



Interventions to Support Resident and Fellow Well-Being During the COVID-19 Pandemic: A Scoping Review

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ABSTRACT

Background The COVID-19 pandemic led to rapid and wide-scale changes in graduate medical education and impacted the well-being of frontline physicians, including residents and fellows. While institutions and programs implemented initiatives to support the unique needs of trainees during the pandemic, there remains a gap in the literature in examining the approaches used, the domains of well-being addressed, and the effectiveness of these efforts.

Objective To review the literature on interventions designed to promote resident and fellow well-being during the COVID-19 pandemic.

Methods The authors conducted a scoping review of the literature published between January 1, 2020, and November 30, 2023, in PubMed, Scopus, Embase, PsycINFO, CINAHL, and ERIC to identify interventions to promote the well-being of trainees during the COVID-19 pandemic.

Results Eighteen articles met inclusion criteria, mainly studies conducted in the United States (14 of 18, 77.8%). Most interventions targeted psychological well-being (16 of 18, 88.9%), with only a few studies that included interventions in the physical or social domains. Interventions entailed redeployment, schedule modifications, communication strategies, and expanded mental health support. Most interventions were limited to a few weeks' duration in the first surge phase of the pandemic. Only 11 studies (61%) reported outcome measures, and only 2 (11%) used instruments with validity evidence. Most studies did not report sufficient data to evaluate study quality.

Conclusions While longer-term outcome data were often lacking, studies described a range of interventions to support resident well-being. Future research should focus on the effectiveness of well-being interventions and include cohorts from more diverse clinical settings.

Introduction

The COVID-19 pandemic led to rapid and wide-scale changes in graduate medical education. While the pandemic spurred the adoption of telemedicine and virtual learning platforms and encouraged multidisciplinary and interprofessional collaboration in education and patient care, the large volumes of critically ill patients, uncertainties around disease management, and fears of infection challenged health care professionals worldwide, making efforts to address their well-being a global priority.^{1,2} Residents and fellows functioned at the front lines of care for patients with COVID-19 and experienced unique vulnerabilities. Multiple reviews and high-quality studies prior to the pandemic showed that

resident physicians are at higher risk for burnout and depression than the general population.³⁻⁵ Residency training is characterized by high stress, long hours, disrupted sleep, social isolation, and extreme physical and mental demands.⁶ Data collected since March 2020 suggest that COVID-19 exacerbated preexisting high rates of burnout and depression in residents, with the negative effect on well-being particularly pronounced during the pandemic's first surge phase and for individuals redeployed to the front lines of patient care.^{7,8} However, there remains a gap in the literature in examining the well-being strategies used and the effectiveness of these efforts. In this review, we report on interventions to promote resident and fellow well-being during the COVID-19 pandemic. Lessons learned can guide how graduate medical education should function when faced with future crises.

We used the biopsychosocial model to categorize well-being into 3 dimensions.⁹ Physical well-being

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focuses on bodily health and functioning and encompasses factors such as nutrition, exercise, and sleep. Psychological well-being emphasizes mental and emotional aspects. Lastly, social well-being involves the quality of social connections, social support, and engagement. This framework interconnects physical, psychological, and social domains and provides a comprehensive model for understanding and promoting well-being.⁹ Through the review, we sought to answer 3 research questions:

1. What interventions were implemented to support the well-being of residents and fellows during the COVID-19 pandemic?
2. What domains of well-being were addressed?
3. What were the key findings for the effectiveness of interventions on well-being?

We also aimed to identify knowledge gaps and limitations to inform future work in this area.

Methods

Literature Search Strategy

A scoping review methodology was chosen because it identifies the types of interventions implemented, the populations studied, and the outcomes measured. The review is based on the scoping review framework by Arksey and O'Malley.¹⁰ We used 5 of the 6 steps of the framework: identifying the research question, searching the literature, selecting studies, organizing and charting the data, and summarizing and reporting the results. We did not use the sixth step (consulting with stakeholders to validate the findings), which is an optional component of the framework.¹⁰ The literature search was conducted according to the standards and guidelines established in the Preferred Reporting Items for Systematic Reviews and Meta-Analysis with extension for Scoping Reviews (PRISMA-ScR).¹¹

Unlike other published reviews of resident well-being, we exclusively reviewed studies of interventions implemented during the COVID-19 pandemic. A medical librarian (J.S.) and the 4 coauthors (S.A., H.I., L.K., I.P.) developed a comprehensive search strategy. The search query utilized search terms related to “well-being,” “residents,” “medical residents,” “fellows,” “medical fellows,” “residency,” “graduate medical education,” “mental health,” and “COVID-19.” The databases searched were PubMed, Scopus, Embase, PsycINFO, CINAHL, and ERIC. The PubMed search strategy (online supplementary data) was adapted for the other databases. Database searches were initially conducted in December 2023 and repeated in June 2024 to check for new literature. In addition to

peer-reviewed journal articles, we examined funded trials, peer-reviewed conference papers, and grey literature with sufficient information about methodologic approach and results. We manually reviewed the reference lists of studies that met inclusion criteria to identify other relevant works. The **FIGURE** details the screening workflow.

Study Selection

Inclusion criteria were determined to address our research aim and key questions. Studies needed to be written in English, be published between January 1, 2020, and June 25, 2024, and describe well-being interventions targeting residents and/or fellows in the context of the COVID-19 pandemic. We included studies that provided sufficient information about their methodologic approach to allow others to replicate the intervention. We excluded reviews, commentaries, perspectives, editorials, and studies that did not report an intervention.

Data Extraction

Data extraction was conducted in 2 stages. First, 2 authors (J.S., I.P.) independently screened titles and abstracts to determine their inclusion against criteria. The same authors read the full text of selected manuscripts, and the entire review team independently screened 11 of the 225 retrieved publications (4.9%) to ensure consistency. During data cleaning, keywords were consolidated in the case of plurals (“intervention” vs “interventions”). Discrepancies between the 2 primary reviewers were resolved by 2 additional authors (S.A.R., H.I.); L.K. served as a tiebreaker when needed.

Information was extracted at the full-text review stage using a workbook in Microsoft Excel 365. It included: (1) publication details (title, year, country of corresponding author, publication type, and keywords); (2) study population (residents and/or fellows); (3) study design (quantitative, qualitative, or mixed methods); (4) primary study focus/foci; (5) outcomes examined; and (6) feasibility and sustainability data reported in the primary literature. Data were checked for consistency by the authors. Articles were grouped based on the study population, type of intervention, and the well-being domain(s) targeted (physical, psychological, or social) as determined by the entire research team. We summarized the data in 2 tables and through narrative descriptions of the intervention characteristics to generate findings specific to our research questions. The study was reviewed and approved by the Sheikh Khalifa Medical City Research Ethics Committee (RS-735). Informed consent is not applicable for this review.

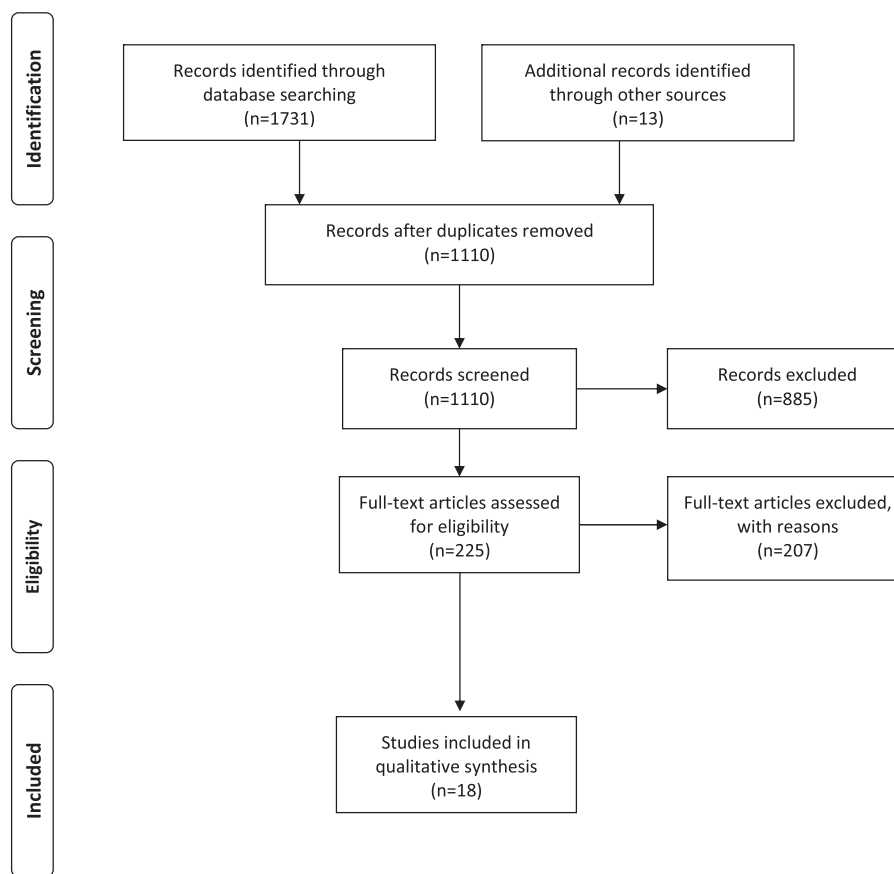


FIGURE
Preferred Reporting Items for Systematic Reviews and Meta-Analyses Flow Diagram of Scoping Review Search

Results

Study Characteristics

The search identified 1744 articles, with 1731 through database searches and 13 from other sources. After removing duplicates, 1110 articles remained for title/abstract review. During title/abstract screening, 885 articles (79.7%) were discarded as not meeting inclusion criteria. Based on the full-text assessment of the remaining 225 articles, 207 (92.0%) did not meet inclusion criteria. The majority of excluded articles described the negative effect of the COVID-19 pandemic on residents but did not report on any interventions. Ultimately, 18 of the 225 (8.0%) published studies were included in this review.¹²⁻²⁹

Most of the studies (14 of 18, 77.8%) described interventions implemented in the United States.^{13-18,20-25,28,29} The remaining 4 studies were conducted in Canada (n=2),^{19,27} Israel (n=1),¹² and the Netherlands (n=1).²⁶ Seventeen studies (94.4%)^{12-26,28,29} described an intervention at a single institution/health system, and 12 (66.7%)^{12,13,16,19-26,28} targeted residents in a single specialty. Represented

specialties included general surgery and surgical specialties (n=3),^{17,19,25} anesthesiology (n=3),^{16,22,28} family medicine (n=3),^{13,21,24} internal medicine (n=2),^{20,26} pediatrics (n=1),¹² and emergency medicine (n=1).²³ The majority of interventions were instituted in the spring or summer of 2020. Study characteristics are shown in TABLE 1.

What Interventions Were Implemented?

The included articles describe changes to trainee schedules and deployments,^{12,17,19,21,25,28} increased mental health support services,^{14,15,17,20,26,29} and virtual programs to build and support peer communities.^{13,16,17,19,23,27,29} Many described a combination of several interventions that were simultaneously implemented. Several hospitals expanded existing well-being interventions, such as resident counseling services, often adapting them to virtual delivery during the pandemic.^{13-15,18,25,26} Most program directors increased communication with trainees and incorporated their feedback to improve the well-being initiatives.

TABLE 1
Eighteen Studies that Describe Well-Being Interventions for Medical Trainees During the COVID-19 Pandemic

Author	Intervention	New or Existing Program	Population	Specialty	Location	Time and Follow-Up
Damari et al ¹²	Shortened work shifts	New	67 residents	Pediatrics	Israel ^b	March-May 2020
De La Rosa et al ¹³	Virtual support groups based on Balint principles	Existing	Residents ^a	Family medicine	Massachusetts, USA ^b	Summer 2020
Ey et al ¹⁴	Telehealth and remote counseling	Existing	Residents and faculty ^a	Multispecialty	Oregon, USA ^b	March-June 2020
Huff et al ¹⁵	Psychiatry/counseling support	Existing	Residents and health care staff ^a	Multispecialty	Ohio, USA ^b	Spring 2020 (no definitive time frame)
Jotwani et al ¹⁶	Virtual communication sessions and debriefing sessions	New	Residents and fellows ^a	Anesthesiology	New York, USA ^b Single academic health system	3 weeks in March 2020
Kemp et al ¹⁷	Multipronged well-being program	New	Residents and fellows ^a	Surgery and surgical subspecialties	Michigan, USA ^b	Spring and summer 2020 (no definitive time frame)
Klatt et al ¹⁸	Mindfulness program	Existing	267 residents, attending physicians, administrators, chaplain	Multispecialty	Ohio, USA ^b	90 days in spring and summer 2020 (no definitive time frame)
Lie et al ¹⁹	Resident reserve unit	New	Residents ^a	Surgery	British Columbia, Canada ^b Single program with trainees spread over 20 sites in the province	Spring 2020 (no definitive time frame)
Manson et al ²⁰	Virtual counseling and meals, transportation support	New	130 residents	Internal medicine and residents redeployed to internal medicine	New York, USA ^b	Spring 2020 (no definitive time frame)
Messner et al ²¹	Rotation changes	New	6 residents interviewed in a qualitative study (of 24 residents)	Family medicine	Pennsylvania, USA ^b	May-June 2020
Mohamed et al ²²	Peer support program	New	88 residents	Anesthesiology	Florida, USA ^b	April 2020
Monette et al ²³	Weekly 1-hour Zoom-based facilitated debriefings sessions	New	6 residents, 29 attending physicians, 33 nurse practitioners	Emergency medicine	Massachusetts, USA ^b	March and April 2020
Nutting et al ²⁴	Mindfulness program	New	21 residents and faculty	Family medicine	Kansas, USA ^b	November 2020-January 2021
Posey et al ²⁵	Peer support	Existing	21 residents	Orthopedic surgery	North Carolina, USA ^b	Early and peak phase of COVID-19 pandemic (no definitive time frame provided)
Scheepers et al ²⁶	Multiple well-being interventions	Existing	103 residents	Internal medicine and intensive care unit residents	Netherlands ^b	March 2020-May 2020

TABLE 1

Eighteen Studies that Describe Well-Being Interventions for Medical Trainees During the COVID-19 Pandemic (continued)

Author	Intervention	New or Existing Program	Population	Specialty	Location	Time and Follow-Up
Shroff et al ²⁷	Series of 20 webinars on various well-being topics	New	~400 faculty, residents, and medical students (155 participants completed an evaluation survey)	Faculty and residents in multiple specialties	British Columbia, Canada	Eight-month periods during the COVID-19 pandemic (no definitive time frame provided)
Streff et al ²⁸	Rotation scheduling and debriefing	New	48 residents	Anesthesiology	New York, USA ^b	March 2020-June 2020
Viswanathan et al ²⁹	Peer support and virtual counseling	New	40 residents	Multispecialty	New York, USA ^b	Spring and summer 2020 (no definitive time frame)

^a Sample size not reported.

^b Single institution study.

What Dimensions of Well-Being Were Addressed?

Interventions targeted physical, psychological, and social dimensions of well-being. While most studies (16 of 18, 88.9%) included strategies to support psychological well-being,^{13-24,26-29} 9 studies (50.0%) described multiple interventions that targeted several well-being dimensions.^{13,17,19-21,23,25,27,28} Four studies (22.2%) focused on 2 dimensions,^{13,23,25,28} and 5 studies (27.8%) targeted 3 dimensions of well-being.^{17,19-21,27} TABLE 2 describes the interventions.

Strategies to address physical well-being and safety focused on schedule changes to maintain clinical training and resources to care for patients with COVID-19 while ensuring social distancing,^{12,17,19,21,25,28} addressing basic needs (lodging away from families, transportation, and food) during pandemic surges,^{17,19,20,25} promoting good nutrition and exercise,^{19,27} and providing personal protective equipment.^{17,19,25} Interventions targeting psychological well-being included increasing access to mental health support and counseling,^{13-17,20,26,29} peer support,^{22,25,26,29} enhancing personal resilience through synchronous and asynchronous well-being curricula,^{21,27,28} mandatory check-ins,¹⁹ and mindfulness training.^{18,24} Strategies to promote social well-being included regular communication from program directors,^{16,17,20,21} debriefings via video conferencing,^{16,23,26,28} use of social media,^{17,25} virtual social events,²⁵ and a wellness competition.²⁵ The evaluation period for most interventions was limited to 2 to 3 months during the peak phase of the COVID-19 pandemic; one study collected data over an 8-month period.²⁷

What Were Key Findings Related to the Effectiveness of Interventions on Resident Well-Being?

We assessed study quality by looking at which outcomes were reported and if sufficient information was provided to allow replication of the intervention. Seven studies did not provide any data on program effectiveness.^{13,16,17,19-21,28} Of the interventions with outcome measures, 6 used self-reported satisfaction surveys,^{12,22,23,25-27} and 5 reported utilization metrics.^{14,15,18,22,29} Only 2 studies used well-being instruments with established validity evidence.^{18,24} We planned to use the Medical Education Research Study Quality Instrument (MERSQI)³⁰ to assess study quality but found that most studies did not report sufficient data to facilitate scoring.

Discussion

Our scoping review focused exclusively on studies describing well-being interventions for residents and fellows implemented during the COVID-19 pandemic. As the pandemic disrupted routine patient care and clinical training, residency programs worldwide quickly implemented support strategies and well-being interventions.⁸ There was convergence in these interventions, including schedule changes to manage workload, facilitate social distancing, and reduce exposure; enhanced mental health services; increased communication from leaders; and activities to promote social connections.

Although the COVID-19 pandemic affected resident training worldwide, most studies originated in the United States, which is consistent with the

TABLE 2
Well-Being Interventions for Medical Trainees During the COVID-19 Pandemic

Author	Intervention Type	Well-Being Dimension	Assessment Instrument, Construct Measured	Author Findings/Key Takeaways
Damari et al ¹²	Shortened work shifts (26 hours to 13 hours) during the early period of the COVID-19 pandemic. Well-being was assessed in the surveys, though the intervention did not explicitly target well-being.	Physical	<ul style="list-style-type: none"> Pre- and post-intervention survey Self-reported data on medical education experience and ability to deliver quality health care 	Improvements in self-reported metrics for residents' ability to deliver quality health care (potential for error and emotional labor, clinical skills expertise) and medical education experience (skills proficiency, successful learning, and rotation disruptions). Improvement in 5 well-being metrics (general wellness, reduced exposure to personal harm, reduced role conflicts, healthy relationships, reduced feelings of isolation and opportunity to spend time with family).
De La Rosa et al ¹³	Biweekly virtual Balint groups and support groups based on Balint principles for residents to share and discuss.	Psychological and social	No assessment of intervention or well-being metrics reported	The virtual support groups created a safe space to facilitate challenging discussions surrounding race, inequity, violence, and trauma among residents.
Ey et al ¹⁴	Institutional well-being programs for faculty and residents shifted to telehealth and remote counseling in an existing resident and faculty well-being program.	Psychological	Metrics on utilization of services	By the end of the 2019-2020 academic year, the number of sessions had increased 18% over the prior year. Some physicians required medication consultations to address insomnia, anxiety, and depression.
Huff et al ¹⁵	Extension of an existing program. Volunteer psychiatry residents in a COVID-19 elective provided daytime support to health care staff and overnight/weekend support to residents. Residents received a 1-hour training in the BEST model. Faculty assisted when individuals expressed ideation to harm self/others.	Psychological	Metrics on utilization of services (utilization increased to approximately 12 calls/day)	The program built on an existing well-being intervention for psychiatric patients and caregivers (STAR program) and just-in-time training using the BEST model. The report focuses on the experience of care professionals. No data provided on reach or impact.
Jotwani et al ¹⁶	Virtual weekly closed-group mental health sessions (talk therapy and debriefing) to help trainees process clinical experiences in high-volume, high-mortality settings. Predeployment sessions allowed residents to become familiar with mental health clinicians. Trainees in distress were offered additional mental health support. Regular virtual communication sessions with program leaders to enhance transparency on institutional plans and to discuss trainee concerns.	Psychological	No assessment of intervention or well-being metrics reported	Benefits included a rapid response to trainee psychological well-being needs during the surge phase of the COVID-19 pandemic. Other than resident deployment statistics, no data were provided on utilization, reach, or impact.
Kemp et al ¹⁷	Three intervention categories: <i>Physical well-being/safety</i> (1) Redeployment model with 2-resident teams (1 senior and 1 junior) assigned 12-hour shifts for 6 to 7 days followed by the same number of recovery days (2) Safety advocate who acted as liaison regarding PPE issues (3) Alternative housing options for rest, decontamination, and isolation	Physical, psychological, and social	No assessment of intervention or well-being metrics reported	Interventions were reportedly well received by trainees and faculty and could be used in other departments and beyond the context of COVID-19.

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TABLE 2

Well-Being Interventions for Medical Trainees During the COVID-19 Pandemic (continued)

Author	Intervention Type	Well-Being Dimension	Assessment Instrument, Construct Measured	Author Findings/Key Takeaways
	<p><i>Psychological well-being</i></p> <p>(4) Psychological safety through discussions on how to raise concerns</p> <p>(5) Multispecialty trainee wellness committee and enhanced mental health resources</p> <p><i>Social well-being</i></p> <p>(6) Fostering community through appreciation, attentiveness to childcare needs, and use of social media</p>			
Klatt et al ¹⁸	Continuation and remote adaptation of an existing mindfulness program to the COVID-19 pandemic, with mindfulness “boosters” offered to clinicians who had completed the initial 8-week pre-COVID-19 Mindfulness in Motion multimodal onsite intervention.	Psychological	<ul style="list-style-type: none"> Pre-COVID-19, pre- and post-intervention surveys on burnout, resilience, perceived stress, and work engagement COVID-19 pandemic-related metrics on utilization of well-being intervention 	<p>Significant reduction in participants meeting burnout criteria, emotional exhaustion, depersonalization scores, and perceived stress, with increase in the personal accomplishment, resilience, and total work engagement scores using the Maslach Burnout Inventory, Perceived Stress Scale, Connor-Davidson Resilience Scale, and Utrecht Work Engagement Scale.</p> <p>Wide use of 5-6 daily mindfulness practices (10 896 views over 90 days) and 30-minute mindfulness booster sessions (1720 views over 90 days).</p>
Lie et al ¹⁹	Creation of a resident reserve unit (RRU). Residents rotated weekly: one-third in surgery, one-third in the ICUs, and one-third on the RRU. This allowed (1) enhanced collaboration, reduced COVID-19 exposure; (2) a culture that ensured adequate PPE/safety equipment and treated burnout as an illness that required time off; and (3) personal resilience (nutrition and exercise, a sense of community and fulfillment, mandatory check-ins, and openness to resident input).	Physical, psychological, and social	No assessment of intervention or well-being metrics reported	Residents reportedly felt that being able to help with essential services had a positive effect, giving a sense of purpose, and appreciated opportunities to volunteer in the community adding to a sense of fulfillment. The authors noted that residents' personal resilience was enhanced by the mandatory check-ins.
Manson et al ²⁰	Additional resources for residents in the context of major program restructuring during the peak of the COVID-19 pandemic: (1) existing mental health resources augmented with virtual counseling sessions; (2) meals provided onsite (at no cost); (3) financial aid for transportation (to reduce use of public transport to ensure social distancing); and (4) added communication/transparency.	Physical, psychological, and social	No assessment of intervention or well-being metrics reported	The program's restructuring allowed for onsite services and additional time off to enhance trainee safety, reduce trainee fatigue, and enhance psychological and social well-being. No data provided on reach or impact.
Messner et al ²¹	Three rotation models for 2 weeks each: (1) inpatient, (2) ambulatory (in person or telehealth), and (3) an asynchronous COVID-19 reserve rotation curriculum with a well-being curriculum. Opportunities to provide telehealth visits during the COVID-19 reserve weeks depended on preceptor availability. Program	Physical, psychological, and social	No assessment of intervention or well-being metrics reported	Analysis identified 4 themes: (1) COVID-19 pandemic-related fears, unrest, and external barriers; (2) schedule/life changes: burnout and conflicting attitudes about time for patient care, education, and personal life; (3) value of communication by

TABLE 2
Well-Being Interventions for Medical Trainees During the COVID-19 Pandemic (continued)

Author	Intervention Type	Well-Being Dimension	Assessment Instrument, Construct Measured	Author Findings/Key Takeaways
	leaders provided regular communications to trainees.			leadership; and (4) use of time for education and to improve well-being.
Mohamed et al ²²	BUDDYS system paired 2 residents for peer support with frequent check-ins to support each other during the COVID-19 surge.	Psychological	<ul style="list-style-type: none"> Two post-intervention surveys (at 2 and 4 weeks), assessing frequency of check-ins, impact on well-being, and benefit of the intervention 	Residents reported a positive impact on well-being (31% very beneficial, 31% moderately beneficial, 28% somewhat beneficial, 10% not beneficial), and that it helped with anxiety (23%), sharing information related to the COVID-19 pandemic (19%), and helping them focus on family and personal time (37%). The intervention required minimal resources.
Monette et al ²³	Eighteen 1-hour Zoom-based debriefing sessions with emergency clinicians to reduce stress, increase psychological safety, and enhance the sense of connectedness.	Psychological and social	<ul style="list-style-type: none"> Eighteen sessions over a 1- to 2-month period Participants completed post-session surveys (76% response rate) 	Seventy-seven percent of participants attended at least 2 sessions. Participants reported facilitators created a safe environment (98%) and were trusted colleagues (87%). The sessions resulted in an enhanced sense of community.
Nutting et al ²⁴	Eight 75-minute weekly mindfulness sessions provided by certified instructors not affiliated with the residency program. Participants volunteered for the intervention. Topics included emotional intelligence, awareness, community building, communication, and resilience. Activities included mindfulness-meditation, body scans, and deep breathing. Participants were encouraged to practice mindfulness for 20 minutes per day.	Psychological	<ul style="list-style-type: none"> Single sample, pre-post intervention survey Burnout, depression, anxiety, stress, perceived resilience, and compassion 	Participants had significantly better scores on anxiety ($P<.004$), stress ($P<.001$), perceived resilience ($P<.001$), and compassion ($P<.001$). There were no significant changes on the personal accomplishment, emotional exhaustion, and depersonalization subscales of either the abbreviated Maslach Burnout Inventory or the depression subscale of the Depression Anxiety Stress Scale-21.
Posey et al ²⁵	Creation of a 3-team-structure with an inpatient team to deliver care, a second (backup) team that manage telemedicine clinics, and a third (quarantine) team without patient care responsibilities whose members focused on education and trainee well-being. 3D printers and laser cutters were repurposed to create high-quality PPE in face shields, which were also provided to other surgical services. The well-being intervention used a prior resident "family" grouping for peer support; this was supplemented by a friendly interdepartmental wellness competition, hosted via Instagram, and a regular virtual social hour.	Physical and social	<ul style="list-style-type: none"> Single sample, post-intervention survey of resident perceptions No data for assessment of well-being was reported 	All residents reported they had the tools to ensure their physical safety during the COVID-19 pandemic and 94% reported program leaders cared about their well-being. The authors indicated their well-being-focused interventions, particularly the wellness competition, have been continued and adopted by other residency programs at the institution, and may have utility for enhancing activities post-COVID-19 pandemic.
Scheepers et al ²⁶	Existing peer group meetings and newly developed 24/7 hospital-wide peer support, daily guided debriefings under supervision of a medical psychologist, 2 lectures on crisis management by a medical psychologist and trauma expert, information flyers, and a 24/7 telephone line for psychological	Psychological	<ul style="list-style-type: none"> Pre-intervention survey, post-intervention, multiple sample, well-being surveys Well-being 	Institutional interventions (peer groups, 24/7 hospital-wide support, debriefings, crisis management lectures, information flyers, and 24/7 telephone support) were not associated with improved well-being. Informing residents about well-being

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TABLE 2
Well-Being Interventions for Medical Trainees During the COVID-19 Pandemic (continued)

Author	Intervention Type	Well-Being Dimension	Assessment Instrument, Construct Measured	Author Findings/Key Takeaways
	support. Residents also provided information, through lectures and flyers, about individual strategies to help maintain well-being.			strategies was associated with improved physical and psychological well-being.
Shroff et al ²⁷	Pilot of a "Well-being Convene during COVID-19" series of facilitated mind-body health promotion webinars designed by the faculty of medicine for faculty and trainees. Topics ranged from self-compassion, nutrition, mental health first aid, eye yoga, enhancing relationships, and reflective awareness.	Physical, psychological, and social	<ul style="list-style-type: none"> 20 webinar sessions offered over an 8-month period Participants completed post-session surveys (40%-60% response rate) 	Most participants reported the webinars were either very/extremely helpful in providing tools and skills to maintain well-being (79%), and the sessions were an effective way to make and sustain connections with community members (80%).
Streiff et al ²⁸	As part of the institution's COVID-19 pandemic "surge plan," resident rotations were changed to every other week. Well-being interventions included: (1) electronic links to departmental website wellness resources; (2) debriefing with faculty and relating feedback to departmental leadership; and (3) small group debriefing by psychiatrist with expertise in health care worker wellness.	Physical and psychological	No assessment of intervention or well-being metrics reported	Debriefing sessions allowed for an opportunity for residents to share information on their emotional state and their experiences during deployment. Residents voiced feelings of sadness for their patients and their families, and their own fears of contracting COVID-19 and transmitting it to those around them. No data on reach or impact.
Viswanathan et al ²⁹	Well-being interventions included: (1) peer support groups via video and telephone conferencing for faculty, residents, and nursing, focusing on concerns and emotions associated with frontline clinical work with COVID-19 (4-7 per week); and (2) telehealth individual counseling by attending psychiatrists for individuals with severe anxiety or desiring confidentiality (2 sessions per individual).	Psychological	<ul style="list-style-type: none"> Metrics on utilization of services Verbal reports from participants about beneficial impact of group and individual sessions 	The content of group discussions evolved over time, from anxiety related to contracting COVID-19 and fear of spreading it to themes related to the threat of the pandemic to the physician-patient or nurse-patient relationship. Added focal areas included support to enhance coping, sharing of feelings, peer support, validation, peer learning, and interventions by group facilitators. No data on reach or impact.

Abbreviations: BEST, Brief Emotional Support Team; STAR, Stress, Trauma, and Resilience; PPE, personal protective equipment; RRU, resident reserve unit; BUDDYS, Building Dynamic Duos for Your Support

overall predominance of studies from the United States in the medical education literature.³¹ Additionally, most interventions targeted a single institution or a single residency program. This may be because workflows, exposure risks, and educational program designs differ among institutions and programs, highlighting the need for tailored interventions. It is notable that some interventions focused on structural or organizational changes, such as schedule modifications, while others focused on individual-level initiatives, such as efforts to promote mindfulness and personal resilience. One study explicitly mentioned the use of both types of interventions.²⁵ Prior systematic reviews of programs to address well-being and reduce burnout have found that both

individual and structural/organizational changes were effective.^{6,32}

Most studies in our review targeted surgical and anesthesiology residency programs. Possible explanations include the specialty-specific effect of the pandemic on clinical disruptions and exposure risk. A systematic review of approaches to maintaining resident education during the pandemic showed surgical residents' medical education was greatly disrupted by the cancelation of elective surgeries.³³ This may have provided some specialties with more time for well-being interventions and/or scholarly publications. Anesthesiology trainees were commonly redeployed to critical care settings where they cared for the sickest patients and often performed procedures

with a high risk of infection,²⁸ likely contributing to the increased need for well-being interventions in this group. Only one study targeted emergency medicine residents,²³ who were at the forefront of patient care. It is unclear whether emergency medicine residency programs did not implement well-being programs or were too busy with clinical workload to disseminate their initiatives. However, the overall number of interventional studies is too low to provide a robust analysis of observations within study subgroups.

The volume of initial articles screened suggests the importance placed by educators and researchers on resident well-being during the COVID-19 pandemic. The small number of articles meeting inclusion criteria likely demonstrates the obstacles that educators faced in developing, implementing, and studying the outcome of interventions during a global health crisis. Position statements, perspectives, and other non-interventional publications on well-being dominated the literature. Additionally, of the 18 studies identified, few evaluated the effectiveness of the interventions or provided enough information for generalizability or quality assessment. It is possible that clinical demands, workforce shortages, and social distancing mandates hindered the ability to design and implement well-being interventions. This is consistent with other studies of well-being initiatives during global crises. For example, a review of 117 well-being studies of health care professionals during viral outbreaks (SARS, MERS, Ebola, H1N1, and H7N9) found only 4 that addressed mental health.³⁴ A Cochrane systematic review also found that studies conducted during earlier epidemics provided limited evidence to inform well-being interventions for frontline workers during the COVID-19 pandemic.³² Notably, resident well-being studies prior to the pandemic have also been criticized for lack of methodologic rigor and limited use of instruments with established validity evidence.³⁵

While our findings do not allow us to make specific recommendations regarding the effectiveness of the well-being interventions studied, they do provide important information on approaches taken and address gaps in the current literature. Substantial efforts are needed to design, implement, and evaluate research on resident well-being interventions in global crises. This can be done prospectively by individual institutions, through resource and expertise sharing among institutions, and/or by partnering with organizations that promote research on trainee well-being, such as the Accreditation Council for Graduate Medical Education, which offered guidance to teaching institutions for promoting resident and faculty well-being during the COVID-19 pandemic.³⁶ Our study suggests that future research on trainee well-being

interventions should improve the methodologic rigor of research study designs, increase follow-up periods to enable longitudinal observation of effectiveness, and establish assessment protocols and consensus outcome measures.

Limitations

Limitations of our study include the exclusion of non-English language manuscripts, which may limit generalizability and adoption or adaptation to different environments and contexts. For studies that reported multiple interventions, it was not possible to determine which interventions were associated with the reported outcomes. Although we searched the grey literature, it is likely that initiatives were launched during the COVID-19 pandemic but were never published in the literature or disseminated beyond their program or institution.

Conclusions

This review found that studies on interventions to support residents and fellows during the COVID-19 pandemic were limited to a single program or institution and were rarely sustained after the peak weeks of the pandemic. Although multiple interventions are described, the studies are limited by the lack of methodological rigor and long-term outcome measures. Research is still needed to better understand the components of effective interventions to safeguard resident well-being during times of crisis.

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