Wildfires Impact Mental Health

Subjects: Health Care Sciences & Services Contributor: Ejemai Eboreime

One of the many consequences of climate change is an increase in the frequency, severity, and, thus, impact of wildfires across the globe. The destruction and loss of one's home, belongings, and surrounding community, and the threat to personal safety and the safety of loved ones can have significant consequences on survivors' mental health, which persist for years after.

Keywords: wildfire ; bushfire ; mental health ; major depressive disorder ; anxiety disorder ; post-traumatic stress disorder

1. Introduction

Warmer temperatures, longer summers, and blistering heat waves are all consequences of climate change and contributing factors to increasing awareness and incidence of wildfires ^[1]. The three key ingredients necessary to start a fire are heat, oxygen, and fuel ^[2]. Consequences of climate change include warmer temperatures and changes in wind speed and rainfall patterns, the very factors necessary for wildfire ignition and propagation ^[3]. The World Health Organization (WHO) estimates that wildfires and volcanic activities impacted 6.2 million people globally from 1998 to 2017 ^[4]. Current statistics reveal an ongoing significant impact of wildfires across the globe. For example, in 2020, the United States reported that by October 2020 8 million acres of land had been burned by wildfires ^[5]. On average, Canada has spent 800 million dollars annually on wildfire-related costs in recent years ^[6]. Similarly, Australia has reported an increase of 30.6 days in the annual number of average days with high-extreme fire danger from 2016 to 2019 ^[2]. Additionally, contributing to the greater human experience of and impact from wildfires are changes in human migration and expansion. The pattern of human expansion into areas previously dominated by wildlife and nature means more people now live close to, or in, wooded areas, which serve as the fuel and setting for wildfires ^[8]. Researchers calculate that global wildfires can produce between 1.75 and 13.5 billion metric tons of carbon annually which circulate in our atmosphere for months ^[9]. Thus, wildfires themselves contribute to the greenhouse effect, propagating further development of wildfires.

Wildfires exert various impacts and risks to public health including an acute risk of mortality and injury, and by wreaking havoc on the community and the ensuing response team. Wildfires destroy homes and workplaces, displace victims, and impact numerous medical conditions such as chronic obstructive pulmonary disease (COPD), asthma, and mental health [10][11][12]. Studies have found higher rates post-wildfire of hypertension, gastrointestinal disorders, diabetes, and COPD and asthma exacerbation, along with various psychiatric conditions, including mood and anxiety disorders [11][12][13][14][15]. The impact of wildfires on the survivors' mental health has been found in both the adult and pediatric population, with children and adolescents also experiencing higher rates of mood and anxiety disorders post-wildfire [16][17]. Researchers studying the impact of wildfires on children and adolescents have utilized survey and scale measures administered to study participants in this demographic, as well as their parents and/or teachers, to gain an appreciation of mental health outcomes within a study population that may struggle with personally communicating mood symptoms secondary to their developmental level [16][18][19]. Behavioral changes post-wildfire in children can include increased irritability and changes in concentration, sleep, and academic performance [18][20]. The impact of wildfires on mental health cannot be ignored and should not be, as the World Health Organization (WHO) identified neuropsychiatric disorders as the leading cause of disability-adjusted life years in the U.S. in 2010 with mental and behavioural disorders contributing to 13.6% of the total [21]. The repercussions from wildfires can be widespread due to the ability of wildfire-created smoke to dissipate and persist, with the majority of follow-up studies being conducted within 1 to 2 years post-wildfire. However, there is evidence of ongoing mental health effects in more longitudinal studies made 10-20 years post-wildfire [22][23]. There are novel terms to describe emotional and mental health responses to natural disasters such as solastalgia, eco-anxiety, and ecological grief, which will likely become more prominent as such tragedies continue to occur [24][25][26].

2. Post-Traumatic Stress Disorder

A post-natural disaster acute stress reaction is common and expected, but the rate at which an individual's acute stress reaction may persist and develop into psychopathology is a common research objective ^[12]. Researchers have attempted to quantify the rates and severity of PTSD at various times post-wildfire in children, adolescents, and adults. This review suggests there are statistically and clinically significant increases in rates of PTSD in communities ravaged by wildfires. Among adults, higher rates of PTSD and associated symptoms were present shortly after a wildfire and up to 10 years post-wildfire $^{[22][27]}$. In the adult population, the rate of probable PTSD based on a survey screening 3 months post-wildfire was found to be 24% and 60% in two separate studies $^{[27][28]}$. At 6 months after a wildfire, the one-month prevalence rate of PTSD in adults was 12.8%–26% $^{[29][30]}$. At 18 months after the Fort McMurray wildfire, rates of likely PTSD continued to be higher than prior to the trauma, with studies finding similar rates, within 10.2%–13.6% $^{[31][32][33]}$. Bryant et al. provided unique longitudinal information about the impact and prevalence of psychopathology post-wildfire $^{[22][26][34]}$. From 3 to 10 years post-wildfire, the rate of fire-related PTSD in the high-impact group decreased from 15.6% to 7.6% $^{[22][26][34]}$.

Studies have looked at other outcomes or symptoms associated with PTSD post-wildfire including sleep disturbance and insomnia, anger, attachment style, interpersonal violence, and a term known as vicarious traumatization which is the development of PTSD symptoms from indirect trauma exposure [35][36][37][38][39][40][41][42].

A unique and recurring wildfire experience in South Asian countries is the seasonal haze created by bushfires from the intentional slash-and-burn technique used for clearing land for agricultural purposes ^[43]. Respondents who perceived lower Pollutants Standard Index values as dangerous were associated with higher IES-R scores ^[43]. In comparison, a study in British Columbia, Canada, on the impact of increased particulate matter (PM) and worsening air quality related to wildfires did not find an association with an increase in mental health-related physician visits ^[44].

Rates of psychopathology post-wildfire exposure have also been studied in the pediatric population. In the sub-acute phase post-wildfire, the number of children with significant PTSD symptoms can be as high as 92% ^[16]. Studies that have assessed the rate of likely PTSD 6 months post-fire have found similar results with 9–12% of children and adolescents experiencing moderate to severe PTSD and as high as 29.4% in a study involving adolescents in Greece ^{[19][45][46]}. A year post-wildfire, the rate of PTSD in children and adolescents has been found to be between 27 and 37% ^{[17][47]}. The impact of a childhood exposure to a bushfire on one's mental health as an adult was evaluated with a 20 year follow-up study conducted by Mcfarlane and Van Hooff ^[23]. They found no difference in the rate of lifetime or recent 1-month prevalence of PTSD in the wildfire exposed group versus controls ^[23].

Our literature search did not reveal a review specific to risk factors for developing PTSD post-bushfire, but such factors have been investigated by several primary studies. In adults, demographic factors such as female gender, widowed status, or fewer years of education, lower socioeconomic status, and non-caucasian ethnicity are associated risk factors, although gender was not always been found to be significant [26][31][48][42][49]. Trauma-related factors significant to increasing one's risk of post-wildfire PTSD include personal witnessing of burning homes, having fear for one's life or lives of loved ones, losing a loved one, significant property damage, or feeling a lack of support from family, friends, and/or the government [22][26][31][29][34][28][40][48]. The trauma related factors, including perceived threat to one's life and subsequent reaction to the trauma, were found to be more contributory to the degree of PTSD symptoms than demographic or pretrauma factors ^[48]. Finally, a contributing factor to the risk of developing PTSD post-bushfire is ongoing trauma and life stressors [22][23][26][34]. The risk factors for PTSD in children and adolescents were overall quite similar to adults, including demographic factors like female gender, younger age, and middle grades 7-9 [19][45][50][46][47]. For children, a greater predictor of increased emotional distress post-wildfire was the fear for their parents' lives, even more than fear for their own life [19]. Combined with the identified risk factor in adults of a perceived lack of support from loved ones or the government, there is significant evidence to support the critical role a government and public health response has in mitigating mental health consequences after experiencing a bushfire [33]. A tangible government response may serve as validation that a traumatic experience has occurred, whilst providing avenues for recovery and moving forward. The impact and contribution ongoing adverse life events have on the risk of developing psychopathology post-wildfire is indicative of how cumulative stressors may deteriorate human resilience. As such, government aid should not be time sensitive post-wildfire, but rather be sustained in order to mitigate ongoing life stressors that can occur after a community is disrupted.

3. Depression

Second to PTSD, major depressive disorder (MDD) is one of the most common psychiatric illnesses studied and screened-for post-natural disasters ^[51]. Similar to rates of PTSD, there has also been shown to be higher rates of

depression and associated symptoms post-wildfire in adults, which can persist up to 10 years ^[22][28]. In the adult population, studies have found rates of depression approximately 3 months post-bushfire, between 25.5 and 33% ^[27][28]. At 6 months post-wildfire, the estimated rates of MDD are between 10.4% and 17.1%, and between 18.3 and 24.8% at 18 months post-wildfire ^[31][52][32][33]</sup>. Finally, Bryant et al. studied a range of psychological outcomes over 10 years following the devastation of the Victorian Black Saturday bushfire including depression ^[22][26][34]. The rate of depression in the high-impact group was consistently around 10% at the three periods of follow-up ^[22][26][34].

Rates of depression post-wildfire have also been studied in children and adolescent populations. Mcdermott et al. were some of the first researchers to look at depression in children 6 months post-fire and found a rate of 4.7% ^[19]. However, a more recent study found a higher rate of depression 6 months post-wildfire at 20% ^[46]. Even at 18 months post-wildfire, one-third of grade 7–12 students were found to meet the criteria for depression compared to 17% in an age-matched control group ^{[17][53]}.

The emotional response of solastalgia, which describes the mourning of changes in one's natural environment, has been linked to levels of psychological distress post-wildfire ^[54]. Approximately one year after a wildfire, 35% of the participants had scores indicative of moderate-high risk for depression or anxiety on the Kessler Psychological Distress scale, and increased solastalgia was associated with greater odds of psychological distress ^[54].

There were fewer studies in the literature search investigating risk factors for depression post-bushfire in comparison to PTSD. However, some patient factors that have been identified in adults include female gender, age greater than 40 years old, a greater number of adverse experiences in childhood, a prior history of depressive disorder or anxiety disorder, and prior treatment with an antidepressant $^{[14][52][32][33][42]}$. Other researchers did not find an association between demographic factors or gender and depression $^{[28][49]}$. Trauma factors that increase the risk of depression post-fire in adults are similar to PTSD: witnessing or experiencing property loss and fear for the safety of loved ones $^{[22][26][31][28][32]}$. Identified post-trauma risk factors include perceived lack of support from family, friends, or the government, ongoing life stressors, and having received counselling post-fire $^{[22][26][31][52][34][32]}$. Similar risk factors for depression post-wildfire have also been identified in the pediatric population; although the female gender has not been a consistent statistically significant risk factor, the trend is for higher symptom scores $^{[45][50][46]}$. Finally, studies have commented on the association between PTSD and depression in children and adults, with a co-occurrence rate of 0.74 in adults $^{[19][28]}$.

Future research may utilize screening measures that combine specific depression-related questions with associated behavioral changes that impact children's functioning at home and school. Involving not only children and adolescent participants, but their parents, caregivers, and teachers in assessments would likely result in a more comprehensive screening for psychopathology post-wildfire.

4. Anxiety

There have been a number of studies investigating rates of anxiety disorders post-wildfire, although the quantity of evidence is smaller than that for PTSD and depression. Studies performed post-wildfire have shown higher rates of anxiety in both adult and the pediatric populations $^{[17][19][55][27]}$. In adults surveyed 3 months post-wildfire, 27.0% met criteria for an anxiety disorder other than panic disorder and 17.4% had symptoms significant for panic disorder $^{[27]}$. The one-month prevalence rate for generalized anxiety disorder symptoms 6 months post-wildfire was 19.8% $^{[55]}$. At 18 months post-wildfire, the authors found similar rates of generalized anxiety disorder, between 15.7 and 18.7%, with self-reported pre-wildfire rates of anxiety estimated at 8.6–14.5% $^{[31][32][33]}$. Finally, Bryant et al. followed a population of adults for up to 10 years after the Victorian Black Saturday bushfire, and over that time the rate of severe distress, as measured on the Kessler Psychological Distress Scale, decreased from 7.5% to 4.4% $^{[22][26][34]}$.

Anxiety in children and adolescents' post-wildfire has also been studied, although to a lesser extent than adults. At 6 months post-wildfire, 14.1% of children had symptoms significant for high anxiety $\frac{19}{19}$. Looking later on, at 18 months after the Fort McMurray wildfire, 27% of grade 7–12 students had suspected anxiety, with another study finding no difference in the rate of anxiety disorders between wildfire exposed and control groups $\frac{171[53]}{12}$. One unique study looked at childhood exposure to the Ash Wednesday wildfires of 1983 and followed up with participants 20 years later in adulthood $\frac{[23]}{2}$. Only the lifetime rate of any anxiety disorder other than PTSD was found to be significant, specifically with regards to environmental phobia $\frac{[23]}{2}$.

A limitation in studies exploring anxiety is the reliance on scales to objectively measure anxiety such as the Global Health Questionnaire or the Kessler Psychological Distress Scale ^{[22][56]}. This may limit the ability to make specific mental health diagnoses, such as generalized anxiety disorder, without understanding the key criterion and degree of functional impact

within each participant. One mechanism by which wildfires increase victims' anxiety is the resulting emotion and mental turmoil of uncertainty after experiencing such devastating losses and damage to oneself, loved ones, property, belongings, and livelihood. The sensation of anxiety is not necessarily maladaptive, rather it may serve a functional purpose of helping create emotional motivation to respond and prepare for a perceived future threat ^{[52][58]}. Therefore, researchers and clinicians must distinguish between anxiety that serves as a normal and healthy response to a life stressor versus a debilitating anxiety disorder. Anxiety post-wildfire may help provide fuel for appropriate reactions, such as pursuing financial support, rebuilding one's home, identifying available community resources, and cumulatively helping a victim heal from such trauma. However, functionally impairing anxiety describes an emotional response that no longer serves the individual, and therefore the distinction between the two is critical.

Similarly to the risk factors identified for PTSD and depression post-wildfire, the risk factors for anxiety can also be separated into patient factors, trauma factors, and post-trauma factors [55]. Patient factors include younger age or age \leq 25 years old, lower socioeconomic status, a history of anxiety or depressive disorder, being on an antidepressant before the fire or prior adverse experiences in childhood [55][31][32][33][42]. Trauma-related factors increasing the risk of anxiety include witnessing or experiencing property loss and experiencing or fearing the loss of loved ones [14][26][55][31][34][32]. Finally, factors that occur post-fire that may increase the risk of developing anxiety were similar to depression, including perceived lack of support and ongoing life stressors [14][26][55][31][34].

References

- 1. Krawisz, B. Health Effects of Climate Destabilization: Understanding the Problem. WMJ Off. Publ. State Med. Soc. Wis. 2020, 119, 132–138.
- The Combustion Process. Available online: http://www.auburn.edu/academic/forestry_wildlife/fire/combustion.htm (acce ssed on 7 March 2021).
- Xu, R.; Yu, P.; Abramson, M.J.; Johnston, F.H.; Samet, J.M.; Bell, M.L.; Haines, A.; Ebi, K.L.; Li, S.; Guo, Y. Wildfires, GI obal Climate Change, and Human Health. N. Engl. J. Med. 2020, 383, 2173–2181.
- 4. Wildfires. Available online: https://www.who.int/westernpacific/health-topics/wildfires (accessed on 4 March 2021).
- 5. Nelson, R. US Wildfires and Mental Illness Stress Health Systems. Lancet 2020, 396, 1546–1547.
- B.J. Stocks Wildfire Investigations Ltd. Evaluating Past, Current and Future Forest Fire Load Trends in Canada. 2013. Available online: https://www.ccfm.org/wp-content/uploads/2013/08/2-Fire-Load-Trends.pdf (accessed on 3 January 20 21).
- Zhang, Y.; Beggs, P.J.; McGushin, A.; Bambrick, H.; Trueck, S.; Hanigan, I.C.; Morgan, G.G.; Berry, H.L.; Linnenluecke, M.K.; Johnston, F.H.; et al. The 2020 Special Report of the MJA-Lancet Countdown on Health and Climate Change: Le ssons Learnt from Australia's "Black Summer". Med. J. Aust. 2020, 213, 490–492.e10.
- 8. A Cohesive Strategy is Needed to Address Catastrophic Wildfire Threats. Available online: https://www.govinfo.gov/cont ent/pkg/CHRG-106hhrg59491/html/CHRG-106hhrg59491.htm (accessed on 4 March 2021).
- 9. Johns, C. Wildfires, Greenhouse Gas Emissions and Climate Change; Future Directions International: Nedlands, Austr alia, 2020.
- 10. Doerr, S.H.; Santín, C. Global Trends in Wildfire and Its Impacts: Perceptions versus Realities in a Changing World. Phi los. Trans. R. Soc. B Biol. Sci. 2016, 371, 20150345.
- 11. Weilnhammer, V.; Schmid, J.; Mittermeier, I.; Schreiber, F.; Jiang, L.; Pastuhovic, V.; Herr, C.; Heinze, S. Extreme Weat her Events in Europe and Their Health Consequences—A Systematic Review. Int. J. Hyg. Environ. Health 2021, 233, 1 13688.
- 12. Hrabok, M.; Delorme, A.; Agyapong, V.I.O. Threats to Mental Health and Well-Being Associated with Climate Change. J. Anxiety Disord. 2020, 76, 102295.
- 13. Clayer, J.R.; Bookless-Pratz, C.; Harris, R.I. Some Health Consequences of a Natural Disaster. Med. J. Aust. 1985, 14 3, 182–184.
- 14. Cherry, N.; Haynes, W. Effects of the Fort McMurray Wildfires on the Health of Evacuated Workers: Follow-up of 2 Coh orts. CMAJ Open 2017, 5, E638–E645.
- 15. Howard, C.; Rose, C.; Dodd, W.; Kohle, K.; Scott, C.; Scott, P.; Cunsolo, A.; Orbinski, J. SOS! Summer of Smoke: A Ret rospective Cohort Study Examining the Cardiorespiratory Impacts of a Severe and Prolonged Wildfire Season in Canad a's High Subarctic. BMJ Open 2021, 11, e037029.

- 16. Jones, R.T.; Ribbe, D.P.; Cunningham, P.B.; Weddle, J.D.; Langley, A.K. Psychological Impact of Fire Disaster on Childr en and Their Parents. Behav. Modif. 2002, 26, 163–186.
- Brown, M.R.G.; Agyapong, V.; Greenshaw, A.J.; Cribben, I.; Brett-MacLean, P.; Drolet, J.; McDonald-Harker, C.; Omeje, J.; Mankowsi, M.; Noble, S.; et al. Significant PTSD and Other Mental Health Effects Present 18 Months After the Fort Mcmurray Wildfire: Findings From 3070 Grades 7–12 Students. Front. Psychiatry 2019, 10, 623.
- McFarlane, A.C.; Policansky, S.K.; Irwin, C. A Longitudinal Study of the Psychological Morbidity in Children Due to a Na tural Disaster. Psychol. Med. 1987, 17, 727–738.
- McDermott, B.M.C.; Palmer, L.J. Post-Disaster Service Provision Following Proactive Identification of Children with Em otional Distress and Depression. Aust. N. Z. J. Psychiatry 1999, 33, 855–863.
- Kirsch, K.R.; Feldt, B.A.; Zane, D.F.; Haywood, T.; Jones, R.W.; Horney, J.A. Longitudinal Community Assessment for P ublic Health Emergency Response to Wildfire, Bastrop County, Texas. Health Secur. 2016, 14, 93–104.
- 21. NIMH. U.S. Leading Categories of Diseases/Disorders. Available online: https://www.nimh.nih.gov/health/statistics/disa bility/us-leading-categories-of-diseases-disorders.shtml (accessed on 4 March 2021).
- Bryant, R.A.; Gibbs, L.; Colin Gallagher, H.; Pattison, P.; Lusher, D.; MacDougall, C.; Harms, L.; Block, K.; Ireton, G.; Ri chardson, J.; et al. The Dynamic Course of Psychological Outcomes Following the Victorian Black Saturday Bushfires. Aust. N. Z. J. Psychiatry 2020, 55, 666–677.
- 23. McFarlane, A.C.; Van Hooff, M. Impact of Childhood Exposure to a Natural Disaster on Adult Mental Health: 20-Year Lo ngitudinal Follow-up Study. Br. J. Psychiatry 2009, 195, 142–148.
- 24. Comtesse, H.; Ertl, V.; Hengst, S.M.C.; Rosner, R.; Smid, G.E. Ecological Grief as a Response to Environmental Chan ge: A Mental Health Risk or Functional Response? Int. J. Environ. Res. Public Health 2021, 18, 734.
- 25. Palinkas, L.A.; Wong, M. Global Climate Change and Mental Health. Curr. Opin. Psychol. 2020, 32, 12–16.
- Bryant, R.A.; Waters, E.; Gibbs, L.; Gallagher, H.C.; Pattison, P.; Lusher, D.; MacDougall, C.; Harms, L.; Block, K.; Sno wdon, E.; et al. Psychological Outcomes Following the Victorian Black Saturday Bushfires. Aust. N. Z. J. Psychiatry 201 4, 48, 634–643.
- Belleville, G.; Ouellet, M.-C.; Morin, C.M. Post-Traumatic Stress among Evacuees from the 2016 Fort McMurray Wildfir es: Exploration of Psychological and Sleep Symptoms Three Months after the Evacuation. Int. J. Environ. Res. Public Health 2019, 16, 1604.
- 28. Marshall, G.N.; Schell, T.L.; Elliott, M.N.; Rayburn, N.R.; Jaycox, L.H. Psychiatric Disorders Among Adults Seeking Eme rgency Disaster Assistance After a Wildland-Urban Interface Fire. Psychiatr. Serv. 2007, 58, 509–514.
- Agyapong, V.I.O.; Juhas, M.; Omege, J.; Denga, E.; Nwaka, B.; Akinjise, I.; Corbett, S.E.; Brown, M.; Chue, P.; Li, X.-M.; et al. Prevalence Rates and Correlates of Likely Post-Traumatic Stress Disorder in Residents of Fort McMurray 6 M onths After a Wildfire. Int. J. Ment. Health Addict. 2019, 19.
- 30. Verstraeten, B.S.E.; Elgbeili, G.; Hyde, A.; King, S.; Olson, D.M. Maternal Mental Health after a Wildfire: Effects of Soci al Support in the Fort McMurray Wood Buffalo Study. Can. J. Psychiatry 2020, 070674372097085.
- Agyapong, V.I.O.; Ritchie, A.; Brown, M.R.G.; Noble, S.; Mankowsi, M.; Denga, E.; Nwaka, B.; Akinjise, I.; Corbett, S. E.; Moosavi, S.; et al. Long-Term Mental Health Effects of a Devastating Wildfire Are Amplified by Socio-Demographic a nd Clinical Antecedents in Elementary and High School Staff. Front. Psychiatry 2020, 11, 448.
- Moosavi, S.; Nwaka, B.; Akinjise, I.; Corbett, S.E.; Chue, P.; Greenshaw, A.J.; Silverstone, P.H.; Li, X.-M.; Agyapong, V.
 I.O. Mental Health Effects in Primary Care Patients 18 Months After a Major Wildfire in Fort McMurray: Risk Increased by Social Demographic Issues, Clinical Antecedents, and Degree of Fire Exposure. Front. Psychiatry 2019, 10, 683.
- Ritchie, A.; Sautner, B.; Omege, J.; Denga, E.; Nwaka, B.; Akinjise, I.; Corbett, S.E.; Moosavi, S.; Greenshaw, A.; Chue, P.; et al. Long-Term Mental Health Effects of a Devastating Wildfire Are Amplified by Sociodemographic and Clinical Ant eccedents in College Students. Disaster Med. Public Health Prep. 2020, 1–11.
- 34. Bryant, R.A.; Gibbs, L.; Gallagher, H.C.; Pattison, P.; Lusher, D.; MacDougall, C.; Harms, L.; Block, K.; Sinnott, V.; Ireto n, G.; et al. Longitudinal Study of Changing Psychological Outcomes Following the Victorian Black Saturday Bushfires. Aust. N. Z. J. Psychiatry 2018, 52, 542–551.
- 35. Byrne, M.K.; Lerias, D.; Sullivan, N.L. Predicting Vicarious Traumatization in Those Indirectly Exposed to Bushfires. Str ess Health 2006, 22, 167–177.
- Cowlishaw, S.; Metcalf, O.; Varker, T.; Stone, C.; Molyneaux, R.; Gibbs, L.; Block, K.; Harms, L.; MacDougall, C.; Galla gher, H.C.; et al. Anger Dimensions and Mental Health Following a Disaster: Distribution and Implications After a Major Bushfire. J. Trauma. Stress 2021, 34, 46–55.

- Forbes, D.; Alkemade, N.; Waters, E.; Gibbs, L.; Gallagher, C.; Pattison, P.; Lusher, D.; MacDougall, C.; Harms, L.; Bloc k, K.; et al. The Role of Anger and Ongoing Stressors in Mental Health Following a Natural Disaster. Aust. N. Z. J. Psyc hiatry 2015, 49, 706–713.
- Gallagher, H.C.; Lusher, D.; Gibbs, L.; Pattison, P.; Forbes, D.; Block, K.; Harms, L.; MacDougall, C.; Kellett, C.; Ireton, G.; et al. Dyadic Effects of Attachment on Mental Health: Couples in a Postdisaster Context. J. Fam. Psychol. 2017, 31, 192–202.
- 39. Gallagher, H.C.; Richardson, J.; Forbes, D.; Harms, L.; Gibbs, L.; Alkemade, N.; MacDougall, C.; Waters, E.; Block, K.; Lusher, D.; et al. Mental Health Following Separation in a Disaster: The Role of Attachment: Disaster-Related Separatio n and Attachment. J. Trauma. Stress 2016, 29, 56–64.
- 40. Molyneaux, R.; Gibbs, L.; Bryant, R.A.; Humphreys, C.; Hegarty, K.; Kellett, C.; Gallagher, H.C.; Block, K.; Harms, L.; R ichardson, J.F.; et al. Interpersonal Violence and Mental Health Outcomes Following Disaster. BJPsych Open 2020, 6, e1.
- Psarros, C.; Theleritis, C.; Economou, M.; Tzavara, C.; Kioulos, K.T.; Mantonakis, L.; Soldatos, C.R.; Bergiannaki, J.-D. Insomnia and PTSD One Month after Wildfires: Evidence for an Independent Role of the "Fear of Imminent Death". Int. J. Psychiatry Clin. Pract. 2017, 21, 137–141.
- Silveira, S.; Kornbluh, M.; Withers, M.C.; Grennan, G.; Ramanathan, V.; Mishra, J. Chronic Mental Health Sequelae of Climate Change Extremes: A Case Study of the Deadliest Californian Wildfire. Int. J. Environ. Res. Public Health 2021, 18, 1487.
- 43. Ho, R.C.; Zhang, M.W.; Ho, C.S.; Pan, F.; Lu, Y.; Sharma, V.K. Impact of 2013 South Asian Haze Crisis: Study of Physi cal and Psychological Symptoms and Perceived Dangerousness of Pollution Level. BMC Psychiatry 2014, 14, 81.
- Moore, D.; Copes, R.; Fisk, R.; Joy, R.; Chan, K.; Brauer, M. Population Health Effects of Air Quality Changes Due to F orest Fires in British Columbia in 2003: Estimates from Physician-Visit Billing Data. Can. J. Public Health 2006, 97, 105 –108.
- 45. McDermott, B.M.; Lee, E.M.; Judd, M.; Gibbon, P. Posttraumatic Stress Disorder and General Psychopathology in Child ren and Adolescents Following a Wildfire Disaster. Can. J. Psychiatry 2005, 50, 137–143.
- 46. Papadatou, D.; Giannopoulou, I.; Bitsakou, P.; Bellali, T.; Talias, M.A.; Tselepi, K. Adolescents' Reactions after a Wildfire Disaster in Greece. J. Trauma. Stress 2012, 25, 57–63.
- 47. Yelland, C.; Robinson, P.; Lock, C.; La Greca, A.M.; Kokegei, B.; Ridgway, V.; Lai, B. Bushfire Impact on Youth. J. Trau ma. Stress 2010.
- 48. Parslow, R.A.; Jorm, A.F.; Christensen, H. Associations of Pre-Trauma Attributes and Trauma Exposure with Screening Positive for PTSD: Analysis of a Community-Based Study of 2085 Young Adults. Psychol. Med. 2006, 36, 387–395.
- 49. Jones, R.T.; Ribbe, D.P.; Cunningham, P.; Weddle, J.D. Psychosocial Correlates of a Wildfire Disaster: Post Disaster A dult Reactions. Fire Technol. 2003, 39, 103–117.
- 50. Mcdermott, B.M.; Palmer, L.J. Postdisaster Emotional Distress, Depression and Event-Related Variables: Findings Acro ss Child and Adolescent Developmental Stages. Aust. N. Z. J. Psychiatry 2002, 36, 754–761.
- 51. Cohen, J.R.; Adams, Z.W.; Menon, S.V.; Youngstrom, E.A.; Bunnell, B.E.; Acierno, R.; Ruggiero, K.J.; Danielson, C.K. How Should We Screen for Depression Following a Natural Disaster? An ROC Approach to Post-Disaster Screening in Adolescents and Adults. J. Affect. Disord. 2016, 202, 102–109.
- 52. Oral Communications. Eur. Psychiatry 2018, 48, S72–S140.
- 53. Brown, M.R.G.; Agyapong, V.; Greenshaw, A.J.; Cribben, I.; Brett-MacLean, P.; Drolet, J.; McDonald-Harker, C.; Omeje, J.; Mankowsi, M.; Noble, S.; et al. After the Fort McMurray Wildfire There Are Significant Increases in Mental Health Sy mptoms in Grade 7–12 Students Compared to Controls. BMC Psychiatry 2019, 19, 18.
- 54. Eisenman, D.; McCaffrey, S.; Donatello, I.; Marshal, G. An Ecosystems and Vulnerable Populations Perspective on Sol astalgia and Psychological Distress After a Wildfire. EcoHealth 2015, 12, 602–610.
- 55. Agyapong, V.I.O.; Hrabok, M.; Juhas, M.; Omeje, J.; Denga, E.; Nwaka, B.; Akinjise, I.; Corbett, S.E.; Moosavi, S.; Bro wn, M.; et al. Prevalence Rates and Predictors of Generalized Anxiety Disorder Symptoms in Residents of Fort McMurr ay Six Months After a Wildfire. Front. Psychiatry 2018, 9, 345.
- McFarlane, A.C.; Clayer, J.R.; Bookless, C.L. Psychiatric Morbidity Following a Natural Disaster: An Australian Bushfire. Soc. Psychiatry Psychiatr. Epidemiol. 1997, 32, 261–268.
- 57. Clayton, S. Climate Anxiety: Psychological Responses to Climate Change. J. Anxiety Disord. 2020, 74, 102263.
- 58. Barlow, D.H.; Durand, V.M.; Hofmann, S.G. Abnormal Psychology: An Integrative Approach, 8th ed.; Cengage Learnin g: Boston, MA, USA, 2017.

Retrieved from https://encyclopedia.pub/entry/history/show/34637