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Association of mental health encounters in medical school with physician specialty in Ontario, Canada

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Abstract

Background Mental health concerns among medical students are common and may influence specialty selection and early-career practice patterns. However, their potential impact on physician workforce distribution across specialties is not well understood.

Methods We conducted a population-based cohort study of physicians newly registered with the College of Physicians and Surgeons of Ontario (CPSO) between 2008 and 2018. We linked CPSO demographic data with ICES (formerly known as the Institute for Clinical and Evaluative Sciences) health administrative databases using unique encoded identifiers. Mental health encounters were defined as ≥ 1 healthcare encounter for mental health or substance use in the two years prior to medical school graduation. The outcome was the first specialty listed at initial CPSO registration, reflecting physicians' earliest registered specialty upon entry into practice. We used multivariable logistic regression to examine the association between mental health encounters and specialty (with Family Medicine as the referent group) adjusting for age, sex, language proficiency, medical school, rurality and neighbourhood income quintile at age 16.

Results Among 7105 physicians (median age 26 years, 56% female), 46% entered Family Medicine ($n = 3261$). Compared with Family Medicine, physicians with a prior mental health encounter had lower odds of entering acute care specialties including Emergency Medicine/Critical Care (OR 0.48; 95% CI 0.35, 0.67), Surgery (OR 0.63; 95% CI 0.52, 0.77), Anaesthesia (OR 0.67; 95% CI 0.50, 0.91) and Internal Medicine/Neurology (OR 0.68; 95% CI 0.58, 0.80), and higher odds of entering Psychiatry (OR 1.55; 95% CI 1.22, 1.97).

Conclusion Mental health encounters near medical school graduation are associated with early-career specialty registration. These findings may reflect differences in perceived or actual residency support, lifestyle considerations, or training demands across specialties.

Clinical trial number Not applicable.

Keywords Mental health, Medical students, Specialty choice, Physician workforce, Health services utilization, Medical education

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Background

Medical students report significantly lower mental health scores than their age-matched peers, with 40% meeting criteria for burnout [1, 2]. As they enter high-stakes clinical environments, they face intense academic and professional demands compounded by sleep deprivation and competing demands related to their training and workload, relationships and financial debt [3–6]. High levels of psychological distress among trainees are linked to substance use and diminished empathy [6–9]. These concerns extend beyond medical school, with substantial mental health burden reported among practicing physicians. Nearly half (48%) of the over 4000 Canadian physicians and medical students surveyed by the Canadian Medical Association (CMA) in 2021 screened positive for depression and 36% reported thoughts of suicide (14% in the prior 12 months) [10]. Poor mental health among physicians is linked with career dissatisfaction, reduced professional work effort, intentions to leave practice, and increased medical errors [10, 11]. As many regions continue to face shortages of health professionals, physician mental health should be prioritized as an urgent public health crisis, recognizing its importance for physician well-being, quality of patient care and workforce planning [12–15].

Despite its importance to health system resiliency, there is still limited understanding on how physicians' mental health impacts their key career decisions, including choice of specialty. Choosing a specialty is a complex career-defining decision shaped by factors such as length of training, workload and lifestyle flexibility, mentorship, income preferences, student debt and prestige [3, 16–18]. Demographic factors such as gender, rural residence and socio-economic status also impact this decision [16, 19]. Despite growing recognition of the high prevalence of mental health concerns among medical students, there is little research examining whether these experiences influence specialty selection, aside from psychiatry, where a history of mental health conditions is associated with a higher likelihood of choosing the field [20]. Understanding this relationship also has important equity implications, including whether all students feel equally supported during residency and have access to different specialty pathways regardless of prior mental health challenges.

The objective of our study was to examine the association between mental health encounters during medical school and subsequent specialty. We hypothesized that students experiencing mental health concerns may preferentially select specialties perceived as having increased flexibility, reduced on-call responsibilities and shorter residency duration such as Family Medicine.

Methods

Data sources

We linked health administrative databases held at ICES (formerly known as the Institute for Clinical and Evaluative Sciences) to physician demographics obtained from the Canadian Physicians and Surgeons of Ontario (CPSO) using unique encoded identifiers. All physicians must register with the CPSO to practice medicine in Ontario, starting at the onset of post-graduate training. ICES is an independent, nonprofit research institute whose legal status under Ontario's health information privacy law allows it to collect and analyze healthcare and demographic data without consent for health system evaluation and improvement. Datasets were analyzed at ICES and de-identified before being sent to the study team. Details on this probabilistic matching process have been published previously [21, 22]. Further details on specific data sources are outlined in the Supplementary Material.

Study population

We included physicians who had a first-time CPSO registration date between January 1, 2008, and December 31, 2018, who graduated from an Ontario medical school after 2001. We excluded individuals if they were not an Ontario resident on July 1st of their graduation year, did not graduate from an Ontario medical school, or did not have continuous provincial health care insurance (Ontario Health Insurance Plan) for the two years prior to July 1st of their year of graduation.

Primary exposure

Our primary exposure was a mental health encounter, defined as ≥1 mental health or substance use outpatient visit to either a family physician or a psychiatrist or ≥ 1 mental health or substance use emergency department (ED) visit or hospitalization in the 2 years prior the physicians' graduation year. Our exposure captures mental health concerns that resulted in a healthcare encounter and does not capture subclinical distress or care outside physician billing. We used definitions of mental health and substance use encounters from previously validated ICES concepts [22, 23]. We chose the last two years of medical school as the transition from classroom-based settings to clinical environments is associated with increased levels of stress and mental health challenges among medical students [24, 25]. We categorized these definitions into four categories: mood/anxiety/bipolar disorders, psychotic disorders including schizophrenia, substance use/addictions and other (Supplemental Material, Table S1 and S2).

Covariates

We obtained the physicians' date of birth, sex and home address at age 16 through the Registered Persons Database (RPDB). We used the postal code conversion file and Canadian census data to determine the physicians' neighbourhood-level income quintile and rurality at age 16, defining rurality as residence in a community with less than 10 000 people. We obtained graduation year, self-identified language capability (in which physicians felt comfortable practicing medicine), and undergraduate medical school from CPSO. We identified common clinical conditions (asthma and hypertension) from health administrative data based on previously validated methods [26–28].

Outcomes

Our outcome was the first specialty recorded at initial CPSO registration, which reflects a physician's earliest registered specialty at the time of entry into independent practice in Ontario. Where specialty was not available in the CPSO database, we used the billing specialty from the Ontario Health Insurance Plan (OHIP) Claims Database. OHIP is the public health insurance program in Ontario, Canada, providing coverage for almost all medically necessary health services. We categorized specialties as: Anaesthesia, Emergency Medicine/Critical Care, Family Medicine, Internal Medicine/Neurology, Obstetrics-Gynecology, Paediatrics, Psychiatry, Radiology, Surgery and Other (see Supplemental Material for further details).

Statistical analysis

We used descriptive statistics to describe the baseline characteristics of physicians, and to determine the proportions of different types of mental health visits—both by diagnostic category (i.e. mood disorder) and by visit type (i.e. outpatient or ED visit/hospitalization). We performed chi-square testing to examine the relationship between mental health encounters and specialty. We conducted the one-way analysis of variance (ANOVA) to evaluate whether the mean number of mental health encounters per physician was significantly different across specialties.

We used univariate logistic regression models to examine the relationship of each covariate with specialty. We then created a multivariable logistic regression model of the relationship between having a mental health encounter and specialty, adjusting for potential confounders including age, language, undergraduate medical school, and rural status and neighbourhood income at age 16. All variables were considered categorical except for age, which was treated as a continuous variable. We conducted stratified analyses and evaluated effect modification by sex. We performed a sensitivity analysis using an alternate definition of a mental health condition that required ≥ 2 outpatient mental health visits or ≥ 1 ED visit or hospitalization to determine whether associations with specialty persisted. We also used logistic regression to examine the relationship between specialty and other tracer conditions (i.e., asthma and hypertension), to assess whether observed associations were specific to mental health or reflected a more general pattern related to chronic medical conditions.

All analyses were conducted with SAS EG 7.1 software and used a 2-sided type 1 error rate of 0.05 and 95% confidence intervals as the thresholds for statistical significance. The study is reported using the RECORD guideline [29].

Ethics

This study has Ottawa Health Science Network Research Ethics Board (OHSN-REB)- approval (CRRF #4011) and a Data Sharing Agreement (DSA) between CPSO, ICES, and our research team. All additional datasets used for this study are authorized under section 45 of Ontario's Personal Health Information Protection Act, which does not require review by a Research Ethics Board. The OHSN-REB operates in compliance with, and is constituted in accordance with, the requirements of the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS 2). This study was conducted in accordance with the ethical principles of the Declaration of Helsinki and applicable national regulations.

Results

Of the physicians who had a first ever registration date in CPSO between January 1, 2008, and December 31, 2018, we were able to link 89% to ICES data. After removing duplicates and exclusions, there were 7105 unique physicians remaining for analysis (Fig. 1). All data were complete except for language proficiency, rurality, and neighbourhood income at age 16, with missing values detailed in Table 1.

Baseline characteristics

The median age of physicians at first-ever CPSO graduation date was 26 years (IQR 25–28 years) and 56% ($n = 3944$) were female. Seven percent ($n = 488$) resided in rural neighbourhoods, and 60% ($n = 4264$) lived in the highest two neighbourhood income quintiles at age 16. The greatest proportion of physicians graduated from the University of Toronto ($n = 1890$; 26.6%) and McMaster University ($n = 1607$; 22.6%). The majority of physicians ($n = 3261$; 45.9%) were registered in Family Medicine (Table 1).

Family Medicine ($n = 2029$; 62.2%) and Psychiatry ($n = 209$, 63.1%) had a higher proportion of female physicians compared to surgical ($n = 254$, 35.2%) and other

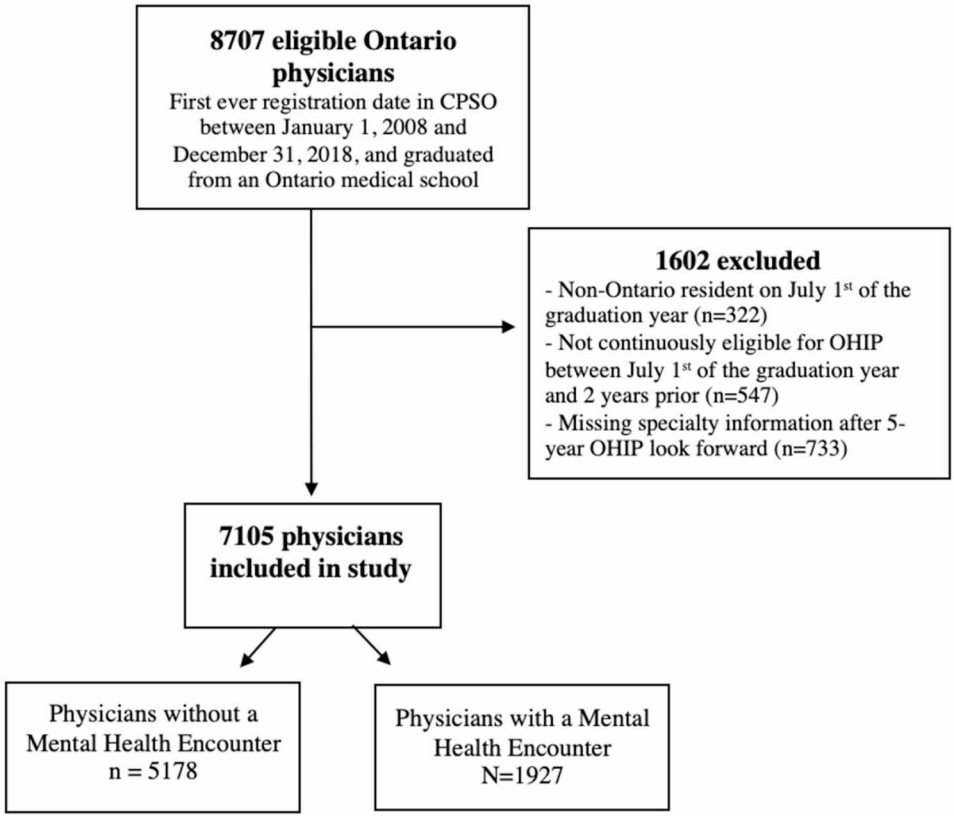


Fig. 1 Flow diagram for the creation of the study sample

specialties ($n = 1452$, 52.0%). Physicians entering Family Medicine were also more likely to have lived in a rural neighbourhood at age 16 (9.7%) than those entering other specialties. The Northern Ontario School of Medicine (NOSM) and the University of Ottawa had the highest proportions of graduates entering Family Medicine, at 67% ($n = 290$) and 50% ($n = 555$), respectively, while Queens ($n = 281$, 37.5%) and Toronto ($n = 760$, 40.2%) had the lowest (Supplemental Table S4).

Mental health encounters

Female physicians had a slightly higher proportion of having at least one mental health encounter ($n = 1137$; 28.8%) compared to male ($n = 790$; 25.0%). Physicians who were in the highest income quintile at age 16 also had a higher proportion of mental health encounters ($n = 789$; 29.0%) compared to those in the lowest quintile ($n = 159$; 23.3%). Physicians from Western University had the highest proportion of mental health encounters in the last 2 years of medical school at 34% ($n = 442$) while physicians who graduated from the University of Toronto had the lowest ($n = 445$, 23.5%) (Table 1).

The number of physicians with mental health encounters during medical school varied by specialty. The proportion was highest among physicians registered in Psychiatry ($n = 134$; 40.5%) and Family Medicine ($n = 986$; 30.2%). The proportion of mental health encounters in medical school was lowest among physicians in Emergency Medicine/Critical Care ($n = 51$; 17.8%), Surgery ($n = 152$; 21.1%), Internal Medicine/Neurology ($n = 271$; 21.4%) and Anaesthesia ($n = 62$; 22.1%) (Table 1). By comparison, there were no statistically significant differences in the prevalence of asthma or hypertension across specialties (Supplemental Table S4).

Among physicians who had a mental health encounter in medical school, most were related to mood/anxiety/bipolar ($n = 1581$; 82.0%) (Supplemental Table S5). Of the physicians who had at least 1 mental health encounter in medical school, psychiatrists had the highest mean number of outpatient visits per physician at 8.52 (SD 13.21) compared to 5.17 (SD 12.99), 2.95 (SD 5.76) 3.29 (SD 4.62) among family medicine, surgical, and all other specialty physicians respectively, though there was wide variation within each specialty (Supplemental Table S6).

Association of mental health and sub-specialty in multivariate models

Compared to Family Medicine, physicians in Anaesthesia (OR 0.67; 0.50, 0.91), Emergency Medicine/Critical Care (OR 0.48; CI: 0.35, 0.67) and Internal Medicine/Neurology (OR 0.68; CI 0.58; 0.80) had a significantly lower odds of having a mental health encounter during the last two

Table 1 Distribution of sociodemographic and clinical characteristics of Ontario physicians newly registered between 2008-2018

	Mental health encounter in the last 2 years of medical school (n=1927, row %)	No mental health encounter in the last 2 years of medical school (n= 5178, row %)	Total (n=7105) (n, column %)
Median Age at first ever registration (Q1-Q3)	27 (25-28)	26 (25-28)	26 (25-28)
Sex[d] (n, %)			
- Male	790 (25.0)	2371 (75.0)	3161 (44.5)
- Female	1137 (28.8)	2807 (71.2)	3944 (55.5)
Language Proficiency (n, %)			
- Unilingual (English)	1516 (27.3)	4044 (72.7)	5560 (78.3)
- Bilingual (English-French)	159 (28.9)	392 (71.1)	551 (7.8)
- Bilingual (other)	230 (26.1)	652 (73.9)	882 (12.4)
- Missing	22 (19.6)	90 (80.4)	112 (1.6)
Rural resident at age 16 (n, %)			
- Yes	129 (26.4)	359 (73.6)	488 (6.9)
- No	1756 (27.3)	4680 (72.7)	6436 (90.6)
- Missing	42 (23.2)	139 (76.8)	181 (2.5)
Neighbourhood Income Quintile at age 16 (n, %)			
- Q1	159 (23.3)	524 (76.7)	683 (9.6)
- Q2	238 (27.5)	628 (72.5)	866 (12.2)
- Q3	296 (26.8)	807 (73.2)	1103 (15.5)
- Q4	402 (26.1)	1139 (73.9)	1541 (21.7)
- Q5	789 (29.0)	1934 (71.0)	2723 (38.3)
- Missing	43 (22.8)	146 (77.2)	189 (2.7)
Asthma (n, %)	420 (30.3)	968 (69.7)	1388 (19.5)
Hypertension (n, %)	40 (31.0)	89 (69.0)	129 (1.8)
Overall	1927 (27.1)	5178 (72.9)	7105 (100.0)
Anaesthesia	62 (22.1)	219 (77.9)	281(4.0)
Emergency Medicine/Critical Care	51 (17.8)	236 (82.2)	287 (4.0)
Family Medicine	986 (30.2)	2275 (69.8)	3261 (45.9)
Internal Medicine and Neurology	271 (21.4)	998 (78.6)	1269 (17.9)
Obstetrics-Gynecology	73 (31.9)	156 (68.1)	229 (3.2)
Paediatrics	91 (29.1)	222 (70.9)	313 (4.4)
Psychiatry	134 (40.5)	197 (59.5)	331 (4.7)
Radiology	45 (26.2)	127 (73.8)	172 (2.4)
Surgery	152 (21.1)	569 (78.9)	721 (10.1)
Other	62 (25.7)	179 (74.3)	241 (3.4)
Undergraduate medical school (n, %)			
- Queens University	189 (25.2)	560 (74.8)	749 (10.5)
- McMaster University	437 (27.2)	1170 (72.8)	1607 (22.6)
- NOSM	140 (32.3)	294 (67.7)	434 (6.1)
- University of Ottawa	274 (24.5)	846 (75.5)	1120 (15.8)
- University of Toronto	445 (23.5)	1445 (76.5)	1890 (26.6)
- Western University	442 (33.9)	863 (66.1)	1305 (18.4)

NB: Mental health encounter defined as: ≥1 mental health and substance use outpatient visit or ≥1 emergency department visit or ≥1 hospitalization in the 2 years prior to medical school graduation; CPSO: College of Physicians and Surgeons of Ontario; NOSM: Northern Ontario School of Medicine; Q5; highest income quintile

years of medical school, after adjusting for age, sex, language proficiency, undergraduate medical school and rural residency and neighbourhood income quintile at age 16. Psychiatrists had a significantly higher adjusted odds of having a mental health encounter during medical school compared to family physicians (OR 1.55; 1.22, 1.97) (Fig. 2).

After stratifying all specialties by sex, we tested the sex-specialty interaction for Anaesthesiology ($p = 0.68$), Surgery ($p = 0.076$) and Psychiatry ($p = 0.36$), none of which were statistically significant.

This association between mental health and specialty was unchanged in our sensitivity analysis using a more

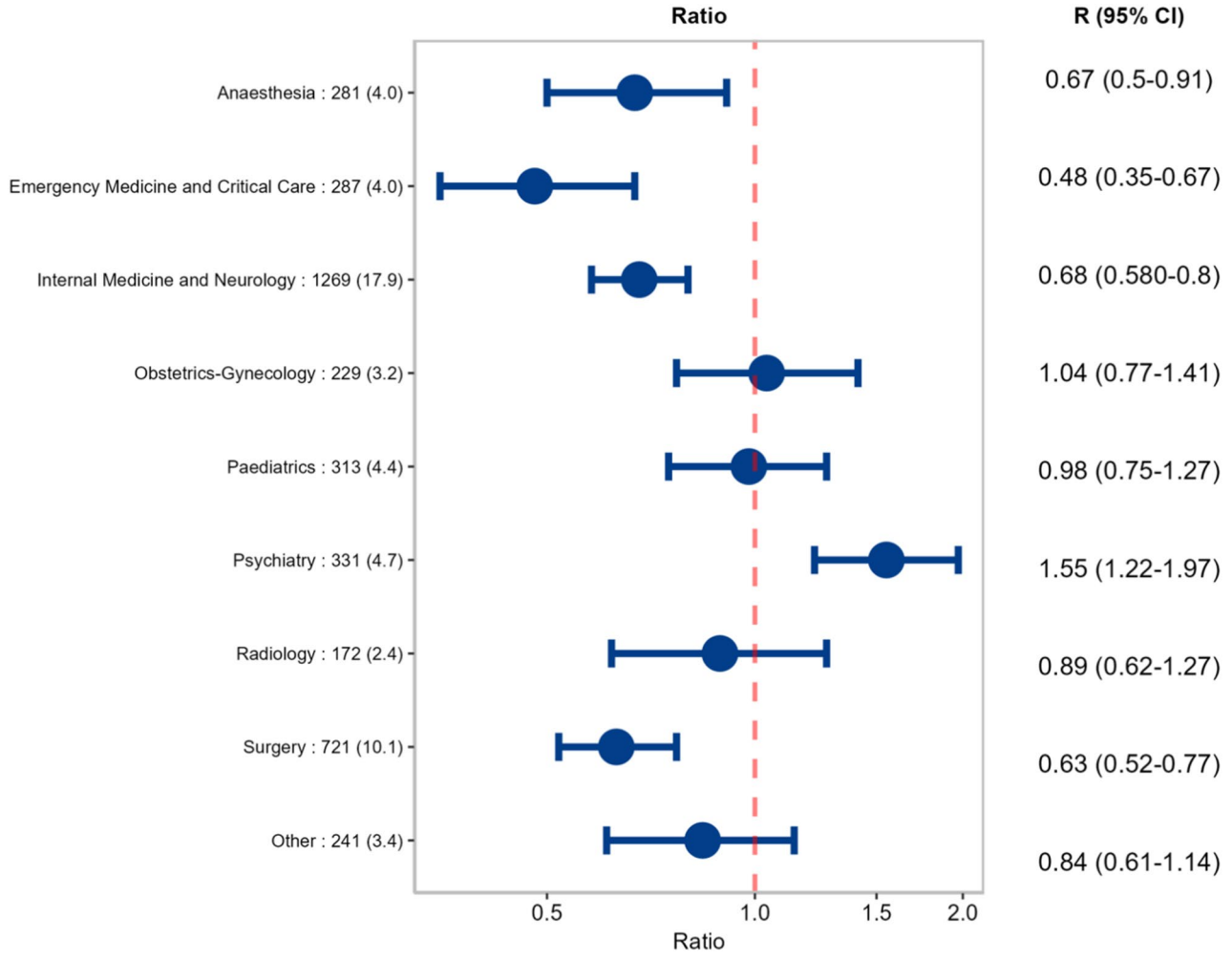


Fig. 2 Adjusted odds ratios demonstrating the association between the specialty of Ontario physicians newly registered between 2008–2018 with having a mental health visit(s) in the 2 years prior to medical school graduation ($n = 7105$), compared to Family Medicine

specific definition of a mental health condition (Supplemental Table S8).

Discussion

In this population-level cohort study of 7,105 newly registered physicians practicing in Ontario between 2008 and 2018, we found that mental health encounters during medical school were associated with subsequent specialty. Compared with physicians entering Family Medicine, those entering Anaesthesia, Emergency Medicine/Critical Care, Surgery, and Internal Medicine/Neurology were less likely to have a mental health encounter in the final two years of medical school, whereas those entering Psychiatry were more likely. Notably, we did not observe a similar association between specialty and physician encounters for asthma or hypertension, supporting that this relationship may be relatively specific to mental health.

Our findings suggest that mental health experiences near graduation are associated with early-career specialty trajectories. One plausible explanation is that students with mental health challenges may gravitate towards specialties perceived to offer greater lifestyle flexibility, shorter training duration, lower clinical acuity, and/or fewer on-call responsibilities compared to other specialties. In Canada, Family Medicine has the shortest standard residency training duration (2 years), whereas most of the other specialties require four to five years of postgraduate training. Emergency Medicine/Critical Care, Internal Medicine/Neurology, Anaesthesia and Surgery are specialties characterized by high acuity environments, substantial on-call responsibilities and longer training programs compared to Family Medicine. While some emergency physicians may work fewer total hours per week, the intensity and front-line nature of the work are associated with high levels of physician burnout [30–33]. Our results are consistent with existing research identifying workload, extended training duration, and demanding clinical settings as major drivers of specialty decision-making [17, 18], but suggest that

a prior history of mental health related care may be an additional, underrecognized consideration.

At the same time, lifestyle characteristics and training duration likely represent only part of a much more complex decision-making process. For example, the higher likelihood of mental health encounters among physicians entering Psychiatry, despite its longer training pathway, suggests that training duration alone is unlikely to explain the patterns observed in our study. It is possible that for some students, mental health challenges may strengthen motivation to seek supportive, relationship-centered work. This is particularly relevant for Psychiatry and Family Medicine, which offer longitudinal care and greater integration of psychosocial and mental health care into everyday clinical practice. Lived experience may increase interest in Psychiatry through personal insight, a greater awareness of stigma, and a desire to care for patients facing similar challenges [20, 34]. Family Medicine may similarly appeal to trainees who value longitudinal, relationship-centered practice and continuity of care [17].

Interestingly, while we had anticipated that Obstetrics and Gynecology (OBGYN) might demonstrate patterns similar to other acute care and procedural specialties due to work-life strain and high burnout [33, 35, 36], we did not observe a significant association between mental health encounters and choice of OBGYN. The absence of an association suggests that the relationship between mental health experiences and specialty choice is complex and multifactorial and may also be influenced by a wide range of characteristics not captured in our administrative data, including specialty culture and interest in specific patient populations.

Ultimately, while mental health encounters preceded specialty choice in our study, the mechanisms underlying this association cannot be determined. It remains unclear whether students with differing patterns of mental health service utilization are drawn to particular specialties, whether unmeasured individual characteristics influence both help-seeking and specialty selection, such as baseline interest or access to mentorship, or whether other educational and structural factors contribute to the observed associations. One such factor may be actual or perceived stigma surrounding mental health. Prior research suggests that applicants who disclose a history of mental health challenges may be ranked lower during the residency matching process [37]. If students anticipate discrimination or worry that disclosure could harm their career prospects, they may self-select away from certain specialties or choose pathways they perceive to be more supportive. Further research is needed to clarify the mechanisms linking mental health encounters and specialty selection, including the potential influence of baseline specialty interest, mentorship, specialty culture, stigma, and perceived fit, to better understand how previous mental health experiences intersect with career decision-making.

A key strength of our study is the use of population-level provincial data to assess the association between medical students' mental health encounters and specialty. Because our exposure definition was based on health care encounters captured through physician billing data our study did not rely on self-report of mental health care which may be under-reported due to concerns around stigma.

However, our study has some limitations. Firstly, we studied physicians who graduated from Ontario medical schools within a Canadian health care system, potentially limiting generalizability to jurisdictions with different medical training environments, remuneration structures, specialty training pathways, and access to mental health services. Secondly, we only identified physician billed encounters. Because physician billed encounters do not capture visits to psychologists, social workers, counsellors, institutional wellness services, or peer support programs, this may potentially underestimate the true prevalence of mental health concerns and help-seeking among medical trainees. Prior literature has identified stigma, confidentiality concerns, and perceived impacts on future career opportunities as potential barriers to help-seeking among medical students, which may further contribute to under-ascertainment of mental health concerns [38]. Although physician billing data do not capture all mental health service use, physician-based encounters likely reflect more clinically significant concerns requiring referral or pharmacological treatment. Similar administrative data approaches have been used in other physician health research [39] and provide an objective measure of clinically recognized mental health service utilization that is not subject to recall or social desirability bias.

Additionally, due to small sample sizes in certain specialties, we grouped several specialties into broader categories to facilitate analysis. For example, all surgical specialties except Obstetrics and Gynecology were combined under "Surgery," and all Internal Medicine subspecialties were grouped together. While this grouping may obscure differences within categories, the core residency training programs within each broad category are generally similar and thus is unlikely to have significantly impacted our findings. Lastly, specialty was determined using physicians' first registered specialty in administrative data. As a result, we were unable to identify physicians who subsequently completed additional training or changed practice focus, such as family physicians who later pursued Emergency Medicine training.

Conclusions

In conclusion, in a large population-based cohort of Ontario physicians, mental health encounters in the final two years of medical school were associated with subsequent specialty selection. These findings suggest that mental health care may be an additional, under-recognized factor in specialty selection. Further research is needed to better understand the mechanisms underlying these associations.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12913-026-15204-8.

Supplementary Material 1

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Author contributions
A. M, P. T, M. S. and C. K. conceived the project idea and design. A. M, N. G., R. T., M. B., P. T, D. M. C. K. contributed to data analysis. A. M drafted the manuscript. All authors contributed to data interpretation, critically revised the manuscript for important intellectual content and approved the final version for publication.

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Data availability
The data set from this study is held securely in coded form at ICES. While data sharing agreements prohibit ICES from making the data set publicly available, access may be granted by ICES to those who meet pre-specified criteria for confidential access, available at https://www.ices.on.ca/DAS. The full analyses plan (data set creation plan) and underlying analytic code are available through ICES on request, understanding that the computer programs may rely on coding templates or macros that are unique to ICES and are therefore either inaccessible or may require modification.

Declarations

Ethics approval and consent to participate
This study has OHSN-REB approval (CRRF #4011) and a Data Sharing Agreement (DSA) between CPSO, ICES, and our research team. All additional datasets used for this study are authorized under Sect. 45 of Ontario's Personal Health Information Protection Act (PHIPA), which does not require review by a Research Ethics Board. As the study used routinely collected administrative health data authorized under PHIPA, informed consent from participants was not required.

Consent for publication
Not applicable.

Competing interests
Dr Manish Sood is supported by a Research Chair in Physician Health and Wellness. Dr Claire Kendall is supported by a Clinical Research Chair at the Faculty of Medicine, University of Ottawa. The authors' institutional affiliations had no influence on the methods and reporting of results of this study.

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