



The state of wellbeing education across North American medical schools: A scoping review

L'état de la formation en matière de bien-être dans les facultés de médecine d'Amérique du Nord : un examen de la portée

Noam Raiter, Kiana Yau, Alisha Sharma, Melanie Lewis and Victor Do

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Article abstract

Background/Objective: Medical students experience increased rates of burnout and mental illness compared to the general population. Yet, it is unclear to what extent North American medical schools have adopted formal wellbeing curricula. We sought to establish prevailing themes of existing wellbeing educational interventions to identify opportunities for further curricular development.

Methods: We conducted a scoping review of the literature searching for wellbeing education programs implemented for undergraduate medical students across North America. We searched four comprehensive databases and grey literature and only included published original research. Two independent researchers screened all papers with a third to resolve any disagreements. Two researchers conducted the data extraction following a predetermined template that was refined continuously, with a third researcher to resolve any discrepancies.

Results: We identified 3996 articles in the initial search of which 30 met inclusion criteria and were included for further analysis. The most common types of interventions were mindfulness and meditation practices. 27 studies found that their wellbeing sessions contributed to positive wellbeing outcomes of learners.

Conclusions: Our review identified that there are few wellbeing curricular initiatives that have been evaluated and published in the literature. Additionally, the methodology and rigour of wellbeing curriculum evaluation to date leaves significant room for improvement. The existing literature does suggest that the adoption of a wellbeing curriculum has the potential to improve outcomes for medical students. These findings can be used to assist the development of a validated wellbeing curricular framework for wellbeing initiatives.

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The state of wellbeing education across North American medical schools: a scoping review

L'état de la formation en matière de bien-être dans les facultés de médecine d'Amérique du Nord : un examen de la portée

Noam Raiter,¹ Kiana Yau,² Alisha Sharma,³ Melanie Lewis,⁴ Victor Do⁵

¹Department of Family and Community Medicine, Temerty Faculty of Medicine, University of Toronto, Ontario, Canada; ²McGill School of Medicine, Faculty of Medicine and Health Sciences, McGill University, Quebec, Canada; ³Department of Internal Medicine University of Toronto, Ontario, Canada; ⁴Department of Pediatrics, Faculty of Medicine and Dentistry, University of Alberta, Alberta, Canada; ⁵Department of Pediatrics, Temerty Faculty of Medicine, University of Toronto, Ontario, Canada

Correspondence to: Noam Raiter, MD 27 King's College Circle, Toronto, ON M5S 1A1; email: noam.raiter@mail.utoronto.ca

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Abstract

Background/Objective: Medical students experience increased rates of burnout and mental illness compared to the general population. Yet, it is unclear to what extent North American medical schools have adopted formal wellbeing curricula. We sought to establish prevailing themes of existing wellbeing educational interventions to identify opportunities for further curricular development.

Methods: We conducted a scoping review of the literature to identify wellbeing education programs implemented for undergraduate medical students across North America. We searched four comprehensive databases and grey literature and only included published original research. Two independent researchers screened all papers, with a third resolving disagreements. Two researchers conducted the data extraction using a continuously refined template, with a third researcher resolving any discrepancies.

Results: We identified 3996 articles in the initial search of which 30 met inclusion criteria and were included for further analysis. The most common types of interventions were mindfulness and meditation practices. 27 studies found that their wellbeing sessions contributed to positive wellbeing outcomes of learners.

Conclusions: Our review identified that there are few wellbeing curricular initiatives that have been evaluated and published in the literature. Additionally, the methodology and rigour of wellbeing curriculum evaluation to date leaves significant room for improvement. The existing literature does suggest that the adoption of a wellbeing curriculum has the potential to improve outcomes for medical students. These findings can be used to assist the development of a validated wellbeing curricular framework for wellbeing initiatives. However, while such a curriculum may represent an effective tool in enhancing medical trainee wellbeing, it cannot effect change in isolation; lasting and meaningful change will require concurrent shifts within the broader systemic framework and cultural fabric of the medical education system.

Résumé

Contexte/Objectif : Les étudiants en médecine connaissent des taux plus élevés d'épuisement professionnel et de maladie mentale que la population générale. Pourtant, on ne sait pas exactement dans quelle mesure les facultés de médecine nord-américaines ont adopté un curriculum formel sur le bien-être. Nous avons cherché à établir les thèmes dominants des interventions éducatives existantes en matière de bien-être afin d'identifier les possibilités de développement curriculaire.

Méthodes : Nous avons procédé à un examen approfondi de la littérature à la recherche de programmes de formation en matière de bien-être mis en œuvre pour les étudiants en médecine de niveau prédoctoral en Amérique du Nord. Nous avons interrogé quatre bases de données exhaustives et la littérature grise et n'avons retenu que les recherches originales publiées. Deux chercheurs indépendants ont examiné tous les articles, un troisième étant chargé de résoudre les éventuels désaccords. Deux chercheurs ont procédé à l'extraction des données en suivant un modèle prédéterminé qui a été affiné de façon itérative, un troisième chercheur étant chargé de résoudre les éventuelles divergences.

Résultats : Nous avons identifié 3996 articles lors de la recherche initiale, dont 30 répondaient aux critères d'inclusion et ont été retenus pour une analyse plus approfondie. Les types d'interventions les plus courants étaient les pratiques de pleine conscience et de méditation. Au total, 27 études ont montré que leurs sessions de bien-être contribuaient à des résultats positifs quant au bien-être des apprenants.

Conclusions : Notre revue de la littérature actuelle a révélé que peu d'initiatives curriculaire en matière de bien-être ont été évaluées et publiées dans la littérature. En outre, la méthodologie et la rigueur de l'évaluation des curriculum sur le bien-être à ce jour laissent une grande place à l'amélioration. La littérature existante suggère que l'adoption d'un curriculum sur le bien-être peut améliorer les résultats des étudiants en médecine. Ces résultats peuvent être utilisés pour aider au développement d'un cadre validé de curriculum sur le bien-être pour les initiatives dans ce domaine.

Introduction

There has been an increasing focus on enhancing the wellbeing of medical learners to address the endemic issue of burnout within the medical system. Studies have demonstrated that medical students have higher rates of mental illness including mood disorders, anxiety, and suicidal ideation compared to their age-matched counterparts.^{1,2} Data has shown that at least 37% of Canadian medical students meet the criteria for burnout.³ Despite individuals entering medicine with high levels of mental wellbeing and resilience,^{4,5} the medical learning environment has a detrimental effect on learner wellbeing. In comparison to age-matched peers, medical learners have a negative wellbeing trajectory upon matriculation into medical school.⁶ These patterns are not exclusive to medical students; residents and staff physicians also experience higher rates of burnout, mental illness, and suicide than their peers,⁷ indicating the long-term effects of this health decline along with the ongoing occupational hazards affecting their wellbeing across the continuum of their career. There are several systemic medical cultural factors which have been noted to contribute to the mental health epidemic in healthcare such as the lack of autonomy, perfectionism, and stigmatization of mental illness.^{8,9} These barriers begin building as early as the first day of medical school, manifesting through the now highly scrutinized “hidden curriculum”^{10,11} which in part teaches medical students that their success is measured by how hard they work and to wear their burnout as a badge of honor.¹²

Burnout, mental illness, and lack of self-care negatively impact academic performance, patient care, empathy, and relationships among peers, which overall leads to poor healthcare system sustainability.^{9,13-16} All of this highlights the irony and stark juxtaposition of medicine’s role of caring for patients and the medical system’s imposed hazardous work conditions for both its staff and trainees. Targeting these issues early in medical school can serve as an important lever to influence longer term change and support high quality health care delivery. At present, many institutions across North America have begun to implement components of education on wellbeing and mental health into their curricula. Systematic reviews have demonstrated some evidence that wellbeing sessions/educational interventions within medical curriculum may be effective in reducing burnout and improving wellbeing, although conclusions thus far are

weak and inherently limited by their basis in low quality literature^{16,17} There is also substantial variation noted between wellbeing curricula in medical schools in Canada, leading to differing content across institutions, a wide variety of delivery methods, and a disparity in comprehensiveness of wellbeing curricula. Robust evaluation data of these wellbeing curricular efforts is lacking and notably many medical schools reportedly remain without a formal wellbeing curriculum, raising the importance of reviewing current curricula.⁹

Objectives

Our scoping review sought to describe the state of wellbeing curricula within undergraduate medical school programs across North America, many of which have been described in the literature following their implementation. In doing so, we aimed to identify prevailing themes and common components of educational sessions to help guide further curricular development within the Canadian context.

Methods

We conducted a scoping review using guidance from the framework by Arksey and O’Malley¹⁸ and further recommendations by Levac et al.¹⁹ We did not register the protocol as the International Prospective Register of Systematic Reviews (PROSPERO) does not allow the registration of scoping reviews. Our protocol was developed based on the PRISMA extension for scoping reviews.

Identifying the Research Question

To review the existing literature, we used the following research questions:

- Which medical schools have established wellbeing curricula and have published research/evaluation data on this curriculum?
- What methods do medical schools use to deliver their wellbeing education?
- Which topics and themes are covered in medical school wellbeing education?
- How were the outcomes and efficacy of these wellbeing education programs determined?

After reviewing the existing literature and analyzing the collected data, our objective was to identify potential gaps in the current literature regarding the state of wellbeing education by comparing and contrasting the findings from

different studies to identify inconsistencies, contradictions, and different opinions.

Identifying Relevant Studies

We conducted a literature search using the following databases: Embase, Medline, Cochrane, and CINAHL. Our search used the following terms: “[Medical student OR Medical school] AND [Well* OR resilienc* OR burnout OR mental health] AND [curriculum OR education OR training OR course* OR module*].” Further, we included relevant subject headings were included for each search term. Detailed search strategies used are presented in Appendix A. We then filtered results to the English language and from 2010 onwards in order to keep results relevant to current progression in the field of wellbeing education. In order to fully encompass the state of literature, we conducted a gray literature search with the same terms on Google Scholar (limited to the first 150 results) and MedEdPortal.

Study Selection

We had the following inclusion criteria:

- 1) The wellbeing curricula initiative took place at a North American medical school.
- 2) The study involved only students enrolled in an undergraduate medicine program.
- 3) The paper’s methodology describes and assesses a component of education surrounding the topic of wellbeing.

We excluded papers if they were not published in English; not published in a peer-reviewed publication; and not reporting on original data, such as commentaries and editorials. The initial screening yielded 4439 papers. We performed deduplication via Covidence leaving 3996 papers for initial screening.

Initial screening of 3996 papers based on the title and abstract were done independently by two researchers (KY, AS), which identified 64 articles for full text review. Any articles that could not be excluded based on information presented in the title and abstract were included for full text review. Additionally, 15 papers were identified from the bibliographies of the initial 64 articles. A total of 79 articles underwent full-text review independently by KY and AS. A third researcher (NR) assisted with the resolution of any discrepancies alongside regular meetings to refine the screening process and reach consensus. Upon further inspection of the full-text articles, we excluded 49 articles for reasons such as describing the wrong target population, being a non-peer-reviewed study, or describe interventions

that were held outside of North America. Ultimately, we identified 30 articles to be included in our scoping review.

Charting the data

Data extraction from the studies was performed by two authors (KY, AS) independently following a predetermined data extraction template in Google Sheets (Appendix B). It included each study’s year and country of publication, sample size and year of medical studies of sample population, description of the session (key principles, mode of delivery, activities), study duration and design, and reported quantitative and/or qualitative outcomes. We performed the data extraction in an iterative manner with continuous refinement of the data extraction template. Afterwards, the two authors (KY, AS) compared the collected data to identify any discrepancies (e.g. missing data), which were resolved via discussion among three authors (KY, AS, NR) until a consensus was reached.

Reporting the results

To address our research question concerning which medical schools have implemented and evaluated wellbeing curricula, we summarized study metrics including authors, year, and location of conducted studies. By further classifying studies by curriculum type, duration, themes of the curriculum, delivery method, outcome type(s) and presence of significant findings, where applicable, we were able to generate an understanding of the methods used by medical schools to deliver and evaluate their wellbeing curricula. We coded outcomes as quantitative or qualitative and differentiated between primary and secondary outcomes. After this, we performed descriptive statistics on quantitative data to identify notable patterns and summarized qualitative outcomes. Finally, we completed a content analysis to identify common themes across papers, since raw qualitative data was not available for thematic analysis.

Results

Descriptive statistics

According to our inclusion criteria, we identified 30 studies to include in the final analysis (Figure 1). Articles were generally evenly distributed across the inclusion years. Approximately half of the included articles were published before or during 2015 ($n = 14, 47\%$),²⁰⁻³³ and the remainder between 2016 and 2020 ($n = 16, 53\%$).³⁴⁻⁴⁹ The largest number of articles was published in 2020 ($n = 7, 23\%$).^{35, 37-39, 40, 42, 48}

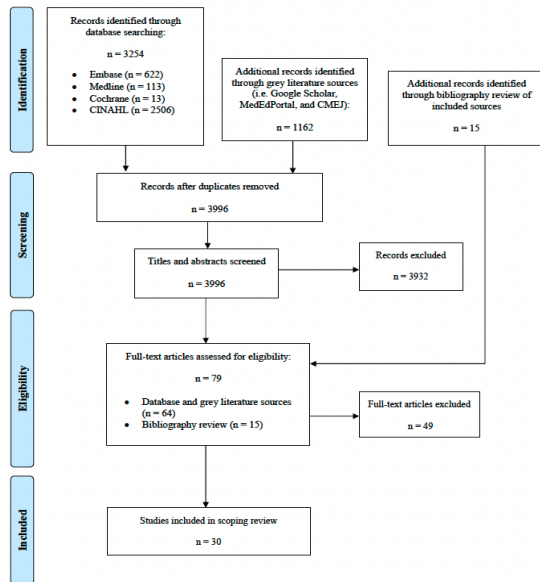


Figure 1. PRISMA flow diagram depicting study selection process

Types of studies

Study characteristics of included studies are summarized in Table 1. The most common study type was quasi-experimental ($n = 13$, 43%),^{20,24,31,35-37,40,42-45,48} with pre-test post-test designs being the most popular among them ($n = 7$, 23%).^{20,21,35,36,44,45,48} This was followed by mixed methods ($n = 8$, 27%).^{30,34,38-40,44,46,47} Sample sizes ranged from 18 to 450; with most studies having a sample size between 15 and 30 students ($n = 5$, 16%).^{21,33,40,43,46} Studies published in the United States comprised the majority of included titles ($n = 27$, 90%) and three were from Canadian institutions (10%).^{33,44,48} No studies from other North American countries met inclusion criteria.

Curricular modalities

Curricular evaluation methods employed in the review studies are summarized in Table 1. There is wide variability in the type of wellbeing curricula that schools implemented and sought to evaluate. The wellbeing curricular methodologies included mindfulness ($n = 7$, 23.3%),^{28,32,36,41,43,44,48} resilience ($n = 4$, 13.3%),^{24,35,42,45} stress management ($n = 3$, 10%),^{29,32,45} and mind-body practices ($n = 3$, 10%).^{21,30,47} The delivery formats for sessions included: small group sessions ($n = 4$, 13.3%),^{20,30,34,45} didactic sessions ($n = 5$, 16.7%),^{26,30,31,37,49} longitudinal curriculum spanning across several years ($n = 3$, 10%),^{23,27,48} and at-home activities ($n = 2$, 6.7%).^{28,30} The duration of sessions varied significantly between papers but most were between four and 11 weeks ($n = 10$,

33.3%).^{26,28-31,37,40,43,47,49} The majority of sessions did not enforce mandatory participation ($n = 22$, 73.3%).^{20-22,24-30,32,33,35,36,40-44,46,47,49} Overall, 16 (53.3%) sessions demonstrated statistically significant improvements relating to at least one aspect of wellbeing that improved following the session.^{20, 21, 25, 28, 30, 32, 35, 37, 41-45, 47-49}

Quantitative outcomes

Quantitative measures reported in studies are summarized in Table 2. Twenty-eight of the 30 studies included in this review reported quantitative data.^{20-26,28-47,49} Twenty-three of these studies performed statistical analysis to determine the effect of the curriculum they were delivering. Sixteen of these groups reported at least one outcome that was significantly improved from pre- and post-session measurements.^{20,21,25,28,30,32,35,37,41-45,47-49} Quantitative measures reported by included studies are summarized in Table 2.

Measures of psychological distress (e.g. depression, suicide ideation, stress, loneliness, anxiety, and burnout) were the most frequently reported variables, appearing in 15 studies,^{23-25,30} Psychological distress was measured using a variety of scales and questionnaires. Seven of 15 studies reported statistically significant decreases in distress levels after participation in the wellbeing curricular initiative being studied.^{25, 28, 30, 32, 41, 47, 49}

Measures of psychological wellbeing (e.g. general wellbeing, mindfulness, empathy, compassion, love, quality of life, wellbeing, and student satisfaction) were reported in 15 studies,^{20-22,25-48,30-37} with six reporting multiple measures of psychological wellbeing.^{226-28,30,33,35} Seven of the 15 studies reported significant improvements in at least one aspect of wellbeing.^{26-28,31,33,34,37} Mindfulness was the most common measure being investigated in eight studies,^{25-27,31-33,35,36} of which four showed significant improvement in mindfulness upon curricular program completion.

Measures of healthy behaviors (e.g. meditation, exercise, sleep, nutrition, and substance use) of participants were reported in three studies,^{24,34,38} of which two showed significant results in increasing frequency of meditation practice²⁴ and exercise.³³ Outcomes related to participants' perspective of wellbeing was measured in four studies,³⁸⁻⁴¹ in which three found significant post-session changes in views towards mental health,³⁹ patient counseling,⁴⁰ and shame.⁴¹ Four of seven studies that measured participants' subjective assessment of their personal traits reported statistically significant results, including increasing levels of

self-compassion^{21,27} and resilience,^{20,33} as assessed by the Self-compassion Scale and the Connor-Davidson Resilience Scale, respectively,

Table 1. Study characteristics and intervention design of included studies.

Study	Study Design	Scales/Instruments Used	Sample	Intervention				
				Themes of Curriculum	Mode of delivery	Activities	Duration	Mandatory
Agarwal et al. ³⁴ 2016 USA	Mixed methods	Likert Scale Questionnaire (researcher developed)	<i>n</i> = 140 All years	Not reported	Small group sessions	Blog writing, group discussion	4 years (1h/week)	Yes
Aggarwal et al. ²⁰ 2013 USA	Quasi-experimental (pre-test/post-test)	Social Distance Scale, Mental Illness: Clinicians' Attitudes Scale	<i>n</i> = 298 Year 1	Not reported	Panel, student-led small groups	Not reported	2 hours (2 x 1h sessions)	No
Bird et al. ³⁵ 2020 USA	Quasi-experimental (pre-test/post-test)	Connor-Davidson Resilience Scale; curriculum presurvey on resilience (researcher developed)	<i>n</i> = 144 Year 3	Resilience	Facilitated workshops	Reflection on stressors in clinical environment, resilience education	1 year	No
Bond et al. ²¹ 2013 USA	Quasi-experimental (pre-test/post-test)	Jefferson Scale of Physician Empathy, Cohen's Perceived Stress Scale, Self-Regulation Questionnaire, Self-Compassion Scale	<i>n</i> = 27 Year 1 and 2	Mind-body practices	Elective course	Yoga, meditation	Not reported	No
Bynum et al. ⁴² 2020 USA	Quasi-experimental (pre-test/post-test)	Survey (researcher developed)	<i>n</i> = 113 Year 2	Resilience	Seminar	Introduction to the psychology of shame, student panel on shame experiences, facilitator sharing of personal shame stories	2h	No
Chung et al. ⁴³ 2018 USA	Quasi-experimental	Survey (researcher developed)	<i>n</i> = 30	Mindfulness	Classroom sessions	Reading assignments, meditation, wellness planning, journaling	4 weeks (1h/week)	No
Danilewitz et al. ⁴⁴ 2018 Canada	Mixed methods	Maslach Burnout Inventory, Five Facet Mindfulness Questionnaire (FFMQ), Jefferson Scale of Empathy, Self-compassion Scale	<i>n</i> = 52	Mindfulness	Online modules	Videos, meditation practice	Not reported	No
Dossett et al. ²⁶ 2013 USA	Cross-sectional	Survey (researcher developed)	<i>n</i> = 122 Year 4	Humanism, relationship-centered medicine, spirituality, complementary/alternative medicine	Didactic, experiential sessions	Community chores, reflection, self-care activities	4 weeks	No
Drolet and Rodgers ²⁷ 2010 USA	Qualitative	Survey (researcher developed)	All years	Student Wellbeing	Longitudinal program (4 years)	Wellness curriculum	Not reported	No
Dyrbye et al. ⁴⁵ 2017 USA	Quasi-experimental	Maslach Burnout Inventory, Interpersonal Reactivity Index, Connor-Davidson Resilience Scale, Happiness, and Gratitude Scale	<i>N</i> = 95 Year 1	Stress management, resilience training	Small group sessions	Journaling, reflective exercise, facilitated group discussion	10-12 h	Yes
Erogul et al. ²⁸ 2014 USA	Randomized controlled trial	Self-compassion Scale, Resilience Scale, Perceived Stress Scale	<i>n</i> = 58 Year 1	Mindfulness	In-class sessions, at-home activities	Mindfulness-based meditation, weekly handouts, full-day retreat, breathing-based yoga, cognitive curriculum about stress	8 weeks (1.25h/week)	No
George et al. ²⁹ 2013 USA	Mixed methods	N/A	<i>n</i> = 95 Year 1	Stress management	Facebook	Facebook-based stress management program	11 weeks	No
Gold et al. ⁴⁶ 2019 USA	Mixed methods	UCLA Loneliness Scale, Emotional Self-Awareness Scale, Interpersonal Fulfillment Index	<i>n</i> = 30 Year 1-2	Psychotherapy	Reflection groups	Not reported	6 months (1.5h/week)	No
Greeson et al. ³⁰ 2015 USA	Mixed methods	Cognitive and Affective Mindfulness Scale - Revised (CAMS-R), Perceived Stress Scale	<i>n</i> = 44 All years	Mind-body skills	Didactic lessons, small group sessions, home activities	Group discussion, instructor-led meditation, self-regulated skill instruction and practice	4 weeks (1.5h/week)	No
Kraemer et al. ⁴⁷ 2016 USA	Mixed methods	Distress Tolerance Scale, Cognitive and Affective Mindfulness Scale – Revised (CAMS-R), Positive Affect Negative Affect Schedule (PANAS), Perceived Stress Scale – 10 (PSS-10)	<i>n</i> = 52 Year 1 and 2	Mind-body skills	Skills training group	Mind-body skills, breathing exercises, autogenic training	11 weeks (2h/week)	No
Kushner et al. ³¹ 2011 USA	Quasi-experimental (one-group posttest-only)	Questions using five-point Likert scale (researcher developed)	<i>n</i> = 343 Year 2	Healthy living	Didactic sessions	Behavior change plan	6 weeks (12 hours)	Yes
MacLean et al. ⁴⁸ 2020 Canada	Quasi-experimental	Freiburg Mindfulness Inventory, Jefferson Scale of Empathy, Connor-	<i>n</i> = 316 Year 1 and 2	Mindfulness	Longitudinal curriculum	Mindfulness exercises	2 years	Yes

		Davidson Resilience Scale, Perceived Stress Scale												
Mascaro et al. ⁴⁹ 2018 USA	Randomized controlled trial (waitlist)	Depression Anxiety and Stress Scale, Beck Anxiety Inventory, UCLA Loneliness Scale, Compassion Love for Humanity Scale, Pittsburgh Sleep Scale, Substance Use Inventory, self-reported exercise frequency	n = 132 Year 2	Cognitively based compassion	Didactic sessions	Meditation	10 weeks (1.5h/week)	No						
McGrady et al. ³² 2012 USA	Randomized controlled trial	Beck Depression Inventory, Beck Anxiety Inventory, Social Readjustment Rating Scale	n = 449 Year 1	Stress management, mindfulness	Structured sessions	Deep breathing, progressive relaxation, guided imagery, survival thinking, meditation, nutrition counselling	Not reported	No						
Nagji et al. ³³ 2013 Canada	Qualitative	N/A	n = 18 Year 1	Theatre-based	Theatre-based sessions	Not reported	15 hours (6 x 2.5h sessions)	No						
Pasarica et al. ³⁶ 2016 USA	Quasi-experimental (pre-test/post-test)	Multiple-choice survey (researcher developed)	n = 44 Year 1 and 2	Mindfulness	Single evidence-based session	Active practical mindfulness exercise	1h	No						
Rockfeld et al. ³⁷ 2020 USA	Quasi-experimental (pre-test/post-test)	5-point Likert scale survey (researcher developed)	n = 183 Year 3	Positive lifestyle choices	Workshops, didactic, small-group sessions, reflective practices	Reflection	4 weeks (over 1 year)	Yes						
Seritan et al. ²² 2015 USA	Qualitative	Association of American Medical Colleges Graduation Questionnaire	n = 105 (per class) All years	Access/availability, confidentiality/cultural humility, transparency/ trust	Office of student wellness, clinical services, advisory council, mental health education	Not reported	Not reported	No						
Sheehy et al. ³⁸ 2020 USA	Mixed methods	Survey (researcher developed)	Year 3	Burnout	Not reported	Workshops, team bonding, leisure	7.5h (5 x 1.5h sessions)	Yes						
Slavin et al. ²³ 2014 USA	Quasi-experimental	Center for Epidemiologic Studies Depression Scale, Spielberger State-Trait Anxiety Inventory	n = 175-178 (per class) All years	Not reported	Longitudinal curriculum reform	Not reported	Not reported	Yes						
Stumbar et al. ³⁹ 2020 USA	Mixed methods	Likert Scale Questionnaire (researcher developed)	n = 112 Year 3	Narrative medicine	Group session	Reflection, writing activity	1.5h	Yes						
Thomas et al. ²⁴ 2011 USA	Quasi-experimental	Evaluation survey (researcher developed)	50% of class Year 1	Stress/resilience	Extracurricular program	Presentations on mental health, help-seeking, and stress resilience	1 year	No						
Thompson et al. ²⁵ 2010 USA	Observational	Center for Epidemiologic Studies Depression Scale, Primary Care Evaluation of Mental Disorders Patient Health Questionnaire	n = 102 Year 3	Not reported	Didactic	Faculty education, discussion, student handbook	Not reported	No						
Williams et al. ⁴⁰ 2020 USA	Quasi-experimental (pre-test/post-test)	Perceived Stress Scale, Frieberg Mindfulness Inventory, multiple choice survey (researcher developed)	n = 24 Year 1 and 2	Meditation	Resilience course	Mindfulness, biofeedback, art, journaling	11 weeks	No						
Yang et al. ⁴¹ 2018 USA	Randomized controlled trial	Five Facet Mindfulness Questionnaire (FFMQ), General Wellbeing Schedule, Perceived Stress Scale	n = 88 All years	Mindfulness	Mobile app	Not reported	30 days	No						

Table 2. Quantitative measures reported by included studies.

Study	Psychological distress			Psychological Wellbeing				Health Behaviors					Attitude change	Personal Traits	Program/ Process Evaluation
	Depression	Stress/ Anxiety	Loneliness	Mindfulness	Wellbeing/ wellness	Empathy/ Love	Quality of life/ Satisfaction	Meditation	Exercise	Sleep	Substance Use	Nutrition			
Agarwal et al. ³⁴ 2016 USA															NS
Aggarwal et al. ²⁰ 2013 USA													√ ^f (p=.01)		
Bird et al. ³⁵ 2020 USA	NS ^b						NS							√ ^k (p=.019)	NS
Bond et al. ²¹ 2013 USA		NS				NS								√ ^{d, e} (p=.003, .04)	

Bynum et al. ⁴² 2020 USA													√ ⁱ (p<.001)	
Chung et al. ⁴³ 2018 USA				√ (p=.0001)	√ (p=.01)								√ (p=.0001)	
Danilewitz et al. ⁴⁴ 2018 Canada	NS ^b			√ (p<.001)		NS							√ ^d (p=.001)	NS
Dossett et al. ²⁶ 2013 USA														NS
Drolet and Rodgers ²⁷ 2010 USA														
Dyrbye et al. ⁴⁵ 2017 USA	NS ^b	√ (increased, P<.0001, 0.03)				√ (decreased, P<.01)	√ (decreased, P<.001, .015)							NS ^k
Erogul et al. ²⁸ 2014 USA		√ (p=.03)												NS ^l
George et al. ²⁹ 2013 USA														NS
Gold et al. ⁴⁶ 2019 USA			NS		NS	NS								NS
Greeson et al. ³⁰ 2015 USA		√ (P<.001)		√ (P<.001)										
Kraemer et al. ⁴⁷ 2016 USA		√ (p=.01-.03)		NS										
Kushner et al. ³¹ 2011 USA									NS	NS		NS	NS	
MacLean et al. ⁴⁸ 2020 Canada		NS		√ (p=.008)		√ (p<.001)								√ ^k (p=.003)
Mascaro et al. ⁴⁹ 2018 USA	√ (p=.008)	NS	√ (p=.002)			√ (p=.005)			√ (p=.007)	NS	NS			
McGrady et al. ³² 2012 USA	√ (p=.045)	NS					NS ^c							
Nagji et al. ³³ 2013 Canada														
Pasarica et al. ³⁶ 2016 USA				NS										
Rockfeld et al. ³⁷ 2020 USA													√ ^{g, h} (p<.001, p<.003)	NS
Seritan et al. ²² 2015 USA							NS							
Sheehy et al. ³⁸ 2020 USA														NS ^k NS
Slavin et al. ²³ 2014 USA	NS	NS												
Stumbar et al. ³⁹ 2020 USA														NS
Thomas et al. ²⁴ 2011 USA														NS
Thompson et al. ²⁵ 2010 USA	√ (p<.01) √ ^a (P<.001)													
Williams et al. ⁴⁰ 2020 USA		NS		NS										
Yang et al. ⁴¹ 2018 USA		√ (p<.05)		NS	√ (p<.05)									

√ = significant; NS = not significant; ^a = suicide ideation; ^b = burnout; ^c = illness frequency; ^d = self-compassion; ^e = self-regulation; ^f = mental illness perception; ^g = understanding relationship between lifestyle factors and patients' wellness
^h = confidence in ability to counsel patients about behavioral changes; ⁱ = attitudes, confidence, and willingness to reach out for help; ^l = utility and burden; ^k = resilience; ^j = adaptability

Of the 28 studies reporting quantitative data, 10 studies specifically reported data on students' perceptions and opinions surrounding the session's educational effectiveness.^{5,20,27,30,38,40,42-46} Evaluation was completed through self-reported data on measures of session's educational effectiveness,^{42-44,46,47} perceived impact on student's wellbeing (e.g. burnout and mindfulness measures pre- and post-session),^{42,44} quality of the content presented,⁴⁵ retention rate,²⁷ and self-perceived feasibility of the session.²⁷

Qualitative data

Qualitative findings and methods are summarized in Table 3. Of the 15 studies that adopted a qualitative experimental approach, two studies were strictly observational and only presented qualitative data,^{47,48} while others presented a mixture of both quantitative and qualitative results.^{20,22,23,25-27,36,38,39,41-43,49} Methods of qualitative data extraction include via open-ended responses with^{30-32,41-43} or without^{27,28,39,49} thematic analysis, focus groups,⁴⁷ mix of written and verbal responses in an informal manner,⁴⁸ and case reports.³⁸

Table 3. Qualitative measures reported by included studies.

Study	Qualitative Findings	Qualitative Methods
Agarwal et al. ³⁴ 2016 USA	Qualitative feedback varied, though no formal analysis was conducted to identify major themes.	Qualitative comments were informally collected from students and small group leaders.
Aggarwal et al. ²⁰ 2013 USA	Five major themes were identified from student responses which most commonly indicated that the curriculum changed participants' views on mental illness and taught them compassion for the patient.	An optional open-ended question was included in the curriculum's final exam
Bynum et al. ⁴² 2020 USA	Qualitative results suggest that the seminar successfully strengthened students' resilience.	Inductive thematic analysis was conducted for two free-response questions
Danilewitz et al. ⁴⁴ 2018 Canada	Thorough analysis was not presented.	Open-ended qualitative feedback was eliAccessed on to support quantitative findings.
Dossett et al. ²⁶ 2013 USA	Qualitative analysis found twelve key themes regarding the HEART program's professional and personal impact on students, with self-discovery identified as the most common theme.	The retrospective cross-sectional program survey included qualitative questions which were developed by study authors through an iterative process guided by the program goals. A codebook was developed for qualitative analysis by the study authors based on grounded theory and the program's goals.
Drolet and Rodgers ²⁷ 2010 USA	No formal analysis conducted, though qualitative feedback was predominantly positive.	Informal written and verbal feedback was collected.
Dyrbye et al. ⁴⁵ 2017 USA	Qualitative feedback was mixed.	Qualitative comments were collected on the end-of course evaluation, though no formal analysis was conducted.
Gold et al. ⁴⁶ 2019 USA	Thematic analysis demonstrated that the reflection groups may be a feasible and effective intervention for mitigating loneliness in medical school.	The baseline survey contained one open-ended qualitative question assessing expectations and goals, and the post-group survey included four qualitative questions assessing the intervention's impact on students. Thematic analysis was performed by two authors.
Greeson et al. ³⁰ 2015 USA	The qualitative findings were predominantly positive, suggesting that the workshop series is an effective and feasible intervention for stress reduction, stress management and relaxation, and increasing self-awareness among medical students.	The pre-workshop evaluation included a qualitative question regarding student goals for workshop participation and the post-workshop evaluation collected open-ended feedback about the workshops' perceived value. Thematic analysis of qualitative feedback was conducted through inductive grouping of student responses based on prevalent themes.
Kraemer et al. ⁴⁷ 2016 USA	Qualitative results supported the overall efficacy and success of the mind-body group.	A questionnaire including five open-ended questions was distributed following completion of the mind-body skills group to assess students' perceived efficacy and overall perception of the group. Three study authors analyzed the qualitative data to identify common themes.
Kushner et al. ³¹ 2011 USA	Qualitative case reports provided insight about both successful and unsuccessful behavior change plans, as well as associated goals and obstacles to change.	Case reports were created to present and analyse qualitative examples of two students' behavior change plans.
Nagji et al. ³³ 2013 Canada	Qualitative data suggested that novel, humanities-based curriculum offerings may help foster personal development and wellbeing in medical students.	Participants were invited to participate in a focus group, in which open-ended questions were used to stimulate discussion. Transcripts of the focus groups were analyzed to identify key themes.
Stumbar et al. ³⁹ 2020 USA	Qualitative responses provided insight into strategies that students felt would help them in future patient care and in maintaining personal wellbeing.	An optional online survey was distributed to participants following session completion which included open-ended questions. Inductive coding was used for thematic analysis of all open-ended responses.

Overall, key messages that were identified through implementation of these wellbeing curriculum sessions were; strengthened social connection,^{20,30,32,42,47} shifting perspectives on becoming a physician^{30,39,42,43} and personal growth,^{39,47} including increased self-discovery⁴² and self-awareness.³⁰ Participants across various studies pointed to increased tolerance to distress,³² resilience,⁴⁷ coping skills,⁴² overcoming imposter syndrome,³⁰ and willingness to express emotions.⁴³ Studies also described curricular participant perspective changes,³⁰ such as changing views on mental illness.³⁹ A collection of studies described increasing healthy behavior adoption among its participants. The promotion of social connection with peers also emerged as a key benefit of the sessions,^{20,30,47} with participants reporting an increased sense of community⁴² and feeling supported³² and less alone.²⁰

Some studies described participants' changing their perspectives on becoming a physician because of the curricular sessions. Examples include increased understanding of humanism,⁴³ the importance of whole patient care,³⁹ increased empathy⁴³ and compassion.³⁹ Participants also reported that sessions equipped them with professional tools⁴² that are useful for their future careers and better prepared them for the transition to residency.⁴²

Nine of the 15 studies that reported qualitative data described participant feedback on curricular program design and delivery.^{20,27,28,31,36,38,41,48,49} Overall, most studies reported positive feedback on program design and delivery.^{31,38,40,41,48} In two studies, participants expressed lack of comfort in sharing personal matters with peers, which was a part of the curricular activity^{20,49} Two studies collected qualitative feedback on program feasibility (e.g. recruitment, program completion rate, compliance, optional vs. mandatory).^{27,28} Danilewitz et al. successfully met their recruitment goal, though program completion rate was variable and adherence to regular meditation practice, the primary intervention of this study, was low.²⁷ Similarly, Dyrbye et al. received mixed feedback regarding the feasibility of their mandatory longitudinal stress management program, with many students citing the mandatory nature of the program as an added source of stress.²⁸

Discussion

The aim of this study was to identify and describe the state of wellbeing education across North American medical schools which have been evaluated as part of their

implementation. Since 2010, though the discourse around medical student wellbeing has continued to increase, the number of studies evaluating wellness related curricular sessions have not increased greatly and there remain relatively few studies in this area, given the number of medical schools in North America.

Curriculum characteristics

Regarding our aim to better understand the methods used by medical schools to deliver their wellbeing education, we identified that most wellbeing curriculum sessions focused on building skills in mindfulness and resilience. Sessions were most frequently delivered via large group information sessions. However, we identified that students prefer wellbeing education to be delivered via small group format^{27,34}, highlighting the potential benefit of altering the modality in which the majority of curricula are currently being delivered. The length of the interventions also had noticeable variation across papers searched, ranging from 1.5 hours to 4 years.

Population demographics and sizes varied between studies as some included only pre-clerkship students, while others included only clerkship students. The largest sample size was 343 and the smallest was 18. This was indicative of the wide variation in methods of education. The smaller sample sizes across studies highlights an opportunity for increased rigor when conducting future research on wellbeing education within medical school.

Of 30 included studies, only eight wellbeing curricula required mandatory participation. This is a highly debated topic as the importance of wellbeing education is evidently critical but the nature of making wellbeing education mandatory may lead to an undermining intrinsic motivation and ultimately increase burnout by increasing workload of students.⁵⁰

Evaluation

Outcomes and efficacy of the wellbeing education programs described in the studies included in this review were determined through a variety of scales and surveys, with measures of psychological distress and wellbeing used most. Throughout 28 studies that used such scales, 27 different validated scales were used, with 15 studies using more than one scale for evaluation. The scales most commonly used were Center for Epidemiologic Studies Depression Scale,^{23,24} Maslach Burnout Inventory,^{27,28} the Five Facet Mindfulness Questionnaire,^{26,27} and the Connor-Davidson Resilience Scale.^{20,28,33} Ten studies only used scales that were developed by those researchers, making

conclusions difficult to draw due to lack of previous evaluation of scale validity. Regarding the effectiveness of these interventions, 16 studies were deemed “successful” based on having at least one statistically significant outcome among quantitative measures. Qualitative data were collected in 15 studies and were predominantly positive in all of these where participants reported strengthened social connections, shifting perspectives on becoming a physician, and personal growth. This wide variation in types of scales used to evaluate the curricular sessions reflect more broadly the non-standardized way wellbeing is measured amongst medical learners and increases the difficulty of objectively comparing session effectiveness.

Implications for wellbeing curriculum in medical schools

Importantly, this scoping review found a lack of published research and evaluation on wellbeing curricula in North American medical schools with only 30 studies identified through our search. The data for Canadian schools is further limited with only three studies conducted at Canadian institutions. Beyond the limited number of published studies, the existing research often lacked rigor and varied widely in its methodology including in design and populations. For instance, the majority of studies were quasi-experimental, a study design.⁵⁰

Additionally, we found a wide variety of reported outcomes, making it difficult to compare the effectiveness of different curricula. Validated tools for quantitative assessment of wellbeing outcomes were used inconsistently, with many studies relying on novel or unvalidated scales. Many studies also only utilised either a quantitative or qualitative method rather than both that may have provided a more comprehensive evaluation. The importance of curriculum evaluation is a critical step to ensure effective educational interventions.⁵¹ Furthermore, only two studies collected data on feasibility of their intervention, which is an important factor for meaningful translation of research in this field. This highlights the opportunity of developing standardized measures to evaluate the effectiveness of wellbeing curricula in medical education.

Medical education leaders may use our study findings to consider opportunities for medical school wellbeing education reform. The limited evidence base behind curricular interventions being utilized makes it difficult for schools to identify whether their sessions are helping students. With the overwhelming evidence that the medical learning environment contributes to poorer

wellbeing amongst medical students, it is incumbent on all faculties to make meaningful efforts to address these threats. Effective wellbeing curricula can be part of the toolbox as we work to change the culture of medicine and thwart systemic occupational hazards.

Limitations

Our study has several limitations. Firstly, as this is a scoping review, we did not conduct an explicit risk of bias assessment to assess the quality of the studies and thus we cannot comment on the level of evidence. Secondly, our study could only evaluate wellbeing curricula in medical schools on which formal evaluative research has been conducted. We know other schools have implemented wellbeing education programs and may have even collected data on their effectiveness but have not published their findings. As such, our work presents an incomplete picture of the field of wellbeing curricula in medical education. While many terms could have been used, our search was limited to the following terms related to wellbeing: Well*, resilienc*, burnout and mental health. Therefore, there may be studies that were not captured within our search that did not use these specific words. However, it is very likely that curriculum aimed at improving wellbeing would include these terms.

Conclusions

Our scoping review found that many of the wellbeing curricula in North America were associated with positive impacts of varying degrees on student participants. However, these conclusions are limited by the wide variety of study methodologies and low rigor of the eligible studies. Ultimately, although wellbeing curricula are becoming more common in medical schools, relatively few of these curricula have been developed, implemented, evaluated, and reported using a curriculum development framework. The present work highlights the potential for wellbeing curricula to positively influence medical trainee wellbeing, as well as the need for standardization and evidence-based practice to identify optimal content and learning strategies to inform these curricula, many of which currently lack structure and may in fact be better characterized as individual intervention sessions.

Future directions

To address these gaps and enhance our understanding of the state of wellbeing curricula within North American undergraduate medical schools, as discussed in our limitations, we propose the development of a standardized wellbeing curriculum framework using an evidence based

approach, such as the updated 2022 curriculum guide by Thomas et al.⁵¹ Specifically, given the complexity and diversity of these gaps, a collaborative effort may be the most effective in creating a framework that not only addresses identified gaps in a comprehensive manner, but also allows for the gathering of valuable data on outcomes and effectiveness of the curricula. This framework, while standardized, should allow for localized adaptations to accommodate the unique contexts of different institutions. Furthermore, the evaluation of such a wellbeing curriculum should be conducted using evidence-based methodology to yield meaningful findings. Moving forward, integration of validated, standardized outcomes in wellbeing education research will provide higher quality evidence to guide decision making, which in combination with qualitative data, will ultimately contribute to more effective wellbeing education interventions for medical students in North America.

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Appendix A. Database search strategies

Embase <1974 to 2021 July 06>

(Medical student or Medical school).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]

AND

(Well* or resilienc* or burnout or mental health).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]

AND

(curriculum or education or training or course* or module*).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]

Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations, Daily and Versions(R) <1946 to July 06, 2021>

(Medical student or Medical school).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

AND

(Well* or resilienc* or burnout or mental health).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

AND

(curriculum or education or training or course* or module*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

EBM Reviews - Cochrane Database of Systematic Reviews <2005 to June 30, 2021>

EBM Reviews - ACP Journal Club <1991 to June 2021>

EBM Reviews - Database of Abstracts of Reviews of Effects <1st Quarter 2016>

EBM Reviews - Cochrane Clinical Answers <June 2021>

EBM Reviews - Cochrane Central Register of Controlled Trials <May 2021>

EBM Reviews - Cochrane Methodology Register <3rd Quarter 2012>

EBM Reviews - Health Technology Assessment <4th Quarter 2016>

EBM Reviews - NHS Economic Evaluation Database <1st Quarter 2016>

(Medical student or Medical school).mp. [mp=ti, ot, ab, tx, kw, ct, sh, hw]

AND

(Well* or resilienc* or burnout or mental health).mp. [mp=ti, ot, ab, tx, kw, ct, sh, hw]

AND

(curriculum or education or training or course* or module*).mp. [mp=ti, ot, ab, tx, kw, ct, sh, hw]

Interface - EBSCOhost Research Databases

Search Screen - Advanced Search

Database - CINAHL Complete

(Medical student OR Medical school) AND (Well* OR resilienc* OR burnout OR mental health) AND (curriculum OR education OR training OR course* OR module*)

Limiters - Published Date: 20100101-20211231

Search modes - Boolean/Phrase

MedEdPortal, Google Scholar, CMEJ:

Medical school OR medical student AND Well* OR resilienc* OR burnout OR mental health AND curriculum OR education OR training OR course* OR module*

Publication Date: 2010-2021

Appendix B. Data extraction template

<p>Study Details</p> <p>Title</p> <p>Author (s)</p> <p>Year</p> <p>Country</p>
<p>Study Characteristics</p> <p>Study design</p> <p>Sample size</p> <p>Intervention design</p> <ul style="list-style-type: none"> ● Themes of curriculum ● Mode of delivery ● Included activities ● Duration ● Scales/instruments used for outcome measures (if applicable) ● Qualitative methods (if applicable)
<p>Results</p> <p>Outcome measures (quantitative)</p> <ul style="list-style-type: none"> ● Psychological distress: depression, stress/anxiety, loneliness ● Psychological wellbeing: mindfulness, wellbeing/wellness, empathy, love, quality of life, satisfaction ● Health behaviors: meditation, exercise, sleep, substance use, nutrition ● Change in attitude ● Personal traits ● Program/process evaluation <p>Qualitative findings</p>