Prevalence and Predictors of Generalized Anxiety Disorder Symptoms in Residents of Fort McMurray Five Years after the Devastating Wildfires

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Abstract: Background: Natural disasters adversely impact individuals living in places where they occur, resulting in emotional distress. The wildfire that occurred in Fort McMurray (FMM), Alberta in 2016 is no different. Objective: This study aims to identify the prevalence and predictors of Generalized Anxiety Disorder (GAD) symptoms in residents of FMM five years after the devastating wildfires. Methods: Data for the study were collected through a cross-sectional survey conducted online from the 24th of April to the 2nd of June 2021. A validated instrument, the GAD-7 scale, was used to collect information on anxiety. Results: This study involved 186 residents of FMM, of which the majority were females (85.5%), employed (94.1%), working at school boards (50.0%), and were either married, cohabiting, or partnered (71.0%). The prevalence of likely GAD among the study sample was 42.5%. Unemployed respondents were seventeen times more likely to develop GAD symptoms (OR = 16.62; 95% C.I. 1.23–223.67) while respondents who would like to receive mental health counseling were five times more likely to experience GAD symptoms (OR = 5.35; 95% C.I. 2.03–14.15). Respondents who suffered a loss of property because of the wildfire were two times more likely to develop GAD symptoms (OR = 2.36; 95% C.I. 1.01–22.62). Conclusion: Policymakers may mitigate GAD symptoms, particularly after natural disasters, by making long-term mental health counseling available and a key component of post-disaster management, and by investing in the social capital of the people to build resilience and support to deal with the post-disaster mental health effects.

Keywords: anxiety; wildfire; counseling; disaster; traumatic; devastating

1. Introduction

Natural disasters are occurrences that have lasting impacts on the areas where they occur and on the lives of those impacted. The impacts of natural or man-made disasters on the lives of people in the regions where they occur include the destruction of homes and dwellings of humans, disruption of other ecological habitats, destruction of businesses and livelihood of people, as well as various health problems ranging from physical to psychological [1]. Natural disasters may arise from the devastating effects of natural phenomena such as earthquakes, volcanic eruptions, typhoons, cyclones, flooding [1], wildfires, hurricanes, and tsunamis [2].

It is projected that over 40% of Canadians will experience a major disaster in the course of their lives, with many of them reporting a significant impact on their capability to
function properly in their day-to-day lives [3]. Fort McMurray (FMM) residents have, over the past few years, endured several serious disasters, including wildfires and flooding. The 2016 wildfires that swept across the Canadian province of Alberta, and specifically FMM, are considered to be the most destructive and most costly in Canadian history [4].

The wildfire was estimated to have destroyed approximately 5890 km² of land and more than 2400 buildings. It resulted in the largest evacuation in Alberta’s history. More than 90,000 residents of Northern Alberta were relocated, and some have still not returned home about five years after the incident [5]. Wildfires leave daily visual reminders of loss that can lead to what some refer to as ‘solastalgia’ [6]. “Solastalgia” is a new concept developed to give greater meaning and clarity to environmentally induced distress [6,7]. This is the distress that is produced by environmental change impacting people when directly connected to their home environment [6].

The mental health consequences of natural disasters are increasingly becoming evident to scientists, even though they remain difficult to assess and address accordingly. Studies have explored the impacts of disasters on the mental health of survivors and examined the presence and severity of depressive, psychotic, generalized anxiety, and post-traumatic stress disorder symptoms [1,8]. A consensus in the disaster-related literature is that mental health issues should be an integral part of the medical and emergency response [9]. The World Health Organization 2018 identified a critical gap in the long-term monitoring of the effects of disasters on mental health and the need to provide ongoing psycho-social support for victims of disasters [10].

The findings in some published studies suggested that Generalized Anxiety Disorder (GAD) symptoms are increased following disasters. Studies have shown that the psychological complications suffered by people who experienced disaster can be better managed if proper assessment and the needed intervention are instituted promptly [11]. Some studies have shown a relationship between disasters such as wildfires, explosions, flooding, tsunamis, and the elevated prevalence rate of GAD symptoms and depression among first responders and survivors [8,12].

A cross-sectional study conducted to ascertain the factors associated with increased levels of GAD among 1465 adolescents six months after a wildfire in Greece showed a probable anxiety symptom rate of 29.4% [13]. Significantly higher levels of symptoms of GAD and phobic anxiety were reported in a similar cross-sectional case-control study of an adult population (18–65 years old) in Greece six months after the wildfires compared to the controls [14]. A three-month follow-up study conducted in California in 2003 to estimate the prevalence of psychopathology among persons seeking relief services after a wildfire reported that 33% of the respondents showed evidence of a mental health problem [15].

Increased levels of anxiety, depression, and stress have been identified in people who witnessed or experienced disasters such as wildfires and flooding, including healthcare workers, students, as well as patients [16]. The core feature of anxiety, which is the feeling of uncertainty, has the propensity to increase following a disaster experience [17]. This feeling of uncertainty is mostly due to the loss of housing, job security, how soon one can recover from physical health challenges, and the stress of having to receive insurance claims. Moreover, the feeling of uneasiness relating to the possibility of experiencing another disaster could increase the risk of having elevated anxiety levels [18]. Other studies have also shown an increasing trend of substance use such as alcohol, nicotine, and other psychoactive substances post-disaster [19]. This also tends to exacerbate existing mental health disorders and worsen the treatment outcome for such survivors [20,21].

The goal of this study was to determine the prevalence of likely GAD and to identify predictors of GAD symptoms in residents of FMM five years after the 2016 wildfires. We hypothesized that wildfire-related variables, rather than sociodemographic variables, will predict likely GAD in residents of FMM.
2. Methodology and Materials

2.1. Setting and Design

The study was set in the Northern Alberta city of Fort McMurray (FMM) of Wood Buffalo in Canada. The region has a diverse population of 111,687 people according to the 2018 municipal population census [22]. FMM is made up of mainly temporary project accommodation facilities and has some surrounding rural communities [7].

The study data were collected through a cross-sectional survey, which was sent through REDCap to respondents. REDCap stands for Research Electronic Data Capture. This is software that is used to capture online data for research [23]. The survey was conducted online from 24 April to 2 June 2021. The questionnaire was accessed by respondents via email using community, government, school, and occupational platforms and was self-administered. Consent was implied if the survey was completed, and the study was approved by the Alberta Health Research Ethics Committee.

2.2. General Measure

The GAD-7 scale was used to assess the presence of anxiety symptoms amongst respondents. This scale consists of seven self-reported items that define the symptoms of GAD over the last two weeks. Items are rated on a 4-point Likert-type scale. The responses for each question were: Not at all sure (0), Several days (1), Over half the days (2), and Nearly every day (3). Scores ranged from 0 to 21, with higher scores indicating more severe symptoms of GAD [24]. This study categorized two types of anxiety: Low anxiety is characterized by a score less than 10 and moderate to high anxiety (Likely anxiety) is characterized by scores of 10 or greater than 10. The scale is known to show consistency and a one-factor structure in its usage [25] and shows that all its items are representative of one construct. The GAD-7 scale has been recommended as the most valid tool for assessing the severity of GAD symptoms in research and clinical practice [25]. Test–retest reliability was also good (intraclass correlation = 0.83). The comparison of scores obtained from the self-report scales with those derived from the MHP-administered versions of the same scales yielded similar outcomes (intraclass correlation = 0.83), indicating good procedural validity. The internal consistency of the GAD-7 was excellent (Cronbach α = 0.92) [25,26].

2.3. Sample Size Estimation

With a population of 111,687 as of the 2018 census [22], a 95% confidence interval, and a ±3% margin of error, the sample size needed for prevalence estimates for likely GAD was 1049. With an expected survey response rate of 20%, we planned to reach 5290 residents with the online survey link.

2.4. Collected Data and Statistical Analysis

A blend of socio-demographic factors (e.g., age, sex at birth, relationship status), clinical factors (e.g., clinical history of depression, anxiety), and wildfire-related variables (e.g., witnessing wildfire or being fearful for one or others’ lives) were collected through this survey. Statistical analysis for this study was completed using SPSS Version 25 (IBM Corp, Armonk, NY, USA) [27]. For demographic, clinical, and wildfire-related variables, descriptive statistics were used and centered on the respondents’ age. Chi-square or Fisher exact (for small sample sizes) analysis was performed to examine all the variables in association with the likely anxiety categorical variable (low and moderate to high anxiety). The significant (p ≤ 0.05) or near significant (0.1 > p > 0.05) variables obtained from the univariate analysis were included in a logistic regression model. Correlational analysis was used to rule out any strong inter-correlations (Spearman’s correlation coefficient of 0.7 to 1.0 or −0.7 to −1.0) between the variables. The logistic regression model was employed to identify significant predictors of likely anxiety. Confidence intervals and odds ratios (OR) were used to determine the predictor variables, including wildfire-related factors for respondents to self-report likely anxiety after the 2016 wildfires in FMM. There was
no imputation for missing data in the analysis, and the results reported only represent completed responses.

3. Results
3.1. Demographic Information of the Respondents

Overall, 186 out of the 249 residents who accessed the online survey completed it, giving a completion response rate of 74.7%. Out of these, the majority were females (85.5%), employed (94.1%), working at school boards (50.0%), and were in a relationship (either married, cohabiting, or partnered) (71.0%) as shown in Table 1.

In terms of clinical history, 51.6% had received mental health diagnosis (MH Dx), including depression (31.2%), bipolar (3.2%), anxiety (41.9%), personality (1.1%), and other (9.1%) disorders. None reported a history of schizophrenia (0.0%). Some of the participants were on medication for a mental health concern (35.5%), (31.7%) antidepressants, (2.2%) antipsychotics, and benzodiazepines, (6.5%) mood stabilizers, (11.3%) sleeping tablets, and 1.6% on other forms of medications. More than one-third of the respondents had received MH counseling in the past year (38.7%), more than 50% would like to receive MH counseling, and almost 80% received counseling when they returned to FMM.

Wildfire-related questions, sources of information, and support indicate that most participants resided in FMM during the 2016 wildfire (89.8%) and were near property destroyed (45.5%). Before and after the wildfire, 73.1% were living in their own homes, 78.0% owned homes, and most were in FMM town during the evacuation (89.8%). Most respondents witnessed the burning of their homes or structures (83.6%) and feared for their lives and that of their loved ones on the day of evacuation (89.3%). More than four-fifths of the participants reported daily exposure to media coverage of the wildfire (80.2%) and its effects (85.9%). Fewer respondents reported significant losses to the wildfire, for instance, homes destroyed (15.1%), substantial smoke damage (11.8%), slight smoke damage (29.0%), and cars destroyed (3.8%), no loss of property (55.9%), and none reported complete business destruction. Approximately 59% of the participants lived in the same house they lived in before the evacuation order came into effect, and most participants reported receiving some or absolute support from a variety of sources, including family and friends (86.3%), the Red Cross (74.3%), the government of Alberta (62.6%), and insurance companies (72.4%).

Table 1. Socio-demographic information, clinical, and wildfire-related characteristics.

| Variables                        | ≤40 Years n (%) | >40 Years n (%) | Total n (%) |
|----------------------------------|-----------------|-----------------|-------------|
| Gender                           | 9 (10.2)        | 18 (18.4)       | 27 (14.5)   |
| Female                           | 79 (89.8)       | 80 (81.6)       | 159 (85.5)  |
| Employment status                | 82 (93.2)       | 93 (94.9)       | 175 (94.1)  |
| Unemployed                       | 6 (6.8)         | 5 (5.1)         | 11 (5.9)    |
| Employment place                 |                 |                 |             |
| School boards                    | 41 (50.6)       | 46 (49.5)       | 87 (50.0)   |
| Healthcare industry              | 5 (6.2)         | 5 (5.4)         | 10 (5.7)    |
| Keyano College                   | 9 (11.1)        | 11 (11.8)       | 20 (11.5)   |
| Oil Sands industry               | 7 (8.6)         | 6 (6.5)         | 13 (7.5)    |
| Municipal or government agency    | 6 (7.4)         | 7 (7.5)         | 13 (7.5)    |
| Other                            | 13 (16.0)       | 18 (19.4)       | 31 (17.8)   |
| Marital status                   |                 |                 |             |
| In a relationship                | 62 (70.5)       | 70 (71.4)       | 132 (71.0)  |
| Not in a relationship            | 26 (29.5)       | 28 (28.6)       | 54 (29.0)   |
| Variables                                                                 | ≤40 Years | >40 Years | Total |
|---------------------------------------------------------------------------|-----------|-----------|-------|
| History of depressive disorder diagnosis from a health professional.      |           |           |       |
| No                                                                       | 61 (69.3) | 67 (68.4) | 128 (68.8) |
| Yes                                                                      | 27 (30.7) | 31 (31.6) | 58 (31.2)  |
| History of bipolar disorder diagnosis from a health professional.        |           |           |       |
| No                                                                       | 86 (97.7) | 94 (95.9) | 180 (96.8) |
| Yes                                                                      | 2 (2.3)   | 4 (4.1)   | 6 (3.2)    |
| History of anxiety disorder diagnosis from a health professional.        |           |           |       |
| No                                                                       | 49 (55.7) | 59 (60.2) | 108 (58.1) |
| Yes                                                                      | 39 (44.3) | 39 (39.8) | 78 (41.9)  |
| History of schizophrenia diagnosis from a health professional.           |           |           |       |
| No                                                                       | 88 (100.0)| 98 (100.0)| 186 (100.0)|
| Yes                                                                      | 0 (0.0)   | 0 (0.0)   | 0 (0.0)    |
| History of personality disorder diagnosis from a health professional.    |           |           |       |
| No                                                                       | 87 (98.9) | 97 (99.0) | 184 (98.9) |
| Yes                                                                      | 1 (1.1)   | 1 (1.0)   | 2 (1.1)    |
| History of other mental health diagnoses from a health professional.     |           |           |       |
| No                                                                       | 78 (88.6) | 91 (92.9) | 169 (90.9) |
| Yes                                                                      | 10 (11.4) | 7 (7.1)   | 17 (9.1)   |
| Received mental health diagnosis (any type) from a health professional.  |           |           |       |
| No                                                                       | 39 (44.3) | 51 (52.0) | 90 (48.4)  |
| Yes                                                                      | 49 (55.7) | 47 (48.0) | 96 (51.6)  |
| History of Antidepressants                                               |           |           |       |
| No                                                                       | 61 (69.3) | 66 (67.3) | 127 (68.3) |
| Yes                                                                      | 27 (30.7) | 32 (32.7) | 59 (31.7)  |
| Antipsychotics                                                           |           |           |       |
| No                                                                       | 86 (97.7) | 96 (98.0) | 182 (97.8) |
| Yes                                                                      | 2 (2.3)   | 2 (2.0)   | 4 (2.2)    |
| Benzodiazepines                                                          |           |           |       |
| No                                                                       | 85 (96.6) | 97 (99.0) | 182 (97.8) |
| Yes                                                                      | 3 (3.4)   | 1 (1.0)   | 4 (2.2)    |
| Mood stabilizers                                                         |           |           |       |
| No                                                                       | 83 (94.3) | 91 (92.9) | 174 (93.5) |
| Yes                                                                      | 5 (5.7)   | 7 (7.1)   | 12 (6.5)   |
| Sleeping tablets                                                         |           |           |       |
| No                                                                       | 79 (89.8) | 86 (87.8) | 165 (88.7) |
| Yes                                                                      | 9 (10.2)  | 12 (12.2) | 21 (11.3)  |
| Other                                                                    |           |           |       |
| No                                                                       | 87 (98.9) | 96 (98.0) | 183 (98.4) |
| Yes                                                                      | 1 (1.1)   | 2 (2.0)   | 3 (1.6)    |
| Medication for a mental health concern                                   |           |           |       |
| No, I am not                                                             | 57 (64.8) | 63 (64.3) | 120 (64.5) |
| Yes, I am                                                               | 31 (35.2) | 35 (35.7) | 66 (35.5)  |
| Respondents who received MH counseling in the past year                   |           |           |       |
| No                                                                       | 46 (52.3) | 68 (69.4) | 114 (61.3) |
| Yes                                                                      | 42 (47.7) | 30 (30.6) | 72 (38.7)  |
| Respondents who would like to receive MH counseling                      |           |           |       |
| No                                                                       | 33 (37.5) | 55 (56.1) | 88 (47.3)  |
| Yes                                                                      | 55 (62.5) | 43 (43.9) | 98 (52.7)  |
| Respondents who received counseling when they returned to FMM            |           |           |       |
| No                                                                       | 63 (78.8) | 76 (80.9) | 35 (20.1)  |
| Yes                                                                      | 17 (21.3) | 18 (19.1) | 139 (79.9) |
| Respondents who resided in Fort McMurray during the 2016 wildfire         |           |           |       |
| No                                                                       | 15 (17.0) | 4 (4.1)   | 19 (10.2)  |
| Yes                                                                      | 73 (83.0) | 94 (95.9) | 167 (89.8) |
| Variables                                                                 | ≤40 Years | >40 Years | Total |
|--------------------------------------------------------------------------|-----------|-----------|-------|
|                                                                           | n (%)     | n (%)     | n (%) |
| Area of residence during wildfire                                         |           |           |       |
| 0.0–1.0 properties destroyed per km²                                     | 30 (41.1) | 46 (48.9) | 78 (45.5) |
| 1.1–50.0 properties destroyed per km²                                    | 22 (30.1) | 25 (26.6) | 47 (28.1) |
| 50.1–300.0 properties destroyed per km²                                   | 21 (28.8) | 23 (24.5) | 44 (26.3) |
| Respondents reported witnessing the burning of homes or structures by the wildfire |           |           |       |
| No                                                                       | 17 (20.7) | 12 (12.6) | 29 (16.4) |
| Yes                                                                      | 65 (79.3) | 83 (87.4) | 148 (83.6) |
| Respondents who have been fearful for their own lives, or the lives of their close friends or family members on the day of evacuation |           |           |       |
| No                                                                       | 8 (9.8)   | 11 (11.6) | 19 (10.7) |
| Yes                                                                      | 74 (90.2) | 84 (88.4) | 158 (89.3) |
| During the period of the evacuation order for Fort McMurray, how frequently did you watch television images about the devastation caused by the wildfires in Fort McMurray? |           |           |       |
| Daily                                                                    | 62 (75.6) | 80 (84.2) | 142 (80.2) |
| Less than daily                                                          | 13 (15.9) | 10 (10.5) | 23 (13.0) |
| Respondents did not watch the TV images of the devastation               | 7 (8.5)   | 5 (5.3)   | 12 (6.8) |
| During the period of the evacuation order for Fort McMurray, how frequently did you read newspaper and internet articles related to the devastation caused by the wildfires in Fort McMurray? |           |           |       |
| Daily                                                                    | 69 (84.1) | 83 (87.4) | 152 (85.9) |
| Less than daily                                                          | 10 (12.2) | 9 (9.5)   | 19 (10.7) |
| Respondents did not watch the TV images of the devastation               | 3 (3.7)   | 3 (3.2)   | 6 (3.4) |
| Did you lose property because of the wildfire in Fort McMurray?           |           |           |       |
| No                                                                       | 75 (85.2) | 83 (84.7) | 150 (84.9) |
| Yes                                                                      | 13 (14.8) | 15 (15.3) | 28 (15.1) |
| The home suffered substantial smoke damage                               |           |           |       |
| No                                                                       | 77 (87.5) | 87 (88.8) | 164 (88.2) |
| Yes                                                                      | 11 (12.5) | 11 (11.2) | 22 (11.8) |
| The home suffered slight smoke damage                                     |           |           |       |
| No                                                                       | 64 (72.7) | 68 (69.4) | 132 (71.0) |
| Yes                                                                      | 24 (27.3) | 30 (30.6) | 54 (29.0) |
| The car was destroyed by the fire                                        |           |           |       |
| No                                                                       | 86 (97.7) | 93 (94.9) | 179 (96.2) |
| Yes                                                                      | 2 (2.3)   | 5 (5.1)   | 7 (3.8)  |
| The business was completely destroyed by the fire                          |           |           |       |
| No                                                                       | 88 (100.0) | 98 (100.0) | 186 (100.0) |
| Yes                                                                      | 0 (0.0)   | 0 (0.0)   | 0 (0.0)  |
| Suffered no loss of property in the fire                                  |           |           |       |
| No                                                                       | 40 (45.5) | 42 (42.9) | 82 (44.1) |
| Yes                                                                      | 48 (54.5) | 56 (57.1) | 104 (55.9) |
| Do you live in the same house you lived in before the evacuation order came into effect |           |           |       |
| Yes                                                                       | 41 (50.0) | 63 (67.0) | 104 (59.1) |
| No, I live in a different house even though the previous home was not destroyed by the fire | 28 (34.1) | 18 (19.1) | 46 (26.1) |
| No, I live in a different house because my previous home was destroyed by the fire | 13 (15.9) | 13 (13.8) | 26 (14.8) |
| Support received from family                                              |           |           |       |
| Some to a high level of support                                          | 69 (85.2) | 82 (87.2) | 151 (86.3) |
| Limited or no support                                                     | 12 (14.8) | 12 (12.8) | 24 (13.7) |
Table 1. Cont.

| Variables                                      | ≤40 Years | >40 Years | Total |
|------------------------------------------------|----------|-----------|-------|
| Support received from the Red Cross            |          |           |       |
| Some to a high level of support                | 56 (69.1)| 74 (78.7) | 130 (74.3) |
| Limited or no support                          | 25 (30.9)| 20 (21.3) | 45 (25.7)  |
| Support received from the Government of Alberta|          |           |       |
| Some to a high level of support                | 44 (55.0)| 65 (69.1) | 109 (62.6) |
| Limited or no support                          | 36 (45.0)| 29 (30.9) | 65 (37.4)  |
| Support received from the insurer              |          |           |       |
| Some to a high level of support                | 50 (62.5)| 76 (80.9) | 126 (72.4) |
| Limited or no support                          | 30 (37.5)| 18 (19.1) | 48 (27.6)  |

A chi-square test was used to determine the association between demographic, clinical antecedents, wildfire-related factors, and anxiety (Table 2). Unemployed participants ($p = 0.005$), with no history of depression ($p < 0.001$), with a history of anxiety ($p < 0.001$) and who received MH Dx ($p = 0.01$) had a higher likelihood of having moderate-high GAD symptoms. Participants with a history of taking antidepressants ($p = 0.04$) and benzodiazepine ($p = 0.03$) had a higher likelihood of experiencing symptoms of moderate-high GAD. Respondents who received MH counseling in the past ($p < 0.001$) and those who would like to receive counseling in the future ($p < 0.001$) were more likely to show symptoms of moderate-high anxiety. The likelihood of experiencing moderate-high GAD symptoms was higher among participants who were fearful for their lives and that of their friends or family ($p < 0.01$), those who reported having suffered the loss of property ($p = 0.01$), and those who received limited or no support from their family ($p = 0.046$).

Table 2. Chi-squared test of association between the demographic, clinical antecedents, and Generalized Anxiety Disorder.

| Variables                                      | Low Anxiety GAD Not Likely | Moderate-High Anxiety (Likely GAD) | Chi-Square/Fisher Exact | $p$-Value |
|------------------------------------------------|---------------------------|-----------------------------------|-------------------------|-----------|
| **Demographic Characteristics**                |                           |                                   |                         |           |
| Gender                                         |                           |                                   |                         |           |
| Male                                           | 18 (65.2%)                | 8 (34.8%)                         | 0.653                   | 0.499     |
| Female                                         | 81 (56.3%)                | 63 (43.8%)                        |                         |           |
| Age categories (years)                         |                           |                                   |                         |           |
| ≤40                                            | 40 (51.9%)                | 37 (48.1%)                        | 1.792                   | 0.210     |
| >40                                            | 56 (62.2%)                | 34 (37.8%)                        |                         |           |
| Employment status                              |                           |                                   |                         |           |
| Employed                                       | 95 (60.1%)                | 63 (39.9%)                        | 8.371                   | 0.005     |
| Unemployed                                      | 1 (11.1%)                 | 8 (88.9%)                         |                         |           |
| Employment place                               |                           |                                   |                         |           |
| School boards                                  | 50 (66.7%)                | 25 (33.3%)                        |                         |           |
| Healthcare industry                            | 5 (55.6%)                 | 4 (44.4%)                         |                         |           |
| Keyano College                                 | 10 (50.0%)                | 10 (50.0%)                        |                         |           |
| Oil Sands industry                             | 6 (50.0%)                 | 6 (50.0%)                         | 8.290                   | 0.142     |
| Municipal or government agency                  | 10 (83.3%)                | 2 (16.7%)                         |                         |           |
| Other                                          | 13 (44.8%)                | 16 (55.2%)                        |                         |           |
| Relationship                                   |                           |                                   |                         |           |
| In a relationship                              | 73 (60.3%)                | 48 (39.7%)                        | 1.455                   | 0.293     |
| Not in a relationship                          | 23 (50.0%)                | 23 (50.0%)                        |                         |           |
| Variables                                                                 | Low Anxiety GAD Not Likely | Moderate-High Anxiety (Likely GAD) | Chi-Square/ Fisher Exact | p-Value |
|---------------------------------------------------------------------------|----------------------------|-----------------------------------|--------------------------|---------|
| **Clinical Characteristics**                                              |                            |                                   |                          |         |
| History of Depression from a health professional?                        | No                         | 77 (67.5%)                        | 34 (64.2%)               | 14.871  | <0.001 |
|                                                                         | Yes                        | 19 (35.8%)                        | 37 (32.0%)               |         |        |
| History of Bipolar from a health professional?                           | No                         | 93 (57.4%)                        | 69 (42.6%)               | *       | 1.000  |
|                                                                         | Yes                        | 3 (60.0%)                         | 2 (40.0%)                |         |        |
| History of Anxiety from a health professional?                           | No                         | 67 (57.5%)                        | 30 (30.9%)               | 12.713  | <0.001 |
|                                                                         | Yes                        | 29 (41.4%)                        | 41 (58.6%)               |         |        |
| History of Personality disorder from a health professional?              | No                         | 96 (57.8%)                        | 70 (42.2%)               | *       | 0.425  |
|                                                                         | Yes                        | 0 (0.0%)                          | 1 (100.0%)               |         |        |
| Respondents on medication for other MH concerns from a health professional? | No                         | 94 (57.3%)                        | 70 (42.7%)               | 0.105   | 1.000  |
|                                                                         | Yes                        | 2 (66.7%)                         | 1 (33.3%)                |         |        |
| Never received a mental health diagnosis from a health professional      | No                         | 55 (67.9%)                        | 26 (32.1%)               | 6.983   | 0.012  |
|                                                                         | Yes, received MH Dx        | 41 (47.7%)                        | 45 (52.3%)               |         |        |
| History of Antidepressant medications                                   | No                         | 72 (63.2%)                        | 42 (38.8%)               | 4.470   | 0.043  |
|                                                                         | Yes                        | 24 (45.3%)                        | 29 (54.7%)               |         |        |
| History of Antipsychotic medications                                     | No                         | 94 (57.3%)                        | 70 (42.7%)               | *       | 1.000  |
|                                                                         | Yes                        | 2 (66.7%)                         | 1 (33.3%)                |         |        |
| History of Benzodiazepine medications                                    | No                         | 96 (58.9%)                        | 67 (41.1%)               | *       | 0.031  |
|                                                                         | Yes                        | 0 (0.0%)                          | 4 (100.0%)               |         |        |
| History of Mood Stabilizer medications                                   | No                         | 91 (58.0%)                        | 66 (42.0%)               | 0.244   | 0.745  |
|                                                                         | Yes                        | 5 (50.0%)                         | 5 (50.0%)                |         |        |
| History of Sleeping Tablets                                              | No                         | 88 (59.1%)                        | 61 (40.9%)               | 1.404   | 0.313  |
|                                                                         | Yes                        | 8 (44.4%)                         | 10 (55.6%)               |         |        |
| Are you on any other medication for mental health concerns               | No                         | 94 (57.3%)                        | 70 (42.7%)               | *       | 1.000  |
|                                                                         | Yes                        | 2 (66.7%)                         | 1 (33.3%)                |         |        |
| Are you on any medication for mental health concerns                     | No                         | 66 (63.6%)                        | 39 (36.4%)               | 4.84    | 0.050  |
|                                                                         | Yes,                       | 28 (46.7%)                        | 32 (53.3%)               |         |        |
| Respondents received MH counseling in the past                            | No                         | 73 (70.2%)                        | 31 (29.8)                | 18.215  | <0.001 |
|                                                                         | Yes                        | 23 (36.5%)                        | 40 (63.5)                |         |        |
| Respondents would like to receive MH counseling                          | No                         | 65 (82.3%)                        | 14 (17.7%)               | 37.708  | <0.001 |
|                                                                         | Yes                        | 31 (35.2%)                        | 57 (64.8%)               |         |        |
Table 2. Cont.

| Variables | Low Anxiety GAD Not Likely | Moderate-High Anxiety (Likely GAD) | Chi-Square/ Fisher Exact | p-Value |
|-----------|-----------------------------|-----------------------------------|--------------------------|---------|
| **Fort McMurray Wildfire Related Characteristics** |                            |                                  |                          |         |
| Where did you live on May 3 when there was an order to evacuate Fort McMurray during the 2016 wildfires? |                            |                                  |                          |         |
| In Fort MacMurray | 87 (57.2%) | 65 (42.8%) | 0.043 | 1.000 |
| Other | 9 (60.0%) | 6 (40.0%) |          |         |
| Did you reside in Fort McMurray during the 2016 wildfire? |                            |                                  |                          |         |
| No | 8 (66.7%) | 4 (33.3%) | 0.446 | 0.561 |
| Yes | 88 (56.6%) | 67 (43.2%) |          |         |
| Area of residence in wildfire |                            |                                  |                          |         |
| 0–1.0 properties destroyed per km² | 41 (61.2%) | 26 (38.8%) |          |         |
| 1.1–50.0 properties destroyed per km² | 27 (58.7%) | 19 (41.3%) | 2.037 | 0.360 |
| 50.1–300.0 properties destroyed per km² | 20 (47.6%) | 22 (52.4%) |          |         |
| Place of residence prior to wildfire |                            |                                  |                          |         |
| Own home | 74 (58.3%) | 53 (41.7%) | 0.133 | 0.855 |
| Renting | 22 (55.0%) | 18 (45.0%) |          |         |
| Place of residence now |                            |                                  |                          |         |
| Own home | 78 (58.6%) | 55 (41.4%) | 0.361 | 0.565 |
| Renting | 18 (52.9%) | 16 (47.1%) |          |         |
| Did you witness the burning of any homes or structures in Fort McMurray? |                            |                                  |                          |         |
| No | 18 (69.2%) | 8 (30.8%) | 1.738 | 0.204 |
| Yes | 78 (55.3%) | 63 (44.7%) |          |         |
| On the day of the evacuation, were you fearful for your life or the lives of your friends or family? |                            |                                  |                          |         |
| No | 17 (89.5%) | 2 (10.5%) | 8.976 | 0.003 |
| Yes | 79 (53.4%) | 69 (46.6%) |          |         |
| During the period of the evacuation order for Fort McMurray, how frequently did you watch television images about the devastation caused by the wildfires in Fort McMurray? |                            |                                  |                          |         |
| Daily | 74 (55.6%) | 59 (44.4%) |          |         |
| Less than daily | 15 (65.2%) | 8 (34.8%) | 0.918 | 0.670 |
| Respondents did not watch the TV images of the devastation | 7 (63.6%) | 4 (36.4%) |          |         |
| During the period of the evacuation order for Fort McMurray, how frequently did you read newspaper and internet articles related to the devastation caused by the wildfires in Fort McMurray? |                            |                                  |                          |         |
| Daily | 78 (54.5%) | 65 (45.5%) |          |         |
| Less than daily | 13 (72.2%) | 5 (27.8%) | * | 3.748 |
| Respondents did not watch the TV images of the devastation | 5 (83.3%) | 1 (16.7%) |          |         |
| Respondents who report their home was completely destroyed because of the wildfires in Fort McMurray |                            |                                  |                          |         |
| No | 84 (60.0%) | 56 (40.0%) | 2.241 | 0.143 |
| Yes | 12 (44.4%) | 15 (55.6%) |          |         |
| Respondents who report their homes suffered substantial smoke damage because of the wildfires in Fort McMurray |                            |                                  |                          |         |
| No | 85 (58.2%) | 61 (41.8) | 0.256 | 0.643 |
| Yes | 11 (52.4%) | 10 (47.6%) |          |         |
Table 2. Cont.

| Variables | Low Anxiety (GAD Not Likely) | Moderate-High Anxiety (Likely GAD) | Chi-Square/Fisher Exact | p-Value |
|-----------|-----------------------------|-----------------------------------|------------------------|---------|
| Respondents who report their homes suffered slight smoke damage because of the wildfires in Fort McMurray | | | | |
| No | 70 (60.9%) | 45 (39.1%) | 1.731 | 0.237 |
| Yes | 26 (50.0%) | 26 (50.0%) | | |
| Respondents who report their car was completely destroyed because of the wildfires in Fort McMurray | | | | |
| No | 92 (57.5%) | 68 (42.5%) | 0.000 | 1.000 |
| Yes | 4 (57.1%) | 3 (42.9%) | | |
| Respondents who report they suffered no loss of property in the fire | | | | |
| No, did not lose | 47 (70.1%) | 20 (29.9%) | 7.343 | 0.010 |
| Yes, lose | 49 (49.0) | 51 (51.0%) | | |
| Do you live in the same house you lived in before the evacuation order came into effect? | | | | |
| Yes | 64 (64.6%) | 35 (35.4%) | 5.516 | 0.069 |
| No, I live in a different house even though my previous home was not destroyed by the fire. | 20 (46.5%) | 23 (53.5%) | | |
| No, I live in a different house because my previous home was destroyed by the fire | 11 (45.8%) | 13 (54.2%) | | |
| Support received from Family | | | | |
| Some to a high level of support | 85 (60.3%) | 56 (39.7%) | 4.343 | 0.046 |
| Limited or no support | 9 (37.5%) | 15 (62.5%) | | |
| Support received from the Red Cross | | | | |
| Some to a high level of support | 75 (60.5%) | 49 (39.5%) | 2.514 | 0.145 |
| Limited or no support | 19 (46.3%) | 22 (53.7%) | | |
| Support received from the Government of Alberta | | | | |
| Some to a high level of support | 65 (62.5%) | 39 (37.5%) | 3.510 | 0.074 |
| Limited or no support | 29 (47.5%) | 32 (52.5%) | | |
| Support received from Insurer | | | | |
| Some to a high level of support | 72 (60.5%) | 47 (39.5%) | 2.175 | 0.162 |
| Limited or no support | 22 (47.8%) | 24 (52.2%) | | |

* Fisher Exact Test.

3.2. Multivariate Analysis of Predictors of GAD Symptomatology

Table 3, as illustrated below, is the multivariate logistic regression model that was used to predict the likely GAD among respondents. The model included 11 out of the 14 predictor variables, which were either significant or trending towards significance in the Chi-Square analysis. This was after the removal of the variable of receiving Benzodiazepine medication, a history of mental health diagnosis, and receiving antidepressant medications, which showed a high correlation with other variables (rs > 0.7) that were not included in the regression model.

The model was statistically significant; X² (df = 12; n = 164) = 65.60, p < 0.001, indicating that the model could differentiate between respondents who did or did not exhibit likely GAD five years after the 2016 wildfires. The model accounted for 33.0% (Cox and Snell R²) to 44.2% (Nagelkerke R²) of the variance. Using the Hosmer–Lemeshow goodness-of-fit test, the model was adequately fit (Chi² = 7.48; p = 0.49) and correctly classified 75.6% of cases according to the goodness-of-fit statistic.

Three variables, namely employment status, willingness to receive mental health counseling, and suffered the loss of property as a result of wildfires in FMM, significantly
predicted likely GAD symptoms in the model. Unemployed respondents were almost seventeen times more likely to develop GAD symptoms (OR = 16.62; 95% C.I. 1.23–223.67) compared to respondents who were employed while controlling for other variables in the model. Furthermore, respondents who were willing to receive mental health counseling were approximately six times more likely to present with GAD symptoms (OR = 5.35; 95% C.I. 2.03–14.15), compared to respondents who did not want mental health counseling. Furthermore, respondents who suffered the loss of property because of the wildfire in FMM were two times more likely to develop GAD symptoms (OR = 2.36; 95% C.I. 1.01–5.53), compared to respondents who did not lose property during the wildfire, with all other factors in the model controlled for.

Table 3. A multivariate logistic regression model that predicts the likely anxiety among respondents.

| Characteristics                                             | B    | S.E.  | Wald  | Df  | p-Value | Odd’s Ratio | 95% C.I. for Odd’s Ratio |
|-------------------------------------------------------------|------|-------|-------|-----|---------|-------------|-------------------------|
| Employment status                                           | 1.811| 1.326 | 4.491 | 1   | 0.034   | 16.622      | 1.235–223.67            |
| Have received a depressive disorder diagnosis               | 0.842| 0.518 | 2.641 | 1   | 0.104   | 2.321       | 0.841–5.406             |
| Have received an anxiety disorder diagnosis                 | 0.546| 0.532 | 1.051 | 1   | 0.305   | 1.726       | 0.608–4.896             |
| On medication for a mental health concern                   | −0.594| 0.566 | 1.104 | 1   | 0.293   | 0.552       | 0.182–1.672             |
| Have received mental health counseling in the past year     | 0.027| 0.489 | 0.003 | 1   | 0.957   | 1.027       | 0.393–2.681             |
| Would like to receive mental health counseling              | 1.748| 0.488 | 12.847| 1   | **0.000**| 5.741       | 2.208–14.930            |
| Was fearful of life or lives of friends or family on the day of the evacuation | 1.295| 0.930 | 1.937 | 1   | 0.0164  | 3.650       | 0.589–22.607            |
| Suffered loss of property as a result of wildfires in FMM  | 0.860| 0.433 | 3.937 | 1   | **0.047**| 2.363       | 1.011–22.607            |
| Live in the same house even before the evacuation order came into effect |         |       |       |     |         |             |                         |
| Live in a different house even though the home was not destroyed | 0.415| 0.492 | 0.713 | 1   | 0.399   | 1.515       | 0.577–3.975             |
| Live in a different house because my home was completely destroyed | 0.340| 0.601 | 0.321 | 1   | 0.571   | 1.405       | 0.433–4.561             |
| Received little or no support from family                   | 0.867| 0.671 | 1.671 | 1   | 0.196   | 2.379       | 0.639–9.856             |
| Received little or no support from GoA                       | 0.178| 0.454 | 0.156 | 1   | 0.694   | 1.195       | 0.491–2.909             |
| Constant                                                    | −3.759| 0.998 | 14.202| 1   | 0.000   | 0.023       |                         |

4. Discussion

This study has established that the prevalence of likely GAD in residents of Fort McMurry five years after the wildfires was 42.5%. This prevalence of likely GAD is higher compared to the prevalence of likely GAD reported in residents of the city 6 months [4] and 18 months [28] after the 2016 wildfire, which was 20% and 16%, respectively. The increase may partly be due to the period within which the study was conducted. This study was carried out at a time when the people of FMM may not have fully recovered from the
effects of the flooding in 2020 and were experiencing possible distress from the ongoing COVID-19 pandemic and its attendant restrictions and job losses. On the other hand, the prevalence of likely GAD reported in this study was consistent with the prevalence of GAD reported by a systematic review after wildfires in other jurisdictions, which ranged from 27.3% to 46.7% [29,30].

Concerning sociodemographic characteristics, unemployed respondents were 17 times more likely to present with likely GAD compared to their employed counterparts. This is in line with other findings, which examined the relationship between employment and anxiety as well as depression and other physical illnesses [31,32]. Another community survey in a sample of high census tracts in Southwestern Michigan found significant levels of GAD symptoms and self-reported illness among the unemployed [33,34]. The adverse effects were largely reversed by reemployment according to the study, and unemployment was shown to increase the vulnerability to other stressful life events [33].

This study finding is consistent with previous studies, which reported a link between losing a job or job insecurity and various mental health conditions, including, but not limited, to GAD, and psychological distress [35]. According to a cohort study conducted in Australia, people who had job insecurity were found to be four times more likely to express severe psychological distress compared to those employed during the pandemic [36]. Economic activities such as income and employment play important roles in the general and mental well-being of people. People facing these major life changes are more prone to GAD [37,38]. There is evidence to suggest that economic pressure and unemployment have a devastating impact on families, in particular children, especially post-disaster, since family is the most important unit for their healthy development [39]. The deterioration of mental health with increasing durations of unemployment can be anticipated because stress factors accumulate over a long period of unemployment [40]: Unemployed people are said to experience continued and more discouraging failures in job-seeking approaches, financial pressures become stronger over time, savings are used up, and personal or household items require repair or replacement [28,38]. These significantly increase the predictability and association with GAD symptoms [37,40]. However, few respondents (9/158, 5.7%) reported that they were unemployed, which may need to be replicated in a large sample to confirm such a finding.

The willingness to receive mental health counseling was also an independent predictor of GAD symptoms. Respondents who reported a need for mental health counseling were five times more likely to develop symptoms of GAD than those who were not willing to. This finding was consistent with those reported in other post-disaster studies, which reported that the need to receive mental health counseling support placed respondents at a higher risk of experiencing mental health symptoms, specifically GAD symptoms [29,41]. This may mean that the reported personal need for therapeutic support during crisis times should be seen and considered as a serious indicator of a possible presence of a mental health concern or the possible development of psychopathology. The desire to have any mental health counseling communicates a psychological need [42,43]. This is in line with most studies that identified psychological distress as a need to be addressed [44,45]. Problems relating to hyperactivity were reduced significantly after the application of the required intervention techniques, including counseling [46]. Understanding the need for one’s existence and fixing and nurturing one’s self helped the survivors of disasters in enhancing the quality of their well-being [46] and motivates the individual to preserve their own life. The emotional domain has also been explored by other researchers as a protective cover for dealing with post-disaster trauma [46]. The provision of mental health counseling will help build the resilience needed for dealing with post-disaster trauma [47]. Other studies have proposed psychological counseling to deal with post-disaster trauma [31]. Some studies suggest that psychological therapies such as group and individual therapies have the potential to build resilience and help survivors deal with post-disaster trauma and other mental health challenges [48].
Another key predictor of GAD symptoms according to the findings of this study is the loss of property. Respondents who suffered the loss of property as a result of the wildfire in FMM were two times more likely to present with GAD symptoms. This suggests that the effect of the disaster may continue up to approximately five years, as shown in the present work. This finding is in line with other study findings that have established linkages between the loss of property or housing and mental health, especially anxiety symptoms. Disasters are associated with the destruction of homes and properties [1,4]. Housing is a basic need and a major social determinant of health [49]. One important factor accounting for poor psychological status following a large and devastating disaster may be property damage. Several epidemiological studies have shown an association between property damage and psychological or psychiatric problems, such as psychological distress, stress disorder, and GAD [50,51]. These studies reported that higher levels of property damage were associated with poorer psychological status after a disaster. Any form of destruction to this basic need, whether through natural or man-made disasters, has the potential to cause a mental health problem such as GAD [52]. In contrast to the findings of this study, the loss of property to the wildfire was not a significant predictor for the development of GAD symptoms in similar studies conducted 6 months [4] and 18 months [30] after the devastating wildfire at FMM.

5. Limitations

Firstly, the survey link was sent by the community providers and so there was no way of knowing the actual number of people who received the survey. Therefore, the response rate in our study may be overestimated as it is based only on the number of people who clicked the survey link instead of the number of people who received the survey. Secondly, because the questionnaires were accessed by participants, the sample size was small and not representative of the population, which limits the generalizability of our study. Thirdly, most of the respondents that took part in the study were females. This also may impact the generalizability of the findings because the sample was not representative of the population gender ratio. Finally, the self-report nature of the responses without any clinician assessment takes away some objectivity of the data provided by the respondents. Given that participants were invited to take part in the study, and we did not sample the population using an equal probability of selection method, the participants may be biased, especially those who were more likely to have anxiety symptoms or some sort of mental health difficulties compared to those who were not. Moreover, the paper is focused on measuring only the effects of the wildfire on the anxiety level of the respondents and did not include potential effects of other traumas caused by the COVID-19 pandemic and the 2020 flooding as contributors to the increased anxiety in respondents.

Notwithstanding the limitations stated above, this study still adds to the limited literature on the predictors of GAD after natural disasters.

6. Conclusions

This study has established the prevalence and correlates of GAD symptoms among residents of Fort McMurray five years after the 2016 wildfires. Potentially, the multiple traumatic events that have impacted the city since the 2016 wildfire, including the COVID-19 pandemic and the 2020 flooding, could explain the high prevalence of likely GAD. However, these factors were not examined in this study, which presents a limitation. The predictors of GAD symptoms established in this study include unemployment, the need to have mental health counseling, and the loss of property as a result of the wildfire. Policymakers may mitigate the increased magnitude of GAD symptoms particularly after natural disasters by making long-term mental health counseling available and a key component of post-disaster management. There is also a need for investment in the social capital of people to build resilience and address post-disaster mental health effects. Ongoing counseling services should be made available to serve as a psychological protective coating for survivors. Governments and health authorities can implement population-level interventions such
as supportive text-messaging programs, which are evidence-based, cost-effective, easily scalable, devoid of geographical barriers to access, do not require expensive data plans, and comes at no cost to the subscriber as part of the suite of psychological interventions to mitigate GAD symptoms post-disaster [53–64]. This may invariably reduce the morbidity associated with GAD and improve the quality of life of the survivors.

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