The effects of age on quality of mental health during the COVID-19   pandemic

Alan Bul[1*], Jacob Gaisinsky[1*], Wendy Zhang[1*], Marco Kurepa[1*], Adam Gaisinsky[2], Massimo Sementilli[3]

[1] Vincent Massey Secondary School, Windsor, Ontario, Canada

[2] Integrative Biology, University of Windsor, Windsor, Ontario, Canada

[3] Biomedical Sciences, University of Windsor, Windsor, Ontario, Canada

SUMMARY

Mental health plays a crucial role in the health and well-being of an individual. Although it is becoming an increasingly prominent topic today, the relationship between age and measures of mental health, such as the frequency of mental illness or perceived mental health, has not been formally studied. Over the last 50 years, the median age of Canadians increased, so studying the impacts of increased age on mental health is important. Furthermore, understanding the impacts of age on mental health disorders is crucial for targeting support to correct populations and challenging associated stigmas. We hypothesized that older age groups would have a lower incidence of mental health disorders and a higher rate of people reporting fair or poor perceived mental health because of increased emotional stability and maturity. Using the Survey on COVID-19 and Mental Health by the government of Canada, we investigated the prevalence of two mental health disorders, generalized anxiety disorder (GAD) and major depressive disorder (MDD) to examine the incidence of mental health disorders across four age brackets. From the Canadian Community Health Survey, data on the perceived mental health of Canadians during the pandemic was compared across age groups. We found significant increase in the prevalence of GAD and MDD in the younger age groups. We also found significant negative correlations between the prevalence of mental health disorders and age using linear regressions. These data suggest that more attention should be placed on the mental well-being of younger adults in Canada.

INTRODUCTION

The Diagnostic and Statistical Manual for Mental Disorders (DSM), published in 1952, details diagnostic criteria for hundreds of psychiatric disorders and is widely used by Canadian mental healthcare professionals (1). DSM-III, published in 1980, introduced diagnostic criteria for GAD) and major depressive disorder (MDD). DSM-5, published in 2013, classified GAD as an anxiety disorder that can be characterized by excessive anxiety and worry about several events or activities (2). It also classified MDD as a depressive disorder that includes symptoms such as depressed mood, changes in appetite and sleep, and recurrent thoughts of

death (3). The increased pressure and work stress in young people may contribute to higher levels of depression and mental instability, while older individuals may experience greater emotional stability due to a more relaxed lifestyle (4).

In addition to the onset of mental health disorders, age has a role in affecting the perceived mental health of individuals. Perceived mental health, an individual's own assessment on their mental health state, is affected by a multitude of factors including social isolation and cognitive decline (5). A distinction has been made between perceived mental health and mental illnesses as it is feasible someone could have poor mental health without having a mental illness or the reciprocal (6). Studies have shown that elderly people are especially prone to perceived feelings of loneliness and social isolation, even when supported by others and when there are no underlying medical conditions (7). Dementia is diagnosed more often in people over the age of 65, indicating that cognitive and emotional decline are more prevalent in the older population (8). Based on these factors, we hypothesized that a positive correlation exists between age and fair or poor perceived mental health among older individuals within the population Determining if such a correlation exists would prove beneficial by identifying groups of individuals with poor perceived mental health, allowing for help to be given and potentially slowing the development of mental illnesses such as depression. Therefore, in this study we investigated the prevalence of two designated mental health disorders, GAD and MDD, using the Survey on COVID-19 and Mental Health by the government of Canada, across four age groups. By doing so, we explored our hypotheses that a negative correlation exists between age and perceived mental health within the Canadian population during the COVID-19 pandemic. This study found that older adults in Canada generally had a lower frequency of positive screening for GAD and MDD, as well as a lower frequency of poor or fair perceived mental health compared to younger adults in Canada.

RESULTS

The dataset utilized for analysis was the Survey on COVID-19 and Mental Health by the government of Canada. Non-institutionalized persons 18 years of age or older, living in Canada's ten provinces were the study population of the survey. Published data from the years 2020 to 2021 were selected as this reflects the initial start of the pandemic period and the height of isolation due to social distancing policy. Linear regressions were done to compare age groups with the frequency of positive GAD and MDD screening as well as fair or poor perceived mental health. Linear regression showed an observed correlation between the age groups and the per-

centages of people reporting fair or poor perceived mental health. An additional correlation was found between screening positive for GAD and MDD as well (**Figure 1, Figure 2, Figure 3**). All calculated R-squared values were found to be greater than 0.8and identified to support the respective correlations: percentage of people with fair or poor perceived mental health vs. age (R-squared = 0.888), percentage of people positive for GAD vs. age (R-squared = 0.852), and percentage of people positive for MDD vs. age (R-squared = 0.861).

To assess whether the data in the Survey on COVID-19 and Mental Health by the government of Canada, followed a parametric distribution, Shapiro-Wilk tests were conducted. As the Shapiro-Wilk tests determined the data to be normally distributed, additional Student's t-tests were used, showing significance present between age when compared to fair or poor perceived mental health in older populations, who additionally demonstrated a smaller percentage of people with fair or poor mental health ($p = 0.0144$, **Figure 4**). When we compared age with GAD and MDD, it was observed that the older populations (>50 years old) saw a decrease in the percentage of those diagnosed with GAD and MDD ($p = 0.0312$, **Figure 5A**) when compared to younger populations which had a higher incidence rate ($p = 0.0375$, **Figure 5B**). We defined 50 years old as the cutoff between the older and younger population because it allowed us to combine the survey data (18-34 years, 35-49 years, 50-64 years, and 65 years) into 2 groups whose means could be compared using simple statistical tests.

DISCUSSION

A negative correlation between age and the percentage of people with GAD and MDD was shown which supports our hypothesis that age would be negatively correlated with mental health metrics. Furthermore, a significant difference in the incidence of GAD and MDD among age groups under 50 and greater than or equal to 50 was found. A possible explanation for this could include the older population being more experienced in coping with their mental well-being as well as the younger generation facing increased environmental stressors. Interestingly, previous studies have shown that older people are less likely to utilize mental health services compared to their younger counterparts (9). This previous finding may be a result of the older population having better mental health; thus, they would not need the services. However, the opposite may also hold merit where the older population appears to have better mental health because they do not use mental health services frequently and thus do not get diagnosed. An alternative explanation to our results is that older individuals may be less inclined to seek diagnoses for their mental health disorders leading to a disproportionate number of undiagnosed cases. All the aforementioned factors may combine to explain the lower levels of GAD and MDD in these older populations.

A strong negative correlation between the percentage of people reported to have fair or poor perceived mental health and age was also found. As age increased, fewer individuals reported their perceived mental health as fair or poor, which supports our hypothesis of a negative correlation between age and mental health metrics. An explanation for this might be that older adults are more emotionally stable (10). Emotional stability leads to fewer feelings of intense negative emotions, which might make one's perceived mental health less negative
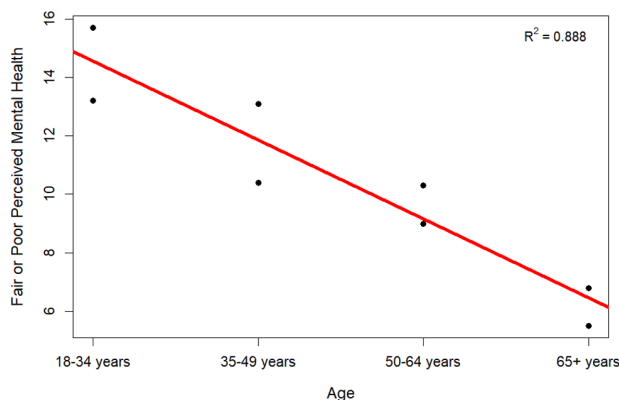

Figure 1: The correlation between percentages of Canadians with fair or poor perceived mental health and age categories. Linear regression showing a negative correlation between the percentage of people with fair or poor perceived mental health and age. Each datapoint represents the percentage of Canadians of a certain age group with fair or poor perceived mental health in one year. Linear regression, R2 = 0.888, ***p < 0.001.
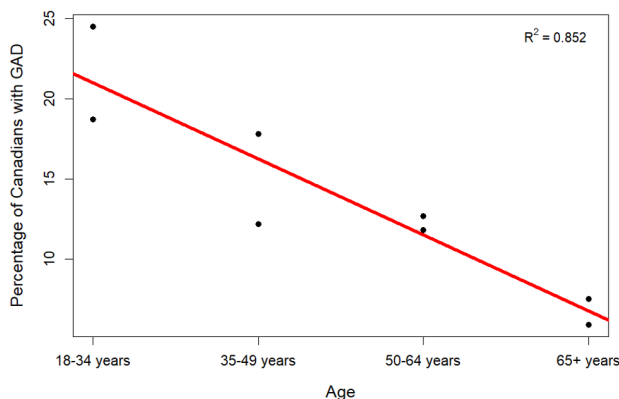

Figure 2: The correlation between percentages of Canadians with Generalized Anxiety Disorder (GAD) and age categories. Linear regression showing a negative correlation between age and the percentage of people with GAD. Each datapoint represents the percentage of Canadians of a certain age group with GAD in one year. Linear regression, R2 = 0.852, **p < 0.01.

(11). Due to this, fewer older adults may classify their mental health as fair or poor. A possible reason for why younger adults had worse perceived mental health may be that they face increased emotional stress through new experiences including living away from home, heartbreak, and financial worries (12). The transition to new experiences is stressful for many young adults and may make them more vulnerable to negative feelings, negatively impacting the classification of their mental health. Another change at the time this data was collected was the onset of the COVID-19 pandemic and corresponding quarantine. Although the pandemic impacted everyone, it may have disproportionately negatively affected younger populations as these individuals tend to be more socially active and mobile than older individuals who typically
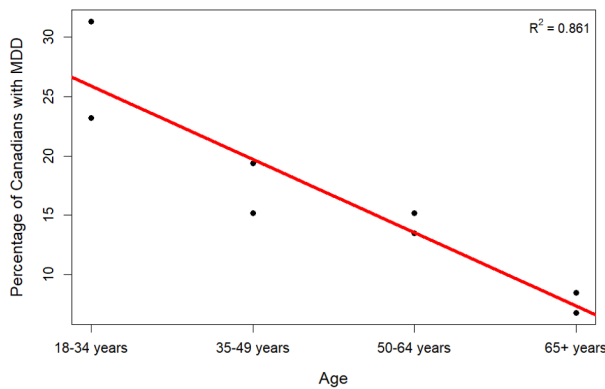
Figure 3: The correlation between percentages of Canadians with Major Depressive Disorder (MDD) and age categories. Linear regression showing a negative correlation between age and the percentage of people with MDD. Each datapoint represents the percentage of Canadians of a certain age group with MDD in one year. Linear regression, R2 = 0.861, ***p < 0.001.

Figure 4: Age distribution and prevalence of fair or poor perceived mental health in Canadians. Boxplot showing the percentage of people reporting to have fair or poor perceived mental health and their distribution across age groups (<50 and ≥50). Boxplot and Student's t-test done in R version 4.2.2. Student's t-test, *p = 0.0144.

stay in their homes more often. From the survey observations, it can be determined that from 2020-2021, the quality of mental health in older Canadians was higher compared to younger adults.

One of the limitations in this analysis is the reliance on self -reported data for perceived mental health. Since mental health is a complex concept, it varies daily and the variability in perceptions of mental health can influence the generalizability of the findings. There may also be social stigmas surrounding reporting one's mental health to others resulting in a discrepancy between actual mental health and reported mental health. Another limitation is the scope of the data, which was restricted to adults only. Future studies could investigate trends between age and mental health in children and adolescents. Additionally, separating the age groups with different cutoffs may influence the results. For instance, if the cutoff was changed from above or below 50 to a higher cutoff, the difference in perceived mental health may change. Despite these limitations, the analyses illustrated that during the COVID-19 pandemic, older populations in Canada were less susceptible to positive screening for GAD and MDD and were less likely to report their mental health as fair or poor than younger populations.

Future studies could investigate similar mental illnesses, such as obsessive-compulsive disorder, bipolar disorder, and schizophrenia. Studying these disorders could further strengthen the understanding of how age correlates with the quality of mental health. Additional studies that compare age with other mental illnesses could help further understand how age influences the quality of mental health. Additionally, since the data collected only included adults during the COVID-19 pandemic, future studies should be done to include children and adolescents during non-pandemic times to generalize the findings to broader age groups and time periods without a pandemic. COVID-19 has dramatically changed how the world operates so this study should be repeated in future years to confirm the results. Based on the observations, the quality of mental health was higher in older adults. Thus, we suggest that GAD and MDD assistance should have additional focus on the younger generation as they are more prone to GAD
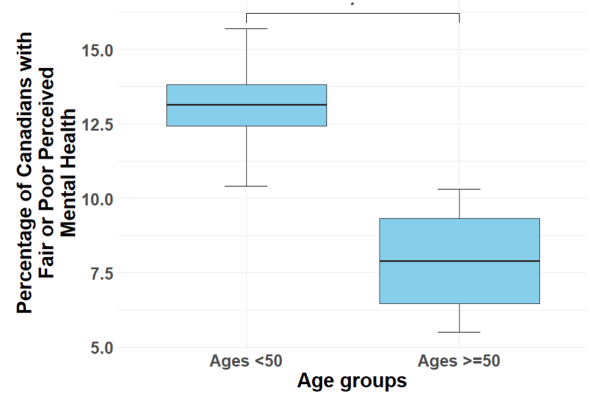
and MDD and fair or poor perceived mental health.

MATERIALS AND METHODS

Canada-wide data on the percentage of Canadians screening positive for mental health disorders (GAD and MDD) were taken from the Survey on COVID-19 and Mental Health from 2020-2021 (13). The data was collected by a voluntary Statistics Canada online survey that was available to all Canadian citizens and filled out by approximately 50,000 people. The data was separated into four age categories (18-34 years, 35-49 years, 50-64 years, and 65 years or older). Canada-wide data on perceived mental health from 2020-2021 was taken from the Canadian Community Health Survey, where participants ranked their mental health as excellent, very good, good, fair, or poor (14). The data contained information from both sexes and willing participants over the age of 18. Quality of mental health was defined by perceived mental health and occurrences of mental health disorders. Fewer percentages of people in an age bracket reporting fair or poor mental health indicated a higher quality of mental health for their group. Fewer percentages of people screening positive for GAD and MDD indicated higher quality of mental health. Three linear regressions were performed on fair or poor perceived mental health, GAD, and MDD against the four age categories to calculate R-squared and p-values. A threshold of 0.8 was used to analyze the significance of R-squared values as this value is generally used as an acceptable threshold to denote significance. Linear regressions were done instead of ANOVA tests as they are more suitable to describe the overall trend across age groups. Additionally, ages were split into two categories, younger (ages below 50) and older (ages greater than or equal to 50). To determine the normality of the data, Shapiro-Wilk tests were performed on all data sets. Student's t-tests were then performed on the two age categories and prevalence of mental illness (GAD and MDD) to calculate a p-value. To reflect a 95% confidence interval, an α value of 0.05 was used to determine significance. We plotted box plots using the percentage of people in the respective age category with GAD, MDD, or fair/poor perceived mental health. R-squared
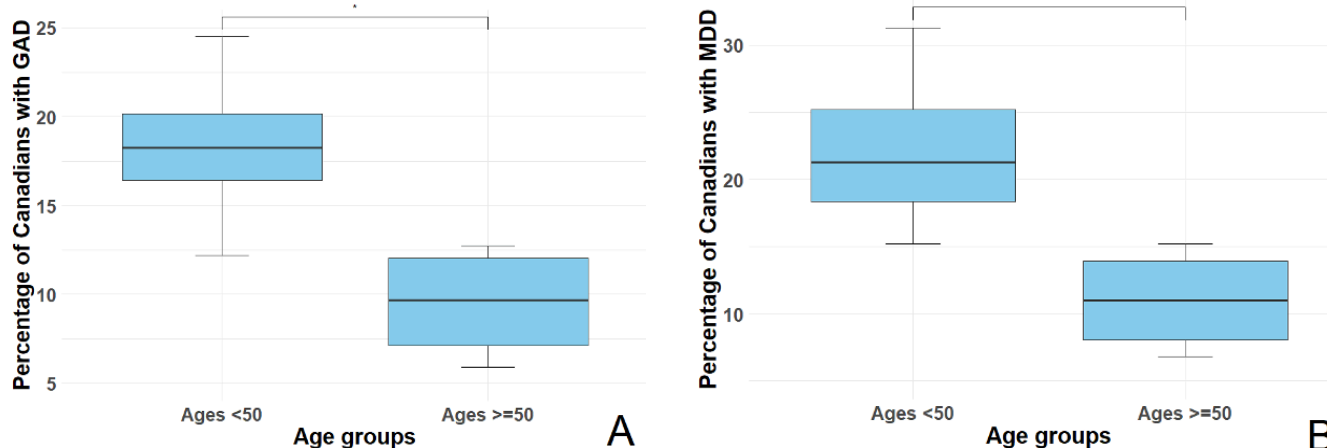
Figure 5: Age distribution and prevalence of (A) Generalized Anxiety Disorder (GAD) and (B) Major Depressive Disorder (MDD) in Canadians. (A) Boxplot showing the percentage of people screening positive for GAD and their distribution across age groups (<50 and ≥50). Boxplot and Student's t-test done in R version 4.2.2. Student's t-test, *p = 0.0312. (B) Boxplot showing the percentage of people screening positive for MDD and their distribution across age groups (<50 and ≥50). Boxplot and Student's t-test done in R version 4.2.2. Student's t-test, *p = 0.0375

values from linear regressions and boxplots were visualized using RStudio, R version 4.2.2. Shapiro-Wilk tests, Student's t-tests, and linear regressions were done using RStudio, R version 4.2.2. The raw data can be found on github.com/MarcoKurepa/The-Effects-of-Age-on-Quality-of-Mental-Health-During-the-COVID-19-Pandemic.

REFERENCES
1. Kogan, C. S., et al. "The True North Strong and Free? Opportunities for Improving Canadian Mental Health Care and Education by Adopting the WHO's ICD-11 Classification." The Canadian Journal of Psychiatry, vol. 62, no.10, Jun. 2017, https://doi.org/10.1177/0706743717717253.
2. "DSM Library – Anxiety Disorders." Psychiatry online. https://doi.org10.1176/appi.books.9780890425787.x05_Anxiety_Disorders. Accessed 26 May. 2024.
3. "DSM Library – Depressive Disorders." Psychiatry online. https://doi.org10.1176/appi.books.9780890425787.x04_Depressive_Disorders. Accessed 26 May. 2024.
4. Law, P.C.F., et al. "A systematic review on the effect of work-related stressors on mental health of young workers." Int Arch Occup Environ Health vol. 93, pp. 611-622, Jan. 2020, https://doi.org/10.1007/s00420-020-01516-7.
5. Donovan, N. J., et al. "Social Isolation and Loneliness in Older Adults: Review and Commentary of a National Academies Report." American Journal of Geriatric Psychiatry, vol. 28, no. 12, Aug. 2020, https://doi.org/10.1016/j.jagp.2020.08.005.
6. "Understanding the Perceived Mental Health of Canadians during the COVID-19 Pandemic", Government of Canada, Statistics Canada. www150.statcan.gc.ca/n1/pub/82-003-x/2020004/article/00003-eng.htm. Accessed 27 Apr. 2024.
7. Fakoya, O. A., et al. "Loneliness and social isolation interventions for older adults: a scoping review of reviews." BMC Public Health; BioMed Central. vol. 20, no. 129, Feb. 2020, https://doi.org/10.1186/s12889-020-8251-6.
8. "Dementia - Symptoms and causes" Mayo Clinic. www.mayoclinic.org/diseases-conditions/dementia/symptoms-causes/syc-20352013. Accessed April 2, 2024.
9. Teo, K., et al. (2022, February 13). "Help-Seeking Behaviors Among Older Adults: A Scoping Review." Journal of Applied Gerontology, vol. 41, no. 5, Feb 2022, https://doi.org/10.1177/07334648211067710.
10. Mader, N., et al. (2023). "Emotional (in)stability: Neuroticism is associated with increased variability in negative emotion after all." Proceedings of the National Academy of Sciences, vol. 120, no. 23, May 2023, https://doi.org/10.1073/pnas.2212154120.
11. Burr, D. A., et al. (2021, April 1). "Emotion dynamics across adulthood in everyday life: Older adults are more emotionally stable and better at regulating desires." Emotion, vol. 21, no. 3, Apr 2021, https://doi.org/10.1037/emo0000734.
12. "How Life Stages May Affect Your Mental Health." Psychological Health Care. www.psychologicalhealthcare.com.au/blog/life-stages-mental-health/. Accessed April 2, 2023.
13. "Survey on COVID-19 and Mental Health (SCMH)." Government of Canada, Statistics Canada. www.statcan.gc.ca/en/survey/household/5330. Accessed April 2, 2023.
14. "Canadian Community Health Survey Annual Component (CCHS)." Government of Canada, Statistics Canada. www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&Id=1496481 Accessed April 2, 2023.