

Skills-Based Programs Used to Reduce Physician Burnout in Graduate Medical Education: A Systematic Review

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ABSTRACT

Background Physician burnout is pervasive within graduate medical education (GME), yet programs designed to reduce it have not been systematically evaluated. Effective approaches to burnout, aimed at addressing the impact of prolonged stress, may differ from those needed to improve wellness.

Objective We systematically reviewed the literature of existing educational programs aimed to reduce burnout in GME.

Methods Following the PRISMA guidelines, we identified peer-reviewed publications on GME burnout reduction programs through October 2019. Titles and abstracts were reviewed for relevance, and full-text studies were acquired for analysis. Article quality was assessed using the Medical Education Research Study Quality Instrument (MERSQI).

Results A total of 3534 articles met the search criteria, and 24 studies were included in the final analysis. Article quality varied, with MERSQI assessment scores varying between 8.5 and 14. Evaluation was based on participant scores on burnout reduction scales. Eleven produced significant results pertaining to burnout, 10 of which yielded a decrease in burnout. Curricula to reduce burnout among GME trainees varies. Content taught most frequently included stress management (n = 8), burnout reduction (n = 7), resilience (n = 7), and general wellness (n = 7). The most frequent pedagogical methods were discussion groups (n = 14), didactic sessions (n = 13), and small groups (n = 11). Most programs occurred during residents' protected education time.

Conclusions There is not a consistent pattern of successful or unsuccessful programs. Further randomized controlled trials within GME are necessary to draw conclusions on which components most effectively reduce burnout.

Introduction

The effect of burnout within health care is well-documented and continues to be a pervasive issue, particularly for physicians.¹ Burnout is defined as a syndrome of emotional exhaustion, a sense of detachment from others, and reduced personal accomplishment.² Moreover, burnout is often experienced by people, such as physicians, who operate in stressful, high-pressure workplaces. One study reported that the various factors influencing burnout levels are particularly challenging for resident physicians due to the demanding nature of residency, along with long work hours, additional nightshifts in later years of residency, pressure of time in the clinical outpatient setting, lack of experienced colleagues, limited resources, and lack of time for family.³

In an attempt to address and reduce resident physician burnout, the Accreditation Council for Graduate Medical Education (ACGME) launched the Physician Well-Being initiative, which provides

resources for the graduate medical education (GME) community that are meant to “promote well-being, mitigate the effects of stress, and prevent burnout.”⁴ Preventative skills such as mindfulness practices, communication skills training, time management, and stress and coping workshops are the most employed programs in influencing burnout, although the ACGME has not adopted a consistent burnout management requirement.⁵

When developing and implementing GME programs for trainees, it is important to distinguish between wellness and burnout. A framework developed to define the relationship between wellness, burnout, and resiliency during residency identifies wellness as a phenomenon that is “more than a lack of impairment.”⁶ Wellness is “a dynamic process involving self-awareness that results in healthy choices,” which creates a balance between physical, emotional, and spiritual health, and perpetuates accomplishment and satisfaction, while offering a unique sense of protection from the often-overwhelming demands of medical training.⁶ Burnout, as mentioned above, is a maladaptive syndrome that occurs due to prolonged occupational stress. Unlike wellness, burnout is associated with lack of control, loss of self-efficacy,

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Editor's Note: The online version of this article contains a table of the aggregate burnout reduction results from programs that utilized the Maslach Burnout Inventory scales.

increased frustration, detachment, and lower levels of compassion for the field and patients; it is often associated with depression and worsened patient outcomes.⁶

Authors of this framework clearly discern among unique paths to resident burnout, wellness, and resiliency, showing that wellness and burnout require 2 distinct forms of programming and implementation to affect change in residency. Wellness itself acts as a coping skill not only to preserve residents' mental well-being, but also to help stave off the effects of burnout. In other words, wellness cannot exist if burnout is present.

The Medscape National Physician Burnout and Suicide Report 2021 found that 42% of physicians reported burnout, with specialties including critical care, rheumatology, and infectious diseases seeing an increase in burnout levels compared to previous years.⁷ Additionally, several recent studies were conducted to determine US resident physician burnout rates across various specialties. Family medicine residents across 12 programs completed burnout assessments each year of the program and found 52% scored in the moderate risk group, 25% scored as high risk, and only 23% scored as low risk.⁸ Thirty-eight percent of survey respondents in orthopedic surgery residency programs reported symptoms of burnout,⁹ and a cohort study of psychiatry residents reported 78% of its residents met criteria for burnout.¹⁰ Despite this clear evidence of the prevalence of burnout, a lack of understanding on how to reduce it persists. There is no consensus on what education programs are currently used and best reduce burnout within residency programs. This review aims to compile current skills-based programs employed to reduce burnout within GME programs.

Methods

Protocol

We conducted a systematic review following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.¹¹ We published a review protocol with PROSPERO (protocol number: CRD42020159482).

Eligibility Criteria

Eligible studies included those that had participants who were exclusively GME trainees. Eligible studies were peer-reviewed empirical publications that evaluated a program intended to reduce burnout with a skills-based outcome. Any type of experimental study design (eg, pre/post, controlled trial) was eligible for inclusion. Studies were also not limited by curriculum design, teaching methods, program length, or when

the program was completed. To be included in this systematic review, studies required a measurement of burnout as a dependent or outcome variable. Studies were included through the identification of program content, including explicit burnout reduction, reducing stress behaviors, and addressing well-being. Studies were excluded from the review that did not report a skills-based program, did not measure residents' burnout as an outcome, and/or included participant samples outside of GME programs.

Information Sources

A comprehensive electronic literature search of articles published through October 2019 was conducted in the following databases: PubMed, ERIC, Communication & Mass Media Complete, and Academic Search Premier. Controlled vocabulary (MeSH) and keywords were used. Four broad concept categories were searched, and the results were combined using the appropriate Boolean operators. The broad categories included skills-based programs, training programs, burnout, and GME or residency. Studies focused on medical residents from all postgraduate years, and all specialties were included in the literature search.

Study Selection, Data Extraction, and Quality Assessment

All selected studies were uploaded into Covidence, a web-based software project management system for systematic reviews. One author independently extracted data from the 24 studies using a standard data collection form that extracted: sample characteristics (sample size, mean age and gender distribution, country of study origin, postgraduate year, and specialty); type of study design; how the skills-based programs were structured, length of the program, main teaching method, and the specific content taught; whether the program occurred within residents' protected education time; how GME trainees' burnout levels were measured; the level of change pre- and post-program in burnout (if applicable); when the data was collected in relation to the study; and the key findings of the study.

The Medical Education Research Study Quality Instrument (MERSQI) was used to establish the quality of each individual study included in this systematic review.¹² The highest possible score a study could receive was a 15.

Results

A total of 3534 abstracts were independently screened by 4 coders after duplicates were removed.

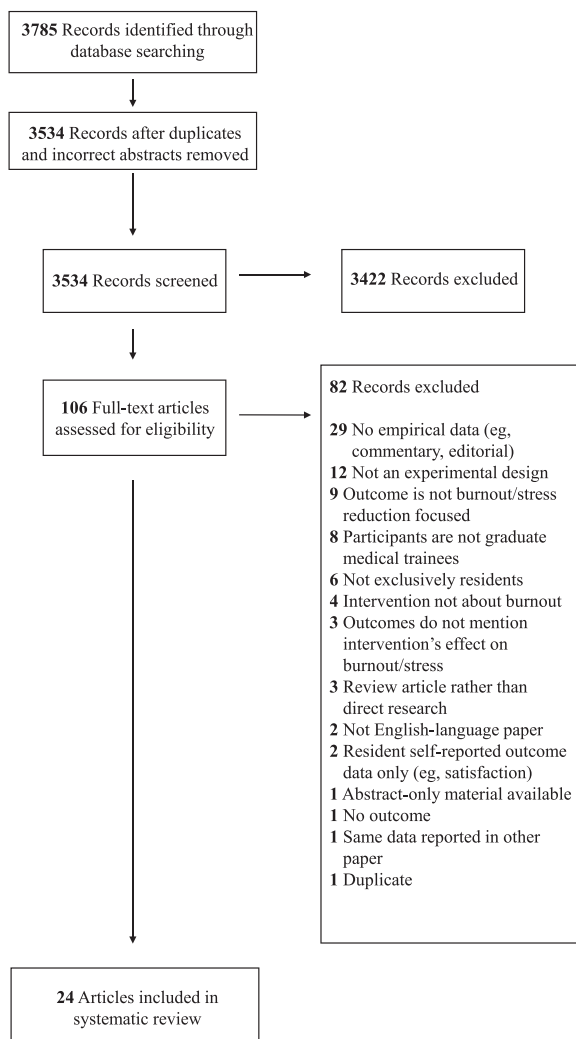


FIGURE 1
PRISMA Flow Chart

Contradictory abstract exclusions were reconciled by the coders. Two authors retrieved 106 full-text studies that were assessed for eligibility, 24 of which were determined as eligible for inclusion. See FIGURE 1 for the PRISMA flow chart of the study selection process.

Content and Teaching Methods

Aggregate curriculum characteristics from the included studies are found in TABLE 1. The content and teaching methods varied widely across the range of studies and often employed multiple combinations of instruction. The most common content taught within these resident training programs were stress management ($n = 8$), burnout reduction ($n = 7$), resilience ($n = 7$), and general wellness ($n = 7$). The teaching methods used most frequently included discussion groups ($n = 14$), didactic sessions ($n = 13$), small

groups ($n = 11$), and mentors or coaches ($n = 8$). Serial programs, programs with a predetermined schedule spanning over the course of weeks or months, were the most common program length ($n = 12$), with 9 studies spanning the course of a full academic year and 3 isolated workshop-style programs. Most programs were taught to exclusively resident populations, with one study including both residents and fellows.¹³ There was a wide range of postgraduate years among the studies.

An important distinction among the selected articles is that most programs ($n = 16$) were offered during the residents' protected didactic education time that was already incorporated into their weekly and monthly schedules, including specific ambulatory rotations or academic half-days. In one study, researchers gathered informal feedback at the conclusion of the program, and most residents reported that since the sessions did not effectively free them from their clinical responsibilities, the burnout reduction program unintentionally created an added burden.¹⁴ Another study that utilized both in-person, mindfulness-based stress reduction classes and a daily practice outside of work found increases in burnout levels reported at 2 different time periods after the program's completion.¹⁵ Detailed curriculum characteristics for each study can be found in TABLE 2.

Burnout Scale Differences

Of the 11 studies that produced significant results related to burnout, 5 used the Maslach Burnout Inventory (MBI),^{16–20} 2 used the abbreviated MBI,^{13,21} 1 used the MBI General Survey,²² 2 used the Copenhagen Burnout Inventory (CBI),^{23,24} and 1 used the Professional Fulfillment Index (PFI).²⁵ The abbreviated MBI adds job satisfaction as a measure of burnout, and the MBI General Survey measures emotional exhaustion on a 5-point scale which is shortened to “exhaustion” as well as cynicism and professional efficacy. The CBI examines personal, work-related, and client-related burnout, while the PFI examines work exhaustion and interpersonal disengagement. The differences in burnout measures and burnout conceptualization among studies should be noted when reviewing TABLE 3.

A visual analysis of the aggregate burnout reduction results from programs that utilized the MBI scales is provided as online supplementary data. This table breaks down the number of times each MBI subscale was used among the studies and shows which study produced significant burnout reduction, no change, and increased significant burnout.

TABLE 1
Curriculum Characteristics of Graduate Medical Education Programs to Reduce Burnout

Characteristic	n (%)
Content ^{a,b}	
Stress management (1)	8 (33.3)
Burnout reduction (2)	7 (29.2)
Resilience (3)	7 (29.2)
General wellness (4)	7 (29.2)
Mindfulness-based stress reduction (5)	6 (25.0)
Mindfulness meditation (6)	5 (20.8)
Communication skills (7)	2 (8.3)
Coping skills (8)	1 (4.2)
Mental health promotion (9)	1 (4.2)
Mind-body skills training (10)	1 (4.2)
Mindfulness and empathy training (11)	1 (4.2)
Respiratory One Method (12)	1 (4.2)
Yoga (13)	1 (4.2)
Therapeutic Relaxation and Enhanced Awareness Training (14)	1 (4.2)
Teaching method ^a	
Discussion groups	14 (58.3)
Didactic	13 (54.2)
Small groups	11 (45.8)
Mentors or coaches	8 (33.3)
Role-play	5 (20.8)
At-home exercises	4 (16.7)
Online learning	3 (12.5)
Case studies	3 (12.5)
Lecture series	2 (8.3)
Quality of evidence (using MERSQI)	
12.5–14	2 (8.3)
11.0–12.0	5 (20.8)
10–10.5	11 (45.8)
8.5–9.5	6 (25.0)
Program length	
Serial	12 (50.0)
Longitudinal (academic year based)	9 (37.5)
Isolated	3 (12.5)
Trainee level	
Residents only	23 (95.8)
Mixed residents and fellows	1 (4.2)
Postgraduate year (PGY)	
Mixed PGYs	13 (54.2)
PGY-1 only	9 (37.5)
PGY-2 only	1 (4.2)
Not reported	1 (4.2)

TABLE 1
Curriculum Characteristics of Graduate Medical Education Programs to Reduce Burnout (continued)

Characteristic	n (%)
Training specialty	
Mixed specialty	9 (37.5)
Surgery	3 (12.5)
Pediatrics	2 (8.3)
Emergency medicine	3 (12.5)
Family medicine	2 (8.3)
Obstetrics and gynecology	1 (4.2)
Internal medicine	1 (4.2)
Oncology	1 (4.2)
Psychiatry	2 (8.3)
Program offered during protected education time	
Yes	16 (66.7)
No	4 (16.7)
Both (mandatory participation inside and outside of training)	2 (8.3)
Not reported	2 (8.3)
Study design	
Single group	15 (62.5)
Randomized control	7 (29.2)
Nonrandomized control	2 (8.3)

Abbreviations: MERSQI, Medical Education Research Study Quality Instrument.

^a Because multiple categories could be coded, percent will exceed 100%.

^b Numbers next to the type of content correspond to “Main Topic of Training” in TABLE 2.

Program Outcomes

Program outcomes are described in TABLE 3. Of the 15 single group (pre/post) trials, 7 reported significant results from the instituted program.^{13,16,17,21–23,25} Five of these studies utilized the MBI,^{13,16,17,21,22} one used the CBI,²³ and one used the PFI.²⁵ Six single group studies produced decreased burnout while one produced a significant increase in burnout.

One study reported statistically significant increases in depersonalization and emotional exhaustion pre- to post-program completion, with no significant change in personal accomplishment.¹⁶ Additionally, over the course of the intervention period spanning the first 6 months of residents’ first year, depression symptoms and fatigue increased significantly.

Of the 24 included studies, 2 were nonrandomized controlled trials.^{18,26} One trial did not yield any significant reductions in burnout between MBI measures, although they did report a reduction in emotional exhaustion for the intervention groups compared to worsening exhaustion levels in the nonintervention group.²⁶ The other’s use of the

TABLE 2
Detailed Curriculum Characteristics of GME Programs to Reduce Burnout

Author, Year	Training Specialty	PGY (n)	Trainee Level	Instructors	Program Length	Teaching Method	Main Topic of Training	Program Occurred During Protected Time	Additional Program Overview
Programs Using MBI Scales									
Ares, 2019 ³³	Neurological surgery	NR	Residents	Faculty	6 sessions delivered bimonthly	Lecture series, didactic, mentors/coaches	2, 4	No	Wellness lecture series; free access to hospital gym, group gym visits; each resident assigned a faculty mentor (met twice yearly)
Babbar, 2019 ¹³	Mixed specialty	PGY-1 (6) PGY-2 (4) PGY-3 (6) PGY-4 (5) Fellow (4)	Mixed residents and fellows	Faculty, certified yoga instructors	8 weeks	Small groups, online learning, mentors/coaches	4, 6, 13	Yes	Weekly 1-hour yoga classes led by certified yoga instructors/faculty, ending with 5-minute guided meditation; daily physical and nutrition challenges offered if residents could not attend in-person yoga class, using wrist-worn fitness device and Polar app to report progress
Bar-Sela, 2012 ²⁷	Oncology	PGYs 1-3 (8) PGY-4+ (7)	Residents	Faculty, clinical psychologist	9 sessions over 1 academic year	Didactic, discussion groups, mentors/coaches	2, 7	Yes	Balint group meetings as portion of weekly academic seminar; 2 residents presented on topic of their choice each week
Bentley, 2018 ²⁸	Psychiatry	PGY-1	Residents	Faculty	8 weeks	Role-play, discussion groups	5, 11	Yes	Each session began with guided meditation, then discussion of "mindful or empathetic" moments, discussion of predetermined topic; handouts were provided with recommended mindfulness experiments
Chaukos, 2018 ¹⁶	Mixed specialty	PGY-1	Residents	Faculty	Three 2-hour sessions over 6 months	Didactic	1, 3	Yes	Adapted from the SMART-3RP; resident workbook and instructor manual developed to provide residents information on techniques to improve stress and resiliency

TABLE 2
Detailed Curriculum Characteristics of GME Programs to Reduce Burnout (continued)

Author, Year	Training Specialty	PGY (n)	Trainee Level	Instructors	Program Length	Teaching Method	Main Topic of Training	Program Occurred During Protected Time	Additional Program Overview
Ghannam, 2019 ²¹	Mixed specialty	PGY-1 (75) PGY-2 (56) PGY-3 (64) PGY-4+ (46)	Residents	Faculty	1 full-day workshop	Didactic, case studies, discussion groups, small groups	1	Yes	Workshop applied techniques of stress management, taught cognitive imagery and restructuring, and breathing exercises
Hart, 2018 ²⁹	Emergency medicine	PGY-1 (pre: 13, post: 9) PGY-2 (pre: 9, post: 7) PGY-3+ (pre: 9, post: 4)	Residents	Faculty, business executives/co-founders of program	Six 1-hour sessions	Didactic, discussion groups, small groups	2, 3	Yes	Didactic sessions focused content around 1 of 5 core principles of "The Happiness Practice." Optional, small group, social discussions called "Happy Chats" between sessions were held at local restaurants between the first 3 sessions to facilitate reflection and develop interpersonal relationships
Riall, 2018 ²²	Surgery	PGY-1 (19) PGY-2 (8) PGY-3 (7) PGY-4 (8) PGY-5 (7)	Residents	Faculty, residents, certified professional coach	Monthly meetings over 1 academic year	Didactic, small groups, mentors/coaches	3, 4	Yes	The Energy Leadership Well-Being and Resiliency Program provides tools for participants to effectively respond, rather than react, to stress; the program encourages healthy behavior through monthly and annual challenges designed to improve health and increase activity
Romceovich, 2018 ¹⁷	Pediatrics	PGY-2 (5) PGY-3 (4) PGY-4 (1)	Residents	Residents	Once weekly, 4 weeks, 90 minutes each	Discussion groups, lecture series, online learning	3, 10	Both	Prior to each in-person session, participants completed 2 free online modules: open discussion of module content, sharing of participants' mindfulness learning experiences between sessions, and hands-on teaching of MBST techniques. Encouraged to make individual "mindfulness plan" for continued skill practice; offered optional monthly "maintenance" group sessions via online video chat 6 months post

TABLE 2
Detailed Curriculum Characteristics of GME Programs to Reduce Burnout (continued)

Author, Year	Training Specialty	PGY (n)	Trainee Level	Instructors	Program Length	Teaching Method	Main Topic of Training	Program Occurred During Protected Time	Additional Program Overview
Runyan, 2016 ³¹	Family medicine	PGY-2	Residents	Behavioral science faculty member	4 weeks, 2 hours each Friday	Didactic, mentors/coaches	2, 4	Yes	Wellness curriculum embedded as part of a mandatory Physician as Leader (PAL) rotation, curriculum focused on implementing self-reflection skills, journaling, gratitude, and mindful breathing exercises
Taylor, 2016 ³⁴	Pediatrics	Not specified	Residents	Self-led by participants	10 days	Online learning, at-home exercises	6	Both	Using smartphone application Headspace, participants completed the online mindfulness meditation program sometimes in a group setting as part of scheduled resident education conferences, but mostly during personal time
McCue, 1991 ²⁶	Mixed specialty	PGY-1 (21) PGY-2 (22) PGY-3 (15) PGY-4 (6)	Residents	Faculty, workshop co-leader	4 hours	Role-play, discussion groups, mentors/coaches	1	Yes	Understanding stress, stress signals, and coping; assessment of individuals' support systems; working with vignettes depicting stressful interactions; establishing connections between health maintenance/self-care and prevention of burnout; identify stressful situations that cause conflicts; stress management
Ospina-Kammerer, 2003 ¹⁸	Family medicine	PGYs 1-3	Residents	Faculty	Once weekly, 4 weeks	Small groups	12	Yes	Respiratory One Method: Intervention groups and control groups held at same time and location; intervention groups instructed in writing and orally how to use this method before each treatment session; participants would repeat the word "one" or a phrase (eg, "let go") and at the same time, intentionally link this word with each exhalation

TABLE 2
Detailed Curriculum Characteristics of GME Programs to Reduce Burnout (continued)

Author, Year	Training Specialty	PGY (n)	Trainee Level	Instructors	Program Length	Teaching Method	Main Topic of Training	Program Occurred During Protected Time	Additional Program Overview
Bragard, 2010 ³⁶	Oncology, hematology and radiotherapy, gynecology, internal medicine	PGY-1 (16) PGY-2 (17) PGY-3 (35) PGY-4 (15) PGY-5 (12) PGY-6 (1)	Residents	Experienced facilitators	30-hour communication skills; 10-hour stress management training	Small groups, role-play, discussion groups, interviews	1, 7	N/A	Stress management skills training focused on 4 topics: detection of job stressors and stress outcomes, relaxation techniques, cognitive restructuring, and time management; last session promoted integration and use of learned skills
Lebares, 2019 ¹⁵	Surgery	PGY-1	Residents	Faculty	20 minutes daily, 8 weeks	Didactic, at-home exercises	5, 6	Yes	Weekly 2-hour modified mindfulness-based stress reduction classes and 20 minutes of daily home practice
Mache 2017 ¹⁹	OB/GYN	PGY-1	Residents	Faculty	12 once weekly sessions, 1.5 hours	Role-play, discussion groups, small groups	3, 8	No	Performed off-duty, residents completed modules that included psychoeducation, theoretical input, watching videos, oral group discussions, experiential exercises, role-play; curriculum developed from Lazarus's transactional model of stress
Mache 2018 ²⁰	Emergency medicine	PGY-1	Residents	Hired psychologists	90-minute sessions over 3 months	Didactic, discussion groups, at-home exercises	9	Yes	Based off Lazarus's transactional model of stress; sessions focused on working and analyzing real situations and problems, coping strategies, support between colleagues and establishing concrete future goals; each training session included psychoeducation (theoretical input, watching videos, oral group discussions, experiential exercises, and home assignments)

TABLE 2
Detailed Curriculum Characteristics of GME Programs to Reduce Burnout (continued)

Author, Year	Training Specialty	PGY (n)	Trainee Level	Instructors	Program Length	Teaching Method	Main Topic of Training	Program Occurred During Protected Time	Additional Program Overview
Ripp, 2016 ¹⁴	Internal medicine	PGY-1	Residents	Psychotherapists	18 one-hour sessions, twice monthly	Discussion groups, small groups, mentors/coaches	2	No	Based on program where practicing physicians met regularly with trained discussion group leaders to discuss topics related to stress, balance, and job satisfaction; leaders assigned to groups of 3 residents to facilitate discussion
Programs Using Non-MBI Scales									
Al Ghallani, 2019 ³²	Pediatrics, internal medicine, family medicine, ophthalmology, emergency medicine, radiology, psychiatry, dermatology	PGY-1 (33/37) PGY-2 (26/16) PGY-3 (24/18) PGY-4 (25/7) PGY-5 (11/6)	Residents	Faculty	Two 1-day workshops	Didactic, active exercise session (gym workout)	1, 4, 6	No	A gym was involved in the wellness day with an active exercise session for all residents; residents given opportunities to learn how to generate income outside their career and to improve financial status; resting rooms provided; residents given periodic ACGME surveys to measure wellness; consulted with experienced psychologist and available hotline to talk to a mental health professional
Goldhagen, 2015 ³⁰	Anesthesiology, family medicine, psychiatry	PGY-1 (8) PGY-2 (16) PGY-3 (14) PGY-4 (7)	Residents	Clinical psychologist	2 or 3 one-hour training sessions	Small groups, discussion groups, case studies	2, 3, 5	Yes	Used practical exercises that emphasized meditation, value exploration, and cultivation of positivity to nurture resilience
Kang, 2019 ²³	Psychiatry	PGY-1	Residents	Experienced facilitators	1-hour weekly sessions over 8 weeks	Didactic, discussion groups, guided practice	1, 4, 5, 14	Yes	Each session consisted of a 30-minute theory and discussion based on a weekly theme, followed by 30 minutes of guided practice

TABLE 2
Detailed Curriculum Characteristics of GME Programs to Reduce Burnout (continued)

Author, Year	Training Specialty	PGY (n)	Trainee Level	Instructors	Program Length	Teaching Method	Main Topic of Training	Program Occurred During Protected Time	Additional Program Overview
Szuster, 2019 ²⁵	Nonsurgical training programs	PGY-1	Residents	Trained mindful practice facilitator	4, 2-hour sessions conducted once every 2 weeks	Didactic, small groups, at-home exercises, “experiential exercises”	3, 4, 5, 6	Yes	PRACTICE (presence, resilience, and compassion training in clinical education) consisted of experiential exercises including mindfulness-based self-regulation, narrative medicine, appreciative inquiry; and homework: daily formal meditation practice
Axisa, 2019 ³⁵	Internal medicine, pediatrics, child health	PGY-3 (17) PGY-4 (10) PGY-5 (10) PGY-6+ (9)	Residents	Specialist clinicians who received special training to facilitate the workshops	1 half-day (4.5 hour) workshop; 4 workshops conducted with 5–10 physicians	Case studies, small groups, discussion groups	1	N/A	Holistic well-being framework to encourage discussion about work, life, and self-care; workshop included stressors relating to work-life balance, understanding, barriers to looking after well-being, giving and receiving feedback, stress management strategies
Ireland, 2017 ²⁴	Emergency medicine	PGY-1	Residents	Faculty	10-week training session	Didactic, discussion groups, role-play	1, 2, 5	Yes	Adapted from mindfulness-based stress reduction, mindfulness-based cognitive therapy, and acceptance and commitment therapy; each session covered theoretical content and included common mindfulness exercises; participants were encouraged to practice regularly outside of sessions

Abbreviations: GME, graduate medical education; PGY, postgraduate year; MBI, Maslach Burnout Inventory; NR, not reported; MBST, mind-body skills training; ACGME, Accreditation Council for Graduate Medical Education.

Respiratory One Method, an intentional breathing practice, decreased emotional exhaustion scores within the intervention group, but there was no significant difference between the intervention and control group.¹⁸ There was a statistically significant increase in emotional exhaustion among the control group compared between baseline and immediately post-program completion.

Three of 7 randomized control trials (RCTs) produced significant burnout reduction results.^{19,20,24} Two RCTs using the MBI had statistically significant decreases in emotional exhaustion of the intervention groups across varying time periods, and both had significant increases in emotional exhaustion in the control group across varying time periods.^{19,20} Another RCT that used the CBI saw an increase in burnout in the control group and a significant decrease in the intervention group.²⁴ Using information gathered from programs that successfully reduced burnout, a best practices chart for burnout reduction interventions was developed and are outlined in FIGURE 2.

More than half ($n = 13$) of the studies found that there was no effect of the training program on residents' burnout scores. These studies included all study designs (single study, control trials), various teaching methods and program structure, lengths of the program, and curriculum content. Seven programs occurred during protected education time,^{15,26,31} 3 programs occurred outside of the residents' protected education time,^{14,32,33} and 1 program required residents to participate in modules outside of the workday in addition to program participation during protected time.³⁴ Two programs did not report when the training took place.^{35,36} Program length varied from an isolated 4-hour workshop to 9 program sessions over the course of 1 academic year. Programs showcased a broad spectrum of specialties with all programs taught exclusively to residents and one study that included residents and fellows. Instructors of the programs varied, spanning from a self-led program by the residents themselves to clinical psychologists, although most programs were either led or co-led by faculty ($n = 8$).

Discussion

This systematic review synthesized data of 24 existing educational programs aimed to reduce burnout in GME. Most programs that were successful in reducing burnout incorporated multiple teaching methods and were most often serial programs that occurred during a predetermined amount of time during trainees' protected education time as part of their residency. Programs used a wide variety of

Protected Education Time	
9/10 successful burnout reduction programs implemented the program during residents' protected education time as part of their training	
Program Length 8/10 successful burnout reduction programs used serial programs (ie, weekly meetings over the course of several months)	Common Program Facilitators Graduate medical faculty led 5/10 successful programs and certified program instructors led 5/10 successful burnout reduction programs.
Content Type The most common content types in programs that produced significant burnout reduction include: <ul style="list-style-type: none"> • Stress management (3/10) • Resilience (4/10) • General wellness (4/10) • Mindfulness-based stress reduction (3/10) 	Teaching Methods 6/10 programs that produced significant burnout reduction used the following teaching methods: <ul style="list-style-type: none"> • Small groups • Didactic • Discussion groups 9/10 successful burnout reduction programs used 3 or more different teaching methods throughout the course of the program
Postgraduate Year (PGY) 9/10 programs that produced significant burnout reduction included PGY-1 trainees . Early adoption of a burnout reduction program may yield lower burnout scores throughout the remainder of the program.	

FIGURE 2
Burnout Reduction Program Best Practices

training facilitators, including residents, program directors, certified yoga instructors, clinical psychologists, and professional coaches who were educated in each program's curriculum. We did not discover a consistent pattern of successful or unsuccessful programs pertaining to burnout reduction based on content. While studies received varying scores on the MERSQI assessment between 8.5 and 14, there were no clear outliers, and no studies were removed based on this.

Of the 24 studies included in this review, 8 produced significant positive results pertaining to burnout reduction using the MBI and 3 produced significant results using other burnout measurement scales. Nine studies occurred solely within residents' protected education time,^{13,16,18,20–25} one had training elements occur both inside and outside of protected time,¹⁷ and one occurred completely outside of residents' protected time.¹⁹ It is possible that incorporating training programs within residents' protected time, such as part of academic half-day lectures or scheduled wellness days, could effectively reduce burnout. Incorporating an additional responsibility for residents to participate in outside of protected education time could act as a barrier to prolonged change in physician burnout levels when some of the well-known contributing factors to burnout are excessive administrative tasks and long work hours.³

It is important to highlight the commonalities of successful burnout reduction programs to ensure increased implementation of such interventions in

TABLE 3
Outcomes of GME Programs to Reduce Burnout Using Maslach Burnout Inventory

Outcomes of GME Programs to Reduce Burnout Using Maslach Burnout Inventory (MBI)							
Author, Year	Sample Size, (% Female)	Country	Burnout Scale	Data Collection Time	MBI DP Pre/Post Means	MBI EE Pre/Post Means	MBI PA Pre/Post Means
Single Group Design							
Ares, 2019 ²⁸	28	US	MBI	Baseline immediate post	6.5/5.8	7.6/7.4	15.9/16
Babbar, 2019 ¹³	25	US	aMBI	Baseline immediate post	6.0/4.0 ^a	11.0/9.5	15.0/15.0
Bar-Sela, 2012 ²⁷	17	Israel	MBI	Baseline end of academic year	Junior residents: 2.6/2.13; senior residents: 0.98/1.4	Junior residents: 3.66/3.67; senior residents 3.14/3.48	Junior residents: 1.33/1.96; senior residents: 1.34/1.48
Bentley, 2018 ²⁸	7 (29)	US	MBI-HSS	NR	13.5/12.83	27.83/25.83	38.33/36.83
Chaukos, 2018 ¹⁶	75	US	MBI	Baseline 6 mo. post	8.9/13.5 ^a	19.0/29.0 ^a	37.3/36.2
Ghannam, 2019 ²¹	256 (35.1)	Qatar	aMBI	Baseline 1 mo. post	^b	^b	NR
Hart, 2018 ²⁹	46	US	MBI	Baseline 9 mo. after start of intern year	14.2/15.8	24.3/26.2	33.1/37.9
Riall, 2018 ²²	49 (28.6)	US	MBI General Survey	Baseline 1-year post	NR	16.8/14.4 ^a	NR
Romceovich, 2018 ¹⁷	10 (70)	US	MBI	Baseline (T1) Immediate post (T2) 6 mo. post (T3)	11.9/9.6 (T1 to T2) 12.6/8.5 ^a (T1 to T3)	27.1/23.7 (T1 to T2) 26.9/23.5 (T1 to T3)	29.6/38.1 ^b (T1 to T2) 30.0/34.8 (T1 to T3)
Runyan, 2016 ³¹	12 (75)	US	MBI General Survey	Baseline 3 mo. post	NR	20.44/18.00	NR
Taylor, 2016 ³⁴	33	US	aMBI	Baseline immediate post	NR	NR	NR
Non-Randomized Control Trial							
McCue, 1991 ²⁶	64 (44 IG; 43 CG)	US	MBI	2 weeks pre 6 weeks post	IG: 14.16/14.22 CG: 14.00/15.09	IG: 28.47/27.24 CG: 28.67/32.05	IG: 35.23/35.81 CG: 37.43/36.86
Ospina-Kammerer, 2003 ¹⁸	24 (46)	US	MBI	Baseline immediate post	NR	IG: 12.25/9.54 CG: 12.85/16.56 ^a	NR
Randomized Control Trial							
Bragard, 2010 ³⁶	96 (67.3 IG; 59.6 CG)	Belgium	MBI	Baseline 2 mo. post for IG 8 mo. post first assess. time for CG	IG: 9.2/9.7 CG: 9.1/9.2	IG: 25.2/23.6 CG: 26.7/24.2	IG: 37.2/38.2 CG: 35.8/36.7
Lebares, 2019 ¹⁵	21 (42 IG; 33.3 CG)	US	aMBI	Baseline 3.5 mo. post 12 mo. post	NR	NR	NR
Mache 2017 ¹⁹	80 (69 IG; 70 CG)	Germany	MBI	Baseline immediate post 3 mo. post 6 mo. post	NR	IG: 4.10/3.36 3.52/3.75 ^b CG: 4.19/4.10/4.20/4.15 ^b	NR

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TABLE 3

Outcomes of GME Programs to Reduce Burnout Using Maslach Burnout Inventory (extended)

Outcomes of GME Programs to Reduce Burnout Using Maslach Burnout Inventory				
Author, Year	MBI PE Means	MBI C Means	Quality of Evidence	Additional Key Findings
Single Group Design				
Ares, 2019 ²⁸	NR	NR	10.5	Free gym access contributed to residents' focus on physical health; the more practically based lectures (nutrition, fitness, and resiliency) were received better than lectures that were more cognitive in nature
Babbar, 2019 ¹³	NR	NR	10.5	74% of residents agreed that having protected wellness time with co-trainees improved their training experience
Bar-Sela, 2012 ²⁷	NR	NR	10.5	Higher measures of emotional exhaustion and depersonalization were noted in junior residents at the beginning of the year; in senior residents, all measures increased
Bentley, 2018 ²⁸	NR	NR	10.5	Residents reported increased awareness of cognitive and/or emotional experiences and helped manage personal and work stressors; PGY-1s shared barriers to integrating the skills learned into practice
Chaukos, 2018 ¹⁶	NR	NR	9.5	Over the course of the intervention period spanning the first 6 months of intern year, depression symptoms and fatigue increased significantly
Ghannam, 2019 ²¹	NR	NR	10.5	83.6% (174/208) listed at least one technique they applied in the last month, most of which were taught at the workshop; about 80% of participants reported they had used the breathing technique within the last month
Hart, 2018 ²⁹	NR	NR	10.5	Negatively perceived by the emergency medicine residents, having only 2 of 19 participants rate this intervention positively in free-comment evaluation
Riall, 2018 ²²	27.8/29.8	10.31/ 12.0	10.5	On the annual ACGME Resident/Fellow Survey, residents' positive or very positive program evaluation increased from 80% to 96%
Romceovich, 2018 ¹⁷	NR	NR	10	There were significant improvements in PA ($P = .002$), from T1 to T3 (6 months after the program), there were significant improvements in DP ($P = .014$)
Runyan, 2016 ³¹	24.78/ 26.89	15.67/ 15.33	10.5	Residents reported less perceived stress at follow-up, improved efficacy, decreased exhaustion, as well as higher scores in empathy
Taylor, 2016 ³⁴	NR	NR	8.5	Lack of time and knowledge were top 2 barriers to regular meditation practice, with 84% of residents citing time as major limitation
Non-Randomized Control Trial				
McCue, 1991 ²⁶	NR	NR	9	Major stressors identified in group discussions were lack of sleep, lack of time to eat properly, family problems, and lack of leisure time; workshop participants reported more positive changes in their perceptions of how they managed their stress on follow-up testing compared with nonintervention group
Ospina-Kammerer, 2003 ¹⁸	NR	NR	10	The use of ROM treatment did have an effect on MBI-EE scores as hypothesized in the study, as there was a decrease in reported EE among the IG, but there were no significant difference between the IG and CG through Mann-Whitney U tests ($P = .80$)
Randomized Control Trial				
Bragard, 2010 ³⁶	NR	NR	12	No statistically significant group-by-time changes were noted in emotional exhaustion, depersonalization, and personal accomplishment
Lebares, 2019 ¹⁵	NR	NR	12	No significant differences between intervention or control individually or between evaluation time periods were found; mean group scores for burnout increased in both groups at T2 and T3
Mache 2017 ¹⁹	NR	NR	12	Junior gynecologists reported significant decrease in perceived job stress and emotional exhaustion from baseline to all follow-ups, while the control group did not show any comparable results; a clear positive value of mental health promotion program also noticeable regarding job satisfaction and increased coping skills (ie, emotion regulation)

TABLE 3
Outcomes of GME Programs to Reduce Burnout Using Maslach Burnout Inventory (continued)

Outcomes of GME Programs to Reduce Burnout Using Maslach Burnout Inventory							
Author, Year	Sample Size, (% Female)	Country	Burnout Scale	Data Collection Time	MBI DP Pre/Post Means	MBI EE Pre/Post Means	MBI PA Pre/Post Means
Randomized Control Trial (continued)							
Mache 2018 ²⁰	70 (62 IG; 68 CG)	Germany	MBI	Baseline immediate post 3 mo. post 6 mo. post	NR	IG: 4.18/3.51/ 3.583.74 ^b CG: 4.14/4.25/4.19/ 4.28 ^b	NR
Ripp, 2016 ¹⁴	51	US	MBI	Baseline immediate post	NR	NR	NR
Outcomes of GME Programs to Reduce Burnout Not Using Maslach Burnout Inventory							
Author, Year	Sample Size, (% Female)	Country	Measure of Burnout	Data Collection Time	Burnout Scores		
Single Group Study							
Al Ghailani, 2019 ³²	Pre: 120 (85); Post: 86 (79.1)	UAE	NR	Baseline immediate post	Emotionally exhausted Never: 13 (11)/12 (14.5) Rarely: 27 (22.9)/22 (26.5) Sometimes: 62 (52.5)/43 (51.8) Always: 16 (13.6)/6 (7.2)		
Goldhagen, 2015 ³⁰	47 (53.2)	US	Oldenburg Burnout Inventory	Baseline immediate post 1 mo. post	NR, not significant, trend toward lower scores		
Kang, 2019 ²³	16 (56)	Australia	Copenhagen Burnout Inventory	Baseline immediate post	CBI Personal: 55.37/44.36 ^b CBI Work: 46.22/38.45 CBI Patient: 25.49/19.12 CBI Total: 42.88/34.21		
Szuster, 2019 ²⁵	14	US	Professional Fulfillment Index	Baseline immediate post 3 mo. post	1.56/0.95 ^b /1.44 ^b		
Randomized Control Trial							
Axisa, 2019 ³⁵	46 (70 IG; 78 CG)	Australia, other (overseas)	Professional Quality of Life Scale (ProQOL)	Baseline 3 mo. post 6 mo. post	IG: 29.9/28.9/29 CG: 28.3/27.4/28.0		
Ireland, 2017 ²⁴	44 (64)	Australia	Copenhagen Burnout Inventory	Baseline middle of intervention (week 5) immediate post program completion	IG: 2.55/2.54/2.35 ^a CG: 2.65/2.87/2.81		

the future. Of the 10 programs that successfully reduced burnout, 4 were led by GME faculty, 4 were led by certified instructors or program facilitators, one was led by both faculty and program facilitators, while one was led by residents. Nine of the 10 programs included first-year residents, which could signify the need for early adoption of burnout reduction programs to lower residents' burnout scores throughout the course of the training program and showcase the value in residents incorporating these skills early in their careers. Additionally, the most common length for successful programs was a serial program structure, such as weekly meetings over the course of several weeks or months. The most common content types included stress management, resilience, general wellness, and mindfulness-based stress reduction; the teaching methods most often employed were small groups, discussion groups, and didactic learning

sessions. Using these findings as a baseline for burnout reduction in conjunction with the conceptual logic model proposed by Eskander and colleagues³⁷ could greatly assist those who want to develop a burnout reduction intervention for their GME program. Instituting burnout reduction programs for residents will help provide necessary interpersonal and professional skills to aid in the development of wellness, mindfulness, resilience, and ultimately lower burnout scores during the residents' time in the training program.

While all 11 studies that produced significant burnout results used burnout scales as a measurement tool, only one of these programs was designed with burnout reduction as a main topic of training.²⁶ This calls into question how educators and researchers conceptualize burnout, how they define it, and how people perceive burnout. There were studies excluded

TABLE 3

Outcomes of GME Programs to Reduce Burnout Using Maslach Burnout Inventory (extended continued)

Outcomes of GME Programs to Reduce Burnout Using Maslach Burnout Inventory				
Author, Year	MBI PE Means	MBI C Means	Quality of Evidence	Additional Key Findings
Randomized Control Trial (continued)				
Mache 2018 ²⁰	NR	NR	14	Training was highly effective in reducing physicians' stress and emotional exhaustion levels and improving emotion regulation skills and job satisfaction compared with the levels observed in a waitlist CG
Ripp, 2016 ¹⁴	NR	NR	12	Informal feedback reported sessions did not effectively free residents from clinical responsibilities and instead they created an added burden
Outcomes of GME Programs to Reduce Burnout Not Using Maslach Burnout Inventory				
Author, Year		Quality of Evidence		Additional Key Findings
Single Group Study				
Al Ghailani, 2019 ³²		10.5		Support to residents at work and encouraging adoption of healthy lifestyle modifications and stress coping mechanisms are worthwhile to achieve better well-being and less burnout
Goldhagen, 2015 ³⁰		9.5		Female residents had higher DASS-21 scores than male residents; there was a trend for women and post-medical school graduate year 1 and 2 residents to have a reduction in DASS-21 scores after intervention
Kang, 2019 ²³		9.5		Improved level of mindfulness, decreased level of burnout among trainees post-program; effect size was larger (large vs small-to-medium), possibly because psychiatry trainees may be more receptive to mindfulness concepts
Szuster, 2019 ²⁵		9.5		Three months after conclusion of the program wellness measures had returned to preintervention levels
Randomized Control Trial				
Axisa, 2019 ³⁵		11		Participants agreed that the training was relevant to their needs and met their expectations; small reduction in alcohol use, depression, and burnout in IG compared with CG at 6 months; changes did not reach statistical significance
Ireland, 2017 ²⁴		13		Participants undergoing 10-week mindfulness training program reported greater improvements in stress and burnout relative to participants in the control condition

Abbreviations: GME, graduate medical education; DP, depersonalization; EE, emotional exhaustion; PA, personal accomplishment; aMBI, abbreviated Maslach Burnout Inventory; MBI-HSS, Maslach Burnout Inventory–Human Services Survey; NR, not reported; CBI, Copenhagen Burnout Inventory.

^a $P < .05$.

^b $P < .01$.

from this systematic review that measured burnout as a secondary or tertiary outcome, including communication skills training, mental health support, altering the learning environment, and team learning behavior programs. Future research could extend this systematic review by including all study types that had burnout as an outcome measure even if burnout was not the main topic of study to determine if there are overarching skills or training programs that could better influence burnout reduction and maintain this reduction over a long period of time.

Of the programs that did not produce significant burnout reduction, it was more common to see 2 or fewer teaching methods used as compared to programs that produced significant burnout reduction,

which used 3 different teaching methods on average. This might suggest a need for multiple teaching methods used throughout the program to reduce burnout most effectively, potentially through using Kolb's experiential learning theory as a foundation for program development.³⁸ This education model can be useful when training residents due to the wide range of interactions and varying patients physicians interact with daily. Specifically, when teaching burnout reduction this can also prove useful in applying the skills and strategies taught in various programs to different scenarios throughout residents' training, not only immediately after program completion. Through a 4-stage learning cycle and the identification of 4 separate learning styles, Kolb developed an integrated

process of learning where it is possible to enter the cycle at any stage and follow it through its natural sequence.³⁸ This systematic review adds to the body of research pertaining to burnout and burnout reduction and showcases what is currently implemented within GME. Residency program directors and administrative staff could use this information to incorporate a burnout reduction protocol within their training programs by identifying which teaching methods, curricula, and program length have an influence on specific measures of burnout. This review could also be used by ACGME to discern which teaching methods, content, and program structure could enhance their currently instituted Physician Well-Being initiative that aims to address, reduce, and ultimately prevent physician burnout.⁴ Additionally, the ACGME requires residents and fellows to complete a well-being survey throughout the course of their program, with its questions addressing measures commonly found in burnout scales, such as emotional exhaustion, stress, and resilience scores.³⁹ This review could help tailor this questionnaire to better encompass the needs and deficiencies in GME.

This systematic review adds to the current knowledge regarding best practices in addressing and reducing burnout among GME trainees. Previously published reviews in this area identify prevalence of burnout and interventions to prevent burnout such as the wellness intervention systematic review published in the *Journal of Graduate Medical Education*,³⁷ and our review serves as a complement to this important piece of literature. Interventions addressing wellness may be perceived as a variant of burnout reduction programs, but there are distinct differences between wellness and burnout, as evidenced by having just 4 studies in common with Eskander and colleagues' review³⁷ and ours. The relationship between wellness and burnout is much more complex than a simple dichotomous relationship that sits at either end of a continuum. Through examining burnout reduction programs that address residents who already suffer from moderate to high degrees of burnout compared to interventions meant to prevent burnout, this review creates a deeper, more holistic picture of the current issues with burnout in resident populations and can begin to develop longitudinal programs that create lasting change.

In addition to program directors and administrative staff, this review provides a strong foundation for medical educators who are looking to teach a skills-based program to reduce burnout. Additional programs to develop discrete skills outside of a strictly medical lens are often incorporated into residency training, such as breaking bad news, traditional

communication skills, or shared decision-making, and this review provides a baseline of past programs that both did and did not have a significant outcome on burnout for educators to develop a new curriculum. This research also shows what has not proven effective so future program directors can work toward developing and instituting a validated program. More randomized controlled trials and multiple trials using similar methods would not only help to expand the knowledge of this topic but also assist in establishing a reliable program that is proven effective in reducing resident physician burnout.

While educational programs such as those included in this review are necessary to improve burnout, they have not proven sufficient for the long-term well-being of physicians. A multifaceted approach is needed, one that shifts the sole burden of burnout reduction from physicians' individual behaviors to health care systems more broadly. Several studies included in this review support the importance of organization-directed interventions to better ascertain the more systems-based components of residents' daily experiences that contribute to higher degrees of burnout.^{16,19,20,22,36} Organizational elements including high workloads, long work hours, and prohibitively time-consuming administrative tasks are cited as some of the most common organizational requirements that lead to higher resident burnout scores. Institutional factors such as these and the necessary medical curriculum residents must complete as part of their training program may contribute substantially to residents' experience of burnout, in which case educational approaches such as those implemented within the studies in this review may have little impact on their burnout scores. Until systemic changes are made to the treatment and training of residents, prolonged meaningful change will remain out of reach.

Due to this insufficiency, an integrated approach is necessary to ensure a shared obligation and accountability to improve the well-being of all who work in the hospital setting. This shift is discussed by Bohman and colleagues as well, who stated, "Health care organizations must embrace their responsibility to build an efficient practice environment and to foster a culture of wellness while also supporting physicians' effort to improve their own resilience."⁴⁰

An important limitation of this review is that it is based only on educational programs that have been evaluated and published. There were several feasibility studies that were excluded from the data, as they tested whether a burnout reduction program could be successful within a residency program and did not provide any empirical data to determine if there was a significant difference in burnout. Brief reports,

editorials, and commentary were excluded for the same reason.

Among the included studies, wide variance in sample size and attrition rates was found, which has the potential to skew data toward or away from statistical significance. A consistent level of participation among each of the training programs was not found to accurately determine effects, with sample size ranging from 7 to 256 participants and response rates for burnout measures pre-/post-program completion ranging anywhere from not reported to 100%.

Included studies also had varying ranges of quality when evaluated using the MERSQI, which is another limitation of this systematic review. Longitudinal effects that the burnout reduction programs may have on participants are not accounted for as well, given the cross-sectional nature of the MERSQI. This review was also limited to a maximum score of 15 when the MERSQI is typically evaluated on an 18-point scale due to the type of training programs that were instituted and evaluation methods used. This adjustment in scoring can distort quality results and was not double coded to establish intercoder reliability.

Conclusions

This systematic review synthesizes the current programs instituted in GME that aim to reduce resident physician burnout. Certain program structures and content provide more significant burnout reduction than others, including program participation during protected education time and utilizing multiple teaching methods (ie, didactic, role-play, and group discussion). Additional randomized control trials can help produce a consistently successful burnout reduction protocol for residents.

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