Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
Stressful events as correlates of depressive and PTSD symptoms in Hong Kong women during social unrest and COVID-19 pandemic

Stephanie Ming Yin Wong a,1, Charlotte Wan Chi Wong a,1, Christy Lai Ming Hui a, Sherry Kit Wa Chan a,b, Edwin Ho Ming Lee a, Wing Chung Chang a,b, Yi Nam Suen a,*, Eric Yu Hai Chen a,b

a Department of Psychiatry, University of Hong Kong, 2/F New Clinical Building, Queen Mary Hospital, Pokfulam Road, Hong Kong SAR, China
b State Key Laboratory of Brain and Cognitive Sciences, University of Hong Kong, Hong Kong SAR, China

ARTICLE INFO

Keywords:
Social unrest
Covid-19
Depressive symptoms
PTSD symptoms, Women mental health

ABSTRACT

Background: Stressors at the population level affect women more than men. The influence of prolonged stressors on mental disorders in women is yet unknown, especially when social movements and pandemics coexist.

Methods: This study analysed data from an online mental health self-help service for women in Hong Kong between May and September 2020. We collected demographic data, PTSD symptoms, and exposure to social unrest-related traumatic events (TEs), pandemic-related traumatic events (PEs), and personal stressful life experiences (SLEs). Multiple logistic regression was performed to examine the links between TEs, PEs, and SLEs and PTSD.

Results: The study found that 38.4% of 751 women had moderate-to-severe depressive symptoms and 23.8% had probable PTSD. The most common TEs, PEs, and SLEs were violence via media, major physical health concerns, and plans thwarted due to COVID-19, respectively. Younger age, less education, unemployment, and more stressors (individually or collectively, except for high TEs and PEs) were linked to increased odds of moderate-to-severe depressive symptoms. TEs and PEs increased the risk of probable PTSD only when SLEs were present.

Limitation: The non-random sampling procedure reduced the generalisability to the entire women population.

Conclusions: Exposure to social conflicts and pandemics may increase depressive and PTSD symptoms in women. Developing mental health services for women should consider the impact of concurrent major events.

1. Introduction

Depression and post-traumatic stress disorder (PTSD) are among the most common mental health conditions associated with social unrest and pandemics (Charlson et al., 2019; Ni et al., 2020a; Rogers et al., 2020). The impact of social unrest and pandemics on the mental health of affected populations has largely been studied separately, but their effects when they co-occur are relatively under-researched. As more societies around the world report the co-occurrence of social unrest and pandemics (Centers for Disease Control Prevention, 2020; McVeigh, 2020), the situation becomes increasingly concerning and warrants greater attention.

Hong Kong, one of the first cities affected by COVID-19, was in a unique situation because they had already been months of social unrest when COVID-19 arrived. The social unrest that began in mid-2019 with escalating violence such as attacks, arson, and destruction, has resulted in a significant deterioration in the population’s mental health (Ni et al., 2020b). During the social unrest in 2019, the predicted prevalence of probable depression increased tenfold when compared to the post-Occupy Central movement period in 2017 and more than one-tenth of Hong Kong people were reported to have PTSD (Ni et al., 2020b).

In light of the SARS experience, strict hygiene and safety measures were quickly implemented when COVID-19 arrived in Hong Kong in early 2020 (Chu et al., 2021). While these measures were successful in reducing the number of positive cases and the mortality rate (Centre for Health Protection, 2021), they also resulted in a significant clustering; PTSD, Post-traumatic stress disorder; COVID-19, Coronavirus disease 2019; SARS, Severe acute respiratory syndrome; SLE, Stressful life event; TE, Social unrest-related traumatic event; PE, COVID-19 pandemic-related event; DASS-21, Depression, Anxiety, and Stress Scale-21; DASS-D, Depression Subscale of Depression, Anxiety, and Stress Scale-21; TSQ, Trauma Screening Questionnaire; ANOVA, Analysis of variance; PHQ-9, Patient Health Questionnaire 9 item version.

* Corresponding author.
E-mail address: suenys@hku.hk (Y.N. Suen).
1 These authors contributed equally to this work.

https://doi.org/10.1016/j.jad.2022.01.002
Received 6 March 2021; Received in revised form 28 December 2021; Accepted 1 January 2022
Available online 3 January 2022
0165-0327/© 2022 Elsevier B.V. All rights reserved.
mental health problems. For example, the prevalence of anxiety, depressive symptoms and happiness amidst COVID-19 drastically worsened when compared to 2016 and 2017 (Zhao et al., 2020). Distress was reportedly associated with fears of infection, a lack of masks, and working from home (Choi et al., 2020).

Given the co-occurrence of population-level stressors, a recent study reported that these stressors, in addition to personal stressful life events (SLEs), may increase the severity of depressive and PTSD symptoms in the Hong Kong community (Wong et al., 2021). While population-level stressors may have an impact on the entire population, research indicates that both COVID-19 and social conflict have different effects on men and women. Men, for example, have poorer clinical outcomes and higher mortality when confronted with COVID-19 (Galbadage et al., 2020; Nasiri et al., 2020), whereas women experience more negative emotions and mental disorders (Nienhuis and Lesser, 2020; Wang et al., 2021; Xiong et al., 2020). The social conflict situation is similar to COVID-19. It has been discovered that when exposed to protests and riots, women, particularly mothers and those with lower levels of education, are more likely to suffer from depression, anxiety, and PTSD (Ni et al., 2016, 2020b). Furthermore, regardless of the frequently and type of trauma or stress experienced, women have higher levels of PTSD symptoms (Ainamani et al., 2020; Jewkes et al., 2017; Silove et al., 2017; Tolin and Foa, 2006).

The increased risk is associated with the increasing demands of women’s social, cultural, and family roles in caring for children, the elderly, and the ill, which are associated with higher levels of vulnerability and anxiety than men during COVID-19 (Wang et al., 2021). According to a recent report from a large-scale study covering 40 countries, women are nearly three times more likely than men to report significant mental health problems, such as anxiety, loss of appetite, sleep disturbances, and difficulty performing daily tasks (Care International, 2020). Women’s mental health deserves special attention because they play an important role in the family and malfunctions in women can have a negative impact on other members, particularly children (Kingston and Tough, 2014; Phua et al., 2020).

The impact of social conflict and pandemics on women’s mental health has been well-studied, but they have been studied separately in different scenarios, leaving the impact of their co-occurrence inadequately addressed. The primary outjubt of this study was to investigate the impact of the co-occurrence of population-level stressors on women’s mental health in Hong Kong during this critical period. We hypothesised that stressful events, such as social unrest-related traumatic events (TEs), COVID-19 pandemic-related events (PES), and SLEs are independently, positively associated with increased odds of moderate-to-severe depressive symptoms and probable PTSD in women. We further hypothesised that women with combined high TEs, PEs and SLEs would have stronger positive associations with odds of moderate-to-severe depressive symptoms and probable PTSD in women.

2. Materials and methods

2.1. Study design and participants

Data were collected between May 30, 2020 and September 29, 2020, using an online mental health tool specially designed for women in Hong Kong. The tool was developed as a self-help and psychoeducation tool for women in Hong Kong by the Department of Psychiatry, University of Hong Kong. It was open to all women, with no specific inclusion or exclusion criteria, and respondents were required to provide written consent to participate in the current study. Users were asked to complete a questionnaire about the stressors they had recently faced and their current mental health. Following users’ responses, the tool provided an overview of their current mental health status, general suggestions for maintaining good mental health for those who were not at significant risk of mental disorders, and suggestions for professional help with information on how to help women with severe symptoms. The tool was distributed to women in Hong Kong through community non-governmental organizations and various social media platforms (e.g., Facebook, Instagram). Women who answered all the questions in the questionnaire (i.e., with no missing data) were eligible for a souvenir of anti-epidemic items such as face masks, disinfecting wet wipes, hand sanitizers. They were asked to leave their mobile phone number so that SMS messages about the souvenir collection could be sent to them.

Over 2500 women used the tool and provided written informed consent to participate in the current study during the time frame specified. This study examined data from only 751 unique respondents (i.e., duplicated entries were removed) who completed all questionnaire items relevant to the current study (i.e., no missing data). The study was approved by the Institutional Review Board of the University of Hong Kong/Hospital Authority Hong Kong West Cluster.

2.2. Measures

The questions in the questionnaire and advice on coping were compiled after extensive discussions between the research team, collaborating mental health partner organizations, and women in the community. The data collected in the survey included demographics, symptoms of depression and PTSD, social unrest-related traumatic events (TEs), pandemic-related events (PES) and non-conflict or pandemic-related personal stressful life events (SLEs).

Demographic characteristics collected included age (< 30 years, 30–49 years, and ≥ 50 years), education level (primary education or below, secondary education, tertiary education, and post-tertiary education), employment status (employed, unemployed, and homemakers), and past psychiatric history.

We assessed depressive symptoms using the Depression Subscale (DASS-D, seven items) of the Depression, Anxiety, and Stress Scale-21 (DASS-21) Chinese version (Lovibond and Lovibond, 1995). The DASS-21 was validated using a Chinese sample in Hong Kong (Moussa et al., 2001). Respondents rate the severity of their depressive symptoms in the past week on a 4-point Likert scale, from 0 (none of the time) to 3 (most of the time). A score of 14 to 20 indicates moderate severity of symptoms, while higher scores indicate severe to very severe symptoms (Lovibond and Lovibond, 1995). The Chinese version of the DASS-D has shown good reliability (α = 0.82) (Lu et al., 2018). The internal consistency in the current sample was 0.92.

PTSD risk was assessed using the Trauma Screening Questionnaire (TSQ) (Brewin et al., 2002). The questionnaire consists of ten dichotomous response options (i.e., yes/no). Endorsed items were summed for a total score indicating the likelihood of developing PTSD. A score of six or more indicates probable PTSD (Brewin et al., 2002). This screening questionnaire provides medium to high sensitivity (0.77–0.88) and specificity (0.86–0.90) in predicting outcomes within one to six months after trauma (Walters et al., 2007). Satisfactory internal consistency of the TSQ in the Hong Kong population has been reported (α = 0.93) (Wu et al., 2019). The internal consistency in the current sample was 0.95.

The items on TEs (8 items), PEs (5 items) and SLEs (13 items) were derived and adapted to the context of Hong Kong. Participants were asked whether they had experienced TEs and SLEs since June 2019 (i.e., yes/no). The number of item endorsed in each category was summed to form the score for TEs and SLEs. For PEs, participants were asked to rate the level of stress experienced for each of the five PEs on a 4-point Likert scale (none, a little, moderate, and severe). Ratings of “none” and “a little” were recoded as “0,” and “moderate” and “severe” were recoded as “1.” The total number of PEs was calculated using the sum of the recoded PEs items.

2.3. Statistical analysis

Data analysis was performed using SPSS 26.0 (IBM SPSS Statistics, New York, United States). For all variables, descriptive (mean and standard deviation or frequency and percentage) were computed.
Pearson’s or Spearman’s rank correlation was used to examine the association between normally distributed or non-normally distributed continuous variables, respectively (supplementary material 1). For between-group comparisons of normally or non-normally distributed continuous variables, one-way ANOVA or the Kruskal Wallis test was respectively (supplementary material 1).

Multiple logistic regression models with stressors (SLES, TEs and PEs) as independent variables and age, education level and employment status as covariates were run for each of the dependent variables (i.e., moderate-to-severe depressive symptoms defined by DASS-D ≥ 16 and probable PTSD defined by TSQ score ≥ 6). To test for the cumulative effects of stressors, each stressor was divided into low and high groups based on their medians (2 for SLE and PE and 1 for TE). This grouping variable consisting of the following eight groups was therefore created entered to the multiple logistic regression model: (1) low in all stressors, (2) high SLEs only, (3) high TEs only, (4) high PEs only, (5) high SLEs and TEs, (6) high TEs and PEs, (7) high SLEs and PEs, and (8) high in all stressors.

3. Results

The demographic characteristics of the 751 women considered for analysis are summarised in Table 1. The majority of respondents were middle-aged, tertiary-educated and employed women. While about half of the respondents had a psychiatric history, more than one-third had moderate-to-severe depressive symptoms, and about one-quarter met criteria for probable PTSD.

Participants’ exposure to TEs, PEs and SLEs is summarised in Table 1. On average, they were exposed to 1.21 (SD = 1.19), 2.16 (1.44), and 2.04 (1.89) TEs, PEs, and SLEs respectively. The correlation analysis found that DASS-D, TSQ, TEs, PEs and SLEs were significantly and positively associated with each other’s (supplementary material).

Table 2 summarises the factors associated with moderate-to-severe depressive symptoms and probable PTSD. Younger age, lower education level, unemployment, and more stressors alone or in combination (except for high TEs and PEs) were all significantly associated with higher odds of moderate-to-severe depressive symptoms. When only one stressor was considered, however, only SLEs were significantly associated with higher odds of probable PTSD. When all stressors were taken into account, high in all stressors yielded the greatest odds, followed by high SLEs plus either high TEs or high PEs, while high in both TEs and PEs yielded the smallest positive but still significant odds of probable PTSD.

4. Discussion

This study was carried out against the backdrop of a prolonged series of social unrest since mid-2019 and a COVID-19 pandemic outbreak since early 2020. The findings primarily reflect the experiences of middle-aged women in Hong Kong who are dealing with unprecedented large-scale societal instabilities. We revealed that 38.4% of our sample of Hong Kong women had at least a moderate level of depressive symptoms, a threefold increase from previously reported rate of probable depression among women during the 2019 social unrest (Ni et al., 2020a), a one-third higher than the prevalence reported in an anonymous telephone survey conducted at the beginning of the social unrest (Hou et al., 2021a) and that by another study conducted in July 2020 when COVID-19 was substantially affecting people’s daily living routines (Lai et al., 2021). Although the assessment measures used in the three previous studies and the current study were different, the adopted thresholds are comparable (i.e., 16 on the DASS-D in the current study and 10 on the PHQ-9 in previous studies) (Zhao et al., 2017). The current study’s high prevalence of probable depression could be attributed to the sample focus on women, who used to report more depression than men (Cyranowski et al., 2000), as well as the study’s anonymous reporting nature (Benard et al., 2020). Our study also found that nearly a quarter of women tested positive for probable PTSD, nearly doubling the rate of suspected PTSD among women during social unrest in 2019, as previously reported (Ni et al., 2020b). These findings suggest that comprehensive community screening and monitoring, as well as timely treatment and care, are required to address women’s psychological needs when society is subjected to a series of large-scale stressors.

In this study, women with lower educational attainment were found to be more associated with moderate-to-severe depressive symptoms, which is in line with previously reported findings (Hou et al., 2021a; Ni et al., 2016, 2020b). Our findings also shed light on the factors that contributed to the development of moderate-to-severe depressive symptoms, with the majority of women tested positive for probable PTSD, nearly doubling the rate of suspected PTSD among women during social unrest in 2019, as previously reported (Ni et al., 2020b). These findings suggest that comprehensive community screening and monitoring, as well as timely treatment and care, are required to address women’s psychological needs when society is subjected to a series of large-scale stressors.
effects of stressors on probable PTSD in Hong Kong women. When SLEs are present, the population-level stressors were associated with increased risks of PTSD, and the effects could be the greatest when all three stressors were present at high levels. This finding echoed the findings of a recent study, which found that trauma survivors with more severe PTSD symptoms perceived significantly more hassles in daily life than those with less severe PTSD symptoms (Stensvehagen et al., 2020). However, there has been little research into the causality and underlying mechanisms of the effects of daily hassles on the severity of PTSD symptoms. Future research in this area may provide insight into intervention strategies for people suffering from varying degrees of PTSD severity.

The women in our study did not report active participation in the social unrest in Hong Kong, which could be due to the fact that the sample was mostly middle-aged or older, and the majority of participants in this incident were youths (Shek, 2020). Nonetheless, more than half were exposed to trauma indirectly through the media, which deserves our attention for a variety of reasons. First, while indirect exposure is less likely to result in the development of PTSD than direct exposure (May and Wisco, 2016), repeated media exposure to large-scale stress events has also been shown to be associated with acute stress when compared to direct exposure (Holman et al., 2014). Second, while the stress associated with indirect traumatic exposure is relatively short-lived (Blanchard et al., 2004; Pfefferbaum et al., 2000), the findings of this study, which was conducted months after an active period of social unrest, suggest that PTSD symptoms may persist when the public health crisis is added to the mix.

To the best of our knowledge, specific age groups have not been frequently cited as significant predictors of psychopathological outcomes. Nevertheless, the findings of this study suggest that younger women (e.g., under age 50) may be more vulnerable to developing depressive symptoms in certain critical contexts (e.g., prolonged periods of collective action and crisis). When allocating resources in the community, health care providers should keep this in mind.

### 4.1. Strengths and limitations

This study took advantage of the unique context in Hong Kong to investigate the relationship between various types of stressful events and mental health outcomes. Our findings are especially useful for understanding the needs of women in Hong Kong, and they could serve as a reference for healthcare providers dealing with the current unprecedented situation. The findings of our study, however, should be interpreted with caution. Because the online tool was primarily disseminated through social media and community collaborative partners, it is possible that the sample of our study included women with a mental health history and greater motivation to seek help, as evidenced by a significant proportion of respondents with a psychiatric history (43.7%). However, the fact that our online self-help tool was able to reach a large proportion of women with self-reported symptoms suggests that this particular group requires psychological support. We are unable to determine whether the factors associated with increased symptomatology are unique to women or if they apply to other population subgroups, such as men. More research on a larger community would be necessary to provide a more generalizable picture of the impact of stressful events. Furthermore, because the majority of respondents were middle-aged or older, there could be selection or response bias, which could mean that the mental health needs of younger women were underrepresented in the current study, and thus future studies with younger women are warranted.

### 4.2. Public health implication

The current findings have three implications: how population-level and individual-level effects of stressful events on women’s mental health are understood when they occur concurrently; which demographic subgroup of women was at higher risk for depressive and symptoms and probable PTSD during in Hong Kong during this critical period. Of the three types of stressful events considered in our study, individual-level stressors (i.e., SLEs) were found to be the strongest significant risk factors for moderate-to-severe depressive symptoms. The finding is consistent with previous research that negative daily events are important predictors of mood problems in young people, and that significant risk factors for moderate-to-severe depressive symptoms. The group with high scores in all stressors (McLaughlin et al., 2010), and stress proliferation hypotheses (Pearlin et al., 1997), which is in line with a recent population-based study in Hong Kong (Hou et al., 2021b). When SLEs were present, however, high PEs were associated with moderate-to-severe depressive symptoms more than high TEs. According to the findings, the prolonged duration of COVID-19 pandemic may exacerbate the depressive symptoms associated with SLEs more than TEs. The group with high scores in all stressors did not have the highest odds of having moderate-to-severe depressive symptoms, implying that being women exposed to TEs might be less depressed than those who were not when confronted with COVID-19.

While the association between population-level stressful events (i.e., TEs and PEs) and PTSD symptoms was expected, we did not find significantly higher PTSD symptoms among women with lower education levels, as previously reported (Ni et al., 2016, 2020b). The conflicting findings could be attributed to the fact that the current study also considered the number of stressful events which was not considered in the previous studies. We, on the other hand, discovered the cumulative effects of stressors on probable PTSD in Hong Kong women. When SLEs

| Table 2 | Multiple logistic regression analysis with stressors on moderate-to-severe depressive symptoms and probable PTSD. |
|---------|---------------------------------------------------------------------------------------------------------------|
|         | Moderate-to-severe depressive symptoms | Probable PTSD |
| Demographics | aOR (95%CI) | aOR (95%CI) |
| Age | 0.576 (0.437 – 0.760) *** | 1.245 (0.914 – 1.695) |
| Education level | 0.684 (0.524 – 0.892) ** | 0.984 (0.734 – 1.318) |
| Housewives | 0.660 (0.402 – 1.084) | 0.684 (0.386 – 1.214) |
| Unemployed | 1.573 (1.019 – 2.430) * | 1.257 (0.781 – 2.023) |
| Stressful events (ref.: low in all stressors) | | |
| High SLEs only | 4.893 (1.603 – 14.929) ** | 7.715 (1.726 – 34.489) ** |
| High TEs only | 4.031 (1.623 – 10.012) ** | 1.231 (0.237 – 6.392) |
| High PEs only | 2.904 (1.183 – 7.125) * | 1.874 (0.427 – 8.225) |
| High SLEs and TEs | 5.691 (2.437 – 13.289) *** | 9.696 (2.754 – 34.134) *** |
| High TEs and PEs | 2.221 (0.948 – 5.201) | 5.739 (1.636 – 20.133) ** |
| High SLEs and PEs | 6.251 (2.524 – 15.479) *** | 9.474 (2.569 – 34.929) *** |
| High in all stressors | 5.592 (2.571 – 12.163) *** | 14.536 (4.363 – 48.428) *** |

Model statistics:
- Nagelkerke R square: 0.163
- Hosmer and Lemeshow Test: 9.580; 2.288

*p < .05.

**p < .01.

***p < .001.
PTSD symptoms; and implications for community mental health research, policy, and practice. This study showed clear associations between stressful events, both at the population and individual level, and women’s mental health status - and these associations are evident for both depressive and post-traumatic stress symptoms. Our study, which primarily reflects the experiences of middle-aged women, suggests that, while they did not actively participate in the social unrest, the triggering of more intensely stressful events such as family relationships and financial difficulties, or indirect exposure through media, may have a negative impact of their mental health. One of the study’s key findings is that COVID-19 not only causes anxiety and worry, but it can lead to depression if it repeatedly complicates women’s daily lives. In this regard, we should be more aware of depressive symptoms in younger, less educated women. Future research should look into how psychological interventions can help women cope with the negative emotions that result from the interaction of population-level stress and individual stressors.

In summary, we presented timely data demonstrating that both personal stressful life events and socially induced stressful events are significantly associated with depressive symptoms in women, and that the additional exposure to population-level stressful events may increase women’s vulnerability to developing depression and PTSD. Our findings suggest that when designing mental health services for women, health care providers should consider the impact of concurrent major events at both the individual and population levels.

Role of the funding source

None.

CRediT authorship contribution statement

Stephanie Ming Yin Wong: Visualization, Formal analysis, Data curation, Writing – original draft, Writing – review & editing. Charlotte Wan Chi Wong: Visualization, Formal analysis, Data curation, Writing – original draft, Writing – review & editing. Christy Lai Ming Hui: Writing – review & editing. Sherry Kit Wa Chan: Writing – review & editing. Edwin Ho Ming Lee: Writing – review & editing. Wing Chung Chang: Writing – review & editing. Yi Nam Suen: Visualization, Formal analysis, Data curation, Writing – original draft, Writing – review & editing. Eric Yu Hai Chen: Visualization, Formal analysis, Data curation, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

None.

Acknowledgements

The authors would like to thank all respondents participated in the present study.

Supplementary materials

Supplementary material associated with this article can be found in the online version, at doi:10.1016/j.jad.2022.01.002.

References

Ainamani, H.E., Gumisiriza, N., Rukundo, G.Z., 2020. Mental health problems related to COVID-19: a call for psychosocial interventions in Uganda. Psychol. Trauma 12 (7), 809–811. https://doi.org/10.1037/tru0000670.
Benedict, V., Pignon, B., Geoffroy, P.A., Bencadila, I., Roelants, J.L., Rolland, B., Fovet, T., D’Hondt, F., Thomas, P., Vaiva, G., Amad, A., 2020. Depression with and without a history of psychotic symptoms in the general population: sociodemographic and clinical characteristics. J. Affect. Disord. 273, 247–251. https://doi.org/10.1016/j.jad.2020.04.048.
Blanchard, E.B., Kuhn, E., Rowell, D.L., Hickling, E.J., Wittert, D., Rogers, R.L., Johnson, M.R., Steckler, D.C., 2004. Studies of the vicarious traumatization of college students by the September 11th attacks: effects of proximity, exposure and connectedness. Behav. Res. Ther. 42 (2), 191–205. https://doi.org/10.1016/S0005-7967(03)00118-9.
Brewin, C.R., Rose, S., Andrews, B., Green, J., Tata, P., McEvoy, C., Turner, S., Foa, E.B., 2000. Brief screening instruments for post-traumatic stress disorder. Br. J. Psychiatry 180, 158–162. https://doi.org/10.1192/bjp.180.2.158.
Care International. (2020). Financial insecurity, hunger, mental health are top concerns for women worldwide. https://care.org/news-and-stories/press-releases/financial-insecurity-hunger-mental-health-are-top-concerns-for-women-worldwide/ (accessed 30 September 2021).
Centers for Disease Control Prevention. (2020). Coping with stress. https://www.cdc.gov/ covid-19/symptoms/stress-management/coping.html (accessed 30 September 2021).
Centres for Disease Control Prevention. (2020). Coping with stress. https://www.cdc.gov/ covid-19/symptoms/stress-management/coping.html (accessed 30 September 2021).
Centre for Health Protection. (2021). Countries/areas with reported cases of Coronavirus disease-2019 (COVID-19). https://www.chp.gov.hk/files/pdf/statistics_of_the_confirmed_cases.pdf (accessed 30 September 2021).
Charlson, F., van Ommeren, M., Flaxman, A., Cornett, J., Whiteford, H., Saxena, S., 2010. New WHO prevalence estimates of mental disorders in conflict settings: a systematic review and meta-analysis. Lancet 394 (10194), 240–248. https://doi.org/10.1016/ S0140-6736(10)60074-0.
Choi, E.P.H., Hui, B.P.H., Wan, E.Y.F., 2020. Depression and anxiety in Hong Kong during COVID-19. Int. J. Environ. Res. Public Health 17 (10). https://doi.org/10.3390/ijerph17103740.
Chu, D.K.W., Hui, K.P.Y., Gu, H., Ko, R.L.W., Krishnan, P., Ng, D.Y.M., Liu, G.Y.Z., Wan, C.K.C., Cheung, M.C., Ng, K.C., Nicholls, J.M., Tsang, D.N.C., Peiris, M., Chan, M.C.W., Poon, L.L.M., 2021. Introduction of ORF3a-Q57H SARS-CoV-2 variant causing fourth epidemic wave of COVID-19, Hong Kong, China. Emerg. Infect. Dis. 27 (5), 1492–1495. https://doi.org/10.3201/eid2705.210015.
Cyranowski, J.M., Frank, E., Young, E., Shear, M.K., 2000. Adolescent onset of the gender role in broadcasting acute stress following the Boston Marathon bombings. Proc. Natl. Acad. Sci. U. S. A. 111 (1), 93–98. https://doi.org/10.1073/pnas.1111265110.
Hou, W.K., Hall, B.J., Liang, L., Li, T.W., Liu, H., Galea, S., 2021a. Probable depression and suicidal ideation in Hong Kong amid massive civil unrest. Ann. Epidemiol. 54, 45–51. https://doi.org/10.1016/j.annepidem.2020.09.006.
Hou, W.K., Lee, T.M., Liang, L., Li, T.W., Liu, H., Ettkam, C.K., Galea, S., 2021b. Civil unrest, COVID-19 stressors, anxiety, and depression in the acute phase of the pandemic: a population-based study in Hong Kong. Soc. Psychiatry Psychiatr. Epidemiol. 56 (8), 1499–1508. https://doi.org/10.1007/s00127-021-02075-7.
Jewkes, R., Jama-Shai, N., Sikweyiya, V., 2017. Enduring impact of conflict on mental health and gender-based violence perpetration in Bougainville, Papua New Guinea: a cross-sectional study. PloS One 12 (10), e0186602. https://doi.org/10.1371/journal.pone.0186602.
Kingston, D., Tough, S., 2014. Prenatal and postnatal maternal mental health and school-aged child development: a systematic review. Matern. Child Health J. 18 (7), 1728–1741. https://doi.org/10.1007/s10833-013-1418-3.
Lai, F.T.T., Chan, V.K.Y., Li, T.W., Li, X., Hobfoll, S.E., Lee, T.M., Hou, W.K., 2021. Disrupted daily routines mediate the socioeconomic gradient of depression amid public health crises: a repeated cross-sectional study. Aust. N. Z. J. Psychiatry. Epidemiol. 56 (8), 1499–1508. https://doi.org/10.1007/s00127-021-02075-7.
Li, Y., Zhang, D., Liang, Y., Hu, T., 2016. Meta-analysis of the relationship between life events and depression in adolescents. J. Pediatric Care 2 (1). https://doi.org/10.1176/ajpca.2014.04.05.100008.
Lovibond, P.F., Lovibond, S.H., 1995. The structure of negative emotional states: comparison of the depression anxiety stress scales (DASS) with the Beck depression and anxiety inventories. Behav. Res. Ther. 33 (3), 335–343. https://doi.org/10.1016/0005-7967(94)00075-7.
Lu, S., Hu, S., Guan, Y., Xiao, J., Cai, D., Gao, Z., Sang, Z., Wei, J., Zhang, X., Margraf, J., 2018. Measurement invariance of the depression anxiety stress scales-21 across gender in a sample of Chinese university students. Front. Psychol. 9, 2064. https://doi.org/10.3389/fpsyg.2018.02064.
May, C.L., Wisco, B.E., 2016. Defining trauma: how level of exposure and proximity affect risk for posttraumatic stress disorder. Psychol. Trauma 8 (2), 233–240. https://doi.org/10.1037/tra0000295.
McEveigh, K. (2020). Protests predicted to surge globally as Covid-19 drives unrest. htt://www.theguardian.com/global-development/2020/jul/17/protests-predicted-t o-surge-globally-as-covid-19-drives-unrest/ (accessed 30 September 2021).
Mouna, M.T., Lovibond, P.F., Laube, R., 2001. Psychosocial characteristics of a Chinese version of the short depression anxiety stress scales (DASS-21). Report for New South Wales Transcultural Mental Health Centre. Cunningham, NSW, Sydney. Nastri, M.J., Faddad, S., Tahvildari, A., Farsi, Y., Arabi, M., Hasanzadeh, S., Jamshidi, K., Moridi, M., Miraeiidi, M., 2020. COVID-19 clinical characteristics, and sex-specific risk of mortality: systematic review and meta-analysis. Front. Med. 7, 459. https://doi.org/10.3389/fmed.2020.00459 (Lausanne).
Ni, M.Y., Kim, Y., McDowell, I., Wong, S., Qiu, H., Song, I.O.I., Galea, S., Leung, G.M., 2020a. Mental health during and after protests, riots and revolutions: a systematic review. Aust. N. Z. J. Psychiatry 54 (4), 222–234. https://doi.org/10.1177/0004867419899165.

Ni, M.Y., Li, T.K., Pang, H.H., Chan, B.H.Y., Yuan, B.Y., Kawachi, I., Schooling, C.M., Leung, G.M., 2016. Direct participation in and indirect exposure to the occupied movement and depressive symptoms: a longitudinal study of Hong Kong adults. Am. J. Epidemiol. 184 (9), 636–643. https://doi.org/10.1093/aje/kww103.

Ni, M.Y., Yao, X.L., Leung, K.S.M., Lau, C., Leung, C.M.C., Pan, P., Flores, F.P., Chang, W.C., Cowling, B.J., Leung, G.M., 2020b. Depression and post-traumatic stress during major social unrest in Hong Kong: a 10-year prospective cohort study. Lancet 395 (10220), 273–284. https://doi.org/10.1016/S0140-6736(19)33160-5.

Nienhuis, C.P., Lesser, I.A., 2020. The impact of COVID-19 on women’s physical activity behavior and mental well-being. Int. J. Environ. Res. Public Health 17 (23). https://doi.org/10.3390/ijerph171239036.

Pearlin, L.I., Aneshensel, C.S., LeBlanc, A.J., 1997. The forms and mechanisms of stress in the traumas of recurrent conflict and the cumulative sense of injustice in Timor-Leste. Soc. Psychiatry Psychiatr. Epidemiol. 52 (10), 1281–1294. https://doi.org/10.1007/s00127-017-1428-3.

Stensvågen, M.T., Bronken, B.A., Lien, L., Larsson, G., 2020. Interrelationship of posttraumatic stress, hassles, uplifts, and coping in women with a history of severe sexual abuse: a cross-sectional study. J. Interpers. Violence. https://doi.org/10.1177/0886263420935479.

Tolin, D.F., Foa, E.B., 2006. Sex differences in trauma and posttraumatic stress disorder: a quantitative review of 25 years of research. Psychol. Bull. 132 (6), 959–992. https://doi.org/10.1037/0033-2909.132.6.959.

Walters, J.T.R., Bisson, J.I., Shepherd, J.P., 2007. Predicting post-traumatic stress disorder: validation of the trauma screening questionnaire in victims of assault. Psychol. Med. 37 (1), 143–150. https://doi.org/10.1017/S0033291706085658.

Wang, Y., Di, Y., Ye, J., Wei, W., 2021. Study on the public psychological states and its related factors during the outbreak of coronavirus disease 2019 (COVID-19) in some regions of China. Psychiatr. Health Med. 26 (1), 13–22. https://doi.org/10.1080/13548680.2020.1746817.

Wong, S.M.Y., Hui, C.L.M., Wong, C.S.M., Suen, Y.N., Chan, S.K.W., Lee, E.H.M., Chang, W.C., Chen, Y.H., 2021. Mental health risks after repeated exposure to multiple stressful events during ongoing social unrest and pandemic in Hong Kong: the role of rumination. Can. J. Psychiatry 66 (6), 577–585. https://doi.org/10.1177/0706743720979220.

Wu, K.K., Leung, P.W.L., Wong, C.S.M., Yu, P.M.W., Luk, B.T.C., Cheng, J.P.K., Wong, R.M.F., Wong, P.P.S., Lui, J.C.C., Ngan, J.C.F., Leung, F.L.T., Lam, I.C.W., 2019. The Hong Kong survey on the epidemiology of trauma exposure and posttraumatic stress disorder. J. Trauma. Stress 32 (5), 664–676. https://doi.org/10.1002/jts.22430.

Xiong, J., Lipsitz, O., Nazri, F., Lui, I.M.W., Gill, H., Phan, L., Chen-Li, D., Iacobucci, M., Ho, R., Majeed, A., McIntyre, R.S., 2020. Impact of COVID-19 pandemic on mental health in the general population: a systematic review. J. Affect. Disord. 277, 55–67. https://doi.org/10.1016/j.jad.2020.08.001.

Zhao, Y., Chan, W., Lo, B.C.Y., 2017. Comparing five depression measures in depressed Chinese patients using item response theory: an examination of item properties, measurement precision and score comparability. Health Qual. Life Outcomes 15 (1), 236. https://doi.org/10.1186/s12955-016-0631-y.