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Research paper

Effects of COVID-19 pandemic on anxiety and depression in primary care: A retrospective cohort study

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ABSTRACT

Background: Population-based surveys indicate that many people experienced increased psychological distress during the COVID-19 pandemic. We aimed to determine if there was a corresponding increase in patients receiving services for anxiety and depression from their family physicians.

Methods: Electronic medical records from the University of Toronto Practice Based-Research Network (UTOPIAN; $N = 322{,}920$ patients) were used to calculate incidence rates for anxiety/depression related visits and antidepressant prescriptions before the COVID-19 pandemic (January 2018-February 2020) and during the COVID-19 pandemic (March-December 2020). Data from the pre-pandemic period were used to predict expected rates during the pandemic period which was compared to the observed rate.

Results: The number of patients presenting with anxiety/depression symptoms in primary care varied across age groups, sex, and time since pandemic onset. Among the youngest patients (ages 10–18 years), there were fewer patients than pre-pandemic visiting for new episodes of anxiety/depression and being prescribed antidepressants in April 2020, but by the end of 2020 this trend had reversed such that incidence rates for anxiety/depression related visits were higher than pre-pandemic levels. Among older adults, incidence rates of anxiety/depression related visits increased in April 2020 with the onset of the pandemic, and remained higher than expected throughout 2020.

Limitations: A convenience sample of 362 family physicians in Ontario was used.

Conclusion: Demand for mental health services from family physicians varied by patient age and sex and changed with the onset of the COVID-19 pandemic. By the end of 2020, more patients were seeking treatment for anxiety/depression related concerns.

1. Introduction

On March 11, 2020 the World Health Organization (WHO) declared the novel coronavirus (COVID-19) outbreak a global pandemic (WHO, 2020). Governments around the world responded by implementing measures to prevent the spread of the virus, including workplace and school closures, restricting gathering sizes, and stay-at-home orders (Hale et al., 2021). Both the disease and the measures implemented to contain it were sources of increased stress, which in turn was associated with increased risk for depression (Ettman et al., 2020; Zheng et al., 2021). During the first wave of the pandemic, many people reported increased worry that they or a loved one would contract COVID-19, and disruptions in daily routines, social isolation, and economic uncertainty were also common sources of stress (Jenkins et al., 2021; Zheng et al., 2021). Symptoms of anxiety and depression increased, especially among at-risk groups including youth, health care workers, and people with pre-existing mental illness (Aknin et al., 2021; Jenkins et al., 2021; Xiong et al., 2020). Surveys completed during the initial months of the pandemic in spring 2020 suggest that the number of adults with clinically significant symptoms of anxiety or depression was two to three

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times higher than before the pandemic (Ebrahimi et al., 2021; Ettman et al., 2020; McGinty et al., 2020). Less is known about whether this increase in symptoms was sustained throughout the pandemic, with some studies finding a return to pre-pandemic levels of psychological distress by mid-2020 (Daly and Robinson, 2021), and others reporting increasing distress later in the pandemic (Racine et al., 2021).

The extent to which increased psychological distress has resulted in greater clinical burden of mental illness, with more patients seeking and receiving treatment for anxiety and depression, is unknown. In Canada, most patients accessing mental health services do so through their family physician. Up to 80% of Canadians rely on their family physicians to meet their mental health-care needs (Canadian Mental Health Association, 2018). Depression and anxiety are among the most common reasons for visiting a family physician, both before and during the COVID-19 pandemic (Finley et al., 2018; Stephenson et al., 2021a). For high prevalence mental illnesses such as depression and anxiety, family physicians typically offer drug therapy and/or counselling or psychotherapy (Moulding et al., 2009; Wong et al., 2014), but may also refer patients to public or private mental health services such as individual counselling/psychotherapy or group therapy (Cordeiro et al., 2015). Although some patients may seek out community-based mental health services directly, family physicians remain the most common first point of contact for patients presenting with anxiety and/or depression.

Using clinical data from family physicians in Ontario, Canada, we aimed to determine whether rates of patients presenting with or being treated for anxiety and/or depression from March to December 2020 differed from expected rates based on pre-COVID-19 pandemic patterns. We also investigated whether the effects of the pandemic varied by age and sex, as these factors have been associated with mental health burden during the pandemic (Aknin et al., 2021; Jenkins et al., 2021; Racine et al., 2021; Xiong et al., 2020; Zheng et al., 2021).

2. Methods

2.1. Study design and setting

We conducted a longitudinal cohort study of family medicine patients in the University of Toronto Practice-Based Research Network (UTOPIAN) from 2018 to 2020. The UTOPIAN Data Safe Haven (https://www.dfcm.utoronto.ca/utopian-data-safe-haven) is a primary care electronic medical record (EMR) database with records from family medicine clinics in Ontario, Canada. Relative to family physicians in Ontario, physicians contributing to the UTOPIAN Data Safe Haven are more likely to be female, younger, Canadian medical school graduates, and practicing in an academic setting (Queenan et al., 2016; Stephenson et al., 2021a). Coverage for hospital and primary care services is provided to most Ontario residents through a government run single payer health insurance system (Ontario Health Insurance Plan) and family physicians can use their EMR to bill for the services they provide.

Most patients in the UTOPIAN database live in the Greater Toronto Area, a region of Ontario that has been consistently affected by higher rates of COVID-19 relative to other parts of Ontario (Public Health Ontario, 2020). Ontario declared a state of emergency on March 17, 2020, entering its first "lockdown" (Office of the Premier, 2020). The Ontario Ministry of Health (2020a, 2020b) encouraged family physicians to provide services virtually rather than meeting face-to-face and introduced new billing codes for the provision of services via telephone or video. Restrictions began to be lifted on May 19, 2020, with most of the province entering "Stage 2″ reopening, permitting small indoor gatherings and businesses offering personal care services to reopen, before the end of June 2020 (Nielsen, 2020; Ontario Agency for Health Protection and Promotion, 2020). Ontario experienced a second wave of increased COVID cases and deaths from September 2020 to February 2021, rapidly followed by a third wave from March to June 2021 (Public Health Ontario, 2021). Additional restrictions were applied to contain the spread of the second and third waves, but people were permitted to leave home to access essential services including health care (Canadian Medical Association, 2020; Detsky and Bogoch, 2021).

2.2. Measures

We used 2 types of measures to identify patients presenting with anxiety or depression symptoms: (1) occurrence of a primary care visit where the diagnostic billing code indicated the reason for the visit was either anxiety or depression (ICD-9 code 300 or 311); and (2) a prescription for an antidepressant medication (see Table S1 in supplementary appendix for a complete list of medications). Both indicators have been used previously as part of algorithms designed to identify patients with a life-time history of anxiety or depression (Tu et al., 2020; Williamson et al., 2014; Wong et al., 2014). We used a 12-month washout period for incident anxiety/depression related visits or prescriptions, such that patients who had not had an event within the past 12 months were considered eligible for an 'incident' event. We used a fixed look-back period to eliminate bias due to variation in the record length across patients. This method has been found to provide more stable estimates of incidence trends when using data from electronic medical records (Rassen et al., 2019). Limiting our analysis to events that occurred for the first time within the past year removed the effects of increased intensity of service use per patient that have been observed during the COVID-19 pandemic (Stephenson et al., 2021b, 2021a). Only one incident event could occur per patient during the pandemic period.

2.3. Statistical analysis

We used generalized least squares regression to model pre-pandemic monthly visit and prescription rates based on data from January 2018 to February 2020, with pre-pandemic time and month of the year as predictors. We used restricted maximum likelihood to estimate visit and prescription rates, and modelled residuals as an autoregressive AR(1) process to account for serial correlation among the residuals and to account for seasonality (Fox and Weisberg, 2018). We then used the fitted model to predict the expected incident visit and prescription rates for each month from March through December 2020. For the primary analysis, we calculated the incidence rate ratio (IRR) and 95% confidence interval (CI) of the observed versus expected rate by dividing the observed rate by the expected. All analyses were stratified by age and sex. Data analysis was done using R (Version 4.1.1).

3. Results

A total of 322,920 patients met eligibility criteria for inclusion (Table 1), for whom 188,250 anxiety/depression related visits and 137,129 antidepressant prescriptions were recorded between January 2018 and December 2020. Of these, 61,168 (32.4%) anxiety/depression related visits and 25,116 (18.3%) antidepressant prescriptions were classified as incident events occurring for the first time in the past 12 months.

3.1. Pre-pandemic phase (January 2018-February 2020)

Models used to predict the expected visit and prescription rates during the pandemic were a good fit for the pre-pandemic data (see Table S2 in supplementary material for details) and were consistent with the epidemiology of depression and anxiety disorders and their treatment (Kessler et al., 2012; Lukmanji et al., 2020; McRae et al., 2016; Morkem et al., 2017). Females were more likely than males to visit their family physician for anxiety or depression and be prescribed an antidepressant. Visits for anxiety and depression were less common among elderly patients. Among children and adolescents, antidepressant prescription rates increased over time from 2018 to 2020.

Table 1
Patient characteristics.

	Total
	(*N* = 322,920)
Age	
10–18 years	25,695 (7.96%)
19–34 years	64,569 (20.00%)
35–49 years	73,392 (22.73%)
50–64 years	80,628 (24.97%)
65 years and older	78,636 (24.35%)
Sex	
Female	184,401 (57.10%)
Male	138,519 (42.90%)
Income quintile	
1 (lowest)	62,213 (19.27%)
2	54,523 (16.88%)
3	54,420 (16.85%)
4	58,668 (18.17%)
5 (highest)	83,891 (25.98%)
Missing	9205 (2.85%)
Location	
Toronto	199,992 (61.93%)
Central Ontario (including Greater Toronto Area)	104,568 (32.38%)
Other region of Ontario	18,360 (5.69%)
Year of first visit	
2016 or before	264,139 (81.80%)
2017	19,556 (6.06%)
2018	20,705 (6.41%)
2019	18,520 (5.74%)

Note: Sample characteristics are based on most recent data available at time of data extraction, December 31, 2020. Measures of neighborhood income quintile were based on patient postal codes and reflect the characteristics of the patient population served by the University of Toronto Practice Based Research Network. Location categories are based on the postal code of the family medicine clinic or site where patients were registered. All eligible patients were required to have their first visit before January 1, 2020; year of first visit indicates how many patients were eligible for inclusion across multiple years.

3.2. Early pandemic phase -March-June 2020

There were substantial differences in the effect of the pandemic on visit trends across age groups (Fig. 1). Among patients aged 10–18 years, the number visiting for anxiety/depression was lower than expected in April 2020 ($IRR_{Females}$ = 0.43, $CI_{95\%}$ = [0.36,0.55]; IRR_{Males} = 0.46, $CI_{95\%}$ = [0.38,0.59]), May 2020 ($IRR_{Females}$ = 0.53, $CI_{95\%}$ = [0.43,0.67]; IRR_{Males} = 0.55, $CI_{95\%}$ = [0.45,0.71]), and June 2020 ($IRR_{Females}$ = 0.74, $CI_{95\%}$ = [0.61,0.94]; IRR_{Males} = 0.74, $CI_{95\%}$ = [0.61,0.96]); whereas among patients 65 years and older, the number of patients visiting for anxiety/depression was higher than expected during the same time period (April 2020: $IRR_{Females,}$ = 1.67, $CI_{95\%}$ = [1.39,2.09]; IRR_{Males} = 1.40, $CI_{95\%}$ = [1.17,1.75]); May 2020: ($IRR_{Females}$ = 1.26, $CI_{95\%}$ = [1.04,1.59]; IRR_{Males} = 1.36, $CI_{95\%}$ = [1.13,1.71]), and June 2020 ($IRR_{Females}$ = 1.52, $CI_{95\%}$ = [1.25,1.92]; IRR_{Males} = 1.38, $CI_{95\%}$ = [1.15,1.74]). Across sexes and several age groups, incidence rates for antidepressant prescribing were lower than expected during the first few months of the pandemic (Fig. 2). Consistent with the decline in anxiety/depression visits observed in April-June 2020 among children and youth aged 10–18, there was a corresponding decline in the incidence of antidepressant prescriptions in this age group in April 2020 ($IRR_{Females}$ = 0.57, $CI_{95\%}$ = [0.43,0.86]; IRR_{Males} = 0.75, $CI_{95\%}$ = [0.51,1.44]), May 2020 ($IRR_{Females}$ = 0.43, $CI_{95\%}$ = [0.32,0.64]; IRR_{Males} = 0.39, $CI_{95\%}$ = [0.26,0.76]), and June 2020 ($IRR_{Females}$ = 0.67, $CI_{95\%}$ = [0.51,1.00]; IRR_{Males} = 0.52, $CI_{95\%}$ = [0.35,1.00]). However, among older adults an increase in visitors with anxiety/depression related concerns at the start of the pandemic was not matched by a corresponding increase in prescriptions (Fig. 3).

3.3. Late 2020 pandemic phase - July-December 2020

During the second half of 2020, incident anxiety/depression related visits increased among younger women and remained higher than pre-pandemic levels for older adults (Fig. 1). Across age groups, incidence rates for antidepressant prescribing returned to within pre-pandemic levels by June 2020 and were generally consistent with pre-pandemic trends throughout the latter half of 2020 (Fig. 2). Despite the increase in anxiety/depression related visits observed among females aged 10–18 during the latter half of 2020 (IRRs ranging from 1.29 to 1.56), a corresponding increase in antidepressant prescriptions was not observed (IRRs ranging from 0.66 to 0.97) (Fig. 3).

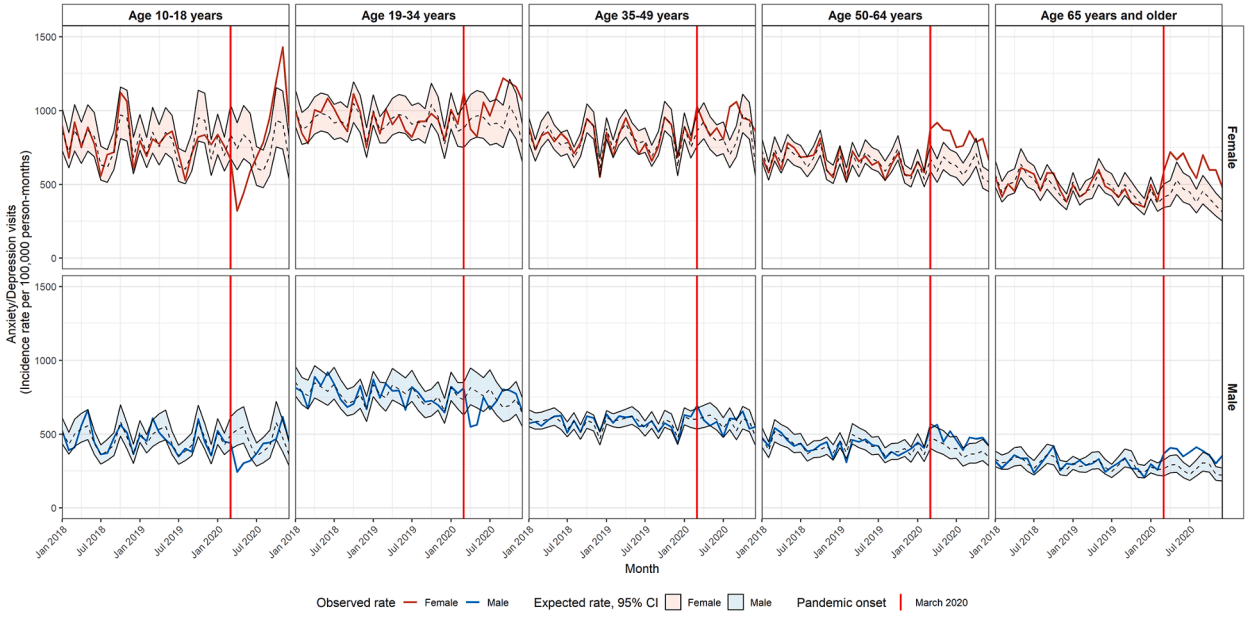

Fig. 1. Expected and observed incidence rates for anxiety/depression related visits, by age and sex. *Note*: Estimates plotted in Fig. 1 are also provided in Table S3 in the supplementary material.

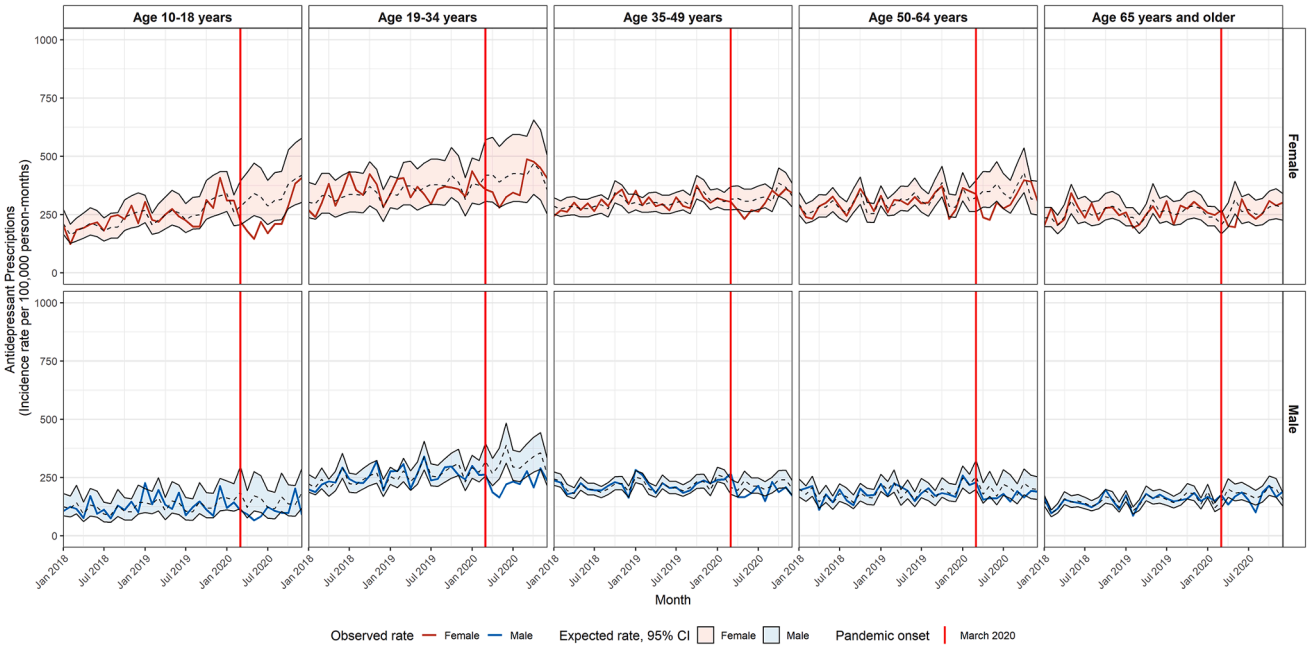

Fig. 2. Expected and observed incidence rates for antidepressant prescriptions, by age and sex. *Note*: Estimates plotted in Fig. 2 are also provided in Table S4 in the supplementary material.

4. Discussion

Despite reports of increased symptom burden for anxiety and depression during the initial months of the pandemic (Aknin et al., 2021; Ebrahimi et al., 2021; Ettman et al., 2020; McGinty et al., 2020), we did not find a corresponding increase in patients presenting to their family physicians with anxiety or depression related concerns in this study. Adolescents and young adults were among those reporting the highest levels of distress during the initial months of the pandemic (Statistics Canada, 2020), but we found that they were less likely to have an anxiety or depression related visit or receive an antidepressant prescription from their family physician than before the pandemic. One explanation for this finding is that younger patients were least likely to seek primary care services for any reason during the initial months of the pandemic (Glazier et al., 2021; Stephenson et al., 2021b), which may have resulted in fewer patients presenting with anxiety or depression. Other data for April – June 2020 also showed fewer diagnoses of depression in primary care settings in the United Kingdom (Williams et al., 2020) and fewer patients presenting with mental health concerns in emergency departments (Holland et al., 2021). The reduction in antidepressant prescriptions we observed during the first wave of the pandemic is also consistent with fewer diagnoses of anxiety and depression.

Throughout both the first and second waves of the pandemic, older adults were more likely to present with anxiety/depression related concerns in a visit with their family physician than they were before the pandemic. This contrasts with other findings that suggest that older adults were more emotionally resilient in coping with the pandemic relative to younger age groups (Klaiber et al., 2021; Parlapani et al., 2021). It is unclear whether the increased incidence of anxiety/depression related visits among older adults should be interpreted as an increase in the number of patients with depression or anxiety disorders. An alternative explanation could be that fear of contracting COVID-19 or experiencing severe COVID-19 related illness was highest among older adults (El-Gabalawy and Sommer, 2021) and that this resulted in an increase in the number of patients who sought advice from their family physician for anxiety related concerns. Researchers who assessed COVID-related fears and symptoms of generalized anxiety disorder (GAD) separately at the start of the pandemic found that COVID-related fears were positively and linearly associated with age, whereas this was not the case for GAD symptoms (Schweda et al., 2021). If the increase in anxiety/depression related visits is due to increased COVID-related fears, then a corresponding increase in antidepressant prescriptions would not be expected. Indeed, we found that despite higher levels of anxiety/depression visits, antidepressant prescribing was lower than or the same as pre-pandemic levels.

Although visits for adolescents were lower than expected during the first few months of the pandemic, this pattern was reversed later in 2020, with an increase in the number of adolescents visiting for anxiety or depression related concerns. This finding adds to a growing body of evidence that the pandemic may have worsened mental health and increased the demand for mental health supports among youth and young adults (Aknin et al., 2021; Racine et al., 2021; Statistics Canada, 2020). In the short-term, patients and families may have attempted to cope with increased psychological distress, but as the pandemic continued the need for additional support may have become more salient. The second wave of the pandemic also coincided with return to (virtual) school, which may have created additional sources of stress. Despite this increase in anxiety/depression related visits during the Fall of 2020, we did not observe a corresponding increase in prescriptions for antidepressants. This could mean that the increase in new visitors occurred for milder cases where antidepressants were not indicated. Increased funding for virtual mental health counselling through funding of family physicians' provision of virtual care as well as a new online psychotherapy program from the Ontario government started during the pandemic may have increased access to alternatives to drug therapy (Canadian Mental Health Association, 2020; Ontario Ministry of Health, 2020a). It is also possible that there is a lagged relationship between the first time in a 1-year period that a patient presents with anxiety/depression related concerns and when antidepressants are prescribed. Antidepressant prescribing might happen more often after 2 or more visits such that the increase in first visits in Fall 2020 would correlate with an increase in new prescriptions in early 2021.

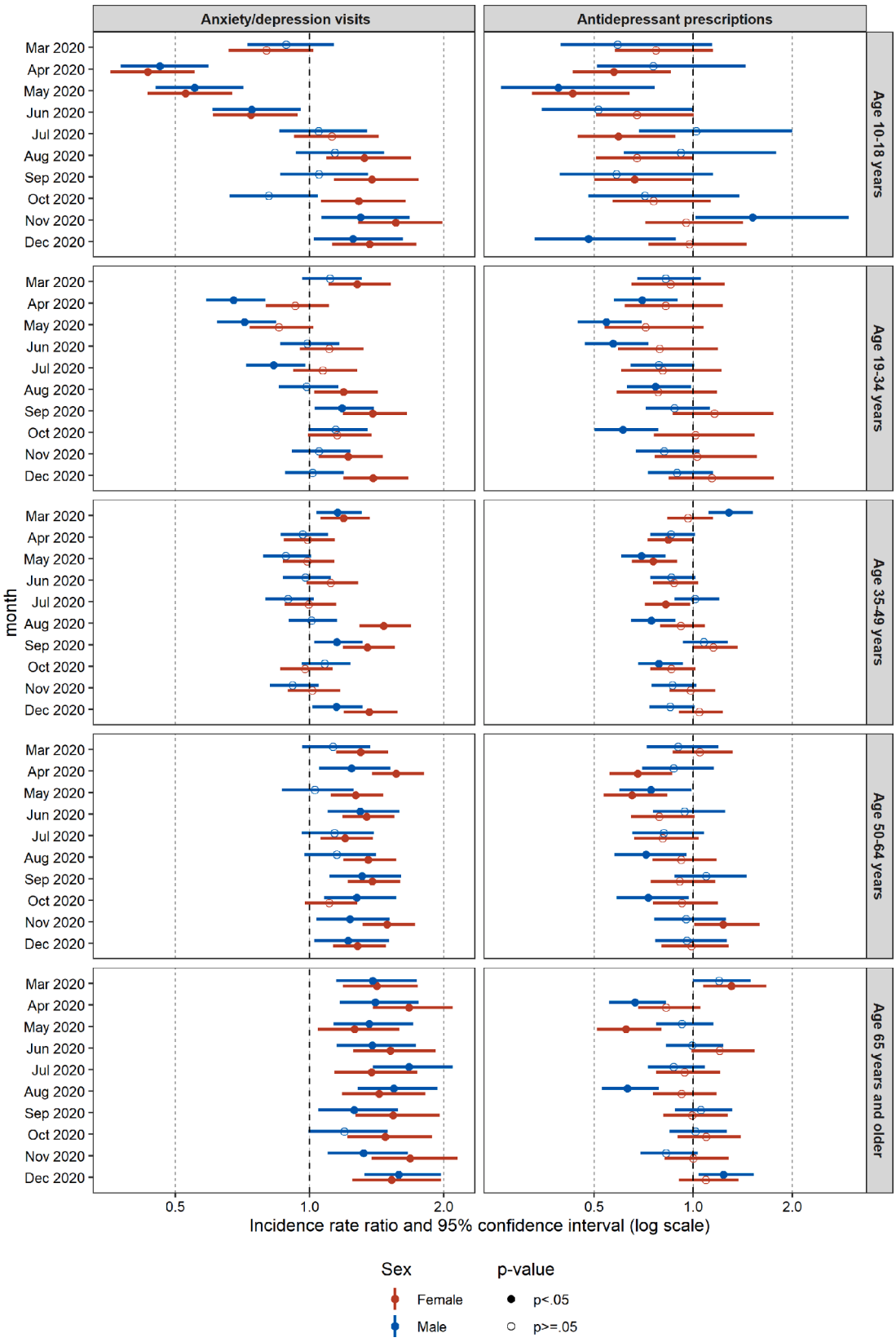

Fig. 3. Rate ratios for the observed versus expected rates for incident anxiety/depression related visits and incident anti-depressant prescriptions for March-December 2020, by age and sex. *Note*: Estimates plotted in Fig. 3 are also provided in Table S3 and S4 in the supplementary material.

4.1. Limitations

The pre-pandemic trends we observed were consistent with epidemiological research using other data sources (Kessler et al., 2012; Lukmanji et al., 2020; McRae et al., 2016), suggesting that primary care EMR data can provide a reliable tool for research, disease surveillance, and responsive health systems. EMR data from family physicians also has unique strengths not present in other data sources. Few other data sources can be used to examine prescribing trends across all ages in Ontario. Insurance coverage and payment models for prescription medications vary by age (Government of Canada, 2021), such that claims data in Ontario are often only available for specific age groups (e.g., age ≥65 years). Nevertheless, there are some limitations. First, the pandemic period included events up to the end of December 2020, but the effects of the pandemic on mental health have continued. No data for the third wave were available at the time of this analysis. Second, our focus was on incident events (i.e., patients presenting with new concerns during the pandemic). There is also evidence that care needs for patients with pre-existing mental illness increased during the pandemic (Robillard et al., 2021), and this is an area for future research. Third, results were limited to encounters with a convenience sample of UTOPIAN physicians; patients may have received services from other healthcare providers that were not captured in our data. Patients may also have sought other forms of mental health support outside the medical system. Before the pandemic, many Canadians experienced unmet mental health care needs (Statistics Canada, 2019). Some efforts to increase mental health support during the pandemic were not captured in our study.

5. Conclusion

Our findings demonstrate that the number of patients seeking support for anxiety/depression from their family physician varied throughout the pandemic and based on patient characteristics. Demand for mental health services has increased since the onset of the COVID-19 pandemic and continued attention is needed to ensure that patients' needs are met.

CRediT authorship contribution statement

Ellen Stephenson: Funding acquisition, Conceptualization, Visualization, Data curation, Formal analysis, Writing – original draft. **Braden O'Neill:** Funding acquisition, Conceptualization, Writing – review & editing. **Sumeet Kalia:** Methodology, Data curation, Formal analysis. **Catherine Ji:** Funding acquisition, Conceptualization, Writing – review & editing. **Noah Crampton:** Funding acquisition, Conceptualization, Writing – review & editing. **Debra A. Butt:** Funding acquisition, Conceptualization, Writing – review & editing. **Karen Tu:** Funding acquisition, Conceptualization, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no conflicts of interest.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jad.2022.02.004.

References

Aknin, L.B., De Neve, J.E., Dunn, E.W., Fancourt, D.E., Goldberg, E., Helliwell, J.F., Jones, S.P., Karam, E., Layard, R., Lyubomirsky, S., Rzepa, A., Saxena, S., Thornton, E.M., VanderWeele, T.J., Whillans, A.V., Zaki, J., Caman, O.K., Amor, Y. Ben, 2021. Mental health during the first year of the COVID-19 pandemic: a review and recommendations for moving forward. Perspect. Psychol. Sci. 1–60. https://doi.org/10.31234/osf.io/zw93g.

Canadian Mental Health Association, 2018. Mental health in the balance: ending the health care disparity in Canada. https://cmha.ca/wp-content/uploads/2021/07/CMHA-Parity-Paper-Full-Report-EN.pdf (accessed 8.18.21).

Canadian Medical Association, 2020.*Re*-opening your practice during COVID-19 https://www.cma.ca/re-opening-your-practice-during-covid-19 (accessed 8.24.21).

Canadian Mental Health Association, 2020. Free ICBT programs supported by the Ontario government during the COVID-19 pandemic. Assoc. Fam. Heal. Teams Ontario News. https://www.afhto.ca/news-events/news/free-icbt-programs-supported-ontario-government-during-covid-19-pandemic (accessed 8.30.21).

Cordeiro, K., Foroughe, M., Mastorakos, T., 2015. Primary mental health care in the family health team setting: tracking patient care from referral to outcome. Can. J. Commun. Ment. Heal. 34, 51–65. https://doi.org/10.7870/cjcmh-2015-021.

Daly, M., Robinson, E., 2021. Psychological distress and adaptation to the COVID-19 crisis in the United States. J. Psychiatr. Res. 136, 603–609. https://doi.org/10.1016/j.jpsychires.2020.10.035.

Detsky, A.S., Bogoch, I.I., 2021. COVID-19 in Canada. JAMA 15, 78–86. https://doi.org/10.1001/jama.2021.14797.

Ebrahimi, O.V., Hoffart, A., Johnson, S.U., 2021. Physical distancing and mental health during the COVID-19 pandemic: factors associated with psychological symptoms and adherence to pandemic mitigation strategies. Clin. Psychol. Sci. 9, 489–506. https://doi.org/10.1177/2167702621994545.

El-Gabalawy, R., Sommer, J.L., 2021. "We are at risk too": the disparate mental health impacts of the pandemic on younger generations. Can. J. Psychiatry. https://doi.org/10.1177/0706743721989162.

Ettman, C.K., Abdalla, S.M., Cohen, G.H., Sampson, L., Vivier, P.M., Galea, S., 2020. Prevalence of depression symptoms in US adults before and during the COVID-19 pandemic. JAMA Netw. Open 3. https://doi.org/10.1001/jamanetworkopen.2020.19686.

Finley, C.R., Chan, D.S., Garrison, S., Korownyk, C., Kolber, M.R., Campbell, S., Eurich, D.T., Lindblad, A.J., Vandermeer, B., Allan, G.M., 2018. What are the most common conditions in primary care? Systematic review. Can. Fam. Phys. 64, 832–840.

Fox, J., Weisberg, S., 2018. Time-series regression and generalized least squares: an appendix. R Companion Appl. Regres. 1–8.

Glazier, R.H., Green, M.E., Wu, F.C., Frymire, E., Kopp, A., Kiran, T., 2021. Shifts in office and virtual primary care during the early COVID-19 pandemic in Ontario, Canada. CMAJ 193, E200–E210. https://doi.org/10.1503/cmaj.202303.

Government of Canada, 2021. Provincial and territorial public drug benefit programs. https://www.canada.ca/en/health-canada/services/health-care-system/pharmaceuticals/access-insurance-coverage-prescription-medicines/provincial-territorial-public-drug-benefit-programs.html (accessed 8.30.21).

Hale, T., Angrist, N., Goldszmidt, R., Kira, B., Petherick, A., Phillips, T., Webster, S., Cameron-Blake, E., Hallas, L., Majumdar, S., Tatlow, H., 2021. A global panel database of pandemic policies (Oxford COVID-19 government response tracker). Nat. Hum. Behav. 5, 529–538. https://doi.org/10.1038/s41562-021-01079-8.

Holland, K.M., Jones, C., Vivolo-Kantor, A.M., Idaikkadar, N., Zwald, M., Hoots, B., Yard, E., D'Inverno, A., Swedo, E., Chen, M.S., Petrosky, E., Board, A., Martinez, P., Stone, D.M., Law, R., Coletta, M.A., Adjemian, J., Thomas, C., Puddy, R.W., Peacock, G., Dowling, N.F., Houry, D., 2021. Trends in US emergency department visits for mental health, overdose, and violence outcomes before and during the COVID-19 pandemic. JAMA Psychiatry 78, 372–379. https://doi.org/10.1001/jamapsychiatry.2020.4402.

Jenkins, E.K., McAuliffe, C., Hirani, S., Richardson, C., Thomson, K.C., McGuinness, L., Morris, J., Kousoulis, A., Gadermann, A., 2021. A portrait of the early and differential mental health impacts of the COVID-19 pandemic in Canada: findings from the first wave of a nationally representative cross-sectional survey. Prev. Med. 145, 106333 https://doi.org/10.1016/j.ypmed.2020.106333 (Baltim).

Kessler, R.C., Petukhova, M., Sampson, N.A., Zaslavsky, A.M., Wittchen, H.-U., 2012. Twelve-month and lifetime prevalence and lifetime morbid risk of anxiety and mood disorders in the United States. Int. J. Methods Psychiatr. Res. 21, 169–184. https://doi.org/10.1002/mpr.1359.

Klaiber, P., Wen, J.H., Delongis, A., Sin, N.L., 2021. The Ups and downs of daily life during COVID-19: age differences in affect, stress, and positive events. J. Gerontol. Ser. B Psychol. Sci. Soc. Sci. 76, E30–E37. https://doi.org/10.1093/geronb/gbaa096.

Lukmanji, A., Pringsheim, T., Bulloch, A.G., Stewart, D.G., Chan, P., Tehrani, A., Patten, S.B., 2020. Antidepressant prescriptions, including tricyclics, continue to

increase in Canadian children. J. Child Adolesc. Psychopharmacol. 30, 381–388. https://doi.org/10.1089/cap.2019.0121.
McGinty, E.E., Presskreischer, R., Han, H., Barry, C.L., 2020. Psychological distress and loneliness reported by US adults in 2018 and April 2020. JAMA J. Am. Med. Assoc. 324, 93–94. https://doi.org/10.1001/jama.2020.9740.
McRae, L., O'Donnell, S., Loukine, L., Rancourt, N., Pelletier, C., 2016. Mood and anxiety disorders in Canada, 2016. Heal. Promot. Chronic Dis. Prev. Canada 36, 314–315. https://doi.org/10.24095/hpcdp.36.12.05.
Morkem, R., Williamson, T., Patten, S., Queenan, J.A., Wong, S.T., Manca, D., Barber, D., 2017. Trends in antidepressant prescribing to children and adolescents in Canadian primary care: a time-series analysis. Pharmacoepidemiol. Drug Saf. 26, 1093–1099. https://doi.org/10.1002/pds.4240.
Moulding, R., Grenier, J., Blashki, G., Ritchie, P., Pirkis, J., Chomienne, M.H., 2009. Integrating psychologists into the Canadian health care system: the example of Australia. Can. J. Public Heal 100, 145–147. https://doi.org/10.1007/bf03405525.
Public Health Ontario, 2020. Evolution of COVID-19 case growth in Ontario. https://www.publichealthontario.ca/-/media/documents/ncov/epi/covid-19-epi-evolution-case-growth-ontario.pdf?sc_lang=en (accessed 8.30.21).
Public Health Ontario, 2021. Enhanced epidemiological summary: trends of COVID-19 incidence in Ontario. https://www.publichealthontario.ca/-/media/documents/ncov/epi/covid-19-epi-trends-incidence-ontario.pdf?sc_lang=en (accessed 8.25.21).
Nielsen, K., 2020. Coronavirus: what you can and cannot do in Ontario amid Stage 1 of reopening. Global News. https://globalnews.ca/news/6956617/coronavirus-ontario-may-19-reopening/ (accessed 8.25.21).
Office of the Premier, 2020. Ontario enacts declaration of emergency to protect the public. News release. https://news.ontario.ca/en/release/56356/ontario-enacts-declaration-of-emergency-to-protect-the-public (accessed 8.25.21).
Ontario Agency for Health Protection and Promotion, 2020. Enhanced epidemiological summary: COVID-19 in Ontario: a summary of wave 1 transmission patterns and case identification. https://www.publichealthontario.ca/-/media/documents/ncov/epi/2020/08/covid-19-wave-1-transmission-patterns-epi-summary.pdf?sc_lang=en (accessed 8.25.21).
Ontario Ministry of Health, 2020a. Changes to the Schedule of Benefits for Physician Services (Schedule) in response to COVID-19 influenza pandemic effective March 14, 2020.
Ontario Ministry of Health, 2020b. Primary Care Changes in response to Corona Virus (COVID- 19) effective March 14, 2020.
Parlapani, E., Holeva, V., Nikopoulou, V.A., Kaprinis, S., Nouskas, I., Diakogiannis, I., 2021. A review on the COVID-19-related psychological impact on older adults: vulnerable or not? Aging Clin. Exp. Res. 33, 1729–1743. https://doi.org/10.1007/s40520-021-01873-4.
Queenan, J.A., Williamson, T., Khan, S., Drummond, N., Garies, S., Morkem, R., Birtwhistle, R., 2016. Representativeness of patients and providers in the Canadian primary care sentinel surveillance network: a cross-sectional study. CMAJ Open 4, E28–E32. https://doi.org/10.9778/cmajo.20140128.
Racine, N., McArthur, B.A., Cooke, J.E., Eirich, R., Zhu, J., Madigan, S., 2021. Global prevalence of depressive and anxiety symptoms in children and adolescents during COVID-19. JAMA Pediatr. 2–10. https://doi.org/10.1001/jamapediatrics.2021.2482.
Rassen, J.A., Bartels, D.B., Schneeweiss, S., Patrick, A.R., Murk, W., 2019. Measuring prevalence and incidence of chronic conditions in claims and electronic health record databases. Clin. Epidemiol. 11, 1–15. https://doi.org/10.2147/CLEP.S181242.
Robillard, R., Daros, A.R., Phillips, J.L., Porteous, M., Saad, M., Pennestri, M.H., Kendzerska, T., Edwards, J.D., Solomonova, E., Bhatla, R., Godbout, R., Kaminsky, Z., Boafo, A., Quilty, L.C., 2021. Emerging new psychiatric symptoms and the worsening of pre-existing mental disorders during the COVID-19 pandemic: a Canadian multisite study: nouveaux symptômes psychiatriques émergents et détérioration des troubles mentaux préexistants pendanturant la p. Can. J. Psychiatry 1–12. https://doi.org/10.1177/0706743720986786.
Schweda, A., Weismüller, B., Bäuerle, A., Dörrie, N., Musche, V., Fink, M., Kohler, H., Teufel, M., Skoda, E.M., 2021. Phenotyping mental health: age, community size, and depression differently modulate COVID-19-related fear and generalized anxiety. Compr. Psychiatry 104. https://doi.org/10.1016/j.comppsych.2020.152218.
Statistics Canada, 2019. Mental health care needs, 2018. 82-625-X. https://www150.statcan.gc.ca/n1/pub/82-625-x/2019001/article/00011-eng.htm (accessed 8.25.21).
Statistics Canada, 2020. Impacts on mental health. soc. econ. impacts COVID-19 a six-month update. https://www150.statcan.gc.ca/n1/pub/11-631-x/2020004/s3-eng.htm (accessed 8.30.21).
Stephenson, E., Butt, D.A., Gronsbell, J., Crampton, N., Ji, C., Kalia, S., O'Neill, B., Tu, K., 2021a. Changes in the top 25 reasons for primary care visits during the COVID-19 pandemic in a high-COVID region of Canada. PLoS One 16, e0255992. https://doi.org/10.1371/journal.pone.0255992.
Stephenson, E., O'Neill, B., Gronsbell, J., Butt, D.A., Crampton, N., Ji, C., Kalia, S., Meaney, C., Tu, K., 2021b. Changes in family medicine visits after the onset of the COVID-19 pandemic in Ontario: a retrospective cohort study. CMAJ Open 9, E651LP–E658LP. https://doi.org/10.9778/cmajo.20210005.
Tu, K., Sodhi, S., Kidd, M., et al., 2020. The University of Toronto Family Medicine Report: Caring for Our Diverse Populations. Toronto, ON. ISBN: 978-1-9990809-1-4. https://issuu.com/dfcm/docs/university_of_toronto_family_medicine_report_-_car.
WHO, 2020. WHO director-general's opening remarks at the media briefing on COVID-19 - 11 March 2020. https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19-11-march-2020 (accessed 2.7.22).
Williams, R., Jenkins, D.A., Ashcroft, D.M., Brown, B., Campbell, S., Carr, M.J., Cheraghi-sohi, S., Kapur, N., Thomas, O., Webb, R.T., Peek, N., 2020. Diagnosis of physical and mental health conditions in primary care during the COVID-19 pandemic: a retrospective cohort study. Lancet Public Heal 5, e543–e550. https://doi.org/10.1016/S2468-2667(20)30201-2.
Williamson, T., Green, M.E., Birtwhistle, R., Khan, S., Garies, S., Wong, S.T., Natarajan, N., Manca, D., Drummond, N., 2014. Validating the 8 CPCSSN case definitions for chronic disease surveillance in a primary care database of electronic health records. Ann. Fam. Med. 12, 367–372. https://doi.org/10.1370/afm.1644.
Wong, S.T., Manca, D., Barber, D., Morkem, R., Khan, S., Kotecha, J., Williamson, T., Birtwhistle, R., Patten, S., 2014. The diagnosis of depression and its treatment in Canadian primary care practices: an epidemiological study. CMAJ Open 2, E337–E342. https://doi.org/10.9778/cmajo.20140052.
Xiong, J., Lipsitz, O., Nasri, F., Lui, L.M.W., Gill, H., Phan, L., Chen-Li, D., Iacobucci, M., Ho, R., Majeed, A., McIntyre, R.S., 2020. Impact of COVID-19 pandemic on mental health in the general population: a systematic review. J. Affect. Disord. 277, 55–64. https://doi.org/10.1016/j.jad.2020.08.001.
Zheng, J., Morstead, T., Sin, N., Klaiber, P., Umberson, D., Kamble, S., DeLongis, A., 2021. Psychological distress in North America during COVID-19: the role of pandemic-related stressors. Soc. Sci. Med. 270, 113687 https://doi.org/10.1016/j.socscimed.2021.113687.