

Psychological Health and Wellness and the Impact of Six-week and Three-Month Supportive Text Messaging Program (Wellness4MDs) Among Physicians and Medical Learners in Canada

By

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Abstract

Background: Physicians and medical trainees experience high rates of burnout, anxiety, and depression but often avoid seeking help due to stigma and confidentiality concerns. **Objectives:** This study aimed to (1) review the prevalence of these mental health conditions and (2) evaluate the impact of Wellness4MDs, a CBT-based supportive text messaging program, on the psychological health and wellness of physicians and medical trainees in Canada. **Methods:** A comprehensive literature review was conducted using databases including Medline, PubMed, Scopus, CINAHL, and PsycINFO, following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. For the intervention, participants received daily CBT-based supportive text messages over three months. Depression, anxiety, burnout, and well-being were assessed at baseline, six weeks, and three months using the PHQ-9, GAD-7, Maslach Burnout Inventory, and WHO-5. Program satisfaction was measured through an online questionnaire. **Results:** The review showed wide variation in mental health prevalence: burnout (4.7%–90.1% in physicians; 18.3%–94% in residents), anxiety (8%–78.9% in physicians; 10%–63.9% in residents) and depression (4.8%–66.5% in physicians; 7.7%–93% in residents). Among 806 participants enrolled in the intervention, 66 completed assessments at all follow-up points. At three months, emotional exhaustion and anxiety significantly decreased by 16.1% ($p = 0.01$) and 15.5% ($p = 0.05$), respectively, with moderate effect sizes. Depression scores did not change significantly. Participants reported high satisfaction (mean = 7.98), with most citing improved well-being and stress coping. **Conclusion:** These findings underscore the urgent need for accessible mental health support. Wellness4MDs offers a promising, low-cost intervention that complements traditional care and strengthens psychological resilience among healthcare professionals.

Keywords: Wellness4MDs, text messaging; prevalence, physician, burnout, depression and anxiety

List of Abbreviations Used

ANOVA - Analysis of Variance

aMBI - Abbreviated-Maslach Burnout Inventory

BAI - Beck Anxiety Inventory

BAT - Burnout Assessment Tool

BMS - 10-Item Burnout Measure-Short version

CB - Client-related Burnout

CBI - Copenhagen Burnout Inventory

CBT - Cognitive Behavioral Therapy

CES-D - Center for Epidemiological Studies Depression scale

COVID -19- Coronavirus Disease 2019

DASS - Depressive Anxiety Stress Scale

DP - depersonalization

DSM-5 - Diagnosis And Statistical Manual of Mental Disorders

EE - Emotional Exhaustion

GAD-7 - Generalized Anxiety Disorder 7-item

GHQ-12 - General Health Questionnaire-12

GP - General Practitioner

HADS - Hospital Anxiety and Depression Scale

iCBT - Internet Delivered Cognitive Behavioral Therapy

ID - Interpersonal Disengagement

LOCF - Last Observation Carried Forward

M - Mean

MBI - Maslach Burnout Inventory

MBI-ES - Maslach Burnout Inventory for Educators

MBI-GS - Maslach Burnout Inventory-General Survey

MBI-HSS - Maslach Burnout Inventory-Human Services Survey

MBI-HSS MP - Maslach Burnout Inventory-Human Services Survey Medical Personnel

MDD - Major Depressive Disorder

Mini-Z - Mini-Z Burnout Assessment

OLBI - Oldenburg Burnout Inventory

OS - Other Specialties

PA - personal accomplishments

PaB - Patient-related Burnout

PB - Personal-related Burnout

PF - Professional Fulfillment

PFI - Professional Fulfillment Index

PHQ-4 - Patient Health Questionnaire-4

PHQ-9 - Patient Health Questionnaire-9

PPE - Personal Protective Equipment

PRIME - MD-Primary Care Evaluation of Mental Disorders

ProQol - Professional Quality of Life Scale

SAS - Self-Rating Anxiety Scale

SCL-CD₆ - Symptom Checklist-Core Depression

SD - Standard Deviation

SDS - Self-Rating Depression Scale

SEM - Standard Error Mean

SMS - Short Message Service

SPSS - Statistical Package for Social Sciences

WB - Work-related Burnout

WBI - Well-Being Index

WHO - World Health Organization

WHO-5 - World Health Organization-Five Well-Being Index

Statement

This thesis represents original work by Samuel Obeng Nkrumah, completed under the supervision of Dr. Vincent I.O. Agyapong and supervisory committee members: Dr. Ejemai Eboreime and Dr. Charles Kelderhouse. The research was carried out in compliance with the Declaration of Helsinki (Hong Kong Amendment) and Canadian Good Clinical Practice guidelines. Ethical approval was obtained from the Health Sciences Research Ethics Board at Dalhousie University (REB#: 2023-6840) and the Human Ethics Review Board at the University of Alberta (Pro00129541). Informed consent was considered given when participants accessed the study information leaflet, answered the survey questions, and submitted their responses voluntarily online.

Some section(s) within the chapters of this thesis include articles that have been submitted or accepted for publication. To avoid repetition and enhance readability, references from these submitted or accepted papers are compiled into a single reference list at the end of the thesis. Other than this formatting adjustment, the articles are presented in the exact form in which they were submitted or accepted for publication.

A brief overview of each included papers is provided below, outlining the specific contributions made by Samuel Obeng Nkrumah to each work.

Overview of the included chapters

Chapter 1: This chapter presents the introduction of the thesis

Chapter 2: This chapter presents the methodological overview.

Chapter 3: This chapter has been publication as: **Obeng Nkrumah, S.,** Adu, M. K., Agyapong, B., Dias, R. D. L., & Agyapong, V. I. O. (2025). Prevalence and correlates of depression, anxiety, and burnout among physicians and postgraduate medical trainees: a scoping review of recent literature. *Frontiers in Public Health*, *13*, 1537108. Doi: 10.3389/fpubh.2025.1537108.

Samuel Obeng Nkrumah was responsible for the study design, data curation, data analysis, and manuscript drafting.

Chapter 4: This chapter represents the main results of the thesis project and has been submitted to Frontiers Public Mental Health for possible publication as: **Samuel Obeng Nkrumah,** Reham Shalaby, Ejemai Eboreime, Belinda Agyapong, Charles Kelderhouse, Vincent Israel Opoku

Agyapong. Psychological Health and Wellness and the Impact of Six-week and Three-Month Supportive Text Messaging Program (Wellness4MDs) Among Physicians and Medical Learners in Canada: A Longitudinal Study

Samuel Obeng Nkrumah was responsible for the study design, data curation, data analysis and original manuscript drafting, while Dr. Vincent Agyapong provided supervisory support.

Chapter 5: This chapter presents the Conclusion, implications for policy, practice and future directives.

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Chapter 1: Introduction

The Introduction chapter is composed of four main parts: an overview of psychological health and well-being among physicians and medical learners; a discussion of evidence-based technology and mental health support; an outline of cognitive behavioral therapy-based support via text messaging to improve psychological health and well-being in this population (Wellness4MDs); and finally, a presentation of the research questions, aims, and objectives of the study.

1.1 An Overview of Psychological Health and Well-being Among Physicians and Medical Learners

A career in medicine, while deeply fulfilling, is often accompanied by significant stress and pressure that can adversely affect a physician's and medical learners physical and emotional health. The demanding nature of medical training, long hours, and high stakes work environments place healthcare professionals at elevated risk for burnout, depression, anxiety, and overall dissatisfaction, both personally and professionally. These issues not only impact the well-being of physicians and medical learners but can also hinder the quality of care delivered to patients and the functioning of the healthcare system as a whole. On a global scale, mental health disorders are becoming increasingly prevalent. The World Health Organization's 2022 report estimates that approximately one in eight people worldwide—nearly one billion individuals—are affected by some type of mental health disorder (World Health Organization, 2022). In Canada, mental health concerns among physicians have gained increased attention, with rising reports of burnout, anxiety, and depression. Data from Statistics Canada (2018) showed that 5.3 million individuals acknowledged needing mental health care. However, only about 20% received partial support (1.2 million), while another 20% received no help at all (1.1 million) (Statistics Canada, 2018). Barriers such as stigma (Knaak, Mantler, & Szeto, 2017), lengthy wait times, and limited access to mental health professionals (Canadian Mental Health Association, 2018; Children's Mental Health Ontario, 2020) were identified as key obstacles.

Medical professionals, including residents and medical students, are not immune to these struggles. Many have come forward to share their mental health experiences,

underscoring how stigma within the medical community often discourages seeking help and exacerbates suffering (Association of American Medical Colleges, 2023). Findings from the 2021 Canadian Medical Association National Physician Health Survey highlighted a marked decline in physicians' mental well-being compared to pre-pandemic levels. While many already reported poor mental health before COVID-19, the pandemic intensified these issues. The survey found that 53% of respondents exhibited symptoms of burnout—a 22-point increase from the pre-pandemic rate of 31%. Furthermore, 25% reported experiencing moderate to severe anxiety, and nearly half showed signs of depression (Canadian Medical Association, 2022a). Close to two-thirds of physicians, postgraduate medical trainees, and medical students reported that their mental health declined after the onset of the pandemic (Medscape, 2022).

A study conducted among cancer care physicians in Ontario, Canada, revealed that almost 3 out of 4 participants met established criteria for burnout (Singh et al., 2022). Likewise, a survey of Lebanese physicians showed that 90.1% experienced moderate to high levels of burnout (Youssef et al., 2022). Furthermore, burnout was also found to be notably prevalent among medical residents, with rates ranging between 41% and 74% across various specialties (Ames et al., 2017). Burnout has a significant effect on the physician workforce. It is associated with a higher likelihood of medical errors, decreased quality of care, increased healthcare expenses, and poorer overall health outcomes—including reduced levels of patient satisfaction (Panagioti et al., 2018; Patel et al., 2018; Tawfik et al., 2018). Physicians experiencing burnout are also more inclined to cut back on their working hours or leave clinical medicine altogether, which can worsen workforce shortages and strain healthcare system capacity (Shanafelt, Dyrbye, et al., 2016; Shanafelt, Mungo, et al., 2016; Willard-Grace et al., 2019).

Depressive symptoms, which are fairly prevalent among physicians and medical learners, are strongly linked to burnout syndrome (Mata et al., 2015; Rotenstein et al., 2018). In a systematic review, Mata et al. found that approximately one in three resident physicians exhibited symptoms of depression (Mata et al., 2015). These symptoms not only impact the personal well-being of doctors but are also connected to a higher likelihood of medical errors. A comprehensive systematic review and meta-analysis further confirmed

this association, showing that physicians experiencing depression are at an increased risk of making medical mistakes (Pereira-Lima et al., 2019). Anxiety is another frequent mental health challenge encountered by these groups. The constant demand to make crucial decisions, uphold clinical expertise, and deliver high-quality care in stressful, high-pressure environments often leads to elevated levels of anxiety in the medical profession. Multiple studies have indicated that physicians are more likely to experience elevated levels of anxiety (Białek, 2021; Elhadi et al., 2020; Fond et al., 2022). In a cross-sectional study by Gong et al., about 25.67% of doctors working in public hospitals in China exhibited symptoms of anxiety (Gong et al., 2014). Similarly, a multicenter study conducted in China found that around one-third of resident physicians reported experiencing symptoms of anxiety (Bai et al., 2021).

Additionally, postgraduate medical trainees facing longer working hours, higher levels of burnout, and reduced sleep have shown a growing risk of developing depression, stress, alcohol misuse, and suicidal thoughts (Ames et al., 2017; Kwok, 2021). The occurrence of high-profile physician suicides, along with growing evidence of elevated rates of mental health issues (Mata et al., 2015) and suicidal thoughts among doctors (Tyssen et al., 2001), has sparked serious concern within the medical community. In response, professional organizations are calling for greater emphasis on physician and medical learners mental health—beginning in training programs, extending into the workplace, and reaching across the broader healthcare system (Center et al., 2003; Thomas, Ripp, & West, 2018). Also, due to the demanding academic workload and the exhausting nature of clinical duties, mental health issues among medical students are on the rise. Recent global data highlight the growing prevalence of mental health challenges among college students. The WHO World Mental Health International College Student project, which surveyed students across 19 institutions in eight countries, reported that mental health disorders are both highly prevalent and increasing in this population (Auerbach et al., 2018). Notably, medical students appear to be disproportionately affected.

A growing body of research indicates that, compared to their non-medical peers, medical students experience significantly higher levels of psychological stress and are at greater risk for developing mental health problems (Seedhom et al., 2019; Shad, Thawani,

& Goel, 2015). These results highlight the importance of implementing specialized interventions that address the specific challenges associated with medical education and training. Also, undergraduate medical students reported high prevalence rates ranging between 30.9% and 77.6% in a study investigating depression (AlJaber, 2020). Promoting mental health and well-being among physicians, postgraduate medical trainees, and medical students is essential, especially as fewer medical professionals are seeking psychological support when needed. A study conducted among university hospital physicians in Europe revealed that over three-quarters of those experiencing distress had never sought professional help for issues like depression or burnout (Fridner et al., 2012). Similarly, another study found that only about one-third (33.9%) of medical students suffering from burnout had accessed mental health support within the previous year (Dyrbye et al., 2015). Stigma and concerns about professional reputation often deter physicians and trainees from pursuing mental health care. Many worry that admitting to struggle with mental health issues could be perceived as a weakness and potentially harm their careers (Medscape, 2020b).

Several barriers to accessing mental health care during residency have been identified, including limited time, concerns about confidentiality, and fears of potential negative impacts on one's professional career (Aaronson et al., 2018). Consequently, there is a need for a mental health service that is grounded in evidence, powered by technology, cost-effective, and universally accessible regardless of location such as the wellness4MDs intervention, a supportive text messaging program grounded in Cognitive Behavioral Therapy (CBT) principles designed to address the psychological difficulties and access-related barriers encountered by physicians, postgraduate medical trainees, and medical students when pursuing mental health care.

1.2 Evidence-based Technology and Mental Health Support

A systematic review examining mental health interventions and available resources for healthcare workers found that 63 out of 118 programs (53%) demanded more than 10 hours of participants' time, potentially diverting them from critical frontline duties (Anger, Dimoff, & Alley, 2024). Over the past few decades, digital technology has rapidly advanced and become integrated into many aspects of life, including healthcare. This

progress has enabled the delivery and screening of mental health services through remote means using accessible tools such as smartphones and computers (Firth et al., 2017; Lorenzo-Luaces, Johns, & Keefe, 2018; Morgan et al., 2017). Remote mental health support options now include mental health apps, guided or unguided internet-based cognitive behavioral therapy (i-CBT), and supportive text messaging programs (V. I. Agyapong et al., 2022; Agyapong et al., 2016; Firth et al., 2017). These services are typically grounded in CBT principles and can be delivered with or without a therapist's direct involvement (V. I. Agyapong et al., 2022; Agyapong et al., 2016). Text messaging, in particular, has proven effective in both treating and preventing mental health issues across various populations (B. Agyapong et al., 2022).

Studies also indicate that remote interventions are just as effective as in-person therapy for managing mental health conditions (Moroz, Moroz, & D'Angelo, 2020; Rodriguez-Pulido et al., 2020). Several CBT-based text messaging programs—such as Text4Support (Noble et al., 2021; Shalaby, Spurvey, et al., 2022), Text4Hope (V. I. Agyapong et al., 2022; Agyapong et al., 2021; Vincent Israel Ouoku Agyapong et al., 2020), Text4Mood (Agyapong et al., 2016), and Wellness4Teachers (Agyapong, da Luz Dias, et al., 2024), have shown to be safe, easy to use, and beneficial in improving participants' mental health outcomes. These large-scale messaging interventions have consistently reported user satisfaction rates above 80% (Agyapong, McLoughlin, & Farren, 2013; Shalaby, Adu, et al., 2022), along with improvements in resilience and mental health awareness (Agyapong et al., 2016). Nonetheless, these SMS text messaging programs have certain limitations. These interventions may not be as effective for more severe or complex mental health issues, such as major depressive disorder or clinical burnout, which often necessitate personalized care and direct involvement from a trained therapist.

1.3 Cognitive Behavioral Therapy-Based Support via Text Message Program to Improve Psychological Health and Well-being of Physicians and Medical Learners (Wellness4MDs)

The Wellness4MDs program is an innovative initiative aimed at enhancing the mental health and overall well-being of physicians and medical learners across Canada by addressing key issues such as depression, anxiety, burnout, and well-being. This proposed

intervention utilizes a text-based format, delivering daily supportive and educational SMS messages—some of which include web links to additional mental health resources. Rooted in cognitive behavioral therapy (CBT) principles, the messages are carefully developed by a multidisciplinary team—including psychiatrists, mental health professionals, clinical psychologists, and individuals with lived experience—and are tailored specifically for physicians and medical learners. Cognitive Behavioral Therapy (CBT), is a psychological treatment aimed at changing negative thought patterns (Beck, 2011) and has been successfully delivered through text messaging to support mental health.

Behavioral therapy interventions such as CBT-based supportive and educational SEM messaging program (e.g. Wellness4MDs)—are grounded in well-established psychological theories that support their use in mental health care. These interventions aim to promote behavior change, enhance emotional regulation, and strengthen psychological resilience. The Cognitive Behavioral Therapy (CBT) framework highlights that maladaptive thoughts and behaviors contribute to psychological distress. By targeting these patterns through structured techniques like cognitive restructuring, behavioral activation, and problem-solving, individuals can achieve improved mental health outcomes (Beck, 1979). CBT-based messages can provide psychoeducation, strengthen healthy coping mechanisms, and help reframe negative thinking in a format that is both widely accessible and easy to scale. Additionally, the Broaden-and-Build Theory suggests that positive emotions expand an individual's cognitive and behavioral repertoire, enabling them to build psychological resources over time (Fredrickson, 2004). Messages that foster gratitude, optimism, and self-compassion can help broaden perspectives and cultivate resilience.

Burnout, which includes emotional exhaustion (EE), depersonalization (DP), and reduced personal accomplishment (PA) (Weber, 2015), can be managed using Cognitive Behavioral Therapy (CBT)-based strategies. The Wellness4MDs SMS intervention grounded in CBT principles, is designed to address these specific components. By promoting stress reappraisal, emotion regulation, and self-compassion, the program helps reduce emotional exhaustion (Lazarus & Folkman, 1984). It also aims to counter DP by challenging beliefs that encourage emotional detachment and by reinforcing empathy and

professional purpose. CBT strategies such as goal setting and cognitive reframing can improve PA by boosting self-efficacy and motivation (Bandura, 1986). These mechanisms offer a strong theoretical basis for using CBT-informed messaging to reduce burnout in healthcare professionals. Beyond burnout, CBT-based messaging has a solid theoretical foundation for treating anxiety, depression, and enhancing well-being by correcting distorted thinking and encouraging healthier coping mechanisms. According to Beck's Cognitive Theory of Anxiety (Beck, 1979), anxiety arises from inflated threat perception and diminished self-efficacy. Messages that correct these patterns can reduce anxiety. Moreover, by incorporating positive psychology elements such as gratitude and optimism, aligned with the Broaden-and-Build Theory (Fredrickson, 2004), these interventions can foster emotional resilience and well-being. Evidence shows that such CBT-based digital interventions can enhance psychological health (Ly, Asplund, & Andersson, 2014; Seligman et al., 2005).

The Wellness4MDs intervention offers consistent, accessible, and multilingual mental health support, serving as a first-line intervention tailored to the demanding schedules of physicians, postgraduate medical trainees, and medical students. Designed for convenience and scalability, the program provides a cost-effective solution that overcomes common barriers to mental health care, including geographic limitations, long wait times, high costs, and stigma associated with seeking traditional in-person support.

1.4. Research Questions

1. Can the Wellness4MDs text messaging program effectively reduce the severity of burnout, anxiety and depression symptoms while enhancing well-being among physicians and medical learners in Canada?
2. Can the Wellness4MDs program achieve high user satisfaction among participants?

1.5. The Aim and Objectives of the Study:

This study aims first, to conduct a scoping review to evaluate the prevalence and correlates of depression, anxiety, and burnout among physicians and postgraduate Medical Trainees, and second, to assess the impact of Wellness4MDs, a cognitive behavioral therapy (CBT)-based supportive text messaging program, on the psychological health and

well-being of physicians and medical learners in Canada. Specifically, it investigates the intervention's effectiveness in improving clinical outcomes using validated and reliable psychological assessment tools. The study also evaluates participants' satisfaction and experience with the Wellness4MDs intervention.

CHAPTER 2: Methodology of the Study.

2.1. Overview of the Overall Methodology of the Study

2.1.1. *Methods for Scoping Review*

Prior to the implementation of the Wellness4MDs project, a scoping review was conducted to examine the prevalence and correlates of depression, anxiety, and burnout among physicians and postgraduate medical trainees. A comprehensive literature search was carried out in April 2024 across five databases: Medline, PubMed, Scopus, CINAHL, and PsycINFO, focusing on English-language articles published from January 1, 2021, to May 1, 2024. Search terms targeted both single and combined conditions and included keywords such as “prevalence of depression,” “prevalence of anxiety,” “prevalence of burnout,” “depression”, “burnout”, “anxiety”, “prevalence”, “physicians,” “doctors,” “medical practitioners,” and “resident physicians.” The review followed PRISMA guidelines and involved two independent reviewers who screened titles, abstracts, and full texts, resolving discrepancies through a third reviewer. Inclusion criteria required studies to report on the prevalence of at least one target condition in clearly defined physician or resident samples, using observational designs (e.g., cross-sectional, cohort, mixed-method or longitudinal). Studies were excluded if they did not specifically focus on physicians, residents or if they included participants from other health-related disciplines, such as dentistry, pharmacy, nursing, or allied health professions. Relevant data were extracted and organized into summary tables for analysis.

2.1.2. *Methodology of the Main Study*

2.1.2.1. Study Design and Setting. This is a quantitative longitudinal study design. Data from the Wellness4MDs subscribers was collected via web-based surveys conducted at the program's enrollment and specific follow-up points (6 weeks and 3 months). The surveys included questions on sociodemographic details, professional roles, years of training, specialties, and work-related factors. Over a three-month period, the Wellness4MDs program delivered daily supportive and informative SMS messages, some with embedded web links to mental health resources or literacy tools, directly to participants' mobile phones. Participation in the surveys was voluntary, and opting out of any survey did not affect program access or services. The Wellness4MDs program was a countrywide collaboration that brought together key stakeholders, including the Royal College of Physicians and Surgeons of Canada, medical schools, provincial medical associations, health authorities, and licensing bodies. Promotional materials which outlined

the program’s objectives and how participants can subscribe and unsubscribe to the program was initially shared with stakeholder partners. Stakeholder partner then shared the program information to their members through their networks, databases, and social media platforms, including Facebook, LinkedIn, Instagram, and X (formerly Twitter). The Wellness4MDs program was offered in both English and French, engaging physicians, postgraduate medical trainees, and medical students across all provinces and territories in Canada.

Participant recruitment took place between December 1, 2023, and September 30, 2024.

Inclusion criteria:

- Members (physicians, postgraduate medical trainees and medical students) of the Royal College of Physicians and Surgeons of Canada, faculties of medicine across Canada, provincial medical associations, provincial health authorities, and provincial medical licensing colleges.
- Physicians and medical learners with a mobile phone that can receive SMS messages.
- Able to read English or French text messages.

Exclusion criteria:

- Cannot read English or French text messages
- Does not own a mobile phone

2.1.2.2. Program Timelines. The Wellness4MDs initiative was a two-year undertaking, with its timeline outlined in **Table 2.1**: the Gantt chart provided below.

Table 2.1

Wellness4MDs Project Gantt Chart

no.	Milestones	Year 1				Year 2			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Milestone 1: Recruitment of project staff and creation of the bank of supportive text messages									
1.1	A project coordinator and evaluation specialist would be recruited to support project coordination, implementation, monitoring and evaluation	X							
1.2	Review and adaptation of the bank of supportive text messages and creation of new messages for the Wellness4MDs program by an expert group	X							
Milestone 2: Launch of the Wellness4MDs program, advertisement and delivery of service									
2.1	Recruitment		X						
2.2	Provision of the service		X	X	X	X	X	X	X
Milestone 3: Evaluation of the service, including clinical assessment and satisfaction of the participants									
3.1	Baseline survey (excluding satisfaction survey)	X	X	X	X	X	X	X	X
3.2	Follow-up survey (including satisfaction survey)			X	X	X	X	X	X
Milestone 4: Data compilation, analysis and preparation of reports, publications and presentations for multi-scale dissemination									
4.1	Data compilation				X	X	X	X	X

no.	Milestones	Year 1				Year 2			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
4.2	Data analysis				X	X	X	X	X
4.3	Preparation of reports, publications and presentations				X	X	X	X	X

2.1.2.3. Wellness4MDs Initiative. The Wellness4 MDs program utilized the ResilienceNHope software, an online platform designed to support various mental health messaging programs, including Text4Support, Text4Hope, Text4Mood, and Wellness4Teachers (Resilience N Hope). Physicians, postgraduate medical trainees, and medical students across Canada enrolled in the program by texting "WellMD" to a specific number and could opt out at any time by replying with "stop". Over a period of three months, the program delivered daily supportive and informative text messages, scheduled to be sent at a consistent time each day. These messages are based on cognitive behavioral therapy (CBT) principles and were created by a multidisciplinary team of professionals, including psychiatrists, mental health therapists, clinical psychologists, and individuals with lived experience. About one-third of these messages contain links to reliable resources related to physician health and wellness.

Examples of SMS Text Messages that were delivered to participants:

- “We all possess unique strengths. Rather than comparing yourself to others, concentrate on uncovering and embracing your unique path. Strengths come in many forms, such as kindness, humor, perseverance, curiosity, forgiveness, love, cooperation, and optimism. Use your strengths to uplift others, such as by supporting a colleague in need.”
- “Striving for perfection can lead to anxiety. Keep in mind that a flawless work environment doesn't exist. Experiment with intentionally allowing imperfection and observe the outcome. Do your fears materialize? Remember, life offers

countless opportunities—don't confine yourself from experiencing them.” An embedded link is also included (Oregon Counseling, 2021).

- “Most problems aren't solved all at once. Try breaking them into smaller, manageable steps. Start your day by taking a step that feels manageable. Seek the support of friends, family, colleagues, or a supervisor to help you move forward.” An embedded link is also provided (Solving Problems).

2.1.2.4. Hypothesis. We hypothesize the following: (1) We expect higher rates of burnout, anxiety, and depression among physicians and postgraduate medical trainees compared to the general population (Beresin et al., 2016; Dyrbye et al., 2014; Shanafelt et al., 2012). (2) Drawing on findings from clinical trials and large-scale supportive text messaging initiatives (Agyapong, 2020; Agyapong et al., 2016; Agyapong et al., 2013), we expect that the Wellness4MDs will result in at least 20% reduction in average symptoms of burnout, anxiety, and depression, as measured by validated scales, and a 20% increase in self-reported well-being at 6 weeks and 3 months after enrollment. (3) Additionally, we expect high levels of user satisfaction, with at least 80% of participants reporting that the daily supportive SMS messages contributed positively to their overall mental health and well-being.

2.1.2.5. Sample Size Calculation. To evaluate the program's impact on mental health outcomes, the sample size was estimated using specific parameters. The anticipated effect size for the decrease in average scores on both the 7-item Generalized Anxiety Disorder (GAD-7) and the 9-item Patient Health Questionnaire (PHQ-9) scales at the three-month mark was established at 0.1, assuming a population variance of 1 for each scale. Statistical significance was determined with a 2-sided α level of .05, and the study was powered at 90% ($\beta = .1$). Using a web-based calculation script (*Sample Size Calculators for designing clinical research*), the required sample size to detect statistically significant changes in outcomes was determined to be 1,053 participants.

2.1.2.6. Data Collection and Outcome Measures. Quantitative data from the Wellness4MDs program were gathered from subscribers through web-based surveys conducted at baseline, 6 weeks, and 3 months (illustrated in **Table 2.2**). The surveys included demographic questions (e.g., sex, gender, role as a physician, postgraduate

medical trainee, or medical student), years of training or practice, and specialty if applicable. The surveys also assessed clinical outcomes using validated measures, including the PHQ-9 (Kroenke, Spitzer, & Williams, 2001), the GAD-7 (Spitzer et al., 2006), the Maslach Burnout Inventory (MBI) (Schaufeli & Leiter, 1996), and the World Health Organization-Five Well-Being Index (WHO-5) (Child Outcomes Research Consortium).

The primary outcomes of the study were changes in mean scores on the validated measures from baseline to follow-up time points. The PHQ-9 is a self-reported tool designed to screen for depressive symptoms and assess their severity over the preceding two weeks. Each response is rated on a scale from 0 to 3, producing a total score that can range from 0 to 27 (Kroenke, Spitzer, & Williams, 2001; Mao et al., 2022). It is validated for use in diverse populations, showing strong reliability (Cronbach's $\alpha = 0.79$) and high sensitivity for detecting depressive symptoms using a cut off score of 10 or higher (Levis, Benedetti, & Thombs, 2019; Shin et al., 2020). While the PHQ-9 emphasizes the frequency of depressive symptoms, a key limitation is its lack of focus on how those symptoms affect a person's daily functioning. While it includes an optional tenth item that asks about difficulty in work, home, or interpersonal activities, this item is not incorporated into the overall score. As a result, its utility in assessing functional impact is limited, and the tool may underestimate the real-world consequences of depression on an individual's ability to function.

Likewise, the GAD-7 is a commonly used instrument for screening generalized anxiety disorder and assessing the severity of its symptoms (Kroenke et al., 2007; Williams, 2014). The GAD-7 consists of seven items, each scored on a four-point Likert scale from 0 ("not at all") to 3 ("nearly every day"), yielding a total score between 0 and 21. A score of 10 or higher is a reliable indicator of generalized anxiety disorder, demonstrating 89% sensitivity and 82% specificity (Williams, 2014). The GAD-7 also has robust psychometric properties, including high internal consistency (Cronbach's $\alpha = 0.92$) and test-retest reliability (intraclass correlation = 0.83) (Kroenke et al., 2007; Owusu et al., 2022). Like the PHQ-9, the GAD-7 focuses on symptom severity but does not assess how anxiety

affects daily functioning. Its non-scored item on functional difficulty is often overlooked, limiting the tool’s ability to capture the real-world impact of anxiety.

With a six-point Likert scale, the WHO-5 is a self-reported questionnaire designed to measure subjective well-being, in which participants evaluate five positively worded statements reflecting their experiences during the past two weeks. The raw scores are converted into a scale ranging from Zero (0) (indicating the worst possible well-being) to hundred (100) (indicating the best possible well-being) (De Wit et al., 2007), with scores below 50 suggesting poor emotional well-being. The WHO-5 has shown high reliability and validity, establishing it as an effective instrument for assessing well-being in clinical practice and research contexts (De Wit et al., 2007; Topp et al., 2015). The WHO-5 well-being Index is limited in assessing functional impact because it is broad, lacks items on impairment, and focuses on positive well-being, which may overlook underlying distress and real-life challenges in areas like work or relationships.

The Maslach Burnout Inventory (MBI) assesses three core dimensions of burnout including emotional exhaustion, perceived personal accomplishment and depersonalization. The tool has been validated through extensive research, with Cronbach’s α values of 0.90 for emotional exhaustion, 0.76 for depersonalization, and 0.76 for personal accomplishment (Complete Dissertation by Statistics Solutions). The MBI is limited in assessing overall functional impairment, as it focuses on occupational settings and does not capture impacts on social or family life. It also lacks direct measures of the practical effects of burnout, such as job performance or daily functioning. Secondary outcome for the Wellness4MDs program is subscriber satisfaction and experience with the program and its perceived impact on mental well-being.

Table 2.2

Outcome Measures of Participants

Construct	Tool (scale)	T₀	T₁	T₂
Likely MDD	PHQ-9	√	√	√

Construct	Tool (scale)	T₀	T₁	T₂
Likely GAD	GAD-7	√	√	√
Burnout	Maslach Burnout Inventory	√	√	√
Mental wellbeing	WHO-5 Wellbeing Index	√	√	√
Satisfaction with the service	Standardized satisfaction survey		√	√

T₀: baseline, T₁: six weeks, T₂: three months

2.1.2.7 Data Analysis. Quantitative data was analyzed using descriptive statistics, paired t-tests, chi-square tests and analysis of variance, performed with SPSS Statistics for Windows (Version 25; IBM Corp) (IBM, 2017). Paired t-test was used to evaluate changes in the mean scores of outcome scales between baseline and follow-up time points. The Chi-square test was used to examine the association between participants' sociodemographic characteristics treated as categorical variables. Analysis of variance (ANOVA) was used to examine associations between clinical variables among the study participants. Descriptive statistics were reported using frequencies and percentages, and a significance level of $p \leq 0.05$ used to determine statistical significance for all analyses.

2.1.2.8. Ethical Considerations. The study received ethical approval from the Health Science Research Ethics Board at Dalhousie University (REB#: 2023-6840) and the Human Ethics Review Board at the University of Alberta (Pro00129541). Informed consent was considered granted when participants accessed the study information leaflet, completed the survey, and submitted their responses. Study data was anonymized and de-identified using encrypted files, accessible only to the principal investigator and research coordinator. No personal identifiers were included in any published images, papers, or supplementary materials. Participants did not receive any compensation or incentives for their involvement in the study.

Chapter 3: Prevalence and Correlates of Depression, Anxiety, and Burnout Among Physicians and Postgraduate Medical Trainees: A Scoping Review of Recent Literature

Obeng Nkrumah, S., Adu, M. K., Agyapong, B., Dias, R. D. L., & Agyapong, V. I. O. (2025). Prevalence and correlates of depression, anxiety, and burnout among physicians and postgraduate medical trainees: a scoping review of recent literature. *Frontiers in Public Health*, *13*, 1537108. Doi: 10.3389/fpubh.2025.1537108.

Available at: <https://doi.org/10.3389/fpubh.2025.1537108>

Abstract

Background: The mental well-being of physicians is increasingly recognized as vital, both for their personal health and the quality of care they provide to patients. Physicians face a variety of mental health challenges, including depression, anxiety, and burnout, which have become prevalent issues globally. These mental health concerns are like those found in the general population but are particularly significant in the demanding healthcare setting.

Objective: This review aims to explore the prevalence and correlates of depression, anxiety, and burnout among physicians and residents in training. **Methods:** A comprehensive literature review was conducted, searching databases such as Medline, PubMed, Scopus, CINAHL, and PsycINFO. The review focused on studies published from 2021 to 2024 that addressed the prevalence of these mental health conditions in physicians and residents. The findings, in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, were summarized in detailed tables.

Results: Following titles and abstracts screening, 196 publications were selected for full-text review, with 92 articles ultimately included in the analysis. The results revealed significant variability in the prevalence of burnout, depression, and anxiety. Burnout rates among physicians ranged from 4.7% to 90.1% and from 18.3% to 94% among residents. Depression prevalence ranged from 4.8% to 66.5% in physicians and from 7.7% to 93% in residents. Anxiety rates were between 8% and 78.9% in physicians and 10% to 63.9% in residents. Notably, women reported higher rates of all three conditions compared to men. Key factors influencing these mental health conditions included demographics (age,

gender, education, financial status, family situation, occupation), psychological conditions, social factors (stigma, family life), work organization (workload, work conditions), and COVID-19-related issues (caring for COVID-19 patients, fear of infection, working in high-risk areas, concerns about personal protective equipment (PPE), and testing positive).

Conclusion: This review indicates a high prevalence of burnout, depression, and anxiety among physicians and residents, with female participants consistently showing higher rates than males. These findings can guide policymakers and healthcare administrators in designing targeted programs and interventions to help reduce these mental health issues in these groups.

Keywords: physicians, residents, prevalence, burnout, depression, anxiety

3.1. Introduction

In the demanding and high-stress environment of the healthcare profession, the mental well-being of physicians is increasingly recognized as a critical component of both individual health and patient care quality. Ensuring a robust and capable cadre of physicians is fundamental to the effectiveness of any nation's healthcare infrastructure (Wallace, Lemaire, & Ghali, 2009). The suboptimal mental health and wellness of healthcare personnel have organizational repercussions for patient safety, satisfaction, and overall experience (Wallace, Lemaire, & Ghali, 2009). Physicians can experience a wide array of mental health conditions alongside various challenges impacting their overall wellness, including burnout. Like the broader populace, prevalent mental health issues among physicians include depression, anxiety, and burnout (Association of American Medical Colleges, 2023). Depression, anxiety, and burnout represent significant challenges faced by physicians worldwide (Adam & Golu, 2021; Białek, 2021; Y. Chen et al., 2022; Shanafelt et al., 2019; Stanetić, Savić, & Račić, 2016; Wurm et al., 2016; Yilmaz, 2018), impacting not only their personal lives but also their professional performance and the broader healthcare system. As frontline providers, physicians bear the crucial duty of delivering top-tier medical care to patients amidst the intricacies of healthcare systems, rapidly evolving medical knowledge, and the emotional rigors of patient engagements. Intense work settings, substantial workloads, extended shifts, resource constraints, organizational changes, and a culture characterized by blame and apprehension have all been identified as contributing elements (Harvey et al., 2017; Lemaire & Wallace, 2017; Wilkinson, 2015), increasing the susceptibility of physicians to mental health issues. Physicians and residents often avoid seeking mental health support due to stigma and concerns over their professional reputations. Many fear that acknowledging psychological issues such as burnout, anxiety, or depression might be seen as a weakness (Association of American Medical Colleges, 2023) and negatively impact their careers. A 2018 study by Aaronson et al. identified key barriers to mental health care access during residency, highlighting a lack of time, confidentiality concerns, and potential career consequences as major deterrents (Aaronson et al., 2018). Additionally, notable medical professionals have publicly discussed their own mental health struggles, further illustrating the damaging

effects of stigma within the medical field (Association of American Medical Colleges, 2023).

Depression ranks as the primary contributor to global ill health and disability. It is characterized by persistent feelings of sadness, fatigue, hopelessness, loss of appetite, and loss of interest or pleasure in activities ((2023). World Health Organization, 2023), and it is a prevalent mental health condition among physicians. Approximately 280 million people in the world have depression, and more than 700,000 people die due to suicide every year ((2023). World Health Organization, 2023). Studies consistently report higher rates of depression among physicians compared to the general population (Dyrbye, Thomas, & Shanafelt, 2006; Joules, Williams, & Thompson, 2014; Sen et al., 2010). Numerous people grappling with mental health difficulties encounter insufficient support structures and are discouraged by the social stigma attached to such issues, impeding their capacity to access the essential treatment needed to pursue fulfilling and productive lives, a circumstance in which physicians are not exempt. Mata et al. conducted a significant systematic review and meta-analysis that brought together findings from 54 distinct cross-sectional and longitudinal studies encompassing more than 17,500 resident physicians across 18 nations. Regardless of the country or specialty under investigation, similar rates of depression symptoms among physicians were observed. The combined assessment of depression caseness, indicating the proportion of physicians exhibiting clinically significant depressive symptoms, was calculated at 28.8% (with a 95% confidence interval of 25.3–32.5%) (Mata et al., 2015).

Anxiety is another common mental health challenge faced by physicians. In 2019, approximately 301 million individuals globally experienced anxiety disorders, which stood as the most prevalent among all mental health conditions, characterized by feelings of apprehension, worry, and tension ((2023). World Health Organization, 2023). The pressure to make critical decisions, maintain clinical competence, and provide optimal care in high-stakes situations can contribute to heightened anxiety levels among physicians. Moreover, the rapid pace of medical advancements, coupled with the need to keep abreast of new diagnostic and treatment modalities, can exacerbate feelings of uncertainty and insecurity, further impacting physician well-being. Numerous studies have demonstrated a higher

prevalence of anxiety among physicians (Białek, 2021; Elhadi et al., 2020; Fond et al., 2022). A cross-sectional study conducted by Gong et al., among 2,641 physicians working in public hospitals in China found that approximately 25.67% of doctors displayed signs of anxiety, while 28.13% exhibited symptoms of depression, and 19.01% experienced both anxiety and depression. These mental health challenges among the surveyed physicians were linked to self-reported declines in physical well-being, instances of workplace violence, extended work hours surpassing 60 per week, frequent night shifts occurring twice or more weekly, and a lack of consistent physical activity (Gong et al., 2014).

Freudenberger, a psychologist, introduced the notion of burnout in a paper titled "Staff Burnout," (Freudenberger, 1974) and its recognition gained traction with the introduction of the Maslach Burnout Inventory (MBI) assessment tool by Maslach and Jackson in 1981 (Maslach & Jackson, 1981). Burnout arises as an adverse workplace condition due to prolonged exposure to stress associated with one's job (World Health Organization, 2019). It is often described as a syndrome of emotional exhaustion, depersonalization, and reduced personal accomplishment (Weber, 2015). It is particularly prevalent among individuals who are employed in roles that involve frequent direct interaction with others (Martins et al., 2014) and is prevalent among physicians across various specialties and practice settings (Boutou et al., 2019; Hiver et al., 2022; Kumar, 2016; Naji et al., 2021; Rotenstein et al., 2018; Sanfilippo et al., 2020). The chronic stressors inherent in medical practice, such as heavy workloads, time pressures, and the emotional toll of patient care, can lead to feelings of burnout over time. Physician burnout has garnered more focus over the years (Dyrbye et al., 2017; Thomas, Ripp, & West, 2018). Physicians experiencing burnout tend to make more medical errors (Salyers et al., 2017; Tawfik et al., 2019), are more inclined to leave their positions (Han et al., 2019), express lower job satisfaction (Shanafelt et al., 2009), and have implications on healthcare costs (Salyers et al., 2017). Also, burnout among physicians has been associated with poorer patient perceptions of care (Chung et al., 2020), making it a significant concern for healthcare organizations and policymakers. In a cross-sectional study conducted by O'Dea et al., among 683 general practitioners (constituting 27.3% of practicing Irish general practitioners), 52.7% reported significant emotional exhaustion, 31.6% scored high on

depersonalization, and 16.3% exhibited low levels of personal accomplishment. Overall, 6.6% experienced all three symptoms, meeting the criteria for burnout (O’Dea et al., 2017).

Despite growing recognition of the importance of addressing mental health issues among physicians, there remains a need for a comprehensive understanding of the prevalence and correlates of depression, anxiety, and burnout within this population. The primary objective of this scoping review is to map the existing literature on the prevalence and correlates of depression, anxiety, and burnout among physicians. It aims to provide insights into the scope and magnitude of mental health challenges faced by physicians and medical trainees (residents and fellows) across different specialties, practice settings, and geographic regions. Specifically, this scoping review will address the following: The prevalence of depression, anxiety, and burnout among physicians across different specialties and practice settings; Influence of associated factors e.g., demographic characteristics (e.g., age, gender), professional factors (e.g., years of experience, work hours), social and psychological factors on the prevalence of depression, anxiety, and burnout among physicians. The review seeks to offer critical insights for healthcare policymakers, administrators, educators, and researchers. The findings can serve as a foundation for developing targeted interventions and support systems aimed at improving the mental health and well-being of physicians and residents. In turn, this not only enhances patient care but also boosts the overall efficiency and effectiveness of the healthcare system.

3.2. Methods

3.2.1 Search Strategy

A literature search was conducted to look for articles that explored the prevalence and correlates of depression, anxiety, and burnout among physicians, residents, and fellows. The databases Medline, PubMed, Scopus, CINAHL, and PsycINFO were searched in the second week of April 2024, focusing on studies published from January 1, 2021, to May 1, 2024. Only articles written in English were considered. The search aimed to find studies examining the prevalence of each condition separately (e.g., just depression) and those addressing two or all three conditions together (e.g., depression, anxiety, and

burnout). The search terms included: “prevalence of depression,” “prevalence of anxiety,” “prevalence of burnout,” “depression”, “burnout”, “anxiety”, “prevalence”, “physicians,” “doctors,” “medical practitioners,” and “resident physicians.” Appendix 1 provides some examples of the search strategy. Two reviewers (S.O.N and M.A) independently searched the databases and reviewed the articles. The screening process had two stages: an initial screening of titles and abstracts to assess relevance, followed by a full-text screening. Articles meeting the initial inclusion criteria advanced to the full-text screening phase. Disagreements were resolved by consulting a third reviewer (B.A). The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021).

3.2.2. Inclusion and Exclusion Criteria

Articles were included based on the following criteria: (1) studies published between 2021 and 2024 in English, (2) a clearly defined sample of physicians, residents, and fellows, (3) clear reporting of prevalence for depression, burnout, or anxiety, and (4) a clearly stated study design, such as cross-sectional, cohort, mixed-method, transverse, or longitudinal. Studies that did not sample physicians, were reviews, protocols, or experimental studies were excluded. The study measures of interest were depression, anxiety, or burnout. Thus, studies were excluded if they did not report prevalence or did not focus on physicians or residents. Excluded populations were: (1) Medical students (2) individuals from other health-related fields (e.g., dentistry, pharmacy, nursing, allied health sciences), and (3) other healthcare professionals.

3.2.3. Data Extraction Process

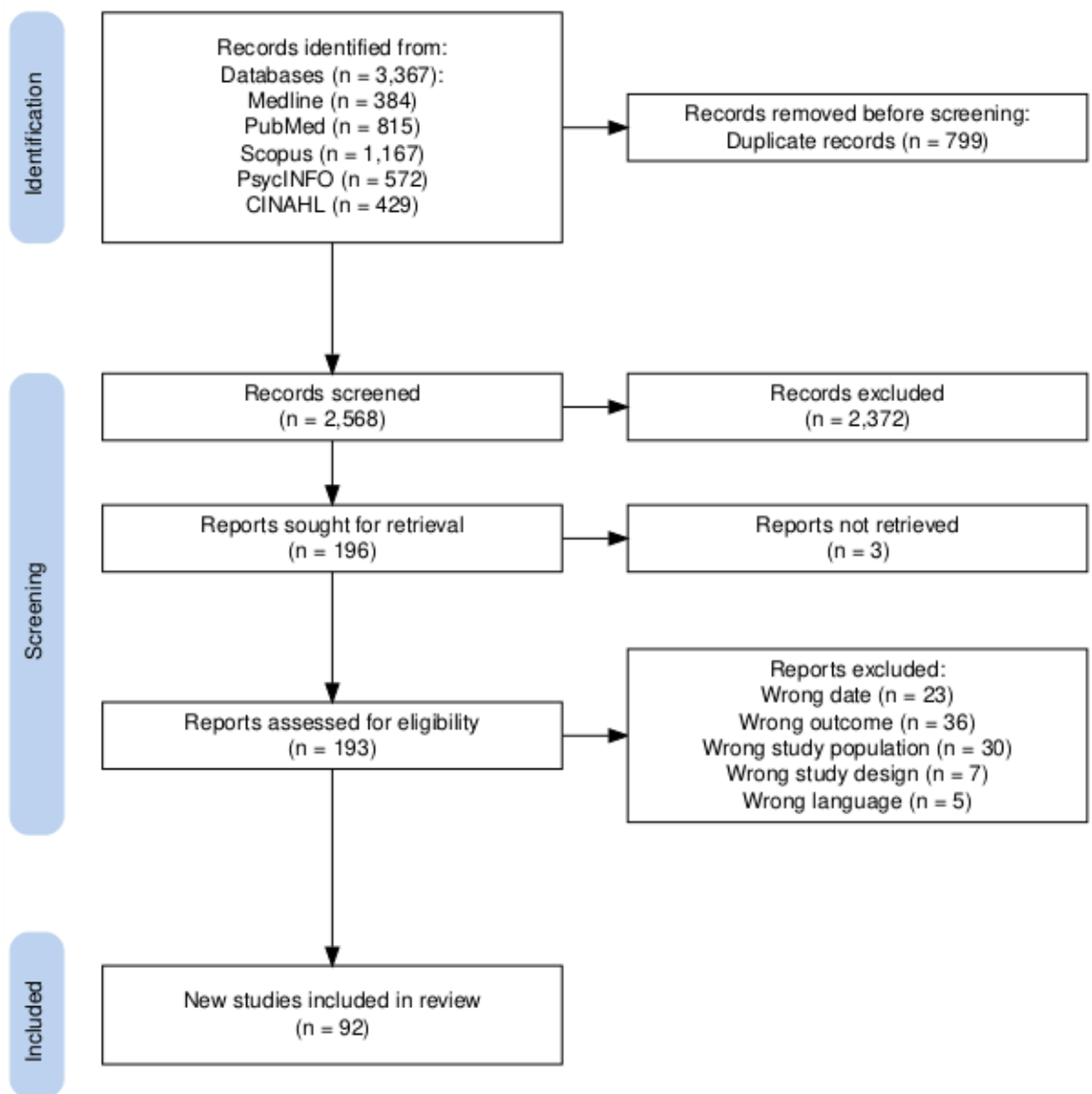
Information was extracted and summarized in a table, which included the author's name, publication year, country of study, study population, sample size, response rate, tools used to assess mental health conditions (depression, anxiety, or burnout), prevalence of these conditions, and any associated factors (Table 1).

3.3. Results

A total of 3,367 records were retrieved from the search (**Figure 3.1**). After removing 799 duplicates, 2,568 publications remained. Title and abstract screening further reduced this number to 196 publications for full-text review. Of these, 3 could not be retrieved, leaving 193 publications for review. Ultimately, 101 articles were excluded, resulting in 92 articles selected for data extraction.

Figure 3.1

PRISMA Flow Diagram Illustrating the Selection Process for Relevant Studies on the Prevalence and Correlates of Burnout, Depression, and Anxiety Among Physicians and Postgraduate Medical Trainees.



3.3.1. Study Characteristics

The articles reviewed included study designs such as cross-sectional, longitudinal, transverse, cohort and mixed methods. Of the 92 articles included in the review, 44 (47.8%) were published in 2021, 27 (29.3%) were published in 2022, 16 (17.4%) were published in 2023 and 5 (5.4%) were published in 2024. Among the studies, four were cohort studies (Chan et al., 2021; L. Chen et al., 2022; Doolittle, 2021; Hagqvist et al., 2022), two used mixed methods (Alrawashdeh et al., 2021; Blazin et al., 2021), one was transverse (Zehra et al., 2022), one was longitudinal (Seda-Gombau et al., 2021), and the remaining 84 were cross-sectional. The sample sizes ranged from 120 to 11,570 for residents in training and from 51 to 55,000 for physicians/doctors. Out of the 92 studies, 50 focused solely on burnout, 10 addressed only depression, and 5 examined anxiety alone. Additionally, 12 studies investigated both anxiety and depression, 3 focused on burnout and depression, and 12 covered burnout, anxiety, and depression (as shown in **Figure 3.2**). Burnout was the most frequently assessed condition 70.65% (n=65), followed by depression 40.2% (n=37) and anxiety 29.3% (n=29). Response rates varied widely from 9.9% to 96.89%, with 22 studies not reporting response rates at all. Most of the studies were conducted in Asia, accounting for 42% (n=39), followed by North America at 20% (n=18), Europe at 18% (n=17), South America at 11% (n=10), and Africa at 9% (n=8) as illustrated in **Figure 3.3**. The target population in most studies was physicians 67.4% (n=62), followed by residents 27.2% (n=25), with 5.4% (n=5) targeting both physicians and residents.

Figure 3.2

Number of Articles Reporting Burnout, Anxiety, Depression or Combinations of these Conditions

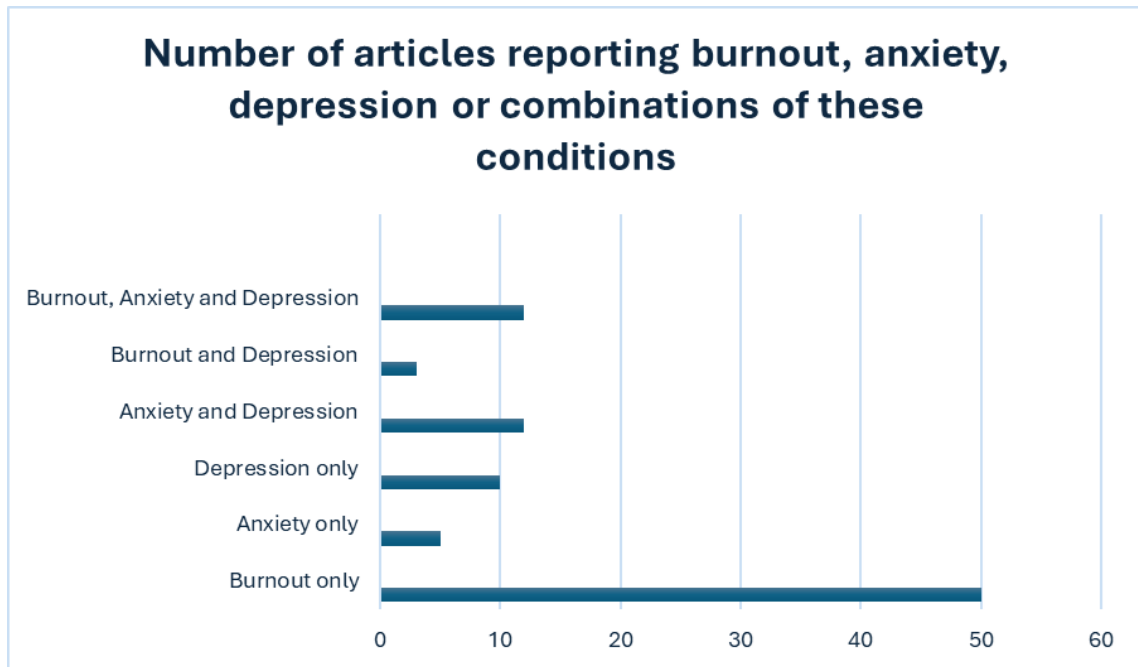
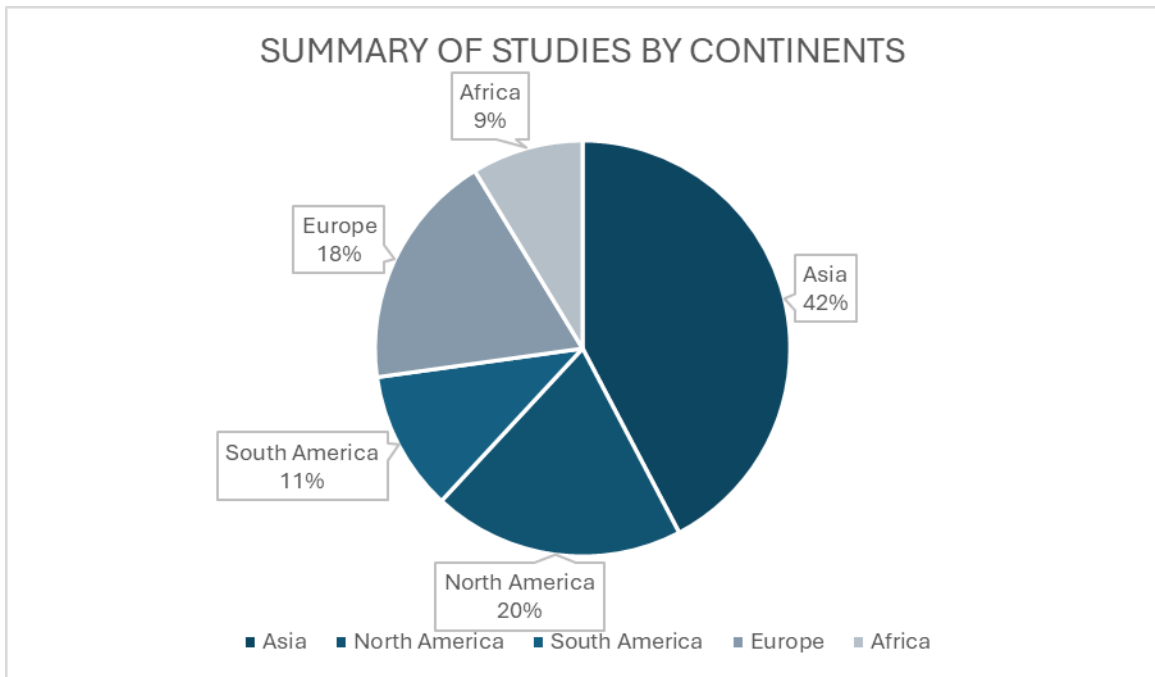


Figure 3.3.

Summary of Studies by Continents



3.3.2. Prevalence of Burnout

Sixty-five (70.7%) of the included studies addressed burnout (**Table 3.1**). Out of these, 76.9% (50 out of 65) focused solely on burnout (Al-Humadi et al., 2021; Alenezi et al., 2022; Alrawashdeh et al., 2021; Baptista et al., 2021; Bean et al., 2022; Blazin et al., 2021; Boland et al.; Celik et al., 2021; Chan et al., 2021; Che et al., 2023; Doe et al., 2024; Doolittle, 2021; Fiabane et al., 2023; Fumis et al., 2022; Gajjar et al., 2022; Ghazwani, 2022; Ghoraishian et al., 2022; Hamdan et al., 2023; Jiménez-Labaig et al., 2021; Keith, 2023; Khan et al., 2024; Kondrich et al., 2022; Kurzthaler et al., 2021; Marques-Pinto et al., 2021; Matsuo et al., 2021; McGarry & O'Connor, 2024; Mcloughlin et al., 2022; Medina-Ortiz et al., 2022; Nguyen et al., 2022; Nimer et al., 2021; Nonaka et al., 2022; Ofei-Dodoo, Loo-Gross, & Kellerman, 2021; Oluwadiya et al., 2023; Passos et al., 2022; Pawłowicz-Szlarska et al., 2022; Pius, Ajuluchukwu, & Roberts, 2023; Rashid et al., 2022; Rubin et al., 2021; Salihu et al., 2023; Seda-Gombau et al., 2021; Shahi, Paudel, & Bhandari, 2022; Shalaby et al., 2023; Singh et al., 2022; Sobczuk et al., 2024; Tipwong et al., 2024; Turalde et al., 2022; Wang et al., 2021; Werdecker & Esch, 2021; Youssef et al., 2022; Yuan et al., 2023), 4.6% (3 studies) assessed both burnout and depression (Hagqvist

et al., 2022; Kwan et al., 2021; Sharp et al., 2021), and 18.5% (12 studies) examined burnout together with depression, and anxiety (Alwashmi & Alkhamees, 2021; Appiani et al., 2021; Carlson et al., 2021; Carneiro Monteiro et al., 2021; Crudden, Margiotta, & Doherty, 2023; de Mélo Silva Júnior et al., 2023; de Mélo Silva Júnior, Valença, & Rocha-Filho, 2022; Hain et al., 2021; Kuriyama et al., 2022; Pogosova et al., 2021; Rahimaldeen et al., 2021; Steil et al., 2022). Of the 65 studies on burnout, 26.2% (n=17) sampled residents, 7.7% (n=5) sampled both residents and physicians, while the remainder 66.2% (n=43) focused on physicians. Most surveys (n=45) used the MBI or a variation of it, and researchers presented the outcomes in different ways (Table 1).

Although the majority of studies used the MBI tool, the criteria for classifying 'overall burnout' varied. Some studies defined burnout as having at least one of the following: high levels of emotional exhaustion, high depersonalization, or low personal accomplishment (Fumis et al., 2022; Rashid et al., 2022; Shahi, Paudel, & Bhandari, 2022). Others required high levels in all three constructs simultaneously (Alenezi et al., 2022). Other tools included the Copenhagen Burnout Inventory (CBI) (Baptista et al., 2021; Fiabane et al., 2023; Kurzthaler et al., 2021; Kwan et al., 2021; McGarry & O'Connor, 2024; Nimer et al., 2021; Pius, Ajuluchukwu, & Roberts, 2023; Rahimaldeen et al., 2021; Werdecker & Esch, 2021; Youssef et al., 2022), Oldenburg Burnout Inventory (OLBI) (Khan et al., 2024; Steil et al., 2022), and the Mini-Z Burnout Assessment (Kuriyama et al., 2022; Nonaka et al., 2022). Single-study tools included the Burnout Assessment Tool (Hagqvist et al., 2022), Burnout Measure-Short Version (Alrawashdeh et al., 2021), Professional Fulfillment Index (Tipwong et al., 2024), Well-Being Index (Rubin et al., 2021), and Professional Quality of Life Scale (Doolittle, 2021). One study used a single-item, non-proprietary validated burnout measure developed by Schmoldt and colleagues (Gajjar et al., 2022). Nearly all studies reported the overall prevalence of burnout, which ranged from 4.7% (Hagqvist et al., 2022) to 94% (Turalde et al., 2022). For residents, the prevalence ranged from 18.3% (Alenezi et al., 2022) to 94% (Turalde et al., 2022), while for physicians, it ranged from 4.7% (Hagqvist et al., 2022) to 90.1% (Youssef et al., 2022). Burnout prevalence was generally higher among females compared to males, except for two studies which reported the opposite (de Mélo Silva Júnior, Valença, & Rocha-Filho, 2022; Shahi, Paudel, & Bhandari, 2022). Most of the included studies (n=63/65) identified

factors associated with burnout among physicians and residents, while the remaining two papers reported only the prevalence of burnout (de Mélo Silva Júnior et al., 2023; Fumis et al., 2022).

Table 3.1

Prevalence and Correlates of Burnout Among Physicians and Postgraduate Medical Trainees in Studies Conducted from 2021 to 2024

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Appiani et al., (Appiani et al., 2021)	2021	Argentina	Physicians	440	68.63%	MBI	Overall prevalence: 73.5%	Increasing burnout: -having less seniority -being a resident -caring for patients with potential or confirmed COVID-19 infection

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
								-Having transient COVID-19-like symptoms - working 24-hour shifts
Fiabane et al., (Fiabane et al., 2023)	2023	Italy	Physicians	18,516	6.5%	CBI	Overall prevalence: 18.5%	Increasing burnout: -female sex -younger age -shorter job tenure -trainee status -higher PHQ-8 and GAD-7 scores

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Matsuo et al., (Matsuo et al., 2021)	2021	Japan	Residents	4,754	12.7%	MBI-GS	Overall prevalence: 28%	Increasing burnout: -excessive working hours -low autonomy -communication problems at the workplace - complaints from patients -peer competition -anxiety about the future
Hain et al., (Hain	2021	South Africa	Doctors	213	45%	MBI	Overall prevalence: 65.8%	Increasing burnout: -Female gender

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
et al., (2021)								-Occupational rank -planning to leave the public sector in the next 2 years.
Crudden et al., (Crudden, Margiotta, & Doherty, 2023)	2023	Ireland	Physicians	2,160	21.9%	MBI	Overall prevalence: 42%	Increasing burnout: - elevated symptoms of depression on the DASS depressive symptom subscale (EE) - higher rates of face-to-face

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
								patient contact (EE)
								Decreasing burnout: - professional efficacy
Ofei-Dodoo et al., (Ofei-Dodoo, Loo-Gross, & Kellerman, 2021)	2021	USA	Physicians	113	45.6%	MBI	Overall prevalence: 50.4%	Increasing Burnout: -personally, treating patients suspected or confirmed to have COVID-19.

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Al-Humadi et al., (Al-Humadi et al., 2021)	2021	USA	Physicians and residents/fellows	1379	16.3%	MBI (2 single items)	Overall prevalence: 19.6%	Increasing burnout: -History of depression or anxiety -younger age - female gender (physician) -higher number of on call time
de Mélo Silva Júnior et al., (de Mélo Silva	2022	Brazil	Residents	1,989	71.4%	MBI 2-version	Overall prevalence: 37%	Associated with increasing burnout: -lower age and leisure time -male sex

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Júnior, Valença, & Rocha-Filho, (2022)								<ul style="list-style-type: none"> - longer duty hours -absence of day off -provision of care without supervision -choice of the wrong specialty -poor learning -psychological abuse -depression
Rubin et al., (Rubin	2021	Canada	Physicians	151	84.1%	WBI	Overall prevalence: 65.4%	Increasing burnout:

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
et al., (2021)								-perception of inadequate staffing levels -being treated unfairly in the workplace.
Che et al., (Che et al., 2023)	2023	China	Physicians (anesthesiologists)	8850	74.93%	MBI-HSS	Overall prevalence: 52.7%	Increasing burnout: - redeployment outside normal professional boundaries* - depression - anxiety - PTSD

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Alwashmi et al., (Alwashmi & Alkhamees, 2021)	2021	Saudi Arabia	Physicians(psychiatrist)	101	Not reported	MBI-HSS	Overall prevalence: 80.2%	Protective factors: - resilience - good institutional support Significantly increasing burnout: -gender (female) -working in tertiary centers -psychiatrist in-training (junior and senior residents)

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Kuriyama et al., (Kuriyama et al., 2022)	2022	Japan	Physicians	1,173	18.2%	Mini-Z	Overall prevalence: 31.8%	Increasing burnout: -having no partner* - shortage of PPE*
Carneiro Monteiro et al., (Carneiro Monteiro et al., 2021)	2021	Brazil	Psychiatry residents	185	62%	MBI-HSS	EE:60% DP:54.8% PA:33%	Significantly associations: -nature of relations to the institutions (EE) -nature of relationships with preceptors/

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
								supervisors (EE, DP) -quality of relationship with family (EE, DP) -age (DP)
Jiménez-Labaig et al., (Jiménez-Labaig et al., 2021)	2021	Spain	Residents and Specialists	243	26.6%	MBI-HSS MP	Overall prevalence: 25.1%	Increasing burnout: -Younger age* -perceived lack of leisure time or vacation time* -poor perception of work life balance*

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Steil et al., (Steil et al., 2022)	2022	Brazil	Residents	3071	10%	OLBI	Overall prevalence: 48.6%	Associated with burnout: -avoidance of seeing patients with confirmed or suspected cases of COVID-19 -lack of supervisor support for the treatment of COVID-19 patients -working in a wing with high

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
								<ul style="list-style-type: none"> risk of contamination -belief that PPE is not efficacious -fear of getting COVID-19 and transmitting it to significant others -having personal relationships impaired since the pandemic
de Mélo Silva Júnior et al., (de	2023	Brazil	Physician residents	First cohort(pre-	Not reported	2-item MBI	Overall prevalence: - pre-COVID cohort: 37%	No information provided

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Mélo Silva Júnior et al., 2023)				COVID) : 524 Second cohort (pandemic group): 419			-pandemic cohort: 26.1%	
Pogosova et al., (Pogosova et al., 2021)	2021	Russia	Physicians	108	Not reported	MBI-HSS	EE: high-50%, moderate-33% DP:34.1% reduced PA:37.5%	Increasing burnout: -being female (EE)

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Rahimaldeen et al., (Rahimaldeen et al., 2021)	2021	Saudi Arabia	Physicians(pediatricians)	386	65%	CBI	Overall prevalence: 80.5%	Increasing burnout: -female gender -being junior pediatrician -being younger pediatricians
Tipwong et al., (Tipwong et al., 2024)	2024	Thailand	Physicians	227	Not reported	PFI	Overall prevalence: 30.7%	Negatively predicting burnout: -clinical teaching self-efficacy
Hamdan et al., (Hamdan	2023	Jordan	Residents and specialist surgeons	180	75%	aMBI	Overall prevalence: 45.2%	Associated with burnout:

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
et al., 2023)								<p>- age positively correlated with PA and negatively with EE and DP</p> <p>- number of children negatively correlated with DP</p> <p>- years of experience among specialists negatively correlated with EE and DP</p>

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Youssef et al., (Youssef et al., 2022)	2022	Lebanon	Physicians	398	Not reported	CBI-Arabic version	Overall prevalence (high and moderate levels): 90.1% PB:80.4% WB:75.6 % CB:69.6%	Increasing burnout: -female gender -younger age -being single -having a dependent child, -living with elderly or a family member with comorbidities -insufficient sleeping hours

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
								<ul style="list-style-type: none"> -working in a public health facility -limited years of professional Experience -lack of previous experience in a pandemic -extensive working hours Decreasing burnout: <ul style="list-style-type: none"> -being married -financial well-being

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
								-good health -history of COVID-19 -previous pandemic experience
Nonaka et al., (Nonaka et al., 2022)	2022	Japan	Physicians	First survey: 1,251 Second survey: 1,241	First survey: 22.6% Second survey: 25.9%	Single-item Mini-Z	Overall prevalence: 34.6% -First survey: 34.6% -Second survey: 34.5%	Increasing burnout: - history of self-quarantine* Not associated with exacerbation: -being a woman*

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Turalde et al., (Turalde et al., 2022)	2022	Philippines	Residents	120	71.67%	MBI	Overall prevalence: 94% EE:34.8% DP:8.14% Low PA:93%	Associated with burnout: -the lack of compensation (EE) -number of on-duty days (EE, DP) -being a clinical resident* -having worked in a prefecture under a state of emergency*

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Singh et al., (Singh et al., 2022)	2022	Canada	Physicians	634	44%	MBI	Overall prevalence: 72.9% EE:64.9% DP:47.2% Low PA:27.2%	Increasing burnout: -working in a hectic or chaotic atmosphere -feeling unappreciated on the job -reporting poor or marginal control over workload -not being comfortable talking to peers about workplace stress

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Alrawash deh et al., (Alrawash deh et al., 2021)	2021	Jordan	Physicians	973	Not reported	BMS	Overall prevalence: 57.7%	decreasing burnout: -older age Increasing burnout: -female gender -working at highly loaded hospitals - working for long hours -doing night shifts

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Blazin et al., (Blazin et al., 2021)	2021	USA	Physicians	132	40%	MBI	Overall prevalence: 28%	<ul style="list-style-type: none"> - lack of sufficient access to PPE -being positively tested for SARS-CoV-2. Increasing burnout: -frequent meetings -insufficient support staff - workflow interruptions

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Wang et al., (Wang et al., 2021)	2021	China	Physicians	1813	90.7%	MBI	Overall prevalence: 82.1%; severe burnout: 38.8%	Increasing burnout: - difficulty in making treatment decisions Protective factors: -higher number of children -higher "income satisfaction"
Carlson et al., (Carlson	2021	USA	Physicians	186	56%	2-item MBI	Overall prevalence: 26%	Positive association with burnout:

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
et al., (2021)								-hours worked in a typical week
Medina-Ortiz et al., (Medina-Ortiz et al., 2022)	2022	Venezuela	Physicians	150	Not reported	MBI	Overall prevalence: 76.7%	Increasing burnout: -higher number of years working in the hospital -lower job satisfaction
Nimer et al., (Nimer et al., 2021)	2021	Jordan	Residents	481	Not reported	CBI	Overall prevalence: 77.5%; severe burnout: 16.2%; moderate	Increasing burnout: -psychological stress - longer working

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
							burnout: 61.3%	-being obstetrics/gynecology residents
Celik et al., (Celik et al., 2021)	2021	Turkey	Physicians (surgeons)	3815	16.1%	MBI	Overall prevalence: 69.1%; severe burnout: 22.0%	factors independently associated with Burnout: -working in a training and research hospital or state hospital* -working \geq 60 h per week* - less frequent participation in social activities*

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Sharp et al., (Sharp et al., 2021)	2021	USA	Fellows	976	51%	MBI two-item measure	Overall prevalence: 32%	<p>Increasing burnout:</p> <ul style="list-style-type: none"> -Working more than 70 hours in an average clinical week - burdens of electronic health record (EHR) Documentation <p>Decreasing burnout:</p> <ul style="list-style-type: none"> -access to mental health services -coverage system

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Nguyen et al., (Nguyen et al., 2022)	2022	USA	Physicians	400	13%	MBI-HSS	Overall prevalence: 57%	in the case of personal illness or emergency Increasing burnout: -increased feelings of burnout due to the COVID-19 pandemic (EE, PA)* - total hours of work per week (EE, PA)*

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
								-younger age (EE, PA) *
Bean et al., (Bean et al., 2022)	2022	USA	Residents	1298	22.8%	2-item MBI	Overall prevalence: 35.8%	Increasing burnout: - Residents' perception of not having adequate time for personal/family life -Residents who reported inappropriate clerical burden -working more than 50 hrs/wk

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
								on inpatient rotations
								Protective against burnout: - Faculty support - performing activities that led residents to choose physical medicine and rehabilitation as a specialty
Hagqvist et al., (Hagqvist	2022	Sweden	Physicians	6699	41%	BAT	Overall prevalence: 4.7%	Increasing burnout:

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
et al., (2022)								-working in the emergency department -junior physicians
Boland et al., (Boland et al.)	2023	UK and Ireland	Physicians	815	66.8%	MBI-HSS (MP)	Overall prevalence: 39.2%	Increasing burnout: -formal supervision in palliative medicine -high levels of depressive symptoms -working over 40 h per week

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
								-high-risk alcohol consumption Decreasing burnout: -staff grade or trainee status -higher perceived level of support
Kondrich et al., (Kondrich et al., 2022)	2022	USA and Canada	Physicians	416	49.5%	MBI	EE: 34.9% DP: 33.9% PA: 20%	Associated with burnout: -lack of appreciation from patients *

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
								-lack of appreciation from supervisors* -perception of an unfair clinical work schedule* -dissatisfaction with promotion opportunities* -feeling that the electronic medical record detracts from patient care* -working in a non-academic setting*

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
McGarry et al., (McGarry & O'Connor, 2024)	2024	USA	Physicians	386	21.6%	CBI	Overall prevalence: 55.4%	Associated with positive burnout: -inadequate compensation -inadequate opportunity to process trauma
Doe et al., (Doe et al., 2024)	2024	USA	Residents	11,570	Not reported	MBI	Overall prevalence: 36.4%	Increasing burnout: -female gender -white race - educational debt exceeding \$250,000

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
								Decreasing burnout: -being black and Asian race -smaller program size
Keith, J (Keith, 2023)	2023	Canada	Physicians	847	50%	MBI-HSS (MP)	Overall prevalence: 58.9%	Increasing burnout: -female pathologists (Significantly higher EE and lower PA)

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Chan et al., (Chan et al., 2021)	2021	Canada	Physicians (Urologists)	609	17.2%	MBI	Overall prevalence: 31.8% EE:8.0% DP:31.8% low PA:10.6%	Increasing burnout: -urologists under financial strain -female urologists -early-to-mid-career urologists.
Alenezi et al., (Alenezi et al., 2022)	2022	Saudi Arabia	Residents	426	77.45%	MBI-HSS	Overall prevalence (high on all subscales): 18.31% High EE: 57.51%	Increasing burnout: -lack of physical exercise (EE, DP, PA) -having less than 3 weekends on-

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
							High DP: 36.62%	call per month (EE)
							High PA: 12.91%	-dissatisfaction with work-life balance (EE, DP)
							moderate EE: 28.87%	-time pressures and deadlines
							moderate DP: 32.63%	(EE)
							moderate PA: 33.57%	-work overload
								-inability to participate in decision-making (EE)
							High on at least one subscale of burnout: 81.22%	-inability to make full use of

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Kurzthaler et al., (Kurzthaler et al., 2021)	2021	Austria	Physicians (GP vs OS)	481 (252 GP and 229 OS)	Not reported	CBI	Overall prevalence (GP vs OS): Intermediate: 3.8% vs 39.8%	<ul style="list-style-type: none"> their skills and abilities (EE, PA) -work centered life (EE) -difficulty in maintaining relationship with their superiors (EE, DP) Predictors of burnout: <ul style="list-style-type: none"> -being single -financial problems experienced during

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
							High: 26.9% vs 22.0%	COVID-19 -stigmatization because of treatment of SARS-CoV-2-positive patients -facing violence in patient care -longer working hours during the pandemic.
Marques-Pinto et al., (Marques-	2021	Portugal	Physicians	43,983	9176 (29%)	MBI	EE:66% DP:33% decrease- PA:39%	Predictors of burnout: -organizational resources (EE, DP) *

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Pinto et al., 2021)								-demands of the relationship with the patients (EE, DP) * -work schedule (EE, DP) *
Yuan et al., (Yuan et al., 2023)	2023	Canada	Resident physicians	345	48%	MBI-HSS	Overall prevalence: 58%	Decreasing burnout: -having dependent -being IMG -being racial minority

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Mcloughlin et al., (Mcloughlin et al., 2022)	2022	Ireland	Residents (psychiatry trainees)	510	21%	aMBI	Overall prevalence: 65%	Associated with burnout: -staff shortages -longer hours -less experience.
Werdecke et al., (Werdecke & Esch, 2021)	2021	Germany	Physicians (GP)	548	Not reported	CBI	PB:35.2% WB:26.6 % PaB:12%	Increasing burnout: -being female (PB) -working as an employed physician (PB). -working in a single practice (PB, WB, PaB)

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Shalaby et al., (Shalaby et al., 2023)	2023	Canada	Resident Doctors	1594	9.8%	MBI	Overall prevalence: 58.2%	Associated with burnout: -working more than 80 h/week (high EE and ID) -being dissatisfied or being neither satisfied nor dissatisfied with a career in medicine (high EE and DP) -agreeing that the residency program has enough strategies

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
								aimed at resident well-being in place (EE, ID)
								-young age of residents (low PF)
Salihu et al., (Salihu et al., 2023)	2023	Nigeria	Resident doctors	185	90.1%	MBI-HSS MP	High EE: 21.6% High DP: 13.6% Low PA: 30.7%	Association with burnout: -Being a younger resident doctor aged 31–35 (EE, DP)

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Rashid et al., (Rashid et al., 2022)	2022	Bangladesh	Doctors	185	90.81%	MBI-HSS	<p>overall prevalence: 55.4%</p> <p>High EE: 95.8%</p> <p>High DP: 98.2%</p> <p>Reduced PA: 97%</p>	<p>-duty hours >50 hours per week (DP)</p> <p>-presence of work-related stress (DP)</p> <p>Increasing burnout (high levels in all 3 domains EE, DP, PA):</p> <p>-Younger age (25–29 years)</p> <p>- being female</p> <p>-working as a medical officer</p>

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Gajjar et al., (Gajjar et al., 2022)	2022	Canada	Physicians	First survey (March 2020): 1,400 Second survey (March 2021): 2,638	First survey: 76.3% Second survey: 75.9%	Validated, single-item, self-defined burnout measure (1-no symptoms of burnout to 5-completely burned out).	Overall prevalence: -First survey: 28% -Second survey: 34.7%	Increasing burnout: - patient expectations/patient accountability -reporting and administrative obligations -practice environment as the three factors that contributed most to burnout.

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Ghazwani, E.Y., (Ghazwani, 2022)	2022	Saudi Arabia	Physicians	51	86%	MBI-22 point scale	Overall prevalence: <25% EE: 18.2% DP: 25% Reduced PA: 25%	Increasing burnout (in all 3 domains EE, DP, PA): -having less (<5 years) experience -attending more patients (5–10/day) on all the three domains of burnout.
Shahi et al., (Shahi, Paudel, &	2022	Nepal	Resident Doctors	410	84.6%	MBI	Overall prevalence: 42.4%	Independently increasing burnout: -Gender (male)

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Bhandari, 2022)							High EE: 16.6% High DP: 15.9% Reduced PA: 9.8%	-marital status -having children -specialty -year of residency -specialties -hours of work per week (≥ 80 h)
Pawłowicz-Szlarska et al., (Pawłowicz-Szlarska et al., 2022)	2022	Poland	Physicians	225	43%	aMBI	High EE: 39.2% High DP: 38.1% Reduced PA: 21.6%	Increasing burnout: -excessive bureaucracy in healthcare systems -rush at work -overtime work

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
							Medium level in all 3 dimensions: 26.8% High levels in all 3 dimensions: 8.2%	
Fumis et al., (Fumis et al., 2022)	2022	Brazil	Physicians	62	82%	MBI	Overall prevalence: 37.2% High EE: 51.0% High DP: 51.0%	No information provided

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
							Reduced PA: 96.1%	
Ghoraishi et al., (Ghoraishi et al., 2022)	2022	Iran	Physicians (Surgeon) and Residents	180	Not reported	MBI	Overall prevalence: 50.0%	Significant associations with burnout: -younger age -lower academic rank or being a resident -working in the public sector -spending less time in leisure and sports activities.

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Passos et al., (Passos et al., 2022)	2022	Brazil	Residents	139	49.26%	MBI	Overall prevalence: 73.1% EE: 44.8% DP: 64.2% PA: 47.8%	No association between overall burnout level and all analyzed variables -current year in the residency program (EE) - the use of antidepressant/hypnotic medication (EE) -current work routine (DP) -having children (PA)

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Kwan et al., (Kwan et al., 2021)	2021	Hong Kong	Doctor/residents	2,879	Doctors: 284 (9.9%) Resident s-in-training: not reported	CBI	PB:72.6% WB:70.6 % CB:55.5%	Increasing PB: -engagement in longer working hour(s) per week -working in Hospital Authority clinics Decreasing PB: -Older age -possession of a first university degree in medicine -possession

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
								of Academy fellowship status
								Increasing WB: -Being single, separated, or divorced -longer working hour(s) per week
Seda-Gombau et al., (Seda-Gombau et al., 2021)	2021	Spain	Physicians	150	27%	MBI for medical professionals	Time1: Overall prevalence:7.5% EE:37.5% DP:32.5%	Increasing burnout: -Age (being older) -Having children

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
							PA:27.5%	
							Time 2: Overall prevalence: 10% EE:55% DP:30% PA:27.5%	
							Time 3: Overall prevalence:50% EE:77.5% DP:70% PA:67.5%	

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Doolittle et al., (Doolittle, 2021)	2021	USA	Physicians	1,021	33%	ProQol	Overall prevalence: 52%	Increasing burnout: -being a woman -single physicians Decreasing burnout: -older age - Exercise (3 times per week for 20 min)
Khan et al., (Khan	2024	South Africa	Doctors	430	68%	OLBI	Overall prevalence: 78%	Significant association with burnout:

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
et al., 2024)								<ul style="list-style-type: none"> -being a medical intern or community-service medical officer -being in the lowest income band -using alcohol to manage work-related stress -experiencing high conflict at work -high role ambiguity and role conflict

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
Sobczuk et al., (Sobczuk et al., 2024)	2024	Poland	Physicians	228	Not reported	MBI-HSS	Overall prevalence: 74.9% EE: 64.5% DP: 37.0% PA: 43.1%	Increasing burnout: - bureaucracy and administrative duties overload - admissions of many patients - poor work culture - night/on-call duties
Pius et al., (Pius, Ajuluchuk	2023	Nigeria	Doctors	685	38.1%	CBI	PB:62.2% WB:52.2 % PaB:27.5%	Increasing burnout: - female gender

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
wu, & Roberts, 2023)								-less than 6 years of work experience -working for at least 71 hours in a week
Baptista et al., (Baptista et al., 2021)	2021	Portugal	Physicians	225	Not reported	CBI	PB: 65.9% WB:68.7% PaB :54.7%	Increasing burnout: -higher levels of depression (PB, WB, PaB) * -higher anxiety levels (PB, WB) * -being female (PaB) *

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
								- having worked for 6 to 15 years (PaB)* -reduction in monthly income inversely correlated with PaB*
Oluwadiya et al., (Oluwadiya et al., 2023)	2023	Nigeria	Physicians	256	60.5%	MBI-ES	Overall prevalence: 57.7%	Associated with burnout: -religion (Muslims) (EE) -geopolitical zone of practice

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
								(working in the north)- (EE) -enjoyment of academic writing (EE) -apathy toward teaching (EE) -university ownership number of published peer-reviewed articles (EE) -salary, and supplementary income (EE)

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Burnout	Associated Factors
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-number of weeks spent teaching in a year (DP, PA)

MBI- Maslach Burnout Inventory; MBI-HSS- Maslach Burnout Inventory-Human Services Survey; MBI-GS- Maslach Burnout Inventory-General Survey; MBI-ES- Maslach Burnout Inventory for Educators; aMBI - abbreviated-Maslach Burnout Inventory; CBI- Copenhagen Burnout Inventory; OLBI – Oldenburg Burnout Inventory; ProQol- Professional Quality of Life Scale; BMS- 10-Item Burnout Measure-Short version; BAT- Burnout Assessment Tool; Mini-Z - Mini-Z Burnout Assessment; WBI- Well-Being Index; PFI - Professional Fulfillment Index; PB- Personal-related Burnout; WB- work-related burnout; P_aB- patient-related burnout; CB- client-related burnout; EE- emotional exhaustion; DP- depersonalization; PA- personal accomplishments; ID- interpersonal disengagement; PF- professional fulfillment; GP- General Practitioner; MP- Medical Personnel; OS- Other Specialties

PPE- Personal Protective Equipment

* Multivariable analysis

3.3.3. Prevalence of Depression

A total of 37 studies reported the prevalence of depression among physicians or residents in training (**Table 3.2**). Of these, 27% (10 studies) focused solely on depression, 32.4% (12 studies) examined both depression and anxiety, 8.1% (3 studies) looked at depression and burnout, and another 32.4% (12 studies) assessed depression in combination with both burnout and anxiety. Among these studies, 32.4% (12 studies) sampled residents, 5.4% (2 studies) sampled both residents and physicians, and 62.2% (23 studies) focused exclusively on physicians. The study samples varied, as did the tools used to measure depression. The most frequently used tool was the Patient Health Questionnaire, employed in 54.1% (20 studies) of the studies (Abu-Elenin, 2021; Bai et al., 2022; Carlson et al., 2021; Carneiro Monteiro et al., 2021; L. Chen et al., 2022; de Mélo Silva Júnior et al., 2023; de Mélo Silva Júnior, Valença, & Rocha-Filho, 2022; Elghazally & Abdeldaim, 2021; Hain et al., 2021; Hameed et al., 2021; Jarad et al., 2023; Khatun et al., 2021; Kuriyama et al., 2022; Kwan et al., 2021; Nair, Ng, & Sulaiman, 2021; Ng et al., 2021; Ouazzani Housni Touhami et al., 2023; Pitanupong, Anantapong, & Aunjitsakul, 2024; Quintana-Domeque et al., 2021; Steil et al., 2022). Other tools included the Depression Anxiety Stress Scale (DASS), used in 16.2% (6 studies) (Alwashmi & Alkhamees, 2021; Crudden, Margiotta, & Doherty, 2023; Debnath et al., 2023; Rahimaldeen et al., 2021; Rahman et al., 2021; Varela et al., 2021), the Hospital Anxiety Depression Scale (HADS), used in 13.5% (5 studies) (Appiani et al., 2021; Hasan et al., 2022; Jaulin et al., 2021; Pogosova et al., 2021; Sarkar et al., 2021), and the Center for Epidemiological Studies Depression scale (CESD), used in 5.4% (2 studies) (Y. Chen et al., 2022; Fu et al., 2021). Single-study tools included the Self-Rating Depression Scale (SDS) (He et al., 2021), Symptom Checklist-Core Depression (SCL-CD) (Hagqvist et al., 2022), General Health Questionnaire (GHQ) (Ji et al., 2023), and Primary Care Evaluation of Mental Disorders (PRIME-MD) (Sharp et al., 2021). The overall prevalence of depression varied widely, ranging from 4.8% (Hagqvist et al., 2022) to 66.5% (Rahimaldeen et al., 2021) among physicians, and from 7.7% (Pitanupong, Anantapong, & Aunjitsakul, 2024) to 93% (Hameed et al., 2021) among residents in training (Table 2). Depression prevalence was generally higher among females compared to males. Most of the studies (n=33) explored factors associated with depression, while the remaining four studies focused solely on prevalence.

Table 3.2

Prevalence and Correlates of Depression Among Physicians and Postgraduate Medical Trainees in Studies Conducted from 2021 to 2024

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
Appiani et al., (Appiani et al., 2021)	2021	Argentina	Physicians	440	55%	HADS	21.9%	Increasing depression: -transient SARS-CoV-2-like symptoms -taking anxiolytics -working 24-hour shifts at the emergency department -physicians with less seniority
Jaulin et al., (Jaulin et al., 2021)	2021	France	Residents	2,302	22.5%	HADS	7.8%	Increasing depression: -female gender -working time (volume of hours worked above 60 h per week)

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
								-on-going training in intensive care
Ouazzani Housni Touhami et al., (Ouazzani Housni Touhami et al., 2023)	2023	Morocco	Doctors	1,267	63.3%	PHQ-9	31.5%	Increasing depression: -working in primary and secondary hospitals* -moderate and high- stress perceptions* -chronic physical illness* -family history of psychiatric disorder*
Hain et al., (Hain et al., 2021)	2021	South Africa (SA)	Doctors	213	45%	PHQ-9	35.6%	Associated with depression:

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
								-doctors planning on leaving the public sector within the next 2 years - country of qualification, with SA-qualified doctors reporting higher rates.
Crudden et al., (Crudden, Margiotta, & Doherty, 2023)	2023	Ireland	Physicians	2,160	21.9%	DASS	25.8%	Increasing depression: -high levels of emotional exhaustion -higher clinical workload
de Mélo Silva Júnior et al., (de Mélo	2022	Brazil	Residents	1,989	71.4%	PHQ-4	46.9%	Associated with depression: -female sex -longer duty hours

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
Silva Júnior, Valença, & Rocha-Filho, 2022)								-absence of day off -poor learning perception -poor feeling about the residency program -overall occurrence of psychological abuse -anxiety -diurnal somnolence and burnout
Alwashmi et al., (Alwashmi & Alkhamies, 2021)	2021	Saudi Arabia	Physicians (psychiatrist)	101	Not reported	DASS-21	6.9%	No significant influence on depression
Carlson et al.,	2021	USA	Physicians	186	56%	PHQ-2	8%	No information provided

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
(Carlson et al., 2021)								
Steil et al., (Steil et al., 2022)	2022	Brazil	Residents	3071	10%	PHQ-9	67.7%	<p>Increasing depression:</p> <ul style="list-style-type: none"> -being a woman -avoidance <p>of seeing patients with confirmed or suspected cases of COVID-19</p> <ul style="list-style-type: none"> -working in a wing with a high risk of Contamination -the belief that personal protection equipment is not efficacious

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
								-fear of getting COVID-19 and transmitting it to significant Others -having personal relationships impaired since the pandemic
de Mélo Silva Júnior et al., (de Mélo Silva Júnior et al., 2023)	2023	Brazil	Physician residents	First cohort(pre-COVID): 524 Second cohort (pandemic	Not reported	PHQ-2	-pre-COVID cohort: 46.0% -pandemic cohort: 58.8%	No information provided

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
				group): 419				
Pogosova et al., (Pogosova et al., 2021)	2021	Russia	Physicians	108	Not reported	HADS	22.7%	Increasing depression: -being a male physician
Rahimaldeen et al., (Rahimaldeen et al., 2021)	2021	Saudi Arabia	Physicians (pediatricians)	386	65%	DASS-21	66.5%	Increasing depression: -female gender -being junior pediatrician -being younger pediatricians
Kuriyama et al.,	2022	Japan	Physicians	1,173	18.2%	PHQ-9	15.4%	No information provided

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
(Kuriyama et al., 2022)								
Hasan et al., (Hasan et al., 2022)	2022	Bangladesh	Physicians	442	93.2%	HADS	48.5%	<p>Increasing depression:</p> <ul style="list-style-type: none"> - being female -physicians who had experienced COVID-19 like symptoms during the pandemic -those who had not received incentives -those who used self-funded personal protective equipment (PPE) -not received adequate training

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
								<ul style="list-style-type: none"> -lacking perceived self-efficacy to manage COVID-19 positive patients -greater perceived stress of being infected -fear of getting assaulted/humiliated -being more connected with social media -having lower income levels to support the family -feeling more agitated -less than 2 h of leisure activity per day -short sleep duration.

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
Rahman et al., (Rahman et al., 2021)	2021	Bangladesh	Physicians	395	Not reported	DASS-21	55.3%	Increasing depression: -being a male physician -age (physicians less than or equal to 27 years)* -physicians with previous history of mental health issues
Carneiro Monteiro et al., (Carneiro Monteiro et al., 2021)	2021	Brazil	Psychiatry residents	185	62%	PHQ-2	16.5%	No information provided
Debnath et al., (Debnath	2023	Bangladesh	Trainee physicians	130	83%	DASS-21	53.7%	Associated with depression:

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
et al., 2023)								- not receiving mental health counseling during the pandemic -anxiety -stress - loneliness
Pitanupong et al., (Pitanupong, Anantapong, & Aunjitsakul, 2024)	2024	Thailand	Psychiatrists/psychiatry trainees	622	36.2%	PHQ-9	Overall prevalence: 12.4% Psychiatrists: 13.9% Psychiatry trainees: 7.7%	Depression in Psychiatrists was associated with: -loneliness -perceived levels of work satisfaction -work stress

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
								Depression in Psychiatry trainees was associated with: - loneliness -perceived level of ability to control work schedule.
Ji et al., (Ji et al., 2023)	2023	China	Doctors	750	94%	GHQ-12	40.85%	Associated with depression: -interaction of long working hours -effort-reward imbalance
Chen et al., (L. Chen et al., 2022)	2022	China & USA	Resident physicians	China: 3,666 USA: 14,723	China: 45% USA: 56%	PHQ-9	Overall prevalence: China- 35.1%	Associated with depression (USA): -neuroticism -early family environment

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
							USA-34.9%	-female gender -not being coupled -long duty hours -reduced sleep duration
								Associated with depression (China): -young age -long duty hours -reduced sleep duration
Ng et al., (Ng et al., 2021)	2021	Hong Kong	Doctors	1,607	393 (24.4%)	PHQ-9	16.0%	Increasing depression: -sleeping fewer hours per night

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
Chen et al., (Y. Chen et al., 2022)	2022	China	Physicians	15,455	Not reported	CESD-20	35.59%	Increasing depression: -female physician* -younger age* -unmarried* -smokers* -having a low salary* -higher education level* -long working tenure* -poor health status and sleep quality* -history of hypertension and coronary heart disease*

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
Fu et al., (Fu et al., 2021)	2021	China	Physicians	677	96.89 %	CESD-10	42.3%	<p>Increasing depression (both male and female physicians):</p> <ul style="list-style-type: none"> -lower subjective support score -lower objective support score <p>Increasing depression (only male physicians):</p> <ul style="list-style-type: none"> -lower support utilization score
Nair et al., (Nair, Ng, &	2021	Malaysia	Residents	Estimated to be 448	Estimated to be	PHQ-9	25.1%	<p>Increasing depression:</p> <ul style="list-style-type: none"> -longer working hours -missing meals at work

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
Sulaiman, 2021)					around 50%			-being a resident in the department of surgery and department anaesthesia Decreasing depression: - Protected study time -having CMEs/lectures -leisure or hobby -exercise
Khatun et al., (Khatun et al., 2021)	2021	Bangladesh	Physicians	114	Not reported	PHQ-9	34.2%	Increasing depression: -being a female* -unmarried/divorced/widowed/separated physicians*

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
								-younger physicians (<35 years) *
Sharp et al., (Sharp et al., 2021)	2021	USA	Fellows	976	51%	PRIME-MD	41%	Increasing depression: -financial concern * -working more than 70 hours in an average clinical week* -the burdens of electronic health record (EHR) documentation *
Abu-Elenin, (Abu-Elenin, 2021)	2021	Egypt	Physicians	254	93.36 %	PHQ-9	43.8%	Associated with depression: -poor sleep quality -being a resident physician -disrupted social life

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
								-stigma exposure due to COVID-19
Hagqvist et al., (Hagqvist et al., 2022)	2022	Sweden	Physicians	6699	41%	SCL-CD6	4.8%	Increasing depression: -being female physicians -being junior physicians
He et al., (He et al., 2021)	2021	China	Doctors	1,521	Not reported	SDS	16.9%	Increasing depression: -female sex* -having a minor child* Decreasing depression: -older age*

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
Jarad et al., (Jarad et al., 2023)	2023	Saudi Arabia	Physicians	917	48%	PHQ-9	45.7%	<p>Associated with depression:</p> <ul style="list-style-type: none"> -physicians aged 25–30 years -females - residents -physicians who expressed self-perceived reduction in work quality <p>Independent predictors of depression:</p> <ul style="list-style-type: none"> -female gender* - self-perceived reduction in work quality*

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
Bai et al., (Bai et al., 2022)	2022	China	Residents	1,533	86.48 %	PHQ-9	Overall prevalence: 44.9% Moderate/severe symptoms: 12.9%	Increasing depression: - poor sleep quality - lower optimism of psychological capital -higher depersonalization -reduced personal accomplishment -inappropriate working duration weekly -higher emotional exhaustion
Quintana - Domeque et al.,	2021	Catalonia (Spain),	Doctors	55,000	First round (June 2020):	PHQ-9	Overall prevalence:	Increasing depression: -being a women

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
(Quintana-Domeque et al., 2021)		Italy and UK			3,025 (5.5%)		Catalonia: June 2020-17.4%, Nov/Dec 2020-15.9%	-individuals below 60 years old -feeling vulnerable/exposed at work -reporting normal/below-normal health.
					Second round (Nov/Dec 2020): 2,250 (4.1%)		Italy: June 2020-20.1%, Nov/Dec 2020-21.7%	
							UK-: June 2020-13.7%, Nov/Dec	

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
							2020-20.0%	
Kwan et al., (Kwan et al., 2021)	2021	Hong Kong	Doctor/residents	2,879	Doctors-284 (9.9%) Residents-in-training- not reported	PHQ-9	21%	Positively associated with depression: -number of working hour(s) per week Negatively associated with depression: -Doctors who completed a project-based learning curriculum during undergraduate studies
Hameed et al., (Hameed	2021	Saudi Arabia	Residents	425	42.6%	PHQ-2	93%	Associated with depression: -excessive sleepiness

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
et al., 2021)								
Elghazally et al., (Elghazally & Abdeldaim, 2021)	2021	Egypt	Physicians	2331	Not reported	PHQ-9	Mild depression: Group 1- 31.2% Group 2- 32.9% Severe depression: Group 1- 5.1% Group 2- 14.6%	Increasing depression: -females -younger age groups -divorced or widowed -frontline physicians -1–5 years of work experience -specialty jobs -contact with patients with COVID-19

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Burnout	Prevalence of Depression Level(s)	Associated Factors
Sarkar et al., (Sarkar et al., 2021)	2021	Bangladesh	Physicians (gastroenterologists)	166	37.9%	HADS	20.7%	Depression was more common in: -gastroenterologists of older (41-50-years) age group -doing government service -service length \leq 15 years -working as specialist less than or equal to 10 years
Varela et al., (Varela et al., 2021)	2021	Venezuela	Residents	120	Not reported	DASS-21	11.7%	Associated with depression: -marital status (married and divorced residents)

HADS-Hospital Anxiety and Depression Scale; PHQ-9- Patient Health Questionnaire-9; PHQ-4- Patient Health Questionnaire-4; DASS-Depressive Anxiety Stress Scale; GHQ-12- General Health Questionnaire-12; CES-D- Center for Epidemiological Studies Depression scale; PRIME-MD-Primary Care Evaluation of Mental Disorders; SCL-CD₆-Symptom Checklist-Core Depression; SDS-Self-Rating Depression Scale

*Multivariate analysis

3.3.4. Prevalence of Anxiety

A total of 29 studies investigated the prevalence of anxiety among physicians and/or residents in training (**Table 3.3**). Among these, 17.2% (5 studies) focused exclusively on anxiety, 41.4% (12 studies) examined both anxiety and depression and another 41.4% (12 studies) assessed anxiety along with burnout and depression. Of these studies, 69% (20 studies) sampled physicians, while 31% (9 studies) focused on residents in training. The most commonly used survey tool is the Generalized Anxiety Disorder scale or its variations, utilized in 48.3% (14 studies) (Abu-Elenin, 2021; Bai et al., 2021; Carlson et al., 2021; de Mélo Silva Júnior et al., 2023; Hain et al., 2021; Jarad et al., 2023; Khatun et al., 2021; Kuriyama et al., 2022; Ouazzani Housni Touhami et al., 2023; Quintana-Domeque et al., 2021; Saeed, Shabila, & Aziz, 2021; Sharma et al., 2021; Steil et al., 2022; Zehra et al., 2022), with outcomes detailed in (Table 3). Other tools included the Depression Anxiety Stress Scale (DASS), used in 20.7% (6 studies) (Alwashmi & Alkhamees, 2021; Crudden, Margiotta, & Doherty, 2023; Debnath et al., 2023; Rahimaldeen et al., 2021; Rahman et al., 2021; Varela et al., 2021), and the Hospital Anxiety Depression Scale (HADS), used in 17.4% (5 studies) (Appiani et al., 2021; Hasan et al., 2022; Jaulin et al., 2021; Pogossova et al., 2021; Sarkar et al., 2021). Additionally, single-study tools included the Beck Anxiety Inventory (BAI) (Chalhub et al., 2021), the Self-Rating Anxiety Scale (SAS) (He et al., 2021), the Patient Health Questionnaire (PHQ) (de Mélo Silva Júnior, Valença, & Rocha-Filho, 2022), and the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (Carneiro Monteiro et al., 2021). The overall prevalence of anxiety ranged from 8% (Sharma et al., 2021) to 78.9% (Abu-Elenin, 2021) among physicians and from 10% (Zehra et al., 2022) to 63.9% (Debnath et al., 2023) among residents in training. Additionally, the prevalence of anxiety reported in the included studies showed higher levels among females. Most of the studies (n=25) investigated factors associated with anxiety, while the remaining four studies did not provide any information on associated factors with anxiety.

Table 3.3

Prevalence and Correlates of Anxiety Among Physicians and Postgraduate Medical Trainees in Studies Conducted from 2021 to 2024

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Anxiety	Prevalence of Anxiety Level(s)	Associated Factors
Appiani et al., (Appiani et al., 2021)	2021	Argentina	Physicians	440	55%	HADS	44%	Increasing anxiety: -transient SARS-CoV-2-like symptoms -taking anxiolytics -working 24-hour shifts at the emergency department -physicians with less seniority
Jaulin et al., (Jaulin et al., 2021)	2021	France	Residents	2,302	22.5%	HADS	19.8%	Increasing anxiety: -female gender -working time (volume of hours worked above 60 h per week)

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Anxiety	Prevalence of Anxiety Level(s)	Associated Factors
								-on-going training in intensive care
Crudden et al., (Crudden, Margiotta, & Doherty, 2023)	2023	Ireland	Physicians	2,160	21.9%	DASS	13.8%	Associated with Anxiety: -reduced satisfaction with remuneration
Bai et al., (Bai et al., 2021)	2021	China	Residents	1,533	86.48%	GAD-7 (Chinese version)	Overall prevalence: 32.8% Major anxiety symptoms: 9.9%	Associated with major anxiety: -poor sleep Quality* -higher emotional Exhaustion* -higher depersonalization* -reduced personal Accomplishment*
Hain et al., (Hain et al., 2021)	2021	South Africa	Doctors	213	45%	GAD-7	23.3%	Associated with Anxiety: -doctors planning to leave the

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Anxiety	Prevalence of Anxiety Level(s)	Associated Factors
								public sector in the next 2 years. -occupational rank
Ouazzani Housni Touhami et al., (Ouazzani Housni Touhami et al., 2023)	2023	Morocco	Doctors	1,267	63.3%	GAD-7	29.2%	Increasing anxiety: -being female* -working in primary and secondary hospitals* -moderate and high- stress perceptions* -chronic physical illness* -family history of psychiatric disorder*
Alwashmi et al., (Alwashmi & Alkhamees, 2021)	2021	Saudi Arabia	Physicians (psychiatrist)	101	Not reported	DASS-21	22.8%	Increasing anxiety: -handling COVID-19 patients.

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Anxiety	Prevalence of Anxiety Level(s)	Associated Factors
Kuriyama et al., (Kuriyama et al., 2022)	2022	Japan	Physicians	1,173	18.2%	GAD-7	34.6%	Associated with Anxiety: -having no partner* -stigma* -experience of self-quarantine*
Carneiro Monteiro et al., (Carneiro Monteiro et al., 2021)	2021	Brazil	Psychiatry residents	185	62%	DSM-5 Self-Rated Level 1 Cross-Cutting Symptom Measure-Adult	53%	No information provided
Steil et al., (Steil et al., 2022)	2022	Brazil	Residents	3071	10%	GAD-7	52.8%	Increasing anxiety: -being a woman -avoidance of seeing patients with confirmed or suspected cases of COVID-19

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Anxiety	Prevalence of Anxiety Level(s)	Associated Factors
								-failure of supervisor support for the treatment of COVID-19 patients -working in a wing with high risk of contamination -belief that personal protection equipment is not efficacious -fear of getting COVID-19, transmitting it to significant others - having personal relationships impaired since the pandemic
de Mélo Silva Júnior	2023	Brazil	Physician residents	First cohort(pr	Not reported	GAD-2	-pre-COVID	No information provided

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Anxiety	Prevalence of Anxiety Level(s)	Associated Factors
et al., (de Mélo Silva Júnior et al., 2023)				e-COVID): 524			cohort: 56.5%	
				Second cohort (pandemic group): 419			- pandemic cohort: 56.5%	
Pogosova et al., (Pogosova et al., 2021)	2021	Russia	Physicians	108	Not reported	HADS	23.8%	Increasing anxiety: -being a female physician
Rahimaldeen et al., (Rahimaldeen et al., 2021)	2021	Saudi Arabia	Physicians (pediatricians)	386	65%	DASS-21	71.3%	Increasing anxiety: -female gender -being junior pediatrician -being younger pediatricians
Hasan et al., (Hasan et al., 2022)	2022	Bangladesh	Physicians	442	93.2%	HADS	67.72%	Increasing anxiety: - being female -physicians who had experienced

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Anxiety	Prevalence of Anxiety Level(s)	Associated Factors
								COVID-19 like symptoms during the pandemic -those who had not received incentives -those who used self-funded personal protective equipment (PPE) -not received adequate training -lacking perceived self-efficacy to manage COVID-19 positive patients -greater perceived stress of being infected -fear of getting assaulted/humiliated

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Anxiety	Prevalence of Anxiety Level(s)	Associated Factors
								<ul style="list-style-type: none"> -being more connected with social media -having lower income levels to support the family -feeling more agitated -less than 2 h of leisure activity per day -short sleep duration.
Rahman et al., (Rahman et al., 2021)	2021	Bangladesh	Physicians	395	Not reported	DASS-21	35.2%	<ul style="list-style-type: none"> Increasing anxiety: -age (physicians less than or equal to 27 years) * -history of availing or Receiving psychotherapy -being a physician of COVID-19 hospitals

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Anxiety	Prevalence of Anxiety Level(s)	Associated Factors
Debnath et al., (Debnath et al., 2023)	2023	Bangladesh	Intern Doctors (Trainee physicians)	130	83%	DASS-21	63.9%	Associated with anxiety: -depression -stress
de Mélo Silva Júnior et al., (de Mélo Silva Júnior, Valença, & Rocha-Filho, 2022)	2022	Brazil	Residents	1,989	71.4%	PHQ-4	56.6%	Increasing Anxiety: -being a woman -older age -more frequent diurnal somnolence -unsatisfactory work-personal life balance -depression
Khatun et al., (Khatun et al., 2021)	2021	Bangladesh	Physicians	114	Not reported	GAD-7	32.5%	Increasing anxiety: -physicians

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Anxiety	Prevalence of Anxiety Level(s)	Associated Factors
								who worked in Dhaka division -physicians who worked more than 8 h per day
Sharma et al., (Sharma et al., 2021)	2021	India	Physicians	100	Not reported	GAD-7	Minimal: 53% Mild: 27% Moderate : 12% Severe: 8%	Associated with anxiety: - working in primary or secondary level healthcare facility* -sleep disturbance*
Abu-Elenin, (Abu-Elenin, 2021)	2021	Egypt	Physicians	254	93.36%	GAD-7	78.9%	Increasing anxiety: -poor sleep quality -being a resident physician -disrupted social life -stigma exposure due to COVID-19

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Anxiety	Prevalence of Anxiety Level(s)	Associated Factors
He et al., (He et al., 2021)	2021	China	Doctors	1,521	Not reported	SAS	11.11%	Increasing anxiety: -female sex* -having a minor child*
Saeed et al., (Saeed, Shabila, & Aziz, 2021)	2021	Iraq	Physicians	450	44.7%	GAD-7	Mild: 28.4% Moderate: 39.3% Severe: 22.9%	Associated with anxiety (moderate/severe): -working in COVID-19 centers -being a general practitioner
Jarad et al., (Jarad et al., 2023)	2023	Saudi Arabia	Physicians	917	48%	GAD-7	43.4%	Associated with anxiety: -physicians aged 25–30 years -females -residents -physicians working an average of > 11 hours/day

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Anxiety	Prevalence of Anxiety Level(s)	Associated Factors
								-physicians reporting self-perceived reduction in work quality Independent predictors of anxiety: -female gender* - working an average 9–11 hours/day* - self-perceived reduction in work quality*
Zehra et al., (Zehra et al., 2022)	2022	Pakistan	Residents	260	Not reported	GAD-7	Mild: 35% Moderate : 16.9% Severe: 10.0%	Increasing anxiety: -younger age (mild) -single status (moderate and severe) -low household income (severe)

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Anxiety	Prevalence of Anxiety Level(s)	Associated Factors
								-lack of job satisfaction (severe)
								Protective towards anxiety: -being male
Quintana-Domeque et al., (Quintana-Domeque et al., 2021)	2021	Catalonia (Spain), Italy and UK	Doctors	55,000	First round (June 2020): 3,025 (5.5%) Second round (Nov/Dec 2020): 2,250 (4.1%)	GAD-7	Overall prevalence: Catalonia : June 2020- 15.9%, Nov/Dec 2020- 14.0% Italy: June 2020- 24.6%, Nov/Dec 2020- 28.2%	Increasing anxiety: -being a women -individuals below 60 years old -feeling vulnerable/exposed at work -reporting normal/below-normal health.

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Anxiety	Prevalence of Anxiety Level(s)	Associated Factors
							UK-: June 2020-11.7%, Nov/Dec 2020-17.9%	
Chalhub et al., (Chalhub et al., 2021)	2021	Brazil	Physicians	450	49.6%	BAI	17%	Associated with anxiety: -being female physician -burnout (high EE, high DP, and lower PA)
Sarkar et al., (Sarkar et al., 2021)	2021	Bangladesh	Physicians (gastroenterologists)	166	37.9%	HADS	25.4%	Associated with anxiety: - gastroenterologists of older (41-50-years) age group -working as specialists less

Author's Name	Year of Publication	Country study was conducted	Study Population	Sample Size	Response Rate	Tool for measuring Anxiety	Prevalence of Anxiety Level(s)	Associated Factors
								than or equal to 5 years
Varela et al., (Varela et al., 2021)	2021	Venezuela	Residents	120	Not reported	DASS-21	39.2%	No information provided
Carlson et al., (Carlson et al., 2021)	2021	USA	Physicians	186	56%	GAD-2	11%	No information provided

HADS- Hospital Anxiety and Depression Scale; DASS- Depressive Anxiety Stress Scale; GAD-7- Generalized Anxiety Disorder 7-item; GAD-2- Generalized Anxiety Disorder 2-item; PHQ-4- Patient Health Questionnaire-4; SAS- Self-Rating Anxiety Scale; BAI- Beck Anxiety Inventory; DSM-5- Diagnosis and Statistical Manual of Mental Disorders; EE- Emotional Exhaustion; DP- Depersonalization; PA- Personal Accomplishments

*Multivariate analysis

3.3.5. Factors Associated with Burnout, Depression and Anxiety

Factors associated with burnout, depression and anxiety were grouped into the following categories: sociodemographic, psychological, social, and organizational. Most of these factors were increasing burnout, depression and anxiety, but protective factors were also identified.

3.3.5.1. Factors Associated with Burnout

3.3.5.1.1. Sociodemographic Factors. *Age:* In eight studies, younger age was associated with higher levels of burnout (Al-Humadi et al., 2021; de Mélo Silva Júnior, Valença, & Rocha-Filho, 2022; Fiabane et al., 2023; Jiménez-Labaig et al., 2021; Rahimaldeen et al., 2021; Rashid et al., 2022; Salihu et al., 2023; Youssef et al., 2022). One study specifically found that younger residents were more likely to experience reduced personal accomplishment (PA) (Shalaby et al., 2023). The impact of older age on burnout was less consistent: three studies reported that older individuals experienced lower levels of burnout (Doolittle, 2021; Kwan et al., 2021; Singh et al., 2022), while another study found higher burnout rates among older age groups (Seda-Gombau et al., 2021).

Gender: Sixteen studies found that females experienced higher levels of burnout (Al-Humadi et al., 2021; Alrawashdeh et al., 2021; Alwashmi & Alkhamees, 2021; Baptista et al., 2021; Chan et al., 2021; Doe et al., 2024; Doolittle, 2021; Fiabane et al., 2023; Hain et al., 2021; Keith, 2023; Pius, Ajuluchukwu, & Roberts, 2023; Pogosova et al., 2021; Rahimaldeen et al., 2021; Rashid et al., 2022; Werdecker & Esch, 2021; Youssef et al., 2022). Conversely, two studies reported that males had higher burnout levels (de Mélo Silva Júnior, Valença, & Rocha-Filho, 2022; Shahi, Paudel, & Bhandari, 2022).

Marital Status/Having Children: The findings on marital status and burnout were inconsistent. In some studies, being married was associated with increased burnout (Kuriyama et al., 2022; Shahi, Paudel, & Bhandari, 2022), while in others, it was linked to decreased burnout (Youssef et al., 2022). Being single or not married was associated with higher burnout levels (Doolittle, 2021). Additionally, four studies found that having children increased burnout (Hamdan et al., 2023; Seda-Gombau et al., 2021; Shahi, Paudel,

& Bhandari, 2022; Youssef et al., 2022), whereas one study reported that having more children served as a protective factor against burnout (Wang et al., 2021).

Financial Situation: Factors such as inadequate compensation (McGarry & O'Connor, 2024), financial problems (Kurzthaler et al., 2021), financial pressure (Chan et al., 2021), lower income (Khan et al., 2024), and educational debt exceeding \$250,000 (Doe et al., 2024) were all associated with increased burnout. Conversely, financial well-being was linked to decreased burnout (Youssef et al., 2022), and higher income satisfaction was identified as a protective factor against burnout (Wang et al., 2021).

Professional Experience: Three studies found increased burnout among junior physicians (Appiani et al., 2021; Hagqvist et al., 2022; Rahimaldeen et al., 2021). Being a resident was often associated with increased burnout (Alwashmi & Alkhamees, 2021; Fiabane et al., 2023; Ghoraishian et al., 2022; Khan et al., 2024), though one study reported decreased burnout (Boland et al.). Less professional experience generally correlated with higher burnout (Ghazwani, 2022; Hamdan et al., 2023; Mcloughlin et al., 2022; Pius, Ajuluchukwu, & Roberts, 2023; Youssef et al., 2022).

3.3.5.1.2. Psychological Factors. Higher burnout was associated with pre-existing psychological factors including depression (Al-Humadi et al., 2021; Baptista et al., 2021; Boland et al.; Che et al., 2023; Crudden, Margiotta, & Doherty, 2023; de Mélo Silva Júnior, Valença, & Rocha-Filho, 2022), anxiety (Al-Humadi et al., 2021; Baptista et al., 2021; Che et al., 2023), and stress (Nimer et al., 2021; Salihu et al., 2023).

3.3.5.1.3. Social Factors Associated with Burnout. Burnout was associated with several social factors, including psychological abuse (de Mélo Silva Júnior, Valença, & Rocha-Filho, 2022), unfair treatment at work (Rubin et al., 2021), poor work-life balance and lack of vacation or leisure (Jiménez-Labaig et al., 2021), limited social activities (Celik et al., 2021), stigmatization for treating COVID-19 patients, and workplace violence (Kurzthaler et al., 2021). In four studies, physicians and residents reported that family life was associated with increased burnout. High burnout was linked to factors such as the quality of family relationships (Carneiro Monteiro et al., 2021), living with a family

member with comorbidities (Youssef et al., 2022), limited family time for residents (Bean et al., 2022), and strained personal relationships since the COVID-19 pandemic (Steil et al., 2022).

3.3.5.1.4. Organizational Factors. Eight studies found that working long hours (over 40 hours per week) were associated with higher burnout (Bean et al., 2022; Boland et al.; Celik et al., 2021; Pius, Ajuluchukwu, & Roberts, 2023; Salihu et al., 2023; Shahi, Paudel, & Bhandari, 2022; Shalaby et al., 2023; Sharp et al., 2021). Additionally, more frequent night shifts (Alrawashdeh et al., 2021; Sobczuk et al., 2024), extended on-call hours (Al-Humadi et al., 2021; Sobczuk et al., 2024), and 24-hour shifts (Appiani et al., 2021) were all linked to increased burnout.

3.3.5.1.5. Burnout Related to COVID-19 Pandemic. The COVID-19 pandemic led to higher burnout due to factors including transient symptoms (Appiani et al., 2021), caring for COVID-19 patients (Ofei-Dodoo, Loo-Gross, & Kellerman, 2021), fear of infection, working in high-risk contamination areas, concerns about PPE effectiveness (Steil et al., 2022), and testing positive for COVID-19 (Alrawashdeh et al., 2021).

3.3.5.1.6. Protective Factors Against Burnout. The authors also highlighted protective factors against burnout, including resilience and strong institutional support (Che et al., 2023), having more children and greater income satisfaction (Wang et al., 2021), and faculty support (Bean et al., 2022). Additionally, researchers identified several other factors that help reduce burnout: professional efficacy (Crudden, Margiotta, & Doherty, 2023), access to mental health services and insurance for personal illness or emergencies (Sharp et al., 2021), staff grade or trainee status combined with higher perceived support (Boland et al.), being of Black or Asian descent and being in smaller programs (Doe et al., 2024), being an International Medical Graduate (IMG) and part of a racial minority (Yuan et al., 2023), and regular exercise (three times a week for 20 minutes) (Doolittle, 2021).

3.3.5.2. Factors Associated with Depression

3.3.5.2.1 Sociodemographic Factors. *Age:* Younger age was linked to higher levels of depression in 7 studies (L. Chen et al., 2022; Y. Chen et al., 2022; Elghazally & Abdeldaim, 2021; Jarad et al., 2023; Khatun et al., 2021; Rahimaldeen et al., 2021; Rahman et al., 2021). The relationship between older age and depression was inconsistent. One study found that older age was associated with lower depression rates in a multivariable analysis (He et al., 2021), while another study found the opposite, with older age linked to higher depression (Sarkar et al., 2021).

Gender: Thirteen studies identified being female as a factor associated with increased depression (L. Chen et al., 2022; Y. Chen et al., 2022; de Mélo Silva Júnior, Valença, & Rocha-Filho, 2022; Elghazally & Abdeldaim, 2021; Hagqvist et al., 2022; Hasan et al., 2022; He et al., 2021; Jarad et al., 2023; Jaulin et al., 2021; Khatun et al., 2021; Quintana-Domeque et al., 2021; Rahimaldeen et al., 2021; Steil et al., 2022), while two studies reported higher depression rates in males (Pogosova et al., 2021; Rahman et al., 2021).

Marital Status/Having Children: In four studies, being single or unmarried was associated with higher depression (L. Chen et al., 2022; Y. Chen et al., 2022; Elghazally & Abdeldaim, 2021; Khatun et al., 2021). Only one study found that being married was linked to increased depression (Varela et al., 2021). Additionally, a multivariate analysis indicated that having children was associated with higher depression levels (He et al., 2021).

Educational Level and Financial Situation: A multivariate analysis found that a higher educational level was linked to increased depression (Y. Chen et al., 2022). Low income (Hasan et al., 2022), low salary (Y. Chen et al., 2022), and financial concerns (Sharp et al., 2021) were associated with higher depression.

3.3.5.2.2. Professional Experience. Two studies reported increased depression among junior physicians (Appiani et al., 2021; Hagqvist et al., 2022). Three studies found that being a resident in training was linked to increased depression (Abu-Elenin, 2021; Jarad et al., 2023; Nair, Ng, & Sulaiman, 2021), and less professional experience was associated with higher depression (Elghazally & Abdeldaim, 2021).

3.3.5.2.3. Psychological Factors. Higher depression levels were associated with pre-existing psychological factors, including anxiety (de Mélo Silva Júnior, Valença, & Rocha-Filho, 2022; Debnath et al., 2023), burnout (de Mélo Silva Júnior, Valença, & Rocha-Filho, 2022), stress (Debnath et al., 2023; Ouazzani Housni Touhami et al., 2023; Pitanupong, Anantapong, & Aunjitsakul, 2024), and poor sleep (Abu-Elenin, 2021; Bai et al., 2022; L. Chen et al., 2022; Y. Chen et al., 2022; Hasan et al., 2022).

3.3.5.2.4. Social Factors. Several social factors were linked to increased depression, including psychological abuse (de Mélo Silva Júnior, Valença, & Rocha-Filho, 2022), stigmatization from exposure to COVID-19 and disrupted social life (Abu-Elenin, 2021), and fewer than 2 hours of daily leisure activities (Hasan et al., 2022). In one study, having a hobby or leisure time was associated with lower depression (Nair, Ng, & Sulaiman, 2021).

3.3.5.2.5. Organizational Factors. Four studies found that long working hours were associated with higher depression (L. Chen et al., 2022; Jaulin et al., 2021; Nair, Ng, & Sulaiman, 2021; Sharp et al., 2021). Additionally, working 24-hour shifts in the emergency department (Appiani et al., 2021) and a higher clinical workload (Crudden, Margiotta, & Doherty, 2023) were all linked to increased depression.

3.3.5.2.6. Depression Related to the COVID-19 Pandemic. The COVID-19 pandemic led to increased depression levels due to several factors, including transient symptoms (Appiani et al., 2021; Hasan et al., 2022), direct contact with COVID-19 patients (Elghazally & Abdeldaim, 2021), avoiding patients with confirmed or suspected COVID-19 cases, working in high-risk contamination areas, fear of contracting the virus and transmitting it to loved ones (Steil et al., 2022); and a lack of confidence in effectively managing COVID-19 patients (Hasan et al., 2022).

3.3.5.3. Factors Associated with Anxiety

3.3.5.3.1. Sociodemographic factors. *Age:* Four studies (Jarad et al., 2023; Rahimaldeen et al., 2021; Rahman et al., 2021; Zehra et al., 2022) found that younger age was linked to higher levels of anxiety. Conversely, two studies (de Mélo Silva Júnior,

Valença, & Rocha-Filho, 2022; Sarkar et al., 2021) found that older age was associated with increased anxiety.

Gender: Eleven studies (Chalhub et al., 2021; de Mélo Silva Júnior, Valença, & Rocha-Filho, 2022; Hasan et al., 2022; He et al., 2021; Jarad et al., 2023; Jaulin et al., 2021; Ouazzani Housni Touhami et al., 2023; Pogosova et al., 2021; Quintana-Domeque et al., 2021; Rahimaldeen et al., 2021; Steil et al., 2022) identified being female as a factor associated with increased anxiety, while one study (Zehra et al., 2022) reported that being male was a protective factor against anxiety.

Marital Status/Having Children: Two studies (Kuriyama et al., 2022; Zehra et al., 2022) linked being single or unmarried with higher anxiety. Additionally, a multivariate analysis suggested that having children was associated with higher anxiety levels (He et al., 2021).

Financial Situation: Factors such as lower income levels (Hasan et al., 2022), dissatisfaction with remuneration (Crudden, Margiotta, & Doherty, 2023), and low household income (Zehra et al., 2022) were all linked to higher anxiety.

3.3.5.3.2. Occupational and Professional Experience. Two studies (Appiani et al., 2021; Rahimaldeen et al., 2021) reported increased anxiety among junior physicians while being a resident was associated with higher anxiety in two studies (Abu-Elenin, 2021; Jarad et al., 2023). Increased anxiety was also linked to a lack of job satisfaction (Zehra et al., 2022) and working as a specialist for five years or less (Sarkar et al., 2021).

3.3.5.3.3. Psychological Factors. Anxiety was associated with stress (Debnath et al., 2023; Hasan et al., 2022), depression (de Mélo Silva Júnior, Valença, & Rocha-Filho, 2022; Debnath et al., 2023), burnout (Chalhub et al., 2021), and poor sleep (Abu-Elenin, 2021; Bai et al., 2021; Hasan et al., 2022; Sharma et al., 2021). A multivariate analysis linked moderate to high stress perceptions and a family history of psychological disorders to increased anxiety (Ouazzani Housni Touhami et al., 2023).

3.3.5.3.4. Social Factors. Several social factors, such as stigmatization from COVID-19 exposure (Abu-Elenin, 2021; Kuriyama et al., 2022), disrupted social life (Abu-

Elenin, 2021), less than two hours of daily leisure activities (Hasan et al., 2022), and unsatisfactory work-life balance (de Mélo Silva Júnior, Valença, & Rocha-Filho, 2022), were associated with increased anxiety.

3.3.5.3.5. Organizational Factors. Increased anxiety was found in physicians working more than 8 hours per day (Khatun et al., 2021) or an average of 11 hours per day (Jarad et al., 2023), and working 24-hour shifts in the emergency department (Appiani et al., 2021). Increased anxiety was reported in residents working over 60 hours per week (Jaulin et al., 2021).

3.3.5.3.6. Anxiety Related to the COVID-19 Pandemic. The COVID-19 pandemic increased anxiety levels due to various factors, including transient symptoms (Appiani et al., 2021; Hasan et al., 2022); handling of COVID-19 patients (Alwashmi & Alkhamees, 2021); avoiding contact with confirmed or suspected COVID-19 cases, working in high-risk areas, fear of contracting and transmitting the virus (Steil et al., 2022); lack of confidence in managing COVID-19 patients (Hasan et al., 2022); and working in COVID-19 hospitals or centers (Rahman et al., 2021; Saeed, Shabila, & Aziz, 2021).

3.4. Discussion

The prevalence and correlates of burnout, depression, and anxiety among physicians and postgraduate medical trainees are critical areas of research that have gained significant attention in recent years. This scoping review highlights the alarming rates of mental health issues in this demographic, with burnout, depression, and anxiety being prevalent and deeply intertwined. In this review, the studies varied considerably in their methodology and findings. The most used tools by researchers were the MBI for burnout, the Patient Health Questionnaire-9 (PHQ-9) for depression, and the Generalized Anxiety Disorder-7 (GAD-7) for anxiety. These tools are recognized as the standard instruments to measure these mental health conditions. For burnout, different versions of the MBI were applied. Additionally, even in studies that utilized the same MBI version, results were reported inconsistently. For example, some studies presented burnout rates as an overall figure (Alwashmi & Alkhamees, 2021; Hain et al., 2021; Rubin et al., 2021; Steil et al.,

2022), while others broke down the results into burnout subdimensions (Alenezi et al., 2022; Kondrich et al., 2022; Pogossova et al., 2021). Similarly, in studies measuring depression and anxiety, alongside the commonly used PHQ-9 and GAD-7, other instruments such as the Depression, Anxiety, and Stress Scales (DASS) and the Hospital Anxiety and Depression Scale (HADS) were also employed. Several sociodemographic, psychological, social, and organizational factors contribute to these mental health challenges, particularly during the ongoing COVID-19 pandemic. The review indicated a stronger focus on assessing burnout, depression, and anxiety among physicians compared to residents in training. This discrepancy was further evident in studies that included both groups, with physicians being more frequently sampled (Ghoraishian et al., 2022; Hamdan et al., 2023). One potential reason for this could be the differing accessibility between physicians and residents. Physicians often remain in one facility, while residents frequently rotate through different healthcare centers, making it more challenging to reach them for surveys and assessments. The findings of this review underline the urgency of addressing these issues and providing effective interventions and support for healthcare professionals

3.4.1. Prevalence of Burnout, Depression, and Anxiety

The prevalence of burnout, depression, and anxiety among physicians and postgraduate medical trainees in the included studies ranged widely. For burnout, the review uncovered considerable variability in prevalence estimates among physicians and residents, with significant differences in how burnout was defined and measured across studies. Burnout prevalence ranged widely from 4.7% to 90.1% among physicians and from 18.3% to 94% among residents in training, with higher rates generally found in residents compared to practicing physicians. These findings seem to agree with what has been reported in a previous systematic review (0% to 80.5%) (Rotenstein et al., 2018). Although global estimates suggest that burnout affects around 50% of both physicians (West et al., 2016) and residents (Low et al., 2019), the review found that over 20 studies on physicians and 7 studies on residents reported burnout prevalence levels exceeding 50%. Burnout was most commonly measured using the MBI, although different tools and criteria for burnout classification led to variability in findings. The high prevalence of burnout among residents, in particular, aligns with previous studies that have highlighted the

intensity of training, long working hours, and high emotional demands as key contributors (Dyrbye et al., 2017). The prevalence of depression among physicians and residents also varied significantly, ranging from 4.8% to 66.5% among physicians and 7.7% to 93% among residents. The findings are consistent with prior research indicating that medical trainees and physicians are at heightened risk of depression compared to the general population (Dyrbye, Thomas, & Shanafelt, 2006; Joules, Williams, & Thompson, 2014). Anxiety, similarly, had a wide prevalence range, from 8% to 78.9% among physicians, and from 10% to 63.9% among residents. This reflects the intense work pressure, substantial workloads, extended shifts, resource constraints, and organizational changes, all contributing (Harvey et al., 2017; Lemaire & Wallace, 2017; Wilkinson, 2015), to increase mental health issues in physicians and medical trainees. Most of the studies reviewed reported prevalence exceeding 35% in both conditions, which is higher than the 20.5% for depression and 25.8% for anxiety found in a global systematic review and meta-analysis (Johns et al., 2022). Similarly, Mata et al. reported a 28.8% prevalence of depression among resident physicians (Mata et al., 2015), a figure lower than what was found in the majority of studies assessing depression in residents included in this review. This lower prevalence of depression reported in Mata et al.'s review compared to most studies included in our analysis may be attributed to several factors: the inclusion of more recent studies that reflect heightened mental health challenges during the COVID-19 pandemic; broader geographic coverage, especially from low- and middle-income countries with diverse healthcare contexts; and methodological variations such as differences in assessment tools, diagnostic thresholds, and sampling strategies.

3.4.2. Sociodemographic Factors

Sociodemographic factors, such as age, gender, marital status, and financial situation, were consistently associated with higher levels of burnout, depression, and anxiety. Younger age, particularly among residents and junior physicians, was frequently linked to higher levels of these mental health issues. This is in line with research indicating that early-career professionals are more vulnerable to the psychological stressors of medical training (Dyrbye et al., 2014). Conversely, the impact of age on burnout and depression in older physicians was inconsistent, suggesting that other factors might

influence the relationship between age and mental health outcomes in healthcare professionals. Junior physicians and residents experience higher burnout, anxiety and depression rates (Fiabane et al., 2023; Ghorraishian et al., 2022; Hagqvist et al., 2022), likely due to their lack of experience and the overwhelming demands of their roles compared to senior physicians who have acquired experience in the job. Frequent night shifts (Alrawashdeh et al., 2021) and extended on-call hours (Al-Humadi et al., 2021; Sobczuk et al., 2024), which are more common among junior physicians and residents, further contributing to higher burnout in these groups.

Gender differences were another notable finding. Female physicians and residents generally reported higher levels of burnout, depression, and anxiety compared to their male counterparts (Hasan et al., 2022; Jarad et al., 2023; Pogosova et al., 2021; Quintana-Domeque et al., 2021; Rahimaldeen et al., 2021; Rashid et al., 2022; Werdecker & Esch, 2021). This disparity may be explained by gender role theory which suggests that women are more likely to express emotional and physical exhaustion, leading to higher scores on emotional exhaustion scales (Eagly, 2013). Also, the added pressure of balancing professional responsibilities and family duties can lead to emotional exhaustion and increased burnout and psychological issues. Additionally, some researchers propose that men may generally exhibit higher resilience (Jordan et al., 2020), which refers to the ability to adapt effectively in the face of stress and adversity (Tugade & Fredrickson, 2004). Research also suggests that resilience has an inverse relationship with burnout (143), meaning individuals with higher resilience may be better protected against burnout. However, a small number of studies reported higher burnout or depression rates in males, possibly due to cultural or institutional factors that present unique challenges for men.

The relationship between marital status, having children, and mental health outcomes was less consistent. While some studies found that being married or having children increased burnout, depression, and anxiety (Hamdan et al., 2023; He et al., 2021; Kuriyama et al., 2022; Shahi, Paudel, & Bhandari, 2022; Varela et al., 2021), others identified these factors as protective. The diversity of findings may be due to the complex interaction between personal, professional, and societal expectations, which may differ across cultural and institutional settings.

Financial stress was a significant factor in the mental health challenges faced by physicians and residents. Studies have shown that inadequate compensation, educational debt, and financial insecurity and pressures contribute to burnout, depression, and anxiety (Chan et al., 2021; Doe et al., 2024; Hasan et al., 2022; McGarry & O'Connor, 2024). A study in South Africa found that lower income was associated with higher burnout levels among physicians during the COVID-19 pandemic (Khan et al., 2024). These findings highlight the importance of addressing financial well-being as part of broader efforts to improve mental health outcomes in the medical profession.

3.4.3. Psychological and Social Factors

Psychological factors such as depression, anxiety, and stress were strongly associated with burnout, depression, and anxiety. Physicians and residents with pre-existing psychological conditions are at greater risk of experiencing burnout, anxiety and depression (Che et al., 2023; de Mélo Silva Júnior, Valença, & Rocha-Filho, 2022; Nimer et al., 2021). This is not surprising given the interrelated nature of these mental health conditions, which often co-occur among healthcare professionals. A study conducted in Morocco linked high anxiety levels to increased stress perception and a family history of psychological disorders (Ouazzani Housni Touhami et al., 2023). The impact of psychological distress is compounded by the high demands of medical practice, where the emotional toll of patient care and the expectation of constant performance can exacerbate existing mental health struggles.

Social factors, including poor work-life balance, limited social activities, and family life stress, were also significant contributors to burnout, depression, and anxiety. The disruption of social life and family dynamics due to long working hours, night shifts, and emotional exhaustion may lead to healthcare professionals' mental health issues. Shift work often disrupts work-life balance and contributes to sleep deprivation, further increasing burnout risk (Amanullah & Ramesh Shankar, 2020). In Brazil, residents with an unsatisfactory work-life balance experience higher anxiety levels (de Mélo Silva Júnior, Valença, & Rocha-Filho, 2022). Conversely, a study in Malaysia found that having hobbies or leisure activities was linked to lower depression levels among residents (Nair, Ng, & Sulaiman, 2021). The COVID-19 pandemic further intensified these social stressors, with

many physicians and residents reporting additional challenges such as stigmatization for treating COVID-19 patients [73], family concerns, and fear of infecting loved ones (Taylor et al., 2020).

3.4.4. Organizational Factors

Work-related factors, including long working hours, high workload, night shifts, and extended on-call hours, were identified as significant predictors of burnout, depression, and anxiety (Appiani et al., 2021; Boland et al.; Celik et al., 2021; Shalaby et al., 2023). These findings are consistent with a large body of literature that highlights the detrimental effects of work-related stressors on healthcare workers' mental health (Tawfik et al., 2018). The strain of working over 40 hours a week, frequent night shifts, and 24-hour shifts exacerbates feelings of exhaustion, stress, and emotional depletion, leading to higher levels of burnout anxiety and depression.

The COVID-19 pandemic has been a key organizational factor in exacerbating these mental health issues. Healthcare workers, particularly those in high-risk areas such as emergency departments and intensive care units (Appiani et al., 2021), reported increased levels of burnout, depression, and anxiety due to the overwhelming demands of treating COVID-19 patients, fear of infection, and inadequate protective measures. The pandemic's impact on mental health highlights the urgent need for better institutional support, improved personal protective equipment (PPE), and mental health resources for frontline healthcare workers.

3.4.5. Protective Factors

Several protective factors were identified in the studies reviewed, including resilience, and strong institutional support (Che et al., 2023), access to mental health services (Sharp et al., 2021), and faculty support (Bean et al., 2022). These findings suggest that fostering a supportive work environment, promoting mental health resources, and encouraging work-life balance can help mitigate the negative impact of stressors on physicians and residents. Additionally, personal factors such as exercising three times a week for 20 minutes (Doolittle, 2021), professional efficacy (Crudden, Margiotta, & Doherty, 2023), and having a supportive family life were all identified as protective factors

against burnout. These findings emphasize the importance of a multifaceted approach to addressing mental health in the medical profession.

3.4.6. Implications for Policy and Practice

The findings of this scoping review underscore the widespread and significant mental health challenges faced by physicians and postgraduate medical trainees, including burnout, depression, and anxiety. These issues are not only detrimental to the well-being of healthcare providers but also have serious implications for patient care, workforce sustainability, and healthcare system efficiency. Therefore, urgent attention and targeted interventions are required at multiple levels to mitigate the impact of these mental health conditions. Firstly, healthcare organizations must prioritize mental health and well-being in their workplace policies. This includes promoting a culture of psychological safety, providing access to mental health services, and ensuring that physicians and trainees have opportunities to engage in stress-reducing activities. Implementing institutional support systems, such as counseling services, peer support programs, and resilience training, could significantly help reduce burnout and foster a healthier work environment. Reducing work-related demands and enhancing access to resources may help residents lower their stress levels and improve their overall well-being (Huang et al., 2020).

Furthermore, providing financial support and improving compensation for healthcare professionals, especially in regions with significant income disparities, may help alleviate stressors contributing to these mental health issues. Secondly, addressing work-life balance is critical in both policy and practice. Policies that regulate working hours, reduce excessive shifts, and prevent burnout-inducing workloads should be implemented. For instance, limiting mandatory on-call hours and advocating for reasonable shift schedules, stress management, training in mindfulness could mitigate the stress and burnout identified in this review (Lawlor et al., 2022; Williams et al., 2015). Additionally, providing sufficient time off and family leave would help professionals manage personal responsibilities alongside demanding work schedules. Finally, the incorporation of mental health education into medical training is essential. Training future healthcare providers to recognize the early signs of burnout, depression, and anxiety, and equipping them with coping strategies, could significantly reduce the prevalence of these conditions in the long

term. Integrating mental health discussions into residency and ongoing professional development programs may help destigmatize these issues and empower healthcare providers to seek help when needed.

3.5. Strength and Limitations

One of the key strengths of this study is its comprehensive and up-to-date examination of the prevalence of major mental health conditions, such as burnout, depression, and anxiety, which are often studied individually but not collectively. The findings offer valuable data that can assist in monitoring changes in these conditions over time. However, the study has some limitations. Firstly, while a significant number of papers were included, the search did not cover all available databases, leaving a possibility that some relevant studies were missed or excluded due to publication bias. Secondly, the research was limited to studies published between 2021 and April 2024 and written only in English, which further restricts its scope. Thirdly, different methods were used to measure the prevalence of burnout, depression, and anxiety, making it difficult to produce a unified estimate for each condition. Future studies should focus on reporting rates specific to each assessment tool rather than merging results from different scales. Fourthly, many of the studies did not mention the validity and reliability of the tools they used. Among the most used tools were the MBI for burnout, the PHQ-9 for depression, and the GAD-7 for anxiety. These tools are widely used globally, with strong evidence supporting their reliability and consistency. For instance, the GAD-7 demonstrates good test-retest reliability and strong internal consistency (Kroenke et al., 2007; Owusu et al., 2022). The MBI, a concise questionnaire used to evaluate burnout symptoms and their intensity, has shown strong reliability. Specifically, it has Cronbach's alpha values of 0.90 for emotional exhaustion, 0.76 for depersonalization, and 0.76 for personal accomplishment (Complete dissertation by statistics solutions). Similarly, the PHQ-9, widely used for depression screening, exhibits solid psychometric properties with good sensitivity and high internal consistency (Levis, Benedetti, & Thombs, 2019; Shin et al., 2020), making it a reliable tool for assessing depression symptoms. Thus, the choice and selection of tools in the retrieved studies seem to be appropriate. Lastly, another limitation of our study is the lack of a formal assessment of bias and methodological quality among the included studies. Future updates

to this review will address this gap by incorporating a meta-analysis and employing standardized tools to systematically evaluate the risk of bias and study quality. Despite these limitations, this study provides a crucial resource for future research on the prevalence of burnout, depression, and anxiety, emphasizing the need for consistent methodologies and longitudinal studies.

3.6. Conclusion

The high prevalence of burnout, depression, and anxiety among physicians and postgraduate medical trainees is a concerning issue that requires immediate attention. This review highlights the complex interplay of sociodemographic, psychological, social, and organizational factors contributing to mental health challenges in this group. The psychological well-being of these professionals is critical, as it directly impacts patient care and overall healthcare outcomes. Additionally, our review highlights a consistently high prevalence of burnout, anxiety, and depression across multiple high-quality studies, underscoring the need for urgent action at both policy and institutional levels. To mitigate these issues, healthcare organizations must prioritize the mental health and well-being of their staff by implementing policies that promote work-life balance, financial security, mental health resources, and institutional support. Additionally, addressing the unique challenges faced by female physicians, junior physicians, and residents is essential to creating a healthier and more sustainable medical workforce. Ultimately, improving mental health outcomes in healthcare professionals will lead to better care for patients and a more resilient healthcare system. It is essential to prioritize and implement interventions that support the psychological well-being of physicians and residents, with the goal of preventing or reducing burnout, depression, and anxiety. One promising approach is the use of evidence-based mobile text messaging technology, which offers a convenient, cost-effective, and accessible way to provide psychological support to those in need (Vincent Israel Opoku Agyapong et al., 2020; Vincent Israel Ouoku Agyapong et al., 2020). This review offers valuable insights to inform policymakers and healthcare administrators in designing effective strategies to mitigate burnout, depression, and anxiety among medical professionals.

Chapter 4: Psychological Health and Wellness and the Impact of Six-week and Three-Month Supportive Text Messaging Program (Wellness4MDs) Among Physicians and Medical Learners in Canada: A Longitudinal Study

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Abstract

Background: Physicians and medical learners face high rates of burnout, anxiety, and depression due to the demanding nature of their work. Many are reluctant to seek support because of stigma, time constraints, and limited access to care. Cognitive Behavioral Therapy (CBT)-based supportive SMS messaging offers a promising, scalable alternative.

Objective: This study evaluates the impact of Wellness4MDs, a CBT-based supportive messaging program, on the psychological health and well-being of physicians and medical learners in Canada. **Methods:** Participants subscribed to the Wellness4MDs program and received daily supportive SMS messages for three months. Standardized self-rated web-based questionnaires assessing depression, anxiety, burnout symptoms were collected at baseline, six weeks, and three months using the PHQ-9, GAD-7, MBI, and WHO-5. Subscribers' satisfaction was measured using an online, self-developed questionnaire

adapted from tools previously employed to assess similar programs. **Results:** A total of 806 subscribers participated, with 226 completing the baseline survey. Sixty-six participants completed surveys at all follow-up points, and 53 completed both baseline and at least one follow-up survey. At the three-month follow-up, there were statistically significant reductions in mean scores for emotional exhaustion (EE) and anxiety symptoms (GAD-7), with reduction from baseline of 16.1% ($t = 2.86, p = 0.01$) and 15.5% ($t = 2.05, p = 0.05$) with effect sizes of 0.4 and 0.3 respectively, indicating moderate effects. These reductions remained statistically significant when missing data were imputed using the last observation carried forward (LOCF) method. However, no significant changes were observed on the PHQ-9 scale. The overall mean satisfaction score for the Wellness4MDs program was 7.98 (SD = 2.06). Most participants reported that the messages helped them cope with stress (72.7%), anxiety (70.5%), depression (51.1%), and loneliness (42.0%). Additionally, 71.6% felt more connected to a support system, and 78.4% reported improved overall mental well-being. **Conclusion:** Wellness4MDs demonstrated effectiveness in reducing emotional exhaustion and anxiety symptoms. Its high user satisfaction, accessibility, and low-cost delivery model make it a promising complement to traditional mental health services for healthcare professionals.

Keywords: Wellness4MDs; mental health; text messaging; physician, postgraduate medical trainee, medical students

4.1. Introduction

The mental health and psychological well-being of physicians have been extensively documented worldwide, as highlighted in numerous studies (Kansoun et al., 2019; Mata et al., 2015; Rotenstein et al., 2018). Evidence shows that physicians experience higher levels of mental distress, burnout, and suicidal ideation compared to other professions (Dyrbye et al., 2014; Gerada, 2018; Shanafelt et al., 2012). This psychological distress is particularly prominent during medical school, residency training, and the early stages of a physician's career (Dyrbye et al., 2014; Shanafelt et al., 2015). The WHO World Mental Health International College Student project, carried out in 19 colleges across eight countries, found that mental disorders among students were both widespread and increasing (Auerbach et al., 2018). Research further indicates that medical students experience even higher levels of stress and greater mental health challenges compared to their non-medical peers (Seedhom et al., 2019; Shad, Thawani, & Goel, 2015). While significant efforts have been directed toward studying and improving the well-being and quality of care for patients, far less attention has been given to the well-being of physicians and medical learners. Many physicians have overlooked their health as they cope with the pressures of heavy workloads, a rapidly expanding knowledge base, increasing government regulations, malpractice concerns, and the ongoing challenge of balancing personal and professional responsibilities.

Mental health disorders such as depression, anxiety, and burnout remain a significant concern in Canada. A National Physician Survey conducted by the Canadian Medical Association revealed a notable decline in the well-being of physicians across the country (Canadian Medical Association, 2022b). The survey reported that only 47% of respondents considered their mental health to be flourishing, a drop from 63% in 2017. Meanwhile, 46% reported moderate mental health, an increase from 33% in 2017, and 7% were classified as having languishing mental health, representing an approximate three-percentage-point increase since 2017. Additionally, more than half (53%) of respondents reported symptoms of burnout, with burnout rates being higher among medical residents (58%) compared to physicians (52%). Furthermore, 1 in 4 respondents experienced anxiety, categorized as either “severe” (10%) or “moderate” (15%), while nearly half (48%)

reported experiencing symptoms of depression (Canadian Medical Association, 2022b). The Medscape Physician Burnout and Depression Report 2024 found that physician burnout rates reached as high as 49% (Medscape, 2024), with elevated levels observed across all medical specialties. Similarly, burnout among medical residents remained high, ranging between 41% and 74% across various specialties (Ames et al., 2017). Furthermore, 27% of residents reported rarely or never having time for a fulfilling social life, and among these, 68% cited failed relationships as a result (Medscape, 2020a).

Physicians' and medical learners' (postgraduate medical trainees and undergraduate medical students) mental health has continued to decline, particularly during the COVID-19 pandemic, with 60% of Canadian physicians reporting worsening mental well-being (Medscape, 2022). Multiple studies have consistently reported high rates of burnout (Hiver et al., 2022; Rotenstein et al., 2018; Sanfilippo et al., 2020), depression (Y. Chen et al., 2022; Nair, Ng, & Sulaiman, 2021; Sharp et al., 2021), and anxiety (Elhadi et al., 2020; Fond et al., 2022; Zehra et al., 2022) among physicians and medical residents. Additionally, mental health and psychological well-being among undergraduate medical trainees (medical students) warrant significant attention due to their serious implications. A meta-analysis revealed that approximately one in three medical students globally (33.8%) experience anxiety, a prevalence notably higher than that of the general population (Tian-Ci Quek et al., 2019). Similarly, a study assessing depression among undergraduate medical students reported overall depression rates ranging between 30.9% and 77.6% (AlJaber, 2020).

Addressing mental health and psychological well-being among physicians and medical learners is crucial, as many medical professionals typically do not seek psychological support or help. A study conducted among physicians at a university hospital revealed that 3 in 4 distressed physicians had never sought professional help for depression or burnout (Fridner et al., 2012). Additionally, among physicians experiencing burnout or depression, more than half (53%) did not consult a mental health professional and expressed no intention to do so in the future (Medscape, 2024). Similarly, only one-third (33.9%) of medical students experiencing burnout sought help for an emotional or mental health issue within the past 12 months (Dyrbye et al., 2015). Numerous studies have

demonstrated that poor psychological health among physicians adversely affects healthcare delivery and physician-related outcomes. These effects include reduced professionalism, increased medical errors, compromised quality and safety of care, and poorer patient outcomes and satisfaction (Brazeau et al., 2010; de Oliveira Jr et al., 2013; Scheepers et al., 2015; Shanafelt et al., 2010; Weigl et al., 2015). Physicians and medical learners often avoid seeking mental health support due to stigma and concerns about their professional reputations. They fear that acknowledging issues like burnout, anxiety, or depression could be viewed as a sign of weakness (Association of American Medical Colleges, 2023) and negatively impact their careers. Barriers such as limited time, confidentiality concerns, and fear of professional consequences further hinder access to mental health care during residency (Aaronson et al., 2018). Additionally, nearly two-thirds (64%) of residents believe there is a stigma surrounding seeking mental health support (Medscape, 2020a).

Therefore, there is a need for an evidence-based, cost-effective, and technology-enabled mental health service that is accessible regardless of geographic location. Such a service would address the psychological challenges faced by physicians, postgraduate trainees, and medical students while overcoming stigma and barriers to access. In view of this, we introduced the Wellness4MDs intervention, a novel text-based initiative aimed at delivering daily supportive and informative SMS messages—some of which included embedded web links, to offer mental health support and educational resources to physicians and medical learners across Canada. The messages are grounded in cognitive behavioral therapy (CBT) principles and developed collaboratively by psychiatrists, mental health therapists, clinical psychologists, and individuals with lived mental health experience. The primary goal of the Wellness4MDs initiative is to support the mental health and well-being of physicians, postgraduate trainees, and medical students in Canada through daily SMS messages.

In Canada, e-mental health initiatives have shown promise in increasing the use of mental health services (Moroz, Moroz, & D'Angelo, 2020). Cost-effective and accessible interventions are particularly important, as many individuals with mental health conditions—including physicians and medical learners, often do not seek help due to stigma or geographical barriers (Saxena et al., 2007). Cognitive Behavioral Therapy

(CBT), a psychological treatment aimed at changing negative thought patterns (Beck, 2011), has been successfully delivered through text messaging, demonstrating its effectiveness in bridging gaps in mental health care and reducing symptoms of anxiety and depression (V. I. Agyapong et al., 2022; Agyapong et al., 2017; Agyapong, McLoughlin, & Farren, 2013).

For example, burnout, comprising emotional exhaustion (EE), depersonalization (DP), and reduced personal accomplishment (PA) (Weber, 2015), can be effectively addressed through Cognitive Behavioral Therapy (CBT)-based interventions. The Wellness4MDs SMS program uses CBT principles to target these dimensions. By promoting stress reappraisal, emotion regulation, and self-compassion, the program helps reduce emotional exhaustion (Lazarus & Folkman, 1984). It also aims to counter DP by challenging beliefs that encourage emotional detachment and by reinforcing empathy and professional purpose. CBT strategies such as goal setting and cognitive reframing can improve PA by boosting self-efficacy and motivation (Bandura, 1986). These mechanisms offer a strong theoretical basis for using CBT-informed messaging to reduce burnout in healthcare professionals. Additionally, CBT-based text messaging interventions are theoretically grounded in addressing anxiety, depression, and promoting well-being by targeting cognitive distortions and maladaptive coping. Beck's Cognitive Theory of Anxiety posits that anxiety stems from overestimating threats and underestimating coping abilities (Beck, 1979). CBT-informed messages that challenge catastrophic thinking and promote calming strategies can interrupt this cycle and reduce anxiety. Regarding well-being, daily SMS messages incorporating gratitude, self-kindness, and optimism draw from positive psychology and the Broaden-and-Build Theory, which suggests that cultivating positive emotions broadens psychological resources and builds resilience (Fredrickson, 2004). These CBT strategies have been shown to improve psychological functioning and are increasingly used in digital mental health interventions (Ly, Asplund, & Andersson, 2014; Seligman et al., 2005).

Research on supportive SMS text messaging has shown positive outcomes, including improved clinical symptoms and high user satisfaction (Agyapong, McLoughlin, & Farren, 2013; Agyapong et al., 2016; Agyapong et al., 2013). For instance, the

Text4Mood service, SMS text messaging program designed to fill gaps in psychological treatment, reported that the majority of subscribers felt more hopeful about managing their challenges (82%), empowered to handle depression and anxiety (77%), and felt connected to a support system (75%). Additionally, 83% of users indicated improvements in their overall well-being (Agyapong et al., 2016). Similarly, Text4Support, another text messaging program, demonstrated significant benefits, including reducing self-harm risk after six months of intervention (Shalaby, Spurvey, et al., 2022) and decreasing symptoms of distress, anxiety, and depression in clinical populations (Noble et al., 2021). Population-level SMS text messaging programs consistently achieve over 80% user satisfaction, with most subscribers reporting a stronger connection to support systems, improved ability to manage anxiety, depression, and life challenges, and enhanced mental health literacy (Agyapong et al., 2016; Agyapong et al., 2013; Shalaby, Adu, et al., 2022; Shalaby et al., 2021). The key strength of these supportive SMS text messaging programs lies in their feasibility and high perceived acceptability among users. However, there are limitations to these SMS text messaging programs. These text-based interventions may be less effective for more complex or severe mental health conditions, such as major depressive disorder or clinical burnout, which often require personalized, therapist-guided treatment.

The Wellness4MDs program distinguishes itself from the other supportive text messaging initiatives, such as Text4Mood, by specifically targeting physicians and medical learners, addressing the unique mental health challenges faced within the medical profession. The program aims to evaluate the probable burnout and mental health symptoms, as well as determine whether the daily supportive SMS messages can reduce the severity of these symptoms and improve overall well-being of physicians and medical learners in Canada.

We hypothesize that: (1) at least a 20% reduction in mean scores for burnout, anxiety, and depressive symptoms on validated scales and a 20% increase in self-reported well-being at 6 weeks and 3 months after receiving the service and (2) at least 80% of subscribers will express satisfaction with the program and perceive the daily supportive SMS text messages as contributing to their overall mental well-being.

4.2. Methods

4.2.1. Study Setting and Design

This quantitative longitudinal study evaluated the short-term effectiveness of the Wellness4MDs program, a supportive text messaging intervention that delivered daily messages over a three-month period. The study targeted Canadian physicians and medical learners, including postgraduate medical trainees and medical students. Recruitment was conducted nationally through collaborations with the Royal College of Physicians and Surgeons of Canada, faculties of medicine, provincial medical associations, health authorities, and medical licensing bodies. Promotional materials describing the Wellness4MDs program, along with subscription and opt-out instructions, were distributed to potential participants. These materials were shared by partner organizations through member mailing lists and social media platforms such as Facebook, LinkedIn, Instagram, and Twitter (now X).

Inclusion criteria include:

- Members (physicians, postgraduate medical trainees and medical students) of the Royal College of Physicians and Surgeons of Canada, faculties of medicine across Canada, provincial medical associations, provincial health authorities, and provincial medical licensing colleges.
- Ownership of a mobile device capable of receiving text messages.
- Able to read English and French text messages.

Exclusion criteria:

- Cannot read English and French text messages
- Does not own a mobile phone

4.2.2. Institutional Review Board Approval

The study received approval from the Health Sciences Research Ethics Board of Dalhousie University (REB#: 2023-6840) and the Human Ethics Review Board of the University of Alberta (Pro00129541). Informed consent was implied when participants accessed the study information leaflet, completed the survey questions, and submitted their

voluntary online responses. Confidentiality and data security protocols were strictly followed, as approved by the ethics boards.

4.2.3. Data Collection

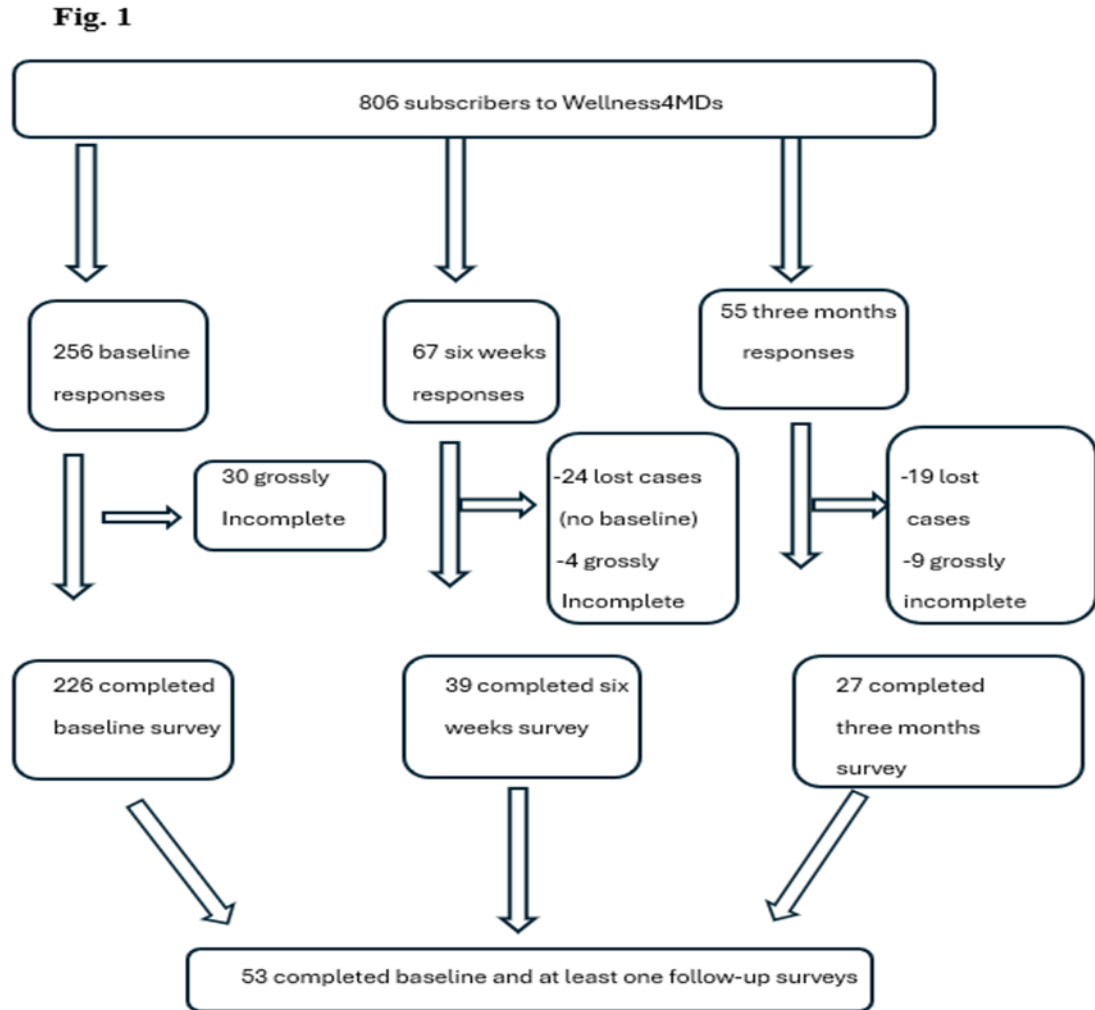
Data was collected between December 1, 2023, and September 30, 2024, through the Wellness4MDs program using a web-based survey at baseline (program enrollment), six weeks, and three months with a REDCap software program (Harris et al., 2009). The procedure for data collection is fully described in the study protocol (Shalaby et al., 2024). Physicians, postgraduate medical trainees (residents), and medical students subscribed to the program by texting “WellMD” for access in English or “BIENMD” for access in French to a designated phone number, which enrolled them to receive daily one-way supportive and informative SMS text messages for six months. Examples of an SMS text message with an embedded web link read:

- “Perfectionism can cause anxiety. Remember a perfect work environment does not exist. Try deliberately being imperfect and see what happens. Do your anxious thoughts come true? Remember that there are many possibilities in life. Try not to limit yourself from enjoying all that is possible.” In addition, an embedded web link has been provided (Oregon Counseling).
- “Problems are almost never solved in one step. See if you can break the problem into steps. Take the first step today by starting with a manageable situation. Get the support of a friend, family, colleagues, or supervisor.” In addition, an embedded web link has been provided (Course Hero).

The SMS text messages were created collaboratively by psychiatrists, mental health therapists, and individuals with lived experience of mental health challenges, and were grounded in cognitive-behavioral therapy (CBT) principles. Participation was voluntary, and participants continued to receive supportive text messages regardless of whether they completed the surveys. Each survey required a maximum of ten minutes to complete. Participants could opt out of the program at any time by texting “STOP” to the same number. No incentives were provided for survey completion. The baseline survey collected demographic data and clinical outcome measures. Follow-up survey links were sent via text message six weeks and three months after enrollment (as illustrated in Figure 4.1).

Figure 4.1.

Study Flowchart Illustrating the Total Number of Subscribers to the Wellness4MDs and the Number of Surveys Collected at each Time Point.



In total, 806 participants subscribed to the program. Of these, 256 participants responded at baseline, resulting in a response rate of 32%; however, only 226 completed the baseline survey, while 30 surveys were grossly incomplete. At follow-up, 66 participants provided responses: 39 completed the six-week survey, and 27 completed the three-month survey. A total of 53 participants completed the baseline survey and at least one follow-up survey, while only 14 participants completed the baseline, six-week, and three-month follow-up surveys.

4.2.4. Outcome Measures

Primary outcome measure was changes in the mean scores on the Patient Health Questionnaire (PHQ-9), Generalized Anxiety Disorder Scale (GAD-7), the Maslach Burnout Inventory (MBI), and the World Health Organization-Five Well-Being Index (WHO-5) for subscribers from baseline to 6 weeks and 3 months, assessing depression, anxiety, burnout symptoms, and quality of life and mental wellbeing, respectively.

The PHQ-9 is a self-administered scale designed to measure likely depression. It is an effective tool for patients and a validated tool for screening depressive symptoms among the general population (Shin et al., 2020). It is a nine-item questionnaire measured on a four-point Likert scale from “0” (not at all) to “3” (nearly every day). The PHQ-9 scale categorizes depression scores into none to minimal (0–4 points), mild (5–9 points), moderate (10–14 points), moderately severe (15–19 points), and severe (20–27 points) (Kroenke, Spitzer, & Williams, 2001). For analysis purposes, scores were recategorized into two groups: Likely depression (score ≥ 10) and unlikely depression (score < 10). The tool’s reliability and validity have shown good psychometric properties with accepted sensitivity using 10 or above as a cutoff score and high internal consistency (Cronbach $\alpha=0.79$) (Levis, Benedetti, & Thombs, 2019; Shin et al., 2020).

The GAD-7 scale is a self-administered valid tool designed to measure likely anxiety (Kroenke et al., 2007; Williams, 2014). The 7 self-reported items are used to assess the severity of generalized anxiety disorder (GAD) symptoms over the past 2 weeks. Ratings are based on a 4-point Likert scale: not at all sure (0), several days (1), over half the days (2), and nearly every day (3). Scores range from 0 to 21. The scale categorizes anxiety scores as minimal (0–4), mild (5–9), moderate (10–14), and severe anxiety (15–21) (Spitzer et al., 2006). A sensitivity of 89% and a specificity of 82% for a cutoff score of 10 (Williams, 2014) are considered. The GAD-7 also showed good test-retest reliability (intraclass correlation 0.83), as well as excellent internal consistency (Cronbach $\alpha=0.92$) (Kroenke et al., 2007; Owusu et al., 2022). The scores were recategorized into Likely anxiety (score ≥ 10) and unlikely anxiety (score < 10).

The Maslach Burnout Inventory- Human Services Survey for Medical Personnel (MBI-HSS MP) was used to collect data on burnout levels among medical personnel. The MBI-MP contains 22 seven-point items distributed across three dimensions: Emotional

Exhaustion (nine items), Personal Accomplishment (eight items), and Depersonalization (five items). The 7-point Likert response scales are defined as follows: 0 (never); 1 (a few times a year or less); 2 (once a month or less); 3 (a few times a month); 4 (once a week); 5 (a few times a week) 6 (every day) (Lin et al., 2022). Questions on the MBI-MP include:

1. I feel emotionally drained from my work.
2. I feel used up at the end of the workday.
3. I feel fatigued when I get up in the morning and have to face another day on the job.
4. I can easily understand how my recipients feel about things.
5. I feel I treat some recipients as if they were impersonal objects.
6. Working with people all day is really a strain for me.
7. I deal very effectively with the problems of my recipients.
8. I feel burned out from my work.
9. I feel I'm positively influencing other people's lives through my work.
10. I've become more callous toward people since I took this job.
11. I worry that this job is hardening me emotionally.
12. I feel very energetic.
13. I feel frustrated by my job.
14. I feel I'm working too hard on my job.
15. I don't really care what happens to some recipients.
16. Working with people directly puts too much stress on me.
17. I can easily create a relaxed atmosphere with my recipients.
18. I feel exhilarated after working closely with my recipients.
19. I have accomplished many worthwhile things in this job.
20. I feel like I'm at the end of my rope.
21. In my work, I deal with emotional problems very calmly.
22. I feel recipients blame me for some of their problems.

Emotional exhaustion was assessed by adding the responses to items 1, 2, 3, 6, 8, 13, 14, 16, and 20. Depersonalization is measured by summing the responses to items 5, 10, 11, 15, and 22. Personal accomplishment is evaluated by totaling the responses to items 4, 7, 9, 12, 17, 18, 19, and 21. Emotional exhaustion scores are categorized as high (≥ 27),

moderate (17–26), or low (0–16). Depersonalization scores are classified as high (≥ 13), moderate (7–12), or low (0–6). Personal accomplishment scores are interpreted as 0–31 indicating low levels, 32–38 moderate levels, and 39 or above reflecting high levels of personal accomplishment. The reliability of MBI is supported by several studies, where Cronbach α ratings of 0.90 for emotional exhaustion, 0.76 for depersonalization, and 0.76 for personal accomplishment (Complete dissertation by statistics solutions).

The WHO-5 is a self-reported measure was to assess well-being over time or to compare well-being between groups (Topp et al., 2015). The scale includes 5 positively worded items with a 6-point Likert scale used to assess participant's feelings in the last 2 weeks, ranging from 0 (not present) to 5 (constantly present). The raw scores are transformed into a score from 0 (worst thinkable well-being) to 100 (best thinkable well-being) (De Wit et al., 2007). The scale is scored by adding up the values of the five responses, resulting in a raw score ranging from 0 to 25, where 0 indicates the lowest possible quality of life, and 25 indicates the highest. To convert this into a percentage score, the raw score is multiplied by 4, with 0% representing the lowest quality of life and 100% the highest. A total raw score of 13 or less, or a percentage score of 50% or below, signifies low quality of life (QoL) and poor mental well-being and requires further evaluation for depression (Gao et al., 2020; Topp et al., 2015). Conversely, a raw score above 13 or a percentage score exceeding 50% reflects a high quality of life (QoL). The WHO-5 demonstrated satisfactory internal consistency reliability and concurrent validity with other scales (De Wit et al., 2007; Topp et al., 2015).

4.2.5. Sample Size Considerations

With a projection that the effect size for the reduction in mean scores of GAD-7 scale, PHQ-9, and MBI) scores at 3 months from baseline would be 0.1, a population variance of 1 for each scale mean score, a 2-sided significance level $\alpha=.05$, and a power of 90% ($\beta=.1$), using a web-based script (*Sample Size Calculators for designing clinical research*), we estimated that the sample size needed to assess the effects of the daily supportive SMS text messages on the outcome variables would be 1053.

4.2.6. Statistical Analysis

SPSS for windows, version 25(IBM Corporation, Armonk, NY, USA) (IBM Corp, 2017) was used to analyze the data for this study. Participants' roles, (physician, postgraduate medical trainee, and medical student) were plotted against all independent variables. The Chi-square/Fisher's exact test was employed to determine the relationship between each of the sociodemographic as categorical variables. Also, to determine the relationship between the clinical variables (continuous variables) among the study participants, a one-way analysis of variance (ANOVA) was conducted. Welch's ANOVA was employed where appropriate to account for violations of the homogeneity of variance assumption. Percentages and numbers were used to report the descriptive characteristics, with a significance level of $p \leq 0.05$ used to determine statistical significance for all analyses. Similarly, to examine the differences in the mean scores of the clinical scales at baseline and those who completed follow-up surveys (six weeks and 3 months), a paired sample 2-tailed *t*-test was performed. Paired sample *t*-tests were used to assess changes in continuous variables between baseline and follow-up. Before applying the paired sample *t*-tests, the normality assumption was assessed using the Shapiro–Wilk test, suitable for smaller sample sizes. We also conducted Levene's test to check for homogeneity of variances. To handle missing data, we utilized imputation techniques, focusing on the Last Observation Carried Forward (LOCF) method. This approach replaces missing values with the most recent recorded observations for the same individual. For example, participants with missing responses at 3 months had their missing data imputed, employing the last observations carried forward, precisely their responses at 6-week. By applying LOCF, we included all participants who completed the follow-up surveys and had baseline data in the analysis.

4.3. Results

Table 4.1a presents the sociodemographic characteristics of participants enrolled in the Wellness4MDs program against participants' role. The age distribution varied across professional roles, with vast majority of medical students aged ≤ 30 years (88.9%), while nearly half of postgraduate trainees fell into the same age group (47.4%), with a notable proportion being older. In contrast, most physicians were aged between 41–50 years (39.5%) or ≥ 51 years (34.2%). Gender distribution was relatively consistent across all

groups, with the majority of participants identifying as female (n = 186, 82.3%). Ethnic composition showed minor variations, though Caucasians comprised the majority in each group (n = 162, 71.7%). Relationship status differed significantly: while most participants were in a common-law relationship, partnered, or married (n = 165, 73.0%), medical students had a higher proportion of single individuals (n = 10, 27.8%) compared to physicians and trainees. Family practice was the most commonly reported specialty (n = 60, 32.1%). Geographically, the largest number of participants resided in Ontario (n = 65, 28.8%), followed by Alberta and Nova Scotia. Housing status also varied by role, with the majority of physicians (n = 137, 90.1%) reporting home ownership.

Table 4.1a

Distribution of Socio-demographics Among the Study Participants

Variables	Role				Chi2/Fishers Exact* Values	p- Test values
	Physician n (%)	Post Graduate Medical Trainee n (%)	Medical Student n (%)	Total n (%)		
Age						
≤ 30 years	3 (2)	18 (47.4)	32 (88.9)	53 (23.5)	149.6	<0.001
31-40 years	37 (24.3)	13 (34.2)	4 (11.1)	54 (23.9)		
41-50 years	60 (39.5)	5 (13.2)	0 (0)	65 (28.8)		
≥51years	52 (34.2)	2 (5.3)	0 (0)	54 (23.9)		
Gender						
Male	27 (17.8)	7 (18.4)	6 (16.7)	40 (17.7)	0.04	1.0
Female	125 (82.2)	31 (81.6)	30 (83.3)	186 (82.3)		
Ethnicity						

Variables	Role				Chi2/Fishers Exact* Values	p- Test values
	Physician n (%)	Post Graduate Medical Trainee n (%)	Medical Student n (%)	Total n (%)		
Caucasian	116 (76.3)	20 (52.6)	26 (72.2)	162 (71.7)	14.08*	0.02
Asian	21 (13.8)	12 (31.6)	7 (19.4)	40 (17.7)		
African/Latino	3 (2.0)	4 (10.5)	2 (5.6)	9 (4.0)		
Others	12 (7.9)	2 (5.3)	1 (2.8)	15 (6.6)		
Relationship status						
Common-law, Partnered or Married	110 (72.4)	29 (76.3)	26 (72.2)	165 (73.0)	16.70*	0.005
Single	15 (9.9)	6 (15.8)	10 (27.8)	31 (13.7)		
Separated or Divorced	25 (16.4)	2 (5.3)	0 (0.0)	27 (11.9)		
Widowed	2 (1.3)	1 (2.6)	0 (0.0)	3 (1.3)		
If you are a physician or postgraduate medical trainee, what is your speciality?						
Family practice	51 (33.6)	9 (25.7)	N/A	60 (32.1)	6.65*	0.42
Internal Medicine and related specialities (e.g., neurology, cardiology,	21(13.8)	3 (8.6)	N/A	24 (12.8)		

Variables	Role				Chi2/Fishers Exact* Values	p- Test values
	Physician n (%)	Post Graduate Medical Trainee n (%)	Medical Student n (%)	Total n (%)		
respiratory medicine etc.)						
Psychiatry	18 (11.8)	4 (11.4)	N/A	22 (11.8)		
Surgical Speciality	17 (11.2)	2 (5.7)	N/A	19 (10.2)		
Anesthesia	8 (5.3)	2 (5.7)	N/A	10 (5.3)		
Radiology and intervention medicine	4 (2.6)	1 (2.9)	N/A	5 (2.7)		
Pathology and Laboratory Medicine	3 (2.0)	0 (0.0)	N/A	3 (1.6)		
Other	30 (19.7)	14 (40.0)	N/A	44 (23.5)		

**If you are a medical student or
post-graduate medical trainee,
which year of the program are you in?**

First year	N/A	13 (37.1)	5 (14.7)	18 (26.1)	6.90	0.08
Second year	N/A	8 (22.9)	10 (29.4)	18 (26.1)		
Third year	N/A	5 (14.3)	12 (35.3)	17 (24.6)		
Fourth year	N/A	9 (25.7)	7 (20.6)	16 (23.2)		

Where do you currently reside

Variables	Role			Total <i>n</i> (%)	Chi2/Fishers Exact* Values	<i>p</i> - Test values
	Physician <i>n</i> (%)	Post Graduate Medical Trainee <i>n</i> (%)	Medical Student <i>n</i> (%)			
Alberta	35 (23.0)	5 (13.2)	6 (16.7)	46 (20.4)	*	
British Columbia	13 (8.6)	6 (15.8)	7 (19.4)	26 (11.5)		
Saskatchewan	6 (3.9)	0 (0)	0 (0)	6 (2.7)		
New Brunswick	11 (7.2)	1 (2.6)	0 (0)	12 (5.3)		
Manitoba	3 (2.0)	3 (7.9)	1 (2.8)	7 (3.1)		
Quebec	5 (3.3)	0 (0)	0 (0)	5 (2.2)		
Nova Scotia	23 (15.1)	5 (13.2)	2 (5.6)	30 (13.3)		
Ontario	35 (23.0)	16 (42.1)	14 (38.9)	65 (28.8)		
New Foundland and Labrador	6 (3.9)	2 (5.3)	1 (2.8)	9 (4.0)		
Nunavut	12 (7.9)	0 (0)	5 (13.9)	17 (7.5)		
Yukon	3 (2.0)	0 (0)	0 (0)	3 (1.3)		
Housing status						
Own Home	137 (90.1)	16 (42.1)	10 (27.8)	163 (72.1)	79.10*	0.001
Rented Accommodation	14 (9.2)	19 (50.0)	18 (50.0)	51 (22.6)		
Live with Family or Friends	1 (0.7)	3 (7.9)	8 (22.2)	12 (5.3)		

Table 4.1b presents the results of one-way analyses of variance (ANOVA) examining differences in clinical characteristics among physicians, postgraduate medical

trainees, and medical students at baseline. The clinical measures assessed included the WHO-5, GAD-7, PHQ-9, and MBI. Medical students reported the highest average well-being ($M = 13.03$, $SD = 5.12$), followed by physicians ($M = 12.03$, $SD = 4.94$) and trainees ($M = 10.83$, $SD = 4.68$), although these differences were not statistically significant. In contrast, for GAD-7 scores, medical students also reported the highest mean anxiety score ($M = 8.85$, $SD = 5.12$), followed by physicians ($M = 7.66$, $SD = 5.40$) and trainees ($M = 7.46$, $SD = 5.22$), indicating greater anxiety symptoms among students. However, these differences were not statistically significant. Similarly, depression scores were highest among trainees ($M = 8.67$, $SD = 6.37$) and lowest among medical students ($M = 7.35$, $SD = 5.26$), but these differences were also not statistically significant. The most notable differences emerged in emotional exhaustion, a core dimension of burnout. Physicians reported the highest levels of emotional exhaustion ($M = 31.69$, $SD = 12.58$), followed by trainees ($M = 30.10$, $SD = 12.48$), and medical students ($M = 24.83$, $SD = 9.81$). Welch's ANOVA indicated these differences were statistically significant ($F(2, 68) = 6.06$, $p = 0.004$). Depersonalization scores followed a similar pattern, with higher mean scores among physicians ($M = 9.55$, $SD = 6.69$) and trainees ($M = 9.43$, $SD = 6.63$) compared to medical students ($M = 7.34$, $SD = 5.24$), although these differences were not statistically significant. Finally, personal accomplishment scores were highest among physicians ($M = 37.30$, $SD = 6.67$) and lowest among medical students ($M = 34.23$, $SD = 7.36$), but no significant group differences were observed.

Table 4.1b

One-way ANOVA Distribution of Clinical Characteristics at Baseline Among the Study Participants

Clinical conditions severity, Mean (SD)					
Variables	Role	N	Mean (SD)	ANOVA Values (df), F values.	p-value
WHO-5	Physician	139	12.03 (4.94)	(2, 205), 1.74	0.18

Clinical conditions severity, Mean (SD)

Variables	Role	N	Mean (SD)	ANOVA Values (df), F values.	p-value
	Post Graduate Medical Trainee	35	10.83 (4.68)		
	Medical Student	34	13.03 (5.12)		
	Total	208	11.99 (4.94)		
GAD-7	Physician	138	7.66 (5.40)	(2, 204), 0.78	0.46
	Post Graduate Medical Trainee	35	7.46 (5.22)		
	Medical Student	34	8.85 (5.12)		
	Total	207	7.82 (5.32)		
PHQ-9	Physician	138	7.40 (5.58)	(2, 204), 0.77	0.47
	Post Graduate Medical Trainee	35	8.69 (6.37)		
	Medical Student	34	7.35 (5.26)		
	Total	207	7.60 (5.66)		

Clinical conditions severity, Mean (SD)

Variables	Role	N	Mean (SD)	ANOVA Values (df), F values.	p-value
Emotional Exhaustion (EE)	Physician	144	31.69 (12.58)	* (2, 68), 6.06	0.004
	Post Graduate Medical Trainee	35	30.10 (12.48)		
	Medical Student	35	24.83 (9.81)		
	Total	214	30.30 (12.36)		
Depersonalization (DP)	Physician	144	9.55 (6.69)	(2, 211), 1.67	0.20
	Post Graduate Medical Trainee	35	9.43 (6.63)		
	Medical Student	35	7.34 (5.24)		
	Total	214	9.17 (6.49)		
Personal Accomplishment (PA)	Physician	144	37.30 (6.67)	(2, 211), 2.80	0.06
	Post Graduate Medical Trainee	35	36.49 (7.14)		

Clinical conditions severity, Mean (SD)					
Variables	Role	N	Mean (SD)	ANOVA Values (df), F values.	p-value
	Medical Student	35	34.23 (7.36)		
	Total	214	36.65 (6.92)		

* Welch ANOVA

Table 4.1c illustrates post hoc comparisons exploring pairwise differences in emotional exhaustion (EE) among physicians, postgraduate medical trainees, and medical students. The analysis reveals that physicians reported significantly higher emotional exhaustion than medical students, with a mean difference of 6.86 (SE = 2.29, $p = 0.009$), and a 95% confidence interval ranging from 1.45 to 12.27.

Table 4.1c

Post hoc Analysis of Emotional Exhaustion (EE) by Professional Role

Variable	(I) What is your role?	(J) What is your role?	Mean difference	Standard error	p-value	95% Confidence Interval Lower bound Upper bound	
Emotional Exhaustion (EE)	Physician	Post Graduate Medical Trainee	1.63	2.29	0.760	-3.78	7.04
		Medical Student	6.86*	2.29	0.009	1.45	12.27
	Post Graduate	Physician	-1.63	2.29	0.760	-7.04	3.78

Variable	(I) What is your role?	(J) What is your role?	Mean difference	Standard error	p-value	95% Confidence Interval	
						Lower bound	Upper bound
	Medical Trainee	Medical Student	5.23	2.91	0.173	-1.63	12.09
	Medical Students	Physician	-6.86*	2.29	0.009	-12.27	-1.45
		Post Graduate Medical Trainee	-5.23	2.91	0.173	-12.09	1.63

* Significance at $p < 0.05$

We conducted a paired sample two-tailed t-test to assess differences in the mean scores of clinical scales between baseline and follow-up time points (six weeks and three months), as shown in **Table 4.2**. The WHO-5 total score showed significant improvements, with a 10.44% increase from baseline to the six-week follow-up ($t = -2.13, p = 0.04$), with a low effect size (Cohen's $d = 0.28$). When combining follow-up data using the last observation carried forward (LOCF) method, WHO-5 scores demonstrated a significant overall increase with a 9.40% change from baseline ($t = -2.06, p = 0.045$), with a low effect size (Cohen's $d = 0.2$), indicating improved well-being over time. Anxiety symptoms, measured by the GAD-7 scale, consistently decreased across follow-up points. Although the reduction at six weeks was not statistically significant ($p = 0.16$), the decrease at three months showed a stronger trend toward significance with a 15.5% change in mean score ($t = -2.05, p = 0.05$), with a low effect size (Cohen's $d = 0.3$). The combined LOCF analysis showed a significant reduction in anxiety symptoms with an overall improvement of approximately 12.6% change in mean score ($t = 2.16, p = 0.04$), with a low effect size (Cohen's $d = 0.2$).

Depression symptoms, as measured by the PHQ-9, showed slight reductions at both the six-week and three-month follow-up points; however, these changes were not statistically significant ($t = 1.17, p = 0.25$ at six weeks; $t = 0.78, p = 0.44$ at three months). Emotional exhaustion (EE) scores significantly decreased over time, with a 9.2% reduction

in mean score from baseline to six weeks ($t = 2.12, p = 0.04$), with a low effect size (Cohen's $d = 0.22$) and a 16.1% reduction at three months ($t = 2.86, p = 0.01$), with a low effect size (Cohen's $d = 0.4$). The LOCF analysis also show a significant decrease with a 10.9% change in mean score ($t = 2.95, p = 0.01$), with a low effect size (Cohen's $d = 0.3$). Depersonalization (DP) scores did not show any statistically significant differences ($p > 0.40$). Similarly, personal accomplishment (PA) scores remained stable, with no significant changes observed from baseline to the follow-up time points ($p > 0.40$).

Table 4.2

Changes in Mental Health Measures from Baseline to Follow-up Time Points.

Measures	N	Mean Scores		Mean difference (95% CI)	% Change from baseline	P value	t-test	Effect size (Cohen's d)
		Baseline	6 weeks					
WHO-5 total score	3 9	12.26 (4.10)	13.54 (4.99)	-1.28 (-2.50, 0.06)	10.44	0.04	-2.13	0.28
GAD-7 total score	3 9	6.36 (3.91)	5.64 (4.34)	0.72 (-0.30, 1.74)	11.30	0.16	1.42	0.17
PHQ-9 total score	3 9	6.64 (4.48)	6.02 (4.73)	0.62 (-0.45, 1.68)	9.20	0.25	1.17	0.13
Emotional Exhaustion (EE) total score	4 0	32.10 (12.99)	29.15 (13.56)	2.95 (0.13, 5.77)	9.20	0.04	2.12	0.22
Depersonalization (DP) total score	4 0	8.92 (7.01)	9.05 (7.45)	-0.13 (-1.55, 1.30)	1.46	0.86	-0.18	0.02

Measures	N	Mean Scores (SD)	Mean difference (95% CI)	% Change from baseline	P value	t- test	Effect size (Cohen 's <i>d</i>)
Personal Accomplishmen t (PA) total score	4 0	36.15 (6.48)	36.87 (6.79)	-0.73 (- 2.45, 0.99)	2.00	0.40 - 0.8 5	0.11
		Baselin e	3 months				
WHO-5 total score	2 6	11.27 (5.17)	12.81 (5.51)	-1.54 (- 3.26, 0.18)	13.7	0.08 - 1.8 4	0.3
GAD-7 total score	2 6	8.38 (4.42)	7.08 (4.78)	1.30 (- 0.004, 2.62)	15.5	0.05 2.0 5	0.3
PHQ-9 total score	2 6	8.23 (6.19)	7.65 (5.60)	0.58 (- 0.94, 2.09)	7.0	0.44 0.7 8	0.1
Emotional Exhaustion (EE) total score	2 7	30.63 (11.12)	25.70 (11.04)	4.93 (1.39, 8.46)	16.1	0.01 2.8 6	0.4
Depersonalizati on (DP) total score	2 7	7.70 (5.94)	7.18 (5.80)	0.52 (- 0.76, 1.80)	6.8	0.41 0.8 4	0.1
Personal Accomplishmen t (PA) total score	2 7	37.15 (7.52)	36.59 (7.54)	0.56 (- 1.08, 2.19)	1.5	0.49 0.7 0	0.1
		Baselin e	All data (6 weeks				

Measures	N	Mean Scores (SD)	Mean difference (95% CI)	% Change from baseline	P value	t- test	Effect size (Cohen 's <i>d</i>)	
			or 3 months)-LOCF					
WHO-5 total score	5 2	11.94 (4.52)	13.06 (5.29)	-1.12 (- 2.20, - 0.03)	9.40	0.04 5	- 2.0 6	0.2
GAD-7 total score	5 2	7.13 (4.46)	6.23 (4.77)	0.90 (0.07, 1.74)	12.6	0.04	2.1 6	0.2
PHQ-9 total score	5 2	7.40 (5.52)	6.75 (5.31)	0.65 (- 0.36, 1.66)	8.8	0.20	1.3 0	0.1
Emotional Exhaustion (EE) total score	5 3	31.77 (12.10)	28.30 (13.06)	3.47 (1.11, 5.83)	10.9	0.01	2.9 5	0.3
Depersonalizati on (DP) total score	5 3	8.40 (6.48)	8.51 (6.93)	-0.11 (- 1.16, 0.93)	1.3	0.83	- 0.2 2	0.02
Personal Accomplishmen t (PA) total score	5 3	36.75 (6.56)	36.64 (7.11)	0.11 (- 1.22, 1.45)	0.3	0.87	0.1 7	0.02

4.3.1. Perceived Impact of the Wellness4MDs Program

A total of 88 survey responses were received from participants after completing the Wellness4MDs intervention. **Table 4.3** summarizes participants' perceptions of the impact of the daily supportive text messages. Overall, 64 participants (72.7%) reported that the Wellness4MDs messages helped them cope with stress, while 62 participants (70.5%)

indicated that the messages assisted them in coping with anxiety. Additionally, 45 participants (51.1%) reported that the messages supported them in managing symptoms of depression, and 37 participants (42.0%) stated that the messages helped them cope with feelings of loneliness. Beyond symptom-specific support, 63 participants (71.6%) agreed that the Wellness4MDs messages contributed to a sense of connection to a support system. Similarly, 58 participants (69.9%) indicated that the messages fostered hopefulness regarding the management of mental health or substance use concerns. Furthermore, a majority of respondents (69 participants, 78.4%) endorsed that the Wellness4MDs messages contributed to improvements in their overall mental well-being. Lastly, 57 participants (64.8%) agreed that the supportive text messages enhanced their overall quality of life (See Figure 4.2).

Table 4.3

Perceived Impact of Daily Messages Post-intervention by Participants

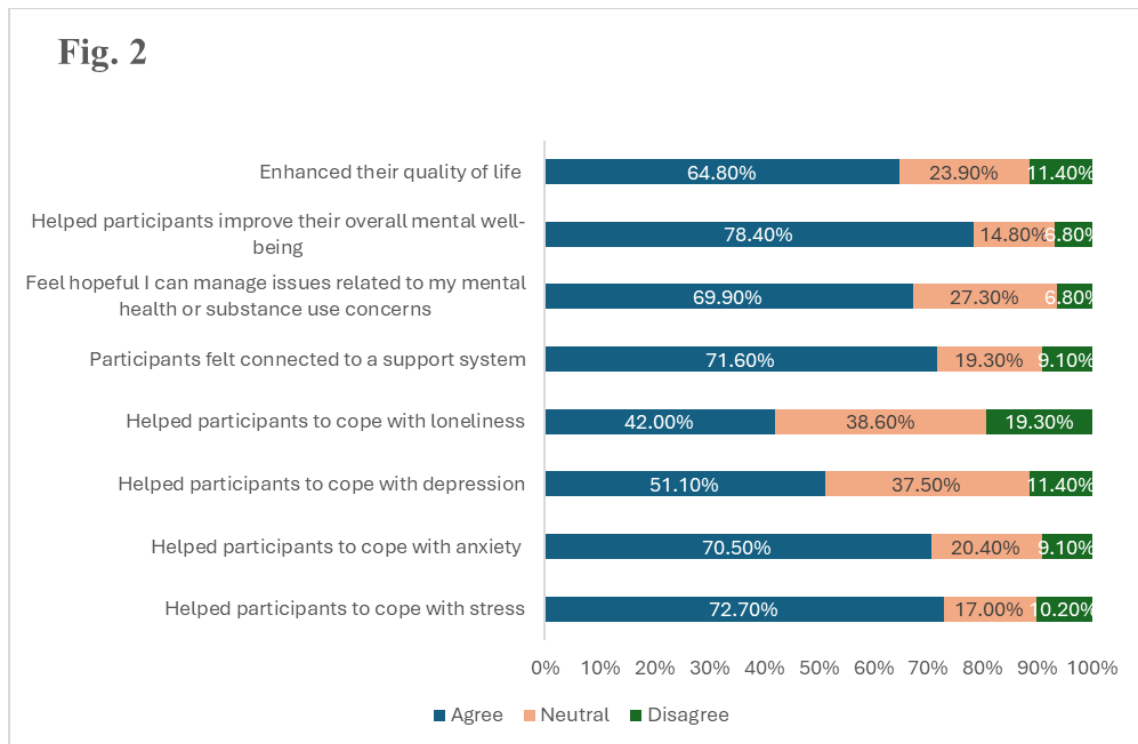
Perceived Impact of Wellness4MDs	All participants, n (%)
	<i>N=88</i>
Helped participants to cope with stress	
Agree	64 (72.7)
Neutral	15 (17.0)
Disagree	9 (10.2)
Helped participants to cope with anxiety	
Agree	62 (70.5)
Neutral	18 (20.5)
Disagree	8 (9.1)
Helped participants to cope with depression	

Perceived Impact of Wellness4MDs	All participants, n (%)
	<i>N=88</i>
Agree	45 (51.1)
Neutral	33 (37.5)
Disagree	10 (11.4)
Helped participants to cope with loneliness	
Agree	37 (42.0)
Neutral	34 (38.6)
Disagree	17 (19.3)
Participants felt connected to a support system	
Agree	63 (71.6)
Neutral	17 (19.3)
Disagree	8 (9.1)
Feel hopeful I can manage issues related to my mental health or substance use concerns	
Agree	58 (69.9)
Neutral	24 (27.3)
Disagree	6 (6.8)
Helped participants improve their overall mental well-being	
Agree	69 (78.4)
Neutral	13 (14.8)

Perceived Impact of Wellness4MDs	All participants, n (%)
	<i>N</i> =88
Disagree	6 (6.8)
Enhanced their quality of life	
Agree	57 (64.8)
Neutral	21 (23.9)
Disagree	10 (11.4)

Figure 4.2.

Perceived Impact of Daily Messages Post-intervention by Participants



4.3.2. Participant Feedback on the Wellness4MDs Program

Table 4.4 presents participants' feedback regarding the Wellness4MDs supportive text messaging program. Of the 88 respondents, 87 (98.8%) reported that the messages

were perceived as "always" or "often" positive, and 85 participants (96.6%) indicated that the messages were "always" or "often" affirming. Similarly, 82 participants (93.2%) rated the messages as "always" or "often" succinct, while 75 (85.2%) found them to be "always" or "often" relevant to their experiences. In terms of engagement, the majority of participants (83, 93.6%) reported that they "always" or "often" read the Wellness4MDs messages (See Figure 4.3). Additionally, 65 respondents (73.9%) indicated that they not only read the messages but also took time to reflect on them. However, only a small proportion (5 participants, 5.7%) reported reading the messages and subsequently engaging in a positive or beneficial action as a result. Regarding repeated engagement, over half of the participants (46, 52.3%) stated that they "often" or "sometimes" returned to re-read the messages. 74 participants (84.1%) expressed satisfaction with the frequency of the Wellness4MDs text messages. When asked about preferred frequency, the majority (53 participants, 60.2%) indicated a preference for receiving supportive messages once daily, while 23.9% of the respondents preferred to receive the messages Once every other day.

Table 4.4

Participants' Feedback After the Intervention

Feedback	All participants, n (%)
	N=88
The Wellness4MDs text messages were positive	
Always	64 (72.7)
Often	23 (26.1)
Sometimes	1 (1.2)
The Wellness4MDs text messages were affirmative	
Always	57 (64.8)
Often	28 (31.8)

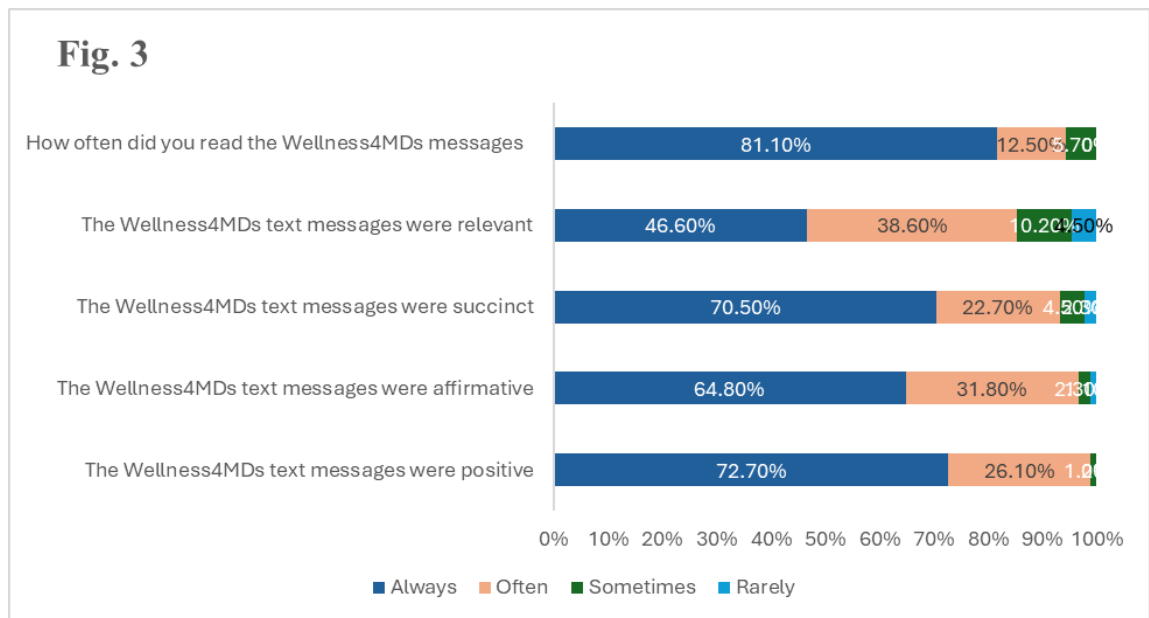
Feedback	All participants, n (%)
	N=88
Sometimes	2 (2.3)
Rarely	1 (1.1)
The Wellness4MDs text messages were succinct	
Always	62 (70.5)
Often	20 (22.7)
Sometimes	4 (4.5)
Rarely	2 (2.3)
The Wellness4MDs text messages were relevant	
Always	41(46.6)
Often	34 (38.6)
Sometimes	9 (10.2)
Rarely	4 (4.5)
How often did you read the Wellness4MDs messages	
Always	72 (81.1)
Often	11 (12.5)
Sometimes	5 (5.7)
Most of the time after receiving the Wellness4MDs messages	
I read the text and took no action	14 (15.9)

Feedback	All participants, n (%)
	<i>N=88</i>
I read the text and took time to reflect on the message	65 (73.9)
I read the text and took a positive or beneficial action	5 (5.7)
I read the text and took a negative or harmful action	2 (2.3)
I did not read the text	2 (2.3)
Did you return to read the Wellness4MDs text messages	
Always	4 (4.5)
Often	8 (9.1)
Sometimes	38 (43.2)
Rarely	32 (36.4)
Never	6 (6.8)
How satisfied were you with the frequency of the Wellness4MDs messages?	
Satisfied	74 (84.1)
Mixed	10 (11.4)
Dissatisfied	4 (4.5)
How often would you prefer to receive supportive messages?	
Twice daily	2 (2.3)

Feedback	All participants, n (%)
	<i>N</i> =88
Once daily	53 (60.2)
Once every other day	21 (23.9)
Once weekly	12 (13.6)

Figure 4.3

Participants' Feedback After the Intervention



4.3.3. Participant Overall Satisfaction with the Wellness4MDs Program

Table 4.5 summarizes participants' overall satisfaction ratings with the Wellness4MDs program. Of the total respondents, 86 participants completed the satisfaction survey item, which asked them to rate their satisfaction on a scale from 1 ("not at all satisfied") to 10 ("very satisfied"). The mean satisfaction score was 7.98 (SD = 2.06).

Table 4.5

How Participants Rated the Overall Satisfaction with the Wellness4MDs

Variable	N	Mean	Standard Deviation	Standard Error Mean
Using any number from 1 (not at all satisfied) to 10 (very satisfied), how would you rate your overall satisfaction with the Wellness4MDs?	86	7.98	2.06	0.22

4.4. Discussion

This study evaluated the psychological health and wellbeing of Physicians and medical learners, including postgraduate medical trainees and medical students using Wellness4MDs program, a novel CBT-based supportive text messaging program. Overall, the results indicate significant reduction in mean scores in emotional exhaustion (EE), anxiety (GAD-7), and well-being (WHO-5), while depression (PHQ-9), depersonalization (DP), and personal accomplishment (PA) showed no significant changes. The Wellness4MDs program achieved high satisfaction among participants.

4.4.1. Effectiveness of the Intervention on Clinical Outcomes

The results demonstrated a significant reduction in emotional exhaustion (EE), a principal component of burnout. Participants exhibited a 9.2% decrease in EE at six weeks ($p = 0.04$), a 16.1% decrease at three months ($p = 0.01$), and a 10.9% overall reduction in mean scores ($p = 0.01$) across follow-up periods using the last observation carried forward (LOCF) method, with a small-to-moderate effect size (Cohen's $d = 0.3$). The findings suggest that the Wellness4MDs intervention was effective in mitigating emotional exhaustion consistently across the study period. Emotional exhaustion is a critical predictor of physician burnout and has been associated with reduced professional satisfaction, impaired work-life balance, decreased quality of patient care, lower patient satisfaction, and heightened risks to patient safety (Shanafelt et al., 2015). These findings align with prior research demonstrating that structured wellness interventions can reduce burnout among healthcare professionals (West et al., 2016). Moreover, the results are consistent with those reported by L'Engle et al. (L'Engle, Trejo, & Coutinho, 2024), who found improvements in burnout following the implementation of a digital wellness program. In

contrast, depersonalization (DP) and personal accomplishment (PA) scores demonstrated minimal changes from baseline to follow-up, with no statistically significant improvements observed. Depersonalization, characterized by emotional disengagement from patients and work, remains a central dimension of burnout (Maslach & Leiter, 2016; Weber, 2015). The absence of a significant reduction in DP suggests that while the Wellness4MDs intervention effectively addressed emotional exhaustion, it may not have sufficiently targeted the broader attitudinal and behavioral elements of burnout. This observation is consistent with a systematic review by Panagioti et al. (Panagioti et al., 2017), which concluded that while individual-focused interventions, such as mindfulness and stress management programs, can reduce emotional exhaustion, meaningful improvements in depersonalization and professional efficacy typically require broader organizational interventions, such as workload adjustments and enhanced institutional support.

Following three months of participation in the Wellness4MDs program, participants also experienced a significant reduction in anxiety symptoms, as measured by the GAD-7 scale. The three-month follow-up demonstrated a 12.6% reduction in anxiety symptoms ($p = 0.04$), with an associated effect size of 0.2. This finding is consistent with previous research demonstrating reductions in anxiety following supportive text messaging interventions during the COVID-19 pandemic (V. I. Agyapong et al., 2022) and aligns with broader literature supporting the efficacy of digital health interventions, including mindfulness- and CBT-based programs, in reducing anxiety among healthcare professionals (Regehr et al., 2014). Given the high prevalence of anxiety in this population, these findings highlight the potential value of integrating digital mental health supports into healthcare settings to promote physician and medical learners' mental health and resilience.

The study also revealed significant improvements in participants' psychological well-being. WHO-5 scores showed a 10.44% increase at the six-week follow-up ($p = 0.04$). Moreover, when combining follow-up data using the LOCF method, a 9.40% mean improvement was confirmed ($p = 0.045$), with an effect size of 0.2, indicating sustained enhancement of well-being over the study period. These findings are consistent with existing evidence demonstrating that digital mental health interventions can improve

psychological well-being among workers (Agyapong et al., 2016; Carolan, Harris, & Cavanagh, 2017) and enhance occupational functioning. Although there was a slight reduction in depression symptoms, as measured by the PHQ-9, across follow-up periods, the observed changes were not statistically significant. This finding contrasts with previous studies that have demonstrated significant reductions in depressive symptoms following digital interventions (Agarwal et al., 2024; Barrett & Stewart, 2021; Nomeikaite et al., 2023). Multiple studies utilizing text-based or internet-delivered CBT interventions have reported improvements in depression outcomes (Agyapong et al., 2017; Vincent Israel Ouoku Agyapong et al., 2020; Brabyn et al., 2016). The lack of statistically significant improvement in depression in the present study may be attributable to the relatively short intervention duration or the nature of the intervention, which, while supportive, may not provide the intensity of therapeutic engagement required to treat clinical depression effectively.

The findings of our study suggest that the Wellness4MDs program was effective in improving emotional exhaustion, reducing anxiety symptoms, and enhancing overall well-being among physicians and medical learners. However, the intervention had a limited impact on depersonalization, personal accomplishment, and depression. These differential effects offer important theoretical and practical insights into how text-based, CBT-informed interventions impact different dimensions of mental health and burnout. The improvement in emotional exhaustion and anxiety aligns with cognitive-behavioral models of stress and emotional regulation. Emotional exhaustion (EE) is closely linked to perceived stress and maladaptive appraisal of workplace demands (Lazarus & Folkman, 1984). Similarly, anxiety is often fueled by catastrophic thinking and heightened threat perception (Beck, 1979). Wellness4MDs messages, grounded in CBT principles, likely targeted these cognitive distortions directly by offering supportive reframing, reminders of coping abilities, and stress management strategies which helped reduce perceived emotional strain and hyperarousal. In contrast, depression and depersonalization represent deeper, more entrenched cognitive and emotional patterns. Depression often involves persistent negative self-schemas and behavioral withdrawal, while depersonalization reflects emotional disengagement and cynicism developed over time (Maslach & Leiter, 2016). These symptoms may require more intensive, personalized, or therapist-guided

interventions to achieve meaningful improvement. Brief generalized text messages may not have been sufficient to modify these more ingrained patterns, especially in a short three-month intervention window.

4.4.2. Participant Satisfaction and Perceived Impact of the Wellness4MDs Program

This study evaluated participants' satisfaction with the Wellness4MDs program following a three-month period of receiving supportive text messages. Findings indicated a high level of overall satisfaction, with a mean satisfaction score of 7.98 (SD = 2.06). This result is consistent with previous studies that have reported high levels of participant satisfaction with supportive text messaging interventions aimed at improving mental health outcomes (Agyapong et al., 2025; Agyapong, McLoughlin, & Farren, 2013; Cartujano-Barrera et al., 2020; Shalaby et al., 2021). For example, a similar SMS-based intervention implemented during the COVID-19 pandemic reported a mean satisfaction score of 8.55 (Shalaby et al., 2021), comparable to the present findings. Although slightly lower, the satisfaction score for Wellness4MDs aligned with the 95% satisfaction rate reported in the Text4Mood program evaluation (Agyapong et al., 2016). Beyond overall satisfaction, the majority of participants reported positive impacts on mental health domains following the intervention. Specifically, 72.7% of participants indicated that the text messages helped them cope with stress, 70.5% with anxiety, 51.1% with depression, and 42.0% with feelings of loneliness. Additionally, 71.6% reported feeling more connected to a support system post-intervention. Participants also perceived broader benefits to their mental health and quality of life. Approximately 69.9% of respondents reported feeling more hopeful about managing mental health or substance use concerns, 78.4% indicated improvements in their overall mental well-being, and 64.8% reported an enhancement in their overall quality of life. These outcomes are largely consistent with findings from similar digital mental health interventions. For instance, the Text4Hope program reported that after six weeks of supportive text messaging, 76% of participants indicated an improved ability to cope with anxiety, 56% with depression, and 49% with loneliness. Notably, a slightly higher proportion of Wellness4MDs participants (78.4%) reported improvements in overall mental well-being compared to the 75.6% improvement rate observed in the Text4Hope program (Shalaby et al., 2021). Conversely, higher levels of improvement in mental well-

being were observed in evaluations of the Text4Mood (Agyapong et al., 2016). These findings suggest that the Wellness4MDs program was well-received and effective in enhancing psychological coping, well-being, and quality of life among participating physicians, postgraduate medical trainees, and medical students. The results further reinforce the potential of supportive text messaging as a scalable and accessible mental health intervention.

4.4.3. Participant Perceptions of Wellness4MDs Message Content and Delivery Frequency

Consistent with findings from prior research, the majority of Wellness4MDs subscribers reported highly favorable perceptions of the supportive text messages received through the program. Specifically, 98.8% of participants indicated that the messages were "always" or "often" positive, 96.6% reported that the messages were "always" or "often" affirming, and 93.2% rated the messages as "always" or "often" succinct (Agyapong et al., 2016; Shalaby et al., 2021). Furthermore, 85.2% of respondents agreed that the messages were "always" or "often" relevant to their personal experiences. These findings suggest that the continuous delivery of supportive, positively framed, and relevant messaging may play a meaningful role in enhancing the mental health and well-being of participants. This aligns with previous literature demonstrating that mobile phone-based mental health interventions are often perceived as positive, affirming, and relevant by their users (Agyapong et al., 2016; Obuobi-Donkor et al., 2023; Shalaby, Vuong, et al., 2022). Engagement with the Wellness4MDs messages was notably high. A majority of participants (93.6%) reported that they "always" or "often" read the text messages, and 73.9% stated that they not only read the messages but also took time to reflect on their content. These engagement rates are comparable to findings from previous study with similar evaluations of supportive text messaging programs (Agyapong, Shalaby, et al., 2024).

Participants also expressed high levels of satisfaction with the frequency of message delivery. Approximately 84.1% of respondents indicated satisfaction with the frequency of the Wellness4MDs messages, which is consistent with previous evaluations of supportive text messaging programs (Agyapong, Shalaby, et al., 2024; Agyapong et al., 2016). Regarding preferences for message frequency, 60.2% of participants preferred to

receive supportive messages once daily. This represents an approximate 8% decrease relative to findings from the Text4Mood program, where a higher proportion of participants preferred daily messages. In contrast, 23.9% of Wellness4MDs participants preferred receiving messages once every other day, a slightly higher proportion compared to the 12% reported in the Text4Mood evaluation (Agyapong et al., 2016).

Wellness4MDs, offered unique advantages over traditional and other digital mental health approaches, including scalability, accessibility, and low cost to participants compared to other interventions. Unlike in-person therapy or app-based interventions, text messaging is non-intrusive, fits easily into daily routines, and allows asynchronous access, making it particularly suitable for busy healthcare professionals. Compared to more expensive digital options like internet-based CBT (iCBT) (Mitchell et al., 2021), Wellness4MDs is free to users and did not require paid subscriptions or costly data plans. Additionally, it addresses critical barriers of face-to-face CBT, such as limited access and long wait times due to the shortage of trained therapists (Cavanagh, 2014).

4.4.4. Implications for Policy, Practice and Future Research

The findings of this study highlight the importance of integrating digital health interventions into physician and medical learners' wellness initiatives. Given the significant reductions in emotional exhaustion, anxiety, and well-being, future programs should continue to leverage technology-based approaches, such as mobile apps, to enhance accessibility and engagement. However, the limited improvements in depersonalization and depression suggest the need for a multi-faceted approach. Future research should explore combining individual-focused digital interventions with organizational-level changes. For example, studies have shown that reducing administrative burdens and optimizing work schedules can significantly improve physicians' mental well-being (Agarwal & Prabhakar, 2024; Lee et al., 2024; Salzberg, 2018). Implementing hybrid models that incorporate workplace modifications, peer support, and targeted mental health care may lead to more comprehensive improvements in physician well-being. Additionally, future research should examine the long-term effects beyond the three-month follow-up period. A longer study duration may offer deeper insights into sustained benefits and potential delayed improvements in depersonalization and depression. Also, we recommend

incorporating qualitative assessments, such as participant interviews, that could provide valuable perspectives on the perceived benefits and limitations of these interventions.

4.5. Limitations

Several limitations of this study should be acknowledged. First, the relatively small sample size may have reduced the statistical power of the analyses, particularly with respect to detecting significant changes in depression and depersonalization outcomes. In addition, the overall low response rate, potentially attributable to the online delivery format of the surveys, may limit the generalizability of the findings to the broader population of Wellness4MDs subscribers. Previous research has demonstrated that surveys administered via text message are associated with lower participant retention rates at follow-up compared to alternative methods, such as paper-based surveys (Bendtsen & Bendtsen, 2014; Daikeler, Bošnjak, & Lozar Manfreda, 2020). Another limitation of this study is the application of the Last Observation Carried Forward (LOCF) method for handling missing data. This technique presumes that the most recent available measurement remains constant over time, which may not accurately capture actual fluctuations. Consequently, it can lead to biased findings and an underestimation of data variability.

The voluntary nature of participation may have also introduced self-selection bias, as individuals with a greater interest in mental health interventions may have been more motivated to engage with the program and complete the surveys. Moreover, while the study employed validated and standardized self-report instruments, these measures are not diagnostic tools. Additionally, while the questionnaire used to assess user satisfaction with the Wellness4MDs program was adapted from tools applied in similar evaluations, it has not been formally validated. It is also important to note that the effect sizes observed for significant outcomes were small, potentially limiting the practical significance of the findings. Nonetheless, this is consistent with previous research, which has shown that self-help interventions delivered without direct therapist involvement often yield small effect sizes (Vincent Israel Ouoku Agyapong et al., 2020; Brabyn et al., 2016). Finally, the absence of a control group limits the ability to draw definitive causal inferences, as improvements observed over time cannot be conclusively attributed to the intervention alone.

4.6. Conclusion

The Wellness4MDs program offers an innovative, cost-effective approach to addressing the psychological and wellness needs of physicians and medical learners. The program significantly improved emotional exhaustion and anxiety symptoms among physicians and medical learners. Although the intervention did not lead to significant changes in depersonalization, personal accomplishment, or depression, its effectiveness in reducing burnout-related emotional exhaustion, lowering GAD-7 scores, and enhancing well-being from baseline to follow-up underscores the potential value of technology-enabled, CBT-based interventions. The Wellness4MDs program was well-received by participants, with high levels of satisfaction reported regarding the content and delivery of the supportive text messages. The study yielded important insights into participants' self-reported experiences, suggesting that the intervention contributed to notable improvements in quality of life, overall mental well-being, and coping with symptoms of anxiety, depression, and loneliness. Furthermore, participants indicated an enhanced sense of connection to a broader support network following the intervention. These findings provide further evidence supporting the feasibility, acceptability, and potential effectiveness of e-health interventions for mental health promotion. In particular, the positive reception among participants underscores the suitability of mobile health communication strategies for physicians and medical learners, offering a scalable and accessible approach to addressing psychological distress within this demographic.

Future initiatives should explore the long-term effects of the Wellness4MDs program beyond the three-month period and consider integrating organizational changes and targeted psychological support to further enhance physician well-being. Additionally, future randomized controlled trials are recommended to comprehensively evaluate the program's impact on anxiety, depression, and burnout symptoms among physicians and medical learners. Given the increasing prevalence of burnout and mental health challenges in the medical profession, continued investment in digital health interventions represents a promising strategy for strengthening physicians' psychological resilience and overall well-being.

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Institutional Review Board Statement

The study was conducted in accordance with the Declaration of Helsinki and approved by the Health Sciences Research Ethics Board of Dalhousie University (REB#: 2023-6840) and the Human Ethics Review Board of the University of Alberta (Pro00129541).

Informed Consent Statement

Informed consent was implied when participants accessed the study information leaflet, completed the survey questions, and submitted their voluntary online responses.

Conflicts of Interest

VA is the founder and Principal Investigator of the ResilienceNHope messaging programs and volunteers as the Board Chair of the Global Psychological eHealth Foundation, a not-for-profit organization. BA volunteers as the President and Chief Executive Officer of the Global Psychological eHealth Foundation. RS volunteers as the Program Director of the Global Psychological eHealth Foundation. EE volunteers as a Board Member of the Global Psychological eHealth Foundation. VA, BA, RS, and EE receive no financial or other compensation from the Global Psychological eHealth Foundation and have no financial conflicts of interest about this article. SON and CK have no commercial or financial conflict of interests.

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in the design and conduct of the study; preparation, review, or approval of the manuscript; or the submission of the results for publication.

Chapter 5: Conclusions, Implications for Policy, Practice and Future Directions

5.1. Summary of the Principal Findings:

The thesis presents an integrated study combining a scoping review and an intervention evaluation to assess psychological distress and explore supportive solutions for physicians and medical learners in Canada. The scoping review synthesized evidence from 92 studies published between 2021 and 2024, revealing a high and variable prevalence of burnout, depression, and anxiety within this population. Specifically, burnout rates ranged from 4.7% to 90.1% among physicians and from 18.3% to 94% among residents, while depression rates were reported between 4.8% and 66.5% in physicians and 7.7% to 93% in residents. Anxiety levels also showed wide variability, with reported rates of 8% to 78.9% in physicians and 10% to 63.9% in residents. The review also reported contributing factors including workload demands, gender disparities, age, COVID-19-related stress, and stigma surrounding help-seeking. Building on these findings, the second phase of the study evaluated the Wellness4MDs program—a CBT-informed supportive text messaging intervention. Out of 806 subscribers, 226 completed the baseline survey and 66 completed all follow-ups. After three months of receiving daily supportive messages, statistically significant reductions were observed in emotional exhaustion (16.1% reduction, $p = 0.01$) and anxiety symptoms (15.5% reduction, $p = 0.05$), although no significant change was noted in depression scores. Participants reported high satisfaction with the program (mean satisfaction score = 7.98/10), with majority reporting that the messages supported coping with stress (72.7%), anxiety (70.5%), depression (51.1%), and loneliness (42.0%), and contributed to improved well-being (78.4%) and a stronger sense of connection to a support system (71.6%).

5.2: Implications for Policy, Practice and Future Directions

The Wellness4MDs study underscores the pressing need for scalable, accessible, and stigma-free mental health interventions tailored to physicians and medical learners. The high prevalence of burnout, anxiety, and depression among physicians and medical trainees, as identified in the scoping review, underscores a pressing need for system-level interventions to support physician mental health. Policymakers must prioritize sustainable, accessible, and evidence-based mental health resources tailored to healthcare workers. One

promising avenue, as demonstrated by the Wellness4MDs program, is the integration of digital mental health tools—such as supportive CBT-based text messaging services—into existing healthcare infrastructure. The program’s high satisfaction ratings, accessibility, and moderate effect sizes in reducing emotional exhaustion and anxiety symptoms suggest it could serve as a scalable complement to traditional interventions. Ministries of health and professional regulatory bodies should recognize such digital interventions as complementary tools that can help mitigate psychological distress in the workforce.

In clinical practice, implementing first-line, low-intensity digital interventions like Wellness4MDs can help close the treatment gap (B. Agyapong et al., 2022; Agyapong et al., 2016) and reach individuals reluctant to access face-to-face care due to stigma or confidentiality concerns. Integrating such programs into residency curricula, employee wellness strategies, and licensing frameworks could enhance preventive mental health care across the medical profession.

Future directions should explore long-term outcomes beyond three months, assess effectiveness across different specialties and demographics, and compare with other digital technology interventions such as iCBT (Gratzer & Khalid-Khan, 2016). Research should also explore integration with stepped-care models and examine how personalized message delivery platforms might further optimize engagement and outcomes. The stepped care model is a mental health service delivery framework that prioritizes starting with the least intensive yet effective interventions and escalating to more intensive care only as needed. It aims to optimize resource use while ensuring care is matched to patient needs. Interventions are arranged along a continuum—from low-intensity options like self-help, psychoeducation, and digital tools (e.g., supportive text messaging, iCBT) to high-intensity treatments such as in-person therapy, medication, or hospitalization. The stepped care model has proven to be both clinically effective and cost-efficient in managing mental health conditions within primary care settings (Bower & Gilbody, 2005). Research shows that stepped care for depression and anxiety resulted in outcomes comparable to traditional care, while optimizing the use of healthcare resources (van Straten et al., 2015).

Integrating the Wellness4MDs intervention—a supportive, CBT-based SMS program—into this model as a first-line, low-intensity approach offers several advantages.

It can serve as an initial support tool to help identify individuals who may require more intensive treatment and can provide scalable, accessible mental health support to a broad population. This allows healthcare systems to prioritize more resource-intensive interventions for individuals with ongoing or more severe symptoms, thereby improving efficiency and access across the continuum of care. Additionally, future research should also investigate the benefits of integrating individual-level digital interventions with systemic organizational strategies. For instance, evidence suggests that efforts such as minimizing administrative tasks and streamlining work schedules can greatly enhance the mental health of physicians (Agarwal & Prabhakar, 2024; Lee et al., 2024; Salzberg, 2018). Developing hybrid approaches that merge supportive digital tools with institutional changes—such as peer support programs and tailored mental health services—may yield more holistic and sustainable improvements in physician well-being. Collectively, these steps will contribute to a more resilient healthcare workforce and advance mental health service equity across geographic and professional boundaries (V. I. Agyapong et al., 2022; Shanafelt, Goh, & Sinsky, 2017).

Researchers, policymakers, and decision-makers may be more inclined to endorse and invest in innovative interventions (e.g. Wellness4MDs) when there is clear evidence of their feasibility and positive impact. Such support can be fostered through strategic investments and coordinated efforts that promote the delivery and effective integration of these services.

5.3. Study Limitations

As outlined in the previous sections, this research exhibited several limitations. In summary, concerning the scoping review, a major constraint was the heterogeneity among the included studies. Variations in study design, participant characteristics, measurement tools, and the operational definitions of psychological outcomes—such as burnout, anxiety, and depression—complicated direct comparisons and may reduce the generalizability of the results. Additionally, most studies employed cross-sectional methodologies, limiting the ability to establish causal relationships or track changes over time. The predominant use of self-reported instruments, though validated, introduces the risk of response bias and lacks the diagnostic precision of clinical assessments.

In relation to the Wellness4MDs intervention, one notable limitation was the potential for self-selection bias. Participants who were more psychologically distressed may have been more likely to enroll in the program and complete the surveys. This may result in an inflated estimate of mental health symptom prevalence and reduce the sample's overall representativeness. The relatively small sample size may have reduced the statistical power of the analyses, particularly with respect to detecting significant changes in depression and depersonalization outcomes. Furthermore, the three-month follow-up period was relatively short, making it difficult to draw conclusions about the long-term effectiveness of the intervention.

High attrition between baseline and follow-up further limited the analysis and may have introduced bias by overrepresenting more engaged participants and underrepresenting those experiencing greater stress or lower benefit, limiting the generalizability of results, and although the last observation carried forward (LOCF) method was used to manage missing data, it may not fully capture variability in participant outcomes. To help reduce attrition, future efforts will prioritize improving participant retention by incorporating greater flexibility and personalized support. This may involve allowing participants to select their preferred time of day (morning, afternoon, or evening), message frequency (daily or every other day), and specific days of the week to receive messages. Moreover, providing an option to temporarily pause the service and restart it when needed could better accommodate individual schedules and changing needs. Lastly, the lack of a control group weakened the ability to draw strong causal inferences regarding the intervention's effects. Future studies should address these limitations by employing randomized controlled designs, ensuring longer follow-up durations, enhancing participant retention, and recruiting more diverse samples.

5.4: Conclusion.

This thesis highlights the significant burden of psychological distress—particularly burnout, anxiety, and depression—among physicians and medical learners in Canada. The findings from the scoping review confirmed widespread variability in the prevalence of these mental health concerns, underlining the urgency of targeted interventions. The Wellness4MDs program, a low-cost, CBT-based supportive text messaging intervention,

demonstrated promising outcomes in mitigating symptoms of emotional exhaustion and anxiety while receiving high user satisfaction ratings. Notably, the intervention was also associated with improved well-being and perceived social support, despite no statistically significant reduction in depressive symptoms.

The effectiveness of Wellness4MDs affirms the value of scalable, technology-driven mental health solutions that address key barriers—such as stigma, confidentiality concerns, and limited access to care—that prevent physicians and medical trainees from seeking help. As a population-level intervention requiring minimal time commitment, Wellness4MDs represents an accessible and flexible adjunct to conventional services. The high uptake and satisfaction rates reinforce the acceptability of such a model among busy healthcare professionals.

In conclusion, this study provides evidence supporting the integration of digital CBT-based messaging interventions into broader physician and medical learners' wellness strategies. While further research with larger and more diverse samples is necessary, the current findings position Wellness4MDs as a meaningful tool for enhancing psychological health in a high-risk, high-impact population.

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Appendix Section

Appendix 3.1: Search Strategy

We searched Medline, PubMed, Scopus, PsycINFO, and CINAHL. Search terms include: “prevalence of depression,” “prevalence of anxiety,” “prevalence of burnout,” “depression”, “burnout”, “anxiety”, “prevalence”, “physicians,” “doctors,” “medical practitioners,” and “resident physicians.” Search was conducted in April, 2024.

3.1.1. Example of Search in Medline

1. *Depression/ or depression.mp.
2. Burnout, Psychological/ or Burnout, Professional/ or burnout.mp.
3. Anxiety.mp. or Anxiety/
4. Prevalence/ or prevalence.mp.
5. Physicians, Family/ or Physicians/ or physicians.mp. or Physicians, Primary Care/
6. medical practitioners.mp.
7. Physicians/ or Doctors.mp.
8. "Internship and Residency"/ or resident physicians.mp.
9. 1 and 2 and 3
10. 4 and 9
11. 5 or 6 or 7 or 8
12. 10 and 11

3.1.2. Example of Search in PubMed

Search: (((depression) AND (burnout)) AND (anxiety)) AND (prevalence) AND (((physicians) OR (doctors)) OR (medical practitioners)) OR (resident physicians))

("depressed"[All Fields] OR "depression"[MeSH Terms] OR "depression"[All Fields] OR "depressions"[All Fields] OR "depression s"[All Fields] OR "depressive disorder"[MeSH Terms]

OR ("depressive"[All Fields] AND "disorder"[All Fields]) OR "depressive disorder"[All Fields] OR "depressivity"[All Fields] OR "depressive"[All Fields] OR "depressively"[All Fields] OR "depressiveness"[All Fields] OR "depressives"[All Fields]) AND ("burnout s"[All Fields] OR "burnout, psychological"[MeSH Terms] OR ("burnout"[All Fields] AND "psychological"[All Fields]) OR "psychological burnout"[All Fields] OR "burnout"[All Fields] OR "burnouts"[All Fields]) AND ("anxiety"[MeSH Terms] OR "anxiety"[All Fields] OR "anxieties"[All Fields] OR "anxiety s"[All Fields]) AND ("epidemiology"[MeSH Subheading] OR "epidemiology"[All Fields] OR "prevalence"[All Fields] OR "prevalence"[MeSH Terms] OR "prevalance"[All Fields] OR "prevalences"[All Fields] OR "prevalence s"[All Fields] OR "prevalent"[All Fields] OR "prevalently"[All Fields] OR "prevalents"[All Fields]) AND ("physician s"[All Fields] OR "physicians"[MeSH Terms] OR "physicians"[All Fields] OR "physician"[All Fields] OR "physicians s"[All Fields] OR ("doctor s"[All Fields] OR "doctoral"[All Fields] OR "doctorally"[All Fields] OR "doctorate"[All Fields] OR "doctorates"[All Fields] OR "doctoring"[All Fields] OR "physicians"[MeSH Terms] OR "physicians"[All Fields] OR "doctor"[All Fields] OR "doctors"[All Fields]) OR ("medic"[All Fields] OR "medical"[All Fields] OR "medicalization"[MeSH Terms] OR "medicalization"[All Fields] OR "medicalizations"[All Fields] OR "medicalize"[All Fields] OR "medicalized"[All Fields] OR "medicalizes"[All Fields] OR "medicalizing"[All Fields] OR "medically"[All Fields] OR "medicals"[All Fields] OR "medicated"[All Fields] OR "medication s"[All Fields] OR "medics"[All Fields] OR "pharmaceutical preparations"[MeSH Terms] OR ("pharmaceutical"[All Fields] AND "preparations"[All Fields]) OR "pharmaceutical preparations"[All Fields] OR "medication"[All Fields] OR "medications"[All Fields]) AND ("practitioner"[All Fields] OR "practitioner s"[All Fields] OR "practitioners"[All Fields])) OR (("internship and residency"[MeSH Terms] OR ("internship"[All Fields] AND "residency"[All Fields]) OR "internship and residency"[All Fields] OR "residencies"[All Fields] OR "residency"[All Fields] OR "reside"[All Fields] OR "resided"[All Fields] OR "residence"[All Fields] OR "residence s"[All Fields] OR "residences"[All Fields] OR "residency s"[All Fields] OR "resident"[All Fields] OR "resident s"[All Fields] OR "residents"[All Fields] OR "resides"[All Fields] OR "residing"[All Fields]) AND ("physician s"[All Fields] OR "physicians"[MeSH Terms] OR "physicians"[All Fields] OR "physician"[All Fields] OR "physicians s"[All Fields]))))

Translations

depression: "depressed"[All Fields] OR "depression"[MeSH Terms] OR "depression"[All Fields] OR "depressions"[All Fields] OR "depression's"[All Fields] OR "depressive disorder"[MeSH Terms] OR ("depressive"[All Fields] AND "disorder"[All Fields]) OR "depressive disorder"[All Fields] OR "depressivity"[All Fields] OR "depressive"[All Fields] OR "depressively"[All Fields] OR "depressiveness"[All Fields] OR "depressives"[All Fields]

burnout: "burnout's"[All Fields] OR "burnout, psychological"[MeSH Terms] OR ("burnout"[All Fields] AND "psychological"[All Fields]) OR "psychological burnout"[All Fields] OR "burnout"[All Fields] OR "burnouts"[All Fields]

anxiety: "anxiety"[MeSH Terms] OR "anxiety"[All Fields] OR "anxieties"[All Fields] OR "anxiety's"[All Fields]

prevalence: "epidemiology"[Subheading] OR "epidemiology"[All Fields] OR "prevalence"[All Fields] OR "prevalence"[MeSH Terms] OR "prevalance"[All Fields] OR "prevalences"[All Fields] OR "prevalence's"[All Fields] OR "prevalent"[All Fields] OR "prevalently"[All Fields] OR "prevalents"[All Fields]

physicians: "physician's"[All Fields] OR "physicians"[MeSH Terms] OR "physicians"[All Fields] OR "physician"[All Fields] OR "physicians's"[All Fields]

doctors: "doctor's"[All Fields] OR "doctoral"[All Fields] OR "doctorally"[All Fields] OR "doctorate"[All Fields] OR "doctorates"[All Fields] OR "doctoring"[All Fields] OR "physicians"[MeSH Terms] OR "physicians"[All Fields] OR "doctor"[All Fields] OR "doctors"[All Fields]

medical: "medic"[All Fields] OR "medical"[All Fields] OR "medicalization"[MeSH Terms] OR "medicalization"[All Fields] OR "medicalizations"[All Fields] OR "medicalize"[All Fields] OR "medicalized"[All Fields] OR "medicalizes"[All Fields] OR "medicalizing"[All Fields] OR "medically"[All Fields] OR "medicals"[All Fields] OR "medicated"[All Fields] OR "medication's"[All Fields] OR "medics"[All Fields] OR "pharmaceutical preparations"[MeSH Terms] OR ("pharmaceutical"[All Fields] AND "preparations"[All Fields]) OR "pharmaceutical preparations"[All Fields] OR "medication"[All Fields] OR "medications"[All Fields]

practitioners: "practitioner"[All Fields] OR "practitioner's"[All Fields] OR "practitioners"[All Fields]

resident: "internship and residency"[MeSH Terms] OR ("internship"[All Fields] AND "residency"[All Fields]) OR "internship and residency"[All Fields] OR "residencies"[All Fields] OR "residency"[All Fields] OR "reside"[All Fields] OR "resided"[All Fields] OR "residence"[All Fields] OR "residence's"[All Fields] OR "residences"[All Fields] OR "residency's"[All Fields] OR "resident"[All Fields] OR "resident's"[All Fields] OR "residents"[All Fields] OR "resides"[All Fields] OR "residing"[All Fields]

physicians: "physician's"[All Fields] OR "physicians"[MeSH Terms] OR "physicians"[All Fields] OR "physician"[All Fields] OR "physicians's"[All Fields]

3.1.3. Example of Search in Scopus

(TITLE-ABS-KEY (prevalence AND of AND depression) OR TITLE-ABS-KEY (prevalence AND of AND anxiety) OR TITLE-ABS-KEY (prevalence AND of AND burnout) AND TITLE-ABS-KEY (physicians) OR TITLE-ABS-KEY (medical AND doctors) OR TITLE-ABS-KEY (medical AND practitioners) OR TITLE-ABS-KEY (resident AND physicians))

3.1.4. Example of Search in CINAHL

Search ID#	Search Terms	Search Options
S10	S7 AND S8	<p>Limiters - Publication Date: 20210101-20241231</p> <p>Expanders - Apply related words; Apply equivalent subjects</p> <p>Search modes – Proximity</p>
S9	S7 AND S8	<p>Expanders - Apply related words; Apply equivalent subjects</p> <p>Search modes - Proximity</p>

Search ID#	Search Terms	Search Options
S8	S4 OR S5 OR S6	Expanders - Apply related words; Apply equivalent subjects Search modes - Proximity
S7	S1 OR S2 OR S3	Expanders - Apply related words; Apply equivalent subjects Search modes - Proximity
S6	resident physicians	Expanders - Apply related words; Apply equivalent subjects Search modes - Proximity
S5	medical practitioners	Expanders - Apply related words; Apply equivalent subjects Search modes - Proximity
S4	physicians or doctors or clinicians	Expanders - Apply related words; Apply equivalent subjects Search modes - Proximity
S3	prevalence of anxiety	Expanders - Apply related words; Apply equivalent subjects Search modes - Proximity
S2	prevalence of burnout	Expanders - Apply related words; Apply equivalent subjects Search modes - Proximity
S1	prevalence of depression	Expanders - Apply related words; Apply equivalent subjects

Search ID#	Search Terms	Search Options
		Search modes – Proximity

3.1.5. Example of Search in PsycINFO

Search ID#	Search Terms	Search Options
S10	S7 AND S8	Limiters - Publication Date: 20210101-20241231 Expanders - Apply related words; Apply equivalent subjects Search modes – Proximity
S9	S7 AND S8	Expanders - Apply related words; Apply equivalent subjects Search modes - Proximity
S8	S4 OR S5 OR S6	Expanders - Apply related words; Apply equivalent subjects Search modes - Proximity
S7	S1 OR S2 OR S3	Expanders - Apply related words; Apply equivalent subjects Search modes - Proximity
S6	resident physicians	Expanders - Apply related words; Apply equivalent subjects Search modes - Proximity
S5	medical practitioners	Expanders - Apply related words; Apply equivalent subjects Search modes - Proximity

Search ID#	Search Terms	Search Options
S4	physicians or doctors or clinicians	Expanders - Apply related words; Apply equivalent subjects Search modes - Proximity
S3	prevalence of burnout	Expanders - Apply related words; Apply equivalent subjects Search modes - Proximity
S2	prevalence of anxiety	Expanders - Apply related words; Apply equivalent subjects Search modes - Proximity
S1	prevalence depression	of Expanders - Apply related words; Apply equivalent subjects Search modes – Proximity