70-.82
	O'Driscoll et al. (2019a)	-
	O'Driscoll et al. (2019b)	-
	Ogbuanya et al. (2019)	.63-.80
	Rosales-Ricardo & Ferreira (2022)	-
Student Burnout Inventory	Fang et al. (2021)	.63-.82
	May et al. (2019)	.93
	Vuori et al. (2008)	.87-.90
Oldenburg Burnout Inventory–Student Version	Ezenwaji et al. (2019)	-
	Ezeudu et al. (2020)	.83-.87
	Igbokwe et al. (2019)	.83-.87
Maslach Burnout Inventory	Lo et al. (2021)	.80-.93

Discussion

The aim of the present study was to provide the first systematic review and meta-analysis of interventions aimed at reducing burnout in students. We found 17 studies

adopting a broad range of intervention strategies, and which focused on secondary and tertiary levels of education. Overall, when considered individually and, when effects were aggregated, for total burnout, we found support for the efficacy of interventions in reducing student burnout. However, we also found evidence for moderation and non-significant effects when certain symptoms, designs, and intervention-types were examined. We now discuss the key findings of the review and then make recommendations for future research and provide implications for practice.

Key findings

Although numerous reviews exist examining the effects of interventions on students' mental health (e.g., Regehr et al., 2013), until now, no such review existed for interventions targeting burnout. Its absence was surprising given the serious implications that burnout has for students' performance, motivation, and mental health (e.g., Walburg, 2014). In line with reviews of burnout interventions in other contexts, including teachers (e.g., Iancu et al., 2018), we found evidence that researchers have begun to test many different types of interventions to reduce student burnout. This includes interventions based around stress reduction (e.g., mindfulness), challenging irrational beliefs (e.g., rational emotive behavior therapy), as well as more classical approaches (e.g., cognitive behavioral therapy). In addition, these interventions have been tested across a range of educational levels, but with most studies focused on tertiary levels.

Again, in line with reviews in other contexts, and in medical residents (e.g., Walsh et al., 2019), we found some evidence that the reviewed interventions are effective in reducing burnout symptoms in students. Evidence for this comes from both the individual studies and also from the results of the meta-analyses, at least in context of total burnout. The strongest evidence appears to come from those interventions with a strong theoretical foundation. Most notably, this includes rational emotive behavior therapy where all four interventions, all based on randomized controlled designs, were found to be effective, and meta-analytic effect sizes could be considered large (and larger than other intervention types). However, we note that these studies recruited students with high initial levels of burnout and so it is unclear whether such approaches would be beneficial to students with more moderate symptoms. Meta-analytic effects were also significant for mindfulness-based interventions. This finding is similar to research in other occupations (e.g., nursing; Suleiman-Martos et al., 2020). Collectively, then, these findings provide promising evidence that we can likely do something to aid students who may be suffering from high levels of burnout.

Critical considerations and recommendations

We now provide recommendations for future work in this area. The first and perhaps most important consideration for future work is to simply conduct more studies testing burnout interventions. Aside from those examining mindfulness and rational emotive behavior therapy, there has not been any systematic examination of specific interventions or intervention types. In addition, conducting controlled studies, especially those with randomized designs, should be prioritized. As illustrated by our study quality analysis, only five studies were deemed to represent high quality

Table 3 Effect sizes for interventions to reduce burnout in students

Study	Hedges' *g*			
	Total burnout	Exhaustion	Cynicism	Reduced efficacy
Bresó et al. (2011)	0.13	0.33	-0.07	-
Charbonnier et al. (2022)	0.27	0.19	0.23	0.18
Clarkson et al. (2019)	0.66	0.56	-0.78	2.21
de Vibe et al. (2013)	0.13	-	-	-
Ezenwaji et al. (2019)	3.77	2.29	5.24	-
Fang et al. (2021)	0.65	-	-	-
Lo et al. (2021)	0.26	0.25	0.35	-0.32
May et al. (2019)	1.21	-	-	-
Modrego-Alarcon et al. (2021)	0.30	-	-	-
Noh et al. (2020)	-0.28	-0.08	-0.13	-
O'Driscoll et al. (2019a)	0.38	0.27	0.17	0.71
O'Driscoll et al. (2019b)	0.27	0.41	0.19	0.22
Ogbuanya et al. (2019)	5.01	-	-	-
Rosales-Ricardo & Ferreira (2022)	0.38	0.36	0.40	-

Studies with insufficient data to calculate effect sizes = Ezeudu et al. (2020), Igbokwe et al. (2019), Vuori et al. (2008)

designs, analysis, and reporting. Researchers should therefore attempt to design studies of high quality in order to most accurately determine the effectiveness of burnout interventions.

We note that all of the interventions we summarized in the present review implemented interventions based at the individual-level (i.e., providing students with the skills and resources to overcome burnout). Consequently, there is a need for the development and testing of interventions focusing on the organisational-level. Such studies could look to change factors that may be contributing to chronic stress in students, which could include changes in exam structures, contact hours, and social expectations (e.g., Regehr et al., 2013). We know that organizational stressors are involved in the development of stress and burnout (e.g., Parrello et al., 2019), as such, testing the efficacy of this type of intervention would be extremely useful in offering alternative means to help students and will likely have broader benefits for student mental health.

Implications for practice

Based on the present findings, we now consider several implications for practice. First, professionals concerned with student burnout in their institutions may wish to examine the characteristics and effectiveness of the interventions they use based on the current study findings. For example, they may wish to incorporate different interventions, such as mindfulness, which boasts a growing body of literature that supports its efficacy in reducing stress and burnout in multiple contexts (Luken & Sammons, 2016). In addition, for interventions to be most effective, it is important that they are made readily accessible and available by schools and universities, which could be in the form of after school groups or

Table 4 Meta-analytical effects of the effectiveness of interventions to reduce burnout in students

Outcome variables	*k*	*N*	g^+	95% CI	*p*	Q^T	I^2	Fail-safe *N*	Egger's intercept	Egger's intercept 95% CI
Total burnout	14	1116	0.90	0.04, 1.75	.02	228.34*	94.31	545	6.50	-0.02, 13.02
Exhaustion	9	592	0.47	-0.03, 0.97	.06	33.10*	75.83	76	2.61	-2.74, 7.96
Cynicism	9	592	0.51	-0.69, 1.71	.33	80.54*	90.07	54	3.43	-3.83, 10.69
Reduced efficacy	5	403	0.37	-0.59, 1.32	.28	20.53*	80.51	9	5.29	0.99, 9.60

*$p < .05$. k = number of studies g^+ = weighted mean g. 95% CI = 95% Confidence Interval. Q^T = total heterogeneity of the weighted mean effect sizes. I^2 = degree of inconsistency in the observed relationship across studies

Table 5 Moderation Analyses Based on Study Design

Criterion variables	*k*	g^+	95% CI	*p*	Q^B
Total burnout					5.84*
Randomized controlled trials	7	1.60	0.16, 3.03	.03	
Quasi-experimental trials	7	0.23	0.09, 0.37	.001	
Exhaustion					1.17
Randomized controlled trials	2	1.31	-0.60, 3.23	.17	
Quasi-experimental trials	7	0.26	0.15, 0.37	< .001	
Cynicism					1.18
Randomized controlled trials	2	2.79	-2.01, 7.59	.25	
Quasi-experimental trials	7	0.16	-0.02, 0.33	.08	

*$p < .05$. k = number of studies g^+ = weighted mean g. 95% CI = 95% Confidence Interval. Q^B = heterogeneity explained by categorization in the data

Table 6 Moderation Analyses Based on Intervention Type

Criterion variables	*k*	g^+	95% CI	*p*	Q^B
Total burnout					45.63*
Mindfulness	6	0.27	0.19, 0.35	< .001	
Psychoeducation	3	0.22	-0.27, 0.71	.37	
REBT	2	4.42	3.20, 5.64	< .001	
Exercise	2	0.79	-0.03, 1.62	.06	
Exhaustion					1.03
Mindfulness	4	0.32	0.22, 0.43	< .001	
Psychoeducation	2	0.12	-0.11, 0.35	.31	
Cynicism					0.03
Mindfulness	4	0.18	-0.14, 0.49	.27	
Psychoeducation	2	0.14	-0.18, 0.45	.39	

*$p < .05$. k = number of studies g^+ = weighted mean g. 95% CI = 95% Confidence Interval. Q^B = heterogeneity explained by categorization in the data

individual school counselling sessions. Given the increased use of technology in our everyday lives, both offline and online forms of support are recommended.

Further to the interventions reviewed here, there have been recent calls to include skills and techniques that have the potential to safeguard student mental health within educational curricula. For example, the OECD has been emphasizing the importance of students' social emotional competences, and how they are important for students' immediate and future success, including their mental health and wellbeing (Chernyshenko et al., 2018). In much the same manner, integrating social emotional competencies into educational programs and curricula may be useful for preventing and alleviating some of the stress and burnout that readily develops in schools and universities.

In addition, burnout awareness should be promoted to educators and students as a method to prevent and reduce burnout in students (e.g., Salerno, 2016). Such awareness programs and methods should include teaching students to recognize the symptoms of burnout and where and how to seek support when necessary. Additionally, teachers should

be equipped to understand how to identify and assist students who may be showing symptoms of burnout, and how to refer them to the appropriate professionals, and to even be able to help these students within their own classrooms too. These strategies should encourage students to both help themselves and accept help from those close by, and will possibly reduce the need to intervene altogether.

Finally, in order to assess and ensure optimal benefits from the interventions, policymakers may also wish to examine their cost-effectiveness. Assessing the cost-effectiveness of interventions has been the subject of little conversation in the burnout literature. Once the effectiveness of an intervention has been established, it is important to consider the resources required to deliver that intervention. This can be approached in two ways: first, by achieving maximal health benefits for a fixed amount of resources and second, by identifying a health status objective and the associated minimal amount of resources required to achieve that objective (see Detsky & Naglie, 1990). It will be important for public policy to consider which approach should be adopted in relation to burnout when considering which interventions and/or types of interventions are recommended to institutions that serve students. At this stage, however, studies that examine the cost-effectiveness of burnout interventions need to be conducted. Such an evidence base will have many benefits, especially in relation to lobbying schools and universities to adopt relevant interventions.

Conclusion

We provided the first systematic review and meta-analysis of research examining the efficacy of interventions to reduce burnout in students. When the effects were aggregated across interventions, there was evidence for their effectiveness in reducing burnout, at least for total burnout. There was also evidence for specific types of intervention such as those based on rational emotive behavior therapy and mindfulness. Although this study provides initial evidence to inform practice in reducing burnout in students, we note that a more systematic examination of particular intervention types, especially those designed to target the organisational-level, would be useful, as are studies examining the cost effectiveness of such interventions.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

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Current Themes of Research: Burnout in education.

Relevant Publications:

Madigan, D. J., Kim, L. E., Glandorf, H. L., & Kavanagh, O. (2023). Teacher burnout and physical health: A systematic review. International Journal of Educational Research, 119, 102173.

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Current Themes of Research: Burnout and health.

Relevant Publications:

Madigan, D. J., Kim, L. E., Glandorf, H. L., & Kavanagh, O. (2023). Teacher burnout and physical health: A systematic review. International Journal of Educational Research, 119, 102173.

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