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Mental Health During and After Protests, Riots and Revolutions: A Systematic Review

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ABSTRACT

Objectives

Protests, riots and revolutions have long been a part of human history and are increasing globally, yet their impact on mental health remains largely unknown. We therefore systematically reviewed studies on collective actions and mental health.

Method

We searched PubMed, Web of Science, PsycINFO, and CINAHL Plus for published studies from their inception until January 1st, 2018. Study quality was rated using the Newcastle-Ottawa Scale.

Results

We identified 52 studies (n=57,487 participants) from 20 countries/regions. The prevalence of post-traumatic stress disorder (PTSD) ranged from 4% to 41% in riot-affected areas. Following a major protest, the prevalence of probable major depression increased by 7%, regardless of personal involvement in the protests, suggestive of community spillover effects. Risk factors for poorer mental health included female sex, lower socioeconomic status, exposure to violence, interpersonal conflicts, frequent social media use and lower resilience and social support. Nevertheless, two studies suggested that collective actions may reduce depression and suicide, possibly due to a collective cathartic experience and greater social cohesion within subpopulations.

Conclusion

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We present the first systematic review of collective actions and mental health, showing compelling evidence that protests even when nonviolent can be associated with adverse mental health outcomes. Health care professionals therefore need to be vigilant to the mental and psychological sequelae of protests, riots and revolutions. Further research on this emerging sociopolitical determinant of mental health is warranted.

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BACKGROUND

In the past few decades, collective actions such as protests, riots, and revolutions (Tarrow, 2011) have taken place in over 180 countries, accounting for 99% of the world's population (Banks and Wilson, 2017) (Figure 1). They continue to increase globally (Ortiz et al., 2013, Stephan and Chenoweth, 2008), yet the mental health consequences of collective actions remain largely unknown. By contrast, the mental health impact of other large-scale population events such as natural disasters, human-made disasters, terrorist attacks and armed conflicts have been much better documented (Galea et al., 2005, Galea and Maxwell, 2009, North and Pfefferbaum, 2002, Goldmann and Galea, 2014, Norris et al., 2002a, North, 2014, Perlman et al., 2011, Charlson et al., 2019). These studies indicate significant levels of both psychopathology and resiliency in the face of mass community trauma, but the relevance of collective actions to health care professionals remains unclear. As the nature of collective actions differs from other major population events, a separate field of inquiry is needed. We therefore systematically reviewed studies on collective actions and mental health around the world.

METHODS

Search strategy and selection criteria

We pre-specified our methods in a study protocol registered in PROSPERO (PROSPERO 2015:CRD42015029732), and followed the Preferred Reporting Items for a Systematic Review and Meta-analysis (PRISMA) guidelines (Liberati et al., 2009). We included

studies reported in English and published in peer-reviewed journals. Studies of all designs, qualitative and quantitative, cross-sectional and longitudinal, were included.

The inclusion criterion for the outcome was that the study measured mental health, either by reporting psychiatric diagnoses, admissions, prescriptions, symptoms, or distress of individuals who were directly or indirectly influenced by an identified collective action. We excluded studies based on labour disputes as these aimed to change the distribution of resources or roles within an organisation. Incidents that involved prolonged, paramilitary conflicts organized by states or state-like actors were also excluded.

PubMed, Web of Science, PsycINFO, and CINAHL Plus were searched for studies published from the inception of each database until January 1st, 2018. Reference lists of retrieved articles were reviewed to identify additional studies. Terms that capture diverse types of collective action, such as “protest”, “civil disorders”, “demonstration”, “revolution”, or “campaign” were searched, along with social movements employing collective actions as a tool, using “social movement”, “political movement”, and “socio-political movement.” These were used in combination with terms such as “mental health”, “mental disorders”, “behavioral symptoms” and “psychological” to identify potential articles addressing collective action and mental health outcomes. An example of the detailed search strategy is presented in Table 1.

Once studies were retrieved, two authors independently screened the articles to be included and any disagreement was resolved by consensus. Titles were examined in the

first round, and abstracts in the second round of screening to determine whether the articles met the inclusion criteria. After the first two rounds of screening, full texts of articles were carefully assessed, and those that met the exclusion criteria were removed.

Two authors constructed a data extraction form, and the first and second author independently completed the form for all included studies. For each article, location, date and duration, and type of the collective action, level of violence (death, looting, arson, gun and tear gas use), study design, study population, sampling methods, sample size, analytic methods, exposure and outcome measurement, social support, media exposure, resilience, and funding information were extracted.

Evidence grading

Three authors independently rated the methodological quality of all included studies using the Newcastle-Ottawa Scale (NOS), which is recommended by the Cochrane collaboration for the appraisal of non-randomised studies (Higgins and Green, 2012a). The NOS was modified for the quality assessment of cross-sectional studies with reference to previous adaptations (Anglin et al., 2013, Patra et al., 2015).

Synthesis of results

Findings were summarised by mental health outcomes. In accordance with recommendations for systematic reviews, we focused first on findings from longitudinal studies and when none were available then cross-sectional studies with high NOS scores were reviewed (JAMA, 2018). When assessing the prevalence of mental health

outcomes, we prioritised findings based on random samples drawn from the general population.

RESULTS

Description of studies

The initial search yielded 18,181 articles. After applying the inclusion and exclusion criteria and searching the reference lists of included studies, we identified a total of 52 studies (Figure 2). These included six longitudinal, eight time series, three serial cross-sectional, 22 cross-sectional, eight case series, and five qualitative studies, involving a total of 57,487 participants (excluding time series and qualitative studies that did not specify sample size). In total, our review identified reports from 20 countries/regions, including the US (16 studies), Hong Kong SAR (six), India (five), Northern Ireland (five studies), Egypt (three), Czechoslovakia (two), Tunisia (two), and one each from Chile, China, Georgia, Iran, Israel, Italy, Kenya, Malaysia, Nigeria, Romania, South Africa, Turkey, and the United Kingdom (Figure 1). The Spearman correlation coefficients between the number of collective actions and the number of published studies from 1967 to 2017 were 0.40 ($p<0.001$) by region and 0.75 ($p=0.08$) by continent (Figure 1). Half of the studies covered riots, 14 were on protests, and nine studied revolutions. The collective actions ranged in time from the 1965 Watts riots to the 2015 Baltimore Protests. Tables 1-2 and Tables S1-S4 summarise the study designs and main findings from five decades of research.

Sample characteristics

Thirteen studies used random samples, some drawn from the general population (Hou et al., 2015, Lau et al., 2016, Lau et al., 2017, Ni et al., 2016, Ni et al., 2017), others by sex (Kubicka et al., 1998, Kubicka et al., 1995), from health facilities (Bamrah et al., 2013), schools (Castillo-Carniglia et al., 2017), or affected communities (Greenley et al., 1975, Hanson et al., 1995, Obilom and Thacher, 2008, Sasao and Chun, 1994). Sample sizes ranged from 5 to 37,319 (median 343). The majority of studies (n=36) were conducted after the collective action, while seven started before the collective action (Brown et al., 1994, Fraser, 1971, Garbarino et al., 2012, Klee and Gorwitz, 1970, Lyons, 1972, Kubicka et al., 1998, Kubicka et al., 1995), and six studies included assessments before, during, and after the collective action (Castillo-Carniglia et al., 2017, Fishbain et al., 1991, Greenley et al., 1975, Ni et al., 2017, Ni et al., 2016, Yimgang et al., 2017).

Assessment of mental health outcomes

Depressive sequelae were the most frequently assessed outcome, recorded in a third (n=18) of all studies, followed by post-traumatic stress disorder (PTSD) (n=11) and anxiety disorder/anxiety symptoms (n=11). Other outcomes included psychiatric admissions and prescriptions, psychological distress, substance abuse, and suicide (Table 1).

Depressive sequelae

Prevalence

Five studies (Hou et al., 2015, Lau et al., 2017, Lau et al., 2016, Ni et al., 2017, Ni et al., 2016) used probability samples in the general population to assess the prevalence of depression following a collective action. However, all of these studies focused on Hong

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Kong's 2014 Occupy Central/Umbrella Movement. Using pre-event data from a population-representative cohort, the prevalence of probable major depression was 1.5% before the Occupy Central/Umbrella Movement. Following the Movement, the prevalence increased to 6.7% (first month), 6.3% (second month), 6.8% (third month) and 8.5% (sixth month) (Ni et al., 2016). Based on the same cohort, four depression trajectories were identified before, during and one year after the Occupy Central/Umbrella Movement: "resistant" (22.6% of sample), "resilient" (37.0%), "mild depressive symptoms" (32.5%), and "persistent moderate depression" (8.0%) (Ni et al., 2017). These findings contrast studies from Northern Ireland. Findings based on three districts with varying degrees of exposure to the 1969 Northern Ireland riots found no differences in anti-depressant prescriptions (Fraser, 1971), and indeed a decline in health care utilisation for depression (Lyons, 1972).

Correlates of depressive sequelae

The negative impact of exposure to collective action appears to vary with the level of violence. For collective actions associated with fatalities, proximity to violence was an important predictor for depression. During the 2011 Arab Spring, the prevalence of depression among children in schools closer to Tahrir Square (a focal point of the revolution) was 62% (Moussa et al., 2015). Living in riot-affected areas was also associated with depression risk (Coudreaut et al., 1995, Fraser, 1971, Tan and Simons, 1973, Yimgang et al., 2017). By contrast, participation in nonviolent collective actions was not associated with depressive sequelae (Ni et al., 2016, Lau et al., 2017). Case series have identified other risk factors for depression following collective actions, including media coverage, unemployment, and poor social cohesion (Tan and Simons,

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1973, Brown et al., 1994, Coudreaut et al., 1995). These have been corroborated by subsequent studies where exposure to collective actions via television (Lazarescu et al., 1993, Galovski et al., 2016) or social networking platforms (Ni et al., 2016, Lau et al., 2017, Lau et al., 2016) was associated with more depressive symptoms.

Socio-demographic factors such as female sex, lower socioeconomic status, and not having children were also associated with more depressive symptoms (Lau et al., 2017, Ni et al., 2017, Moussa et al., 2015). Other risk factors included poorer resilience, pre-existing health conditions, and the loss of personal and social resources (Hou et al., 2015, Ni et al., 2017, Brown et al., 1994). Lower baseline family support and family harmony were predictors of persistent depression following the Occupy Central/Umbrella Movement (Ni et al., 2017), while conflicts with family members (Lau et al., 2017, Ni et al., 2016) were also associated with more depressive symptoms. Qualitative studies have suggested that if the collective action is not able to achieve its aims, hopelessness could result in depression (Matthies-Boon, 2017).

Post-traumatic Stress Disorder

Prevalence

Four studies have assessed the prevalence of PTSD after collective actions (Galovski et al., 2016, Hanson et al., 1995, Obilom and Thacher, 2008, Wang et al., 2011). All the studies were cross-sectional, so the incidence and course of PTSD following collective actions remain unknown. The prevalence of PTSD drawn from probability samples ranged from 4.1% of residents after the 1992 Los Angeles riots (Hanson et al., 1995) to 41% of residents in Nigeria's riot-affected areas (Obilom and Thacher, 2008). Studies

have also examined the prevalence of PTSD among specific groups such as teachers (Stuber et al., 1997), children (Moussa et al., 2015, Kumar and Fonagy, 2013), patients (Ouanes et al., 2014, Coudreaut et al., 1995), medical and paramedical professionals (Ouanes et al., 2012), police officers (Harvey-Lintz and Tidwell, 1997), and victims of looting and arson (Kim-Goh et al., 1995). The prevalence of PTSD among these groups ranged from 6.7% in teachers (Stuber et al., 1997) to 75% in victims of looting and arson (Kim-Goh et al., 1995).

Correlates of PTSD

Exposure to violence was most consistently associated with increased risk of PTSD: direct victims of looting, arson, and physical injury demonstrated the highest levels (Kim-Goh et al., 1995, Obilom and Thacher, 2008, Unuvar et al., 2017). Witnessing a personal attack (Obilom and Thacher, 2008, Kumar and Fonagy, 2013), being in close proximity to violence (Moussa et al., 2015) and the level of media exposure (Galovski et al., 2016) were also associated with PTSD risk. Demographic characteristics such as female sex and lower socio-economic status were associated with increased risk of PTSD among school children (Moussa et al., 2015). In the context of racial (2014 Ferguson Protests in Missouri, US) or ethnoreligious riots (2002 Gujarat in India), social identity was associated with PTSD symptoms (Galovski et al., 2016, Patel and Nath, 2013).

Anxiety

Prevalence

Four studies assessed the prevalence of anxiety after a collective action in the general population (Hou and Bonanno, 2018, Hou et al., 2015, Lau et al., 2017, Lau et al., 2016), and seven in special groups (Bamrah et al., 2013, Dhavale et al., 2002, Garbarino et al., 2012, Lazarescu et al., 1993, Lyons, 1971, Moussa et al., 2015, Matthies-Boon, 2017). Two studies in the general population followed the 2014 Hong Kong Occupy Central/Umbrella Movement, although different anxiety scales were used. Immediately after the Movement, 10.5% of the general population had probable anxiety (General Anxiety Disorder scale) (Lau et al., 2017). In a separate study two months later, 47.4% were found to have moderate-to-severe anxiety (State-Trait Anxiety Inventory) (Hou et al., 2015). A time series analysis of patients in a psychiatric clinic showed an increase in anxiety symptoms after the 1989 Romanian Revolution (Lazarescu et al., 1993). Symptoms of anxiety were common among subgroups, including 69% of general practice patients during the 1969 Northern Ireland riots (Lyons, 1971), 55% of children in primary schools near protest sites (Moussa et al., 2015) and nearly half of selected young political activists after the 2011 Arab Spring in Egypt (Matthies-Boon, 2017). Anxiety symptoms were reported for 34% of children attending schools in riot-affected areas in Bombay, India (Dhavale et al., 2002), and in 37% of internally displaced people and 44% of HIV patients in health facilities after the 2007-08 Kenyan crisis (Bamrah et al., 2013).

Correlates of anxiety

As with depression, anxiety symptoms were correlated with younger age, female sex, lower socioeconomic status (Moussa et al., 2015), being single, and without children (Lau et al., 2017), personal and social resource loss (Hou et al., 2015), political

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uncertainty (Matthies-Boon, 2017), and exposure to media coverage (Lazarescu et al., 1993).

Other outcomes

Alcohol consumption increased among men and women after Czechoslovakia's 1989 Velvet Revolution, although this has been attributed to a loosening of political control over drinking rather than the revolution itself (Kubicka et al., 1998, Kubicka et al., 1995). A school-level aggregated panel design showed that changes in marijuana use following Chile's 2011 Occupy School movement were due to secular trends rather than the collective actions (Castillo-Carniglia et al., 2017). Findings related to reactive psychosis have been mixed. Reactive psychosis increased among patients during the 1989 Romanian Revolution (Lazarescu et al., 1993). In contrast, the 1969 Northern Ireland riots did not appear to impact reactive psychosis (Lyons, 1971) and was associated with fewer suicides (Lyons, 1972).

Appraisal of studies

Five of the six longitudinal studies received the maximum NOS score (Greenley et al., 1975, Kubicka et al., 1998, Kubicka et al., 1995, Ni et al., 2017, Ni et al., 2016); all six were assessed to be of "good quality" (cutoff: NOS score of ≥7 out of maximum 9) (McPheeters et al., 2012, Patra et al., 2015) (Table S5). O 22 cross-sectional and serial cross-sectional studies, five received the maximum score of 6 (Hanson et al., 1995, Hou et al., 2015, Lau et al., 2017, Sasao and Chun, 1994, Castillo-Carniglia et al., 2017) and three had a NOS score of 5 (Galovski et al., 2016, Moussa et al., 2015, Obilom and

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Thacher, 2008) (Table S6). Studies with lower scores generally did not control for confounders such as socio-demographics.

DISCUSSION

To our knowledge, this is the first systematic review of collective actions and mental health. Depression and PTSD are the two most commonly studied mental health outcomes for collective actions, disasters and armed conflicts (Goldmann and Galea, 2014, Charlson et al., 2019). Notably, the prevalence of depression and PTSD following collective actions both in the general population and among victims of violence appear comparable to those experiencing natural disasters, terrorist attacks and armed conflicts (Ni et al., 2017, Ni et al., 2016, Hou et al., 2015, Goldmann and Galea, 2014, Hanson et al., 1995, Obilom and Thacher, 2008, Kim-Goh et al., 1995, Charlson et al., 2019). Risk factors for psychopathology following collective actions individual characteristics (e.g. female sex, low socio-economic status, psychological resilience, health status, social support), the nature of the event itself (e.g. exposure to violence, media coverage, level of engagement), and post-event circumstances (e.g. loss of personal and social resources, unemployment) (Kumar and Fonagy, 2013, Norris et al., 2002b, Norris et al., 2002a, Goldmann and Galea, 2014, North and Pfefferbaum, 2013, Lau et al., 2017, Ni et al., 2017, Ni et al., 2016, Moussa et al., 2015, Hanson et al., 1995).

There is some evidence that collective actions may also be associated with better mental health (n= 2; 4% of all studies) such as reduced depression and suicides (Greenley et al., 1975, Lyons, 1972). This finding may be explained by collective actions serving as a cathartic experience when people collectively express grievances (Curran,

1988). Further, greater social cohesion among subpopulations, either supporting or opposing the cause of the collective action, could strengthen social ties, which in turn could buffer the adverse impact of the stressful environment (Kawachi and Berkman, 2001, Lyons, 1973, Curran, 1988).

For natural disasters and terrorist attacks, the threat of harm or death is a key mediator of mental health consequences (Goldmann and Galea, 2014). Yet collective actions can still exact a substantial, pervasive and persistent toll on mental health even in the absence of large-scale violence such as fatalities, looting or arson, (Ni et al., 2017, Ni et al., 2016, Hou et al., 2015). Nonviolent collective actions must therefore influence health via alternative mechanisms. Stressors and stress appraisal processes are potential explanation for the mental health impact of protests (Ni et al., 2017). Stressors are operationalised as environmental demands that challenge a person's adaptive capacity, while stress reactivity refers to a greater risk of mental disorder following stress exposure (Hammen, 2015, Porta, 2014). The importance of stress reactivity in the development of psychiatric disorders has been recognised by its inclusion as the first domain of the Research Domain Criteria matrix (Insel et al., 2010). Thus, risk factors for mental health disorders following collective actions could be interpreted as the product of exposure and the person's stress reactivity (Hammen, 2005, Ni et al., 2017). Collective actions can generate stressors via interpersonal conflicts and the disruption of health services (Yimgang et al., 2017, Ni et al., 2016). Social media may also act as a stressor due to interactions with other online users holding different ideological views (American Psychological Association, 2016, Bakshy et al., 2015). This could account for

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the association of social media use (Ni et al., 2016) and 'unfriending' (Lau et al., 2016) with depressive sequelae in the 2014 Occupy Central/Umbrella Movement. Protective factors may operate via stress appraisal processes, where higher baseline resilience (a measure of ability to cope with stressors) was associated with fewer depressive sequelae (Ni et al., 2017). Similarly, the protective role of social support might be explained by the stress buffering function of social ties (Goldmann and Galea, 2014, Kawachi and Berkman, 2001).

Limitations

This review is subject to several limitations. First, all identified studies were observational, so causality between the collective action and mental health outcomes cannot be directly inferred (Amenta et al., 2010, Giugni, 1998). It is difficult to ascertain whether changes in mental health were due to the circumstances that led to the collective action or to the collective action itself. Nevertheless, we have highlighted encouraging examples of longitudinal studies with before, during, and after data for collective actions (Castillo-Carniglia et al., 2017, Fishbain et al., 1991, Greenley et al., 1975, Ni et al., 2017, Ni et al., 2016, Yimgang et al., 2017), which represent an advance from the preponderance of cross-sectional studies mostly conducted after the event in the literature thus far. Second, collective actions are disparate and our review may have omitted relevant studies. However, we used a combination of terms to identify different types of collective actions and accessed multiple bibliographic databases to broaden our search strategy. Third, there could also be publication bias as the majority of published studies were on riots and revolutions (Earl et al., 2004). As riots and revolutions

commonly involve violence and deaths, they are more likely to reveal significant associations with adverse mental health. Fuller reporting of studies that find null or positive associations is needed, as well as research on nonviolent forms of collective actions given emerging evidence that they can also influence mental health (Hou et al., 2015, Lau et al., 2017, Lau et al., 2016, Ni et al., 2017, Ni et al., 2016). Fourth, comparisons between studies are limited by the heterogeneity of collective actions and the samples, a limitation that also applies to the disaster literature (Nandi et al., 2009). Due to the heterogeneity of the identified studies, a meta-analysis is not appropriate (Page et al., 2016, Higgins and Green, 2012b). Fifth, this heterogeneity and the limited numbers of studies reduces the generalisability of our findings. This could be addressed by developing a standardised exposure assessment for collective actions, analogous to the Traumatic Exposure Severity Scale for disaster-related trauma (Elal and Slade, 2005). Sixth, the studies employed different measures of mental health, which made cross-study comparisons difficult. Future studies should assess mental health using diagnostic interviews or validated standardised scales (Galea and Maxwell, 2009). Lastly, while the Cochrane collaboration recommends the NOS for the quality assessment of non-randomised studies (Higgins and Green, 2012a), the NOS was designed for cohort and case-control studies only. Nevertheless, the NOS has been modified with reference to previous reviews for the appraisal of cross-sectional studies (Anglin et al., 2013, Patra et al., 2015).

Implications for future research

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Despite the extensive history and prevalence of collective actions around the world, our systematic review only identified 52 relevant studies of mental health outcomes (Figure 1). By comparison, there are more than 280 studies of PTSD following disasters (Nandi et al., 2009), 129 on conflicts (Charlson et al., 2019), and more than 150 studies have been conducted on the mental health consequences of the September 11th terrorist attacks (Perlman et al., 2011). The sparse documentation on collective actions has been attributed to their rapidly evolving and sporadic nature (Slone, 2003). Yet these methodological challenges also apply to disasters and armed conflicts (Galea and Maxwell, 2009).

As the majority of the population is resilient to a traumatic event, it would be more informative to examine trajectories of mental health rather than the population average (Bonanno et al., 2011). Longitudinal studies show that individuals exhibit remarkable resiliency following collective actions or disasters (Ni et al., 2017, Norris et al., 2009). We identify a lack of studies that assess potential mechanisms using theoretical frameworks relevant to mental health outcomes. One relevant framework is the social support deterioration model, which posits that declines in perceived social support after a population event mediate the immediate and delayed psychopathology (Kaniasty and Norris, 1993). The social support deterioration model is most applicable to human-induced events and thus could be relevant to collective actions (Kaniasty and H. Norris, 2009, Rochford and Blocker, 1991). Indeed, collective actions have the potential to exacerbate ideological divisions (Ni et al., 2016, Fraser, 1971) where disputes with family members over politics, rather than actual participation in protests, were associated with depressive sequelae during the 2014 Occupy Central/Umbrella

Movement (Lau et al., 2017, Ni et al., 2016). In order to test the social support deterioration model, future studies should document social dynamics, together with other potential mediators, before, during and after an event as this could be as important in the long-term course of mental health as the event itself (Ni et al., 2017, Ajdukovic, 2004). Emerging methods could also be incorporated, for example biological markers of stress (Hoyt et al., 2018), harnessing the social media as a form of mental health surveillance (Gruebner et al., 2016), and applying time-varying analytic approaches to disentangle underlying mechanisms (Galea and Maxwell, 2009, Slone et al., 2000).

None of the studies identified examined interventions to improve mental health following a collective action. Future research on interventions targeting risk factors for psychopathology and enhancing resilience is warranted. Psychological first aid, cognitive-behavioral therapy (CBT), and exposure-based therapy have been recommended in the disaster setting (Neria et al., 2009, North and Pfefferbaum, 2013). Interpersonal psychotherapy may also be promising since it could specifically address the social disruptions that are frequently observed in collective actions (Markowitz and Weissman, 2004, Ni et al., 2017, Ni et al., 2016).

CONCLUSION

Our review shows that the mental health outcomes following collective actions can be comparable to natural disasters, terrorist attacks or armed conflicts (Ni et al., 2016, Ni et al., 2017, Hou et al., 2015, Goldmann and Galea, 2014, Hanson et al., 1995, Kim-Goh et al., 1995, Obilom and Thacher, 2008, Charlson et al., 2019). Health care professionals

therefore need to be vigilant to both the short- and medium-term psychiatric sequelae of collective actions. They should be particularly aware of potential community spillover effects, where even those who did not take part in the collective action can experience psychiatric sequelae (Ni et al., 2016, Galovski et al., 2016, Lau et al., 2017, Lazarescu et al., 1993). The Constitution of the World Health Organization states that "health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition" (World Health Organization, 1995). This underlines the importance for all sides to find a peaceful resolution. On the other hand, studies have also suggested positive mental health influences of collective actions (Greenley et al., 1975, Lyons, 1972). Given the extensive research on disasters and conflicts, studies of collective actions may benefit from drawing upon the disaster- and conflict-related literatures, which have been summarised in classic reviews and texts (Goldmann and Galea, 2014, Galea et al., 2005, Norris et al., 2002b, Norris et al., 2002a, North and Pfefferbaum, 2002, Charlson et al., 2019). However, given the qualitative differences between collective actions, disasters and armed conflicts, tailored studies for collective actions are needed. Despite the increase in collective actions globally and their documented mental health consequences (Ortiz et al., 2013), collective actions have often been overlooked as a sociopolitical determinant of mental health. The literature has just begun to assess the mental health impact of collective actions and the underlying mechanisms. Research in this emerging field of inquiry would therefore be timely.

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FIGURES

Figure 1. Number of collective actions from 1967 to 2017 (upper panel), number of published studies of collective actions and mental health from 1967 to 2017 (lower panel) and correlation of number of collective actions by region/continent with the number of published studies (right panels). Data source for the number of collective actions: Banks AS, Wilson KA, 2017. Cross-National Time-Series Data Archive. Databanks International. Jerusalem, Israel.

Figure 2. PRISMA flow diagram for studies on collective actions and mental health

TABLES

Table 1. Electronic search strategy for PubMed

Table 2. Published studies on collective actions and mental health

Table 3. Longitudinal studies on collective actions and mental health

SUPPLEMENTARY MATERIAL

Table S1. Main findings of time series studies on collective actions and mental health.

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Table S2. Main findings of serial cross-sectional and cross-sectional studies on collective actions and mental health.

Table S3. Main findings of case series on collective actions and mental health.

Table S4. Main findings of qualitative studies on collective actions and mental health.

Table S5. Newcastle-Ottawa Scale (NOS) scores for longitudinal studies

Table S6. Newcastle-Ottawa Scale (NOS) scores for serial cross-sectional and cross-sectional studies

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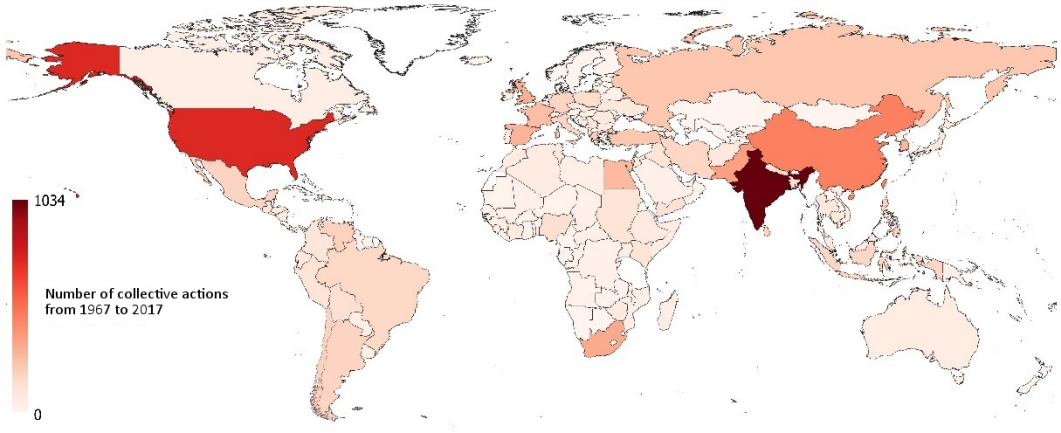
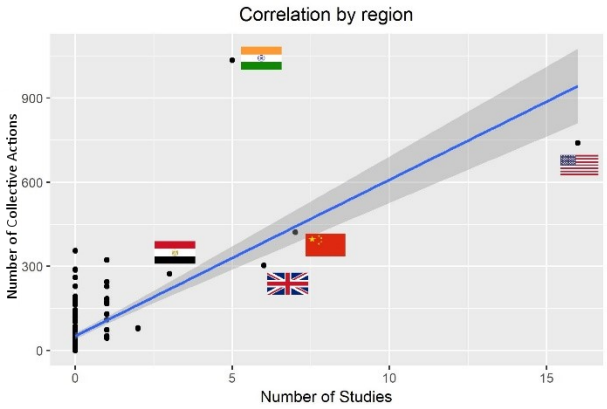
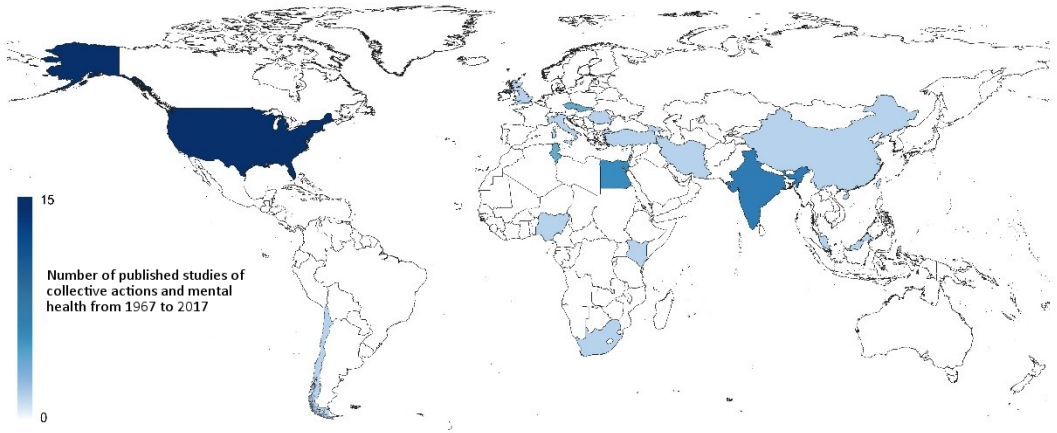
Figure 1. Number of collective actions from 1967 to 2017 (upper panel), number of published studies of collective actions and mental health from 1967 to 2017 (lower panel) and correlation between the number of collective actions with the number of published studies (right panels). Data source for the number of collective actions: Banks AS, Wilson KA 2017. Cross-National Time-Series Data Archive. Databanks International. Jerusalem, Israel.







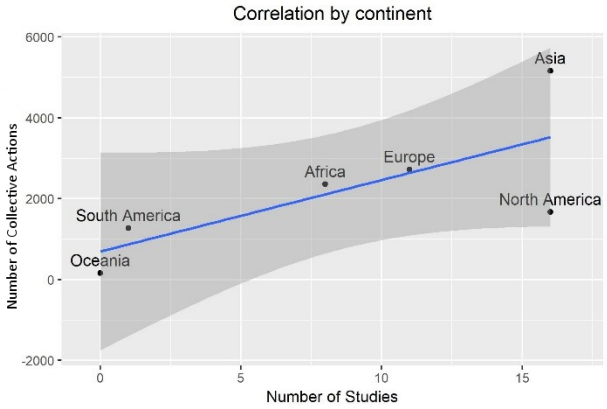


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Figure 2. PRISMA flow diagram for studies on collective actions and mental health

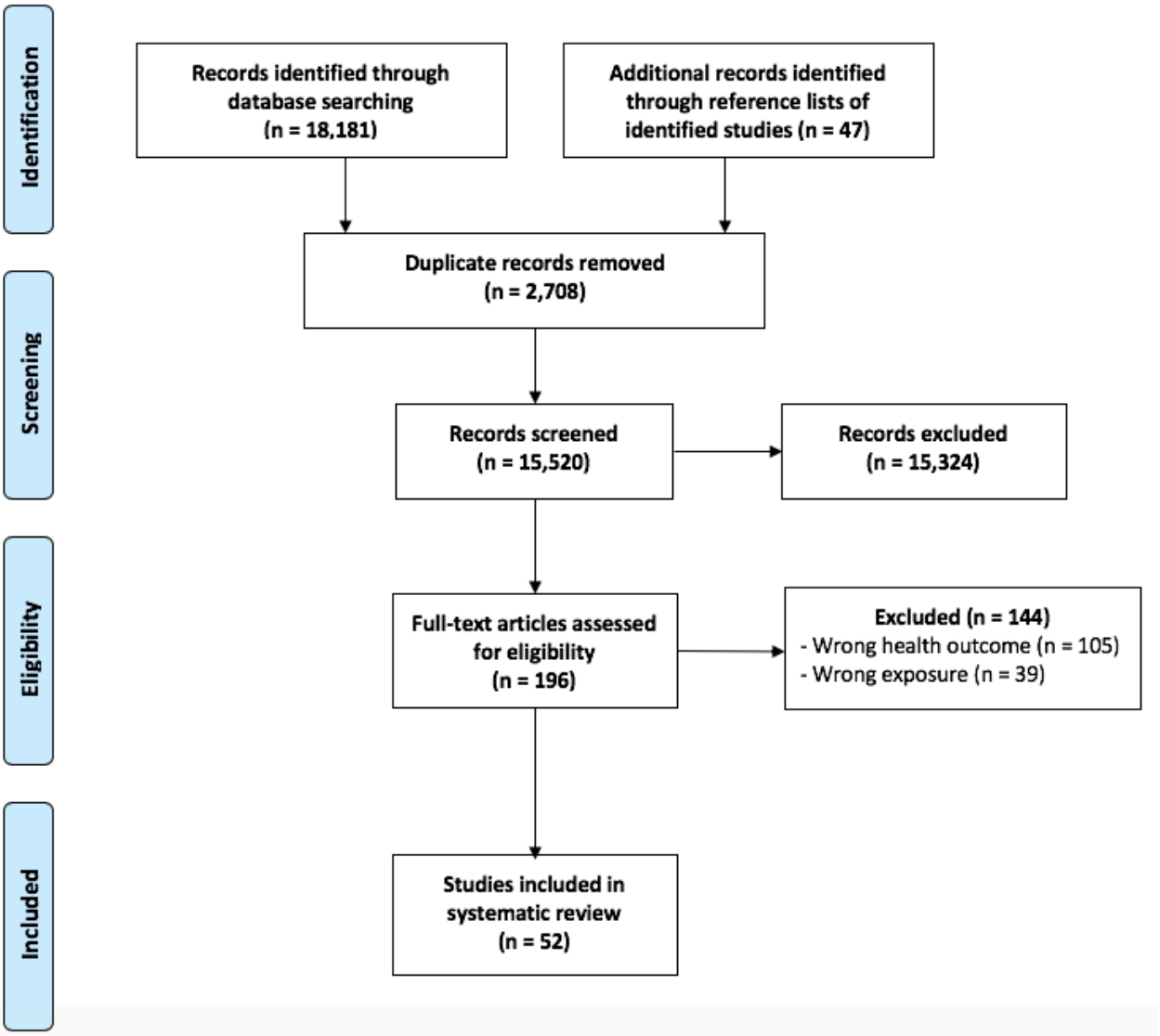

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Table 1. Electronic search strategy for PubMed

Database	Search	Filters/Limits
PubMed	**("protest"[All Fields] OR "revolution"[All Fields] OR "Civil Disorders"[Mesh*] OR "civil disobedience"[All Fields] OR "demonstration"[All Fields]) OR "social movement"[All Fields] OR "political movement"[All Fields] OR "campaign"[All Fields] AND ("Mental Health"[Mesh] OR "Mental Disorders"[Mesh] OR "Behavioral Symptoms"[Mesh] OR psychological[All Fields])**	Humans English

* Mesh = Medical Subject Headings
The full search strategy for each database and the search results are available from the authors.

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Table 2. Published studies on collective actions and mental health

	Number of studies (%)
Study design	
Longitudinal	6 (12%)
Time series	8 (15%)
Serial Cross-sectional	3 (6%)
Cross-sectional	22 (42%)
Case series	8 (15%)
Qualitative	5 (10%)
Study population	
General population	6 (12%)
Residents of affected areas	8 (15%)
Children	9 (17%)
Patients	17 (33%)
Demographic group (e.g. ethnicity)	7 (13%)
Occupational groups (e.g. police)	5 (10%)
Sample size*	
1-499	26 (50%)
500-999	10 (25%)
1000-1999	7 (18%)
≥ 2000	1 (3%)
Outcome†	
Depression	18 (35%)
Post-traumatic stress disorder	11 (21%)
Anxiety	11 (21%)
Psychological distress	6 (12%)
Substance abuse	6 (12%)
Psychiatric admissions and prescriptions	5 (10%)
General psychiatric diagnosis	5 (10%)
Suicide	5 (10%)

* Time series studies and qualitative studies which do not specify the sample size have been excluded
† The number of studies is greater than 52 as some studies examined more than one outcome

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Table 3. Longitudinal studies on collective actions and mental health

Study	Collective action (duration)	Study population (sample size)	Exposure	Outcome	Main findings
Greenley, Arch Gen Psychiatry 1975	1967 New Haven riots (8 days)	Residents of suburban and urban areas (n=938)	Before, during, and after the riot	Psychological distress	Psychological impairment decreased by 9·7% and 6·7% among suburban men and women, respectively.
Kubicka, Addiction 1995	1989 Velvet Revolution (45 days)	Young and middle-aged women (n=608)	Before and after the revolution	Alcohol use	Mean annual alcohol consumption increased from before (3·6 litres) to after the revolution (4·8 litres). The rise in alcohol consumption has been suggested to be due to an expansion of social contacts.
Kubicka, Addiction 1998	1989 Velvet Revolution (45 days)	Young men (n=586)	Before and after the revolution	Alcohol use	The price of alcohol increased and mean annual alcohol consumption decreased by 26% before the revolution. Following the revolution, political control over drinking was abolished and alcohol consumption increased by 16%.
Ni, Am J Epidemiol 2016	2014 Occupy Central/ Umbrella Movement (79 days)	General adult population (n=909)	Protest participation; media exposure; social support	Probable major depression; depressive symptoms	The absolute prevalence of probable major depression increased by 7%, regardless of personal involvement in the protests. Depressive symptoms were associated with exposure to the protest via online/social media, frequent Facebook use and intra-familial socio-political conflicts.
Ni, Am J Public Health 2017	2014 Occupy Central/ Umbrella Movement (79 days)	General adult population (n=1170)	Protest participation; social support; resilience	Probable major depression; depressive symptoms	Four depression trajectories were identified: “resistant” (22·6% of sample), “resilient” (37·0%), “mild depressive symptoms” (32·5%), and “persistent moderate depression” (8·0%). Baseline predictors that appeared to protect against persistent depression included higher household income, resilience, family support, and self-rated health.
Hou, J Couns Psychol 2018	2014 Occupy Central/ Umbrella Movement (79 days)	General adult population (n=108)	During and after the protests	Emotional reactivity; psychological distress	Lower positive emotional reactivity and higher negative emotional reactivity for positive events was detected during the protests.

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Supplementary Appendix

Content

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Studies included in supplementary tables but not cited in the main text

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Table S1. Main findings of time series studies on collective actions and mental health

Study	Collective action (duration)	Study population (sample size)	Exposure	Outcome	Main findings
Fishbain, J Nerv Ment Dis 1991	1980 Liberty City Miami riot (3 days)	Attendees of psychiatric emergency service	Before, during and after the riot	Health care utilisation	The riot did not increase utilisation of psychiatric emergency services.
Fraser, Br J Psychiatry 1971	1969 Northern Ireland riots (6 days)	3 areas in Belfast	Living in areas with different degrees of disturbance	Health care utilisation; psychiatric prescriptions	No changes in psychiatric admissions or antidepressant prescriptions from areas directly exposed to riot conditions. During the riot months, there was an increase in prescriptions for tranquilizers in riot-affected areas.
King, Psychol Med 1982	1969 Northern Ireland riots (6 days)	General practices in Northern Ireland	After the riot	Psychiatric prescriptions	Tranquilizer prescriptions over 1966-1976 increased threefold, which was more rapid compared to other European countries.
Klee, Ment Hyg 1970	1968 Baltimore Riots (4 days)	State-operated psychiatric hospitals	-	Health care utilisation	Admissions during the two-week period before and after the riots did not differ from the preceding year.
Lazarescu, Eur J Psychiatry 1993	1989 Romanian Revolution (22 days)	Psychiatric outpatients	Direct and indirect exposure to revolution	Psychiatric diagnosis	An increase in reactive psychosis was detected.
Lester, Psychol Rep 1997	1960-1992 Race riots	African Americans	Number of riots	Suicide	No association between riots and suicides among African Americans
Lyons, BMJ 1972	1969 Northern Ireland riots (6 days)	3 districts exposed to riots; 1 rural county as control	Living in riot affected areas	Depression; suicide; homicide	There was a decrease in depression in both sex. Suicide rate declined by almost 50%, but there was an increase in homicides and violent crimes.
O'Malley, Ir Med J 1972	1969 Northern Ireland riots (6 days)	Patients referred to psychiatric department	Proximity to the riots	Attempted suicide	An increase in attempted suicides was detected.

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Table S2. Main findings of serial cross-sectional and cross-sectional studies on collective actions and mental health

Study	Collective action (duration)	Study population (sample size)	Exposure	Outcome	Main findings
Serial cross-sectional					
Brown, J Psychoactive Drugs 1994	1992 Los Angeles riots (6 days)	Women at high risk for HIV infection (n=556)	Living in riot-affected areas; social support	Depression; substance abuse	Depression and substance abuse levels among participants did not change before and after the riots. Social support was lower after the riots.
Castillo-Carniglia, Drug Alcohol Depend 2017	2011 Chilean school strikes	High school students (n=37,319)	School occupied for at least 1 day	Substance use	After controlling for secular trends, there was no change in alcohol and marijuana use among adolescents following school strikes.
Yimgang, Am J Public Health 2017	2015 Baltimore Protests (16 days)	Mothers of toddlers who sought care at the emergency department (n=1095)	Proximity to civil unrest; food and housing insecurity	Depressive symptoms	The prevalence of maternal depressed symptoms increased in proximal neighbourhoods to the unrest but not in the distal neighbourhoods. Depressive symptoms returned to baseline after five months.
Cross-sectional					
Bamrah, Prehosp Disaster Med 2013	2007-2008 Kenyan crisis (63 days)	Patients receiving anti-retroviral treatment; internally displaced population (n=1630)	Witnessed or experienced violence to self or family; health status	Depressive symptoms; anxiety symptoms	Among internally displaced persons, 29 to 39% had depressive symptoms and 31 to 37% had anxiety symptoms. Among patients with HIV, 27 to 42% had depressive symptoms and 24 to 44% had anxiety symptoms. Depressive and anxiety symptoms were associated with exposures to violence, but not with health status.
Ben Khelil, Int J Public Health 2016	2010 Tunisian Revolution (27 days)	Forensic autopsies (n=1413)	Media exposure	Suicide; homicide	Suicides became more public and self-immolation cases tripled after the revolution. Among suicide victims, 9% had a history of suicide attempt before the revolution and schizophrenia was the most common mental disorder (40%).
Bhat, Int J Soc Psychiatry 1984	1981 Brixton riot (3 days)	Medical and para-medical staff in three psychiatric hospitals (n=620)	Living and working in riot-affected areas	Emotional reactions	No significant emotional reactions to the riots were detected.
Dhavale, Indian J Soc Work 2002	1992-1993 Bombay riots (51 days)	Students from two municipal schools in riot affected area (n=495)	Exposure to rioting	Anxiety symptoms; fear	Most common symptoms included somatic symptoms (40.2%), sleep disturbances (62.6%), anxiety symptoms (33.5%), and fear of playing with other children (64.2%).

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Galovski, J Trauma Stress 2016	2014 Ferguson Protests (16 days)	Community members and law enforcement in proximity to Ferguson, Missouri (n=565)	Direct exposure; media exposure; connectedness; life interruption; racial identity	PTSD; depression	34% and 43% of the community sample were shown to have PTSD and depression, respectively. Proximity to violence was associated with mental health outcomes. Black members reported more PTSD and depressive symptoms than law enforcement and white members.
Garbarino, J Police Crim Psychol 2012	2001 Genoa G8 Summit Protest (2 days)	Police officers in crowd control unit (n=290)	Assigned to crowd control on days of riot; resilience	Anxiety; depression; mood	Officers were found to be more emotionally stable than the general male population.
Hanson, J Consult Clin Psychol 1995	1992 Los Angeles riots (6 days)	Residents in LA at the time of riot (n=1200)	Exposure to disturbance (e.g. family/personal safety)	PTSD	Prevalence of PTSD was 4.1%; disturbance-related experiences were associated with PTSD.
Harvey-Lintz, Soc Sci J 1997	1992 Los Angeles riots (6 days)	Police officers (n=141)	Officers assigned to the riot area on the days of the riot; observations of violence; social support	PTSD	17% of officers experienced stress symptomatology; officers experiencing stress symptomatology endorsed items that indicated limiting of friendships, social engagements, and expression of emotions and feelings.
Hou, J Affect Disord 2015	2014 Occupy Central/Umbrella Movement (79 days)	General adult population (n=1208)	Loss of personal and social resources; social support	Depressive symptoms; anxiety	47% reported moderate to severe levels of anxiety symptoms; 14% reported probable depression; personal and social resource loss was associated with anxiety and depressive symptoms.
Kim-Goh, Am J Orthopsychiatry 1995	1992 Los Angeles riots (6 days)	Korean-American victims seeking assistance (n=202)	Experience with the riot (looting, arson, injury); financial loss	PTSD; psychological distress; alcohol use	The majority reported severe psychological distress and 75% of the victims experienced probable PTSD; a higher proportion of men reported increased use of tobacco and alcohol.
Kumar, J Trauma Stress 2013	2002 Gujarat riot (30 days)	Children (n=650)	Exposure to riots or an earthquake	PTSD	PTSD symptoms were detected in 27% and 25% of children exposed to riots or an earthquake, respectively.
Lau, Comput Human Behav 2016	2014 Occupy Central/Umbrella Movement (79 days)	General adult population (n=1208)	Social resource	Depressive symptoms; anxiety	Social resource loss on social media was associated with more depressive symptoms, but not anxiety symptoms.
Lau, Soc Pscyhiatry Psychiatr Epidemiol 2017	2014 Occupy Central/Umbrella Movement (79 days)	General adult population (n=344)	Participation in protest by self, family, and peers; media exposure; social support	Depressive symptoms; anxiety	3.2% had probable depression; 10.5% showed probable anxiety. Younger age, being single, without children, and emotional disturbance were associated with adverse mental health.

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Lavalekar, Psychol Stud 2006	2002 Gujarat riots (30 days)	School children in three cities (n=318)	Exposure to riots; media exposure	Social distance; cognitive tests	Children who were not directly affected also experienced disturbance, possibly due to media exposure.
Moussa, J Ment Health 2015	2011 Egyptian Revolution (15 days)	Children attending primary schools near Tahrir Square (n=515)	Proximity to Tahrir Square; media exposure	Depression; PTSD; anxiety	Children attending schools near Tahrir Square showed high rates of depression (62%) and PTSD (70%). Negative perception of the revolution, female sex, and lower socioeconomic class may be risk factors for developing psychiatric symptoms.
Obilom, J Interpers Violence 2008	2001 Ethnoreligious riot in Jos (6 days)	Residents of neighbourhoods with intense rioting (n=281)	Experienced or witnessed traumatic events	PTSD	41% had probable PTSD; victimisation and witnessing a personal attack were significantly associated with increased risk of PTSD.
Papanikolaou, Prehosp Disaster Med 2013	2011 Egyptian Revolution (15 days)	Patients with physical injury (n=240)	Injury; perceived support by the government for the respondent	Psychological symptoms	Patients with physical injury due to the Revolution reported more psychological symptoms than controls, who had unrelated physical injuries.
Sasao, J Community Psychol 1994	1992 Los Angeles riots (6 days)	Korean-American community (n=498)	Exposure to riots; social support	Subjective well-being	Living in riot areas and having experienced tangible loss were not associated with happiness and physical health. Perception of increased ethnic tensions was associated with lower happiness and worse physical health. Social support and social integration was associated with well-being among women.
Slone, J Conflict Resolut 2003	2000 Nazareth riots (10 days)	Students in major Jewish and Arab middle and high schools in Nazareth (n=625)	Active participants or bystanders; motivation for political participation	Psychological symptoms	All groups, except for Jewish Israelis who did not participate in violent activity during the riot, expressed significant distress after the riots.
Straker, Child Dev 1996	1986 Alexandra Rebellion	Students in 12th grade (n=78)	Exposure to violence	Psychological symptoms	62% of students showed psychological distress.
Stuber, Community Ment Health J 1997	1992 Los Angeles riots (6 days)	Teachers from HeadStart program centers (n=98)	Exposure to riots; media exposure	PTSD	3 teachers reported severe PTSD symptoms. Children were reported to be more aggressive, less harmonising, and making less progress.
Wang, J Anxiety Disord 2011	2009 Ürümqi riots (4 days)	Communities affected by the riot (n=1238)	Personal experience with riots	PTSD	12.1% of participants were shown to have probable PTSD.

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Table S3. Main findings of case series on collective actions and mental health

Study	Collective action (duration)	Study population (sample size)	Exposure	Outcome	Main findings
Ad hoc report committee, Am J Psychiatry 1969	1968 Poor People's Campaign (43 days)	Patients in mental health clinic (n=51)	After the protest	Psychiatric diagnosis	Majority of patients experienced either anxiety or depression or both.
Barron, Int J Law Psychiatry 1993	1989 April 9 tragedy (1 day)	Hospital patients (n=21)	Participation in demonstration	Psychiatric diagnosis	PTSD and psychosomatic symptoms were prominent among patients with no prior psychiatric history. Patients described fear, helplessness, emotional distance from others, and blurred or absent memory.
Carpenter, Am J Psychiatry 1971	1969 March on Washington (3 days)	Hospital patients (n=30)	Experience in the mass protest	Psychiatric diagnosis	15 patients presented with symptoms related to substance use or withdrawal. Among the other 15 patients, 12 were diagnosed with anxiety.
Coudreaut, J Nerv Ment Dis 1995	1992 Los Angeles riots (6 days)	Psychiatric patients (n=5)	Living in riot-affected areas	Paranoid delusions; major depression; schizophrenia; PTSD	Patients with psychiatric histories were found to have sought care during periods of unrest. The disadvantaged population may have felt more alone during the riots.
Lyons, Br J Psychiatry 1971	1969 Northern Ireland riots (6 days)	Patients in general practice; admissions due to riots (n=257)	Living in riot affected areas	Depression; anxiety; phobic state; acute psychotic illness; suicide	69% patients presented with situational or state anxiety; insomnia was the most common symptom. 21 out of 40 patients referred to the hospital appeared to be related to the riots.
Ouanes, J Ment Health 2014	2010 Tunisian Revolution (27 days)	Outpatients with psychiatric symptoms attributed to the revolution (n=107)	Self-reports of triggering events	Major depressive disorder; adjustment disorder; PTSD	31% were diagnosed with major depressive disorder, 31% with adjustment disorder, and 27% with PTSD.
Tan, Br J Psychiatry 1973	1969 Kuala Lumpur riot (7 days)	Patients in psychological medicine unit (n=58)	Cases identified to be related to experience during riot	Psychological symptoms	50% diagnosed with schizophrenia, 24% with affective illnesses, and 14% with neuroses. 5 patients attempted suicide due to the riots. 60% of all patients lived in riot-affected areas.
Unuvar, J Forensic Leg Med 2017	2013 Gezi Park Demonstration (85 days)	Applicants to Human Rights Foundation to receive treatment or documentation (n=117)	Riot control agents exposure	General psychiatric assessment	43% were diagnosed with Acute Stress Disorder, 23% with PTSD, and 8% with Major Depressive Disorder

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Table S4. Main findings of qualitative studies on collective actions and mental health

Study	Collective action (duration)	Study population (sample size)	Exposure	Outcome	Main findings
Dunlap, Community Ment Health J, 1988	1965 Watts riots (6 days)	Children (n=182)	Awareness of the riots	Fear response	20% of African American, 44% of Mexican American, and 25% of Caucasian American children reported fear
Matthies-Boon, JNAS, 2017	2011 Egyptian Revolution (15 days)	Activists (n=40)	Experience of violence during the Revolution	Reported anxiety, depression, trauma symptoms	Nearly half of interviewees experienced episodes of severe anxiety due to political violence and uncertainty in Egypt, and more than half experienced periods of depression due to the lack of positive political outcomes and feelings of hopelessness.
Patel, J Muslim Ment Health, 2013	2002 Gujarat riots (30 days)	Adult Gujarati Muslims or Hindus (n=17)	Lived in Gujarat at the time of riots	Social trauma	Muslims reported helplessness, hopelessness and negative affect, which were absent from Hindu participants.
Priya, Qual Res Psychol, 2012	2002 Gujarat riots (30 days)	Internally displaced Muslim students (n=102)	Witnessed violence during the riots	Fear, somatic and behavioral symptoms of trauma	67% of children showed experiences of fear, sleep disturbance, and avoidance.
Warin, Sociol. Rev., 2009	1978 Iranian Revolution (401 days)	Persian women migrants	Migration due to the Revolution	Expression of traumatic experience	Persian women in Australia whom emigrated from Iran after the Islamic Revolution expressed their traumatic experiences in silence through art and domestic tasks such as sewing, making tea, and cooking.

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Table S5. Newcastle-Ottawa Scale (NOS) scores for longitudinal studies

Study	Greenley, Arch Gen Psychiatry 1975	Kubicka, Addiction 1995	Kubicka, Addiction 1998	Ni, Am J Epidemiol 2016	Ni, Am J Public Health 2017	Hou, J Couns Psychol 2018
Collective action	1967 New Haven disorder	1989 Velvet Revolution	1989 Velvet Revolution	2014 Occupy Central/Umbrella Movement	2014 Occupy Central/Umbrella Movement	2014 Occupy Central/Umbrella Movement
(A) Selection (max. 4)						
Representativeness of exposed cohort	**1**	**1**	**1**	**1**	**1**	**1**
Selection of non-exposed cohort	**1**	**1**	**1**	**1**	**1**	**1**
Ascertainment of exposure	**1**	**1**	**1**	**1**	**1**	**0**
Demonstration that outcome was not present at start of the study	**1**	**1**	**1**	**1**	**1**	**1**
(B) Comparability (max. 2)						
Control for age	**1**	**1**	**1**	**1**	**1**	**1**
Control for other factors	**1**	**1**	**1**	**1**	**1**	**1**
(C) Outcome (max. 3)						
Assessment of outcome	**1**	**1**	**1**	**1**	**1**	**1**
Follow-up long enough for outcomes to occur	**1**	**1**	**1**	**1**	**1**	**1**
Adequacy of follow-up of cohorts	**1**	**1**	**1**	**1**	**1**	**1**
Total score (max. 9)	**9**	**9**	**9**	**9**	**9**	**8**

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Table S6. Newcastle-Ottawa Scale (NOS) scores for serial cross-sectional and cross-sectional studies

Study	Castillo-Carniglia, Drug Alcohol Depend 2017	Hanson, J Consult Clin Psychol 1995	Hou, J Affect Disord 2015	Lau, Soc Pscyhiatry Psychiatr Epidemiol 2017	Sasao, J Community Psychol 1994	Galovski, J Trauma Stress 2016	Garbarino, J Police Crim Psychol 2012	Kumar, J Trauma Stress 2013
Collective action	2011 Chilean school strikes	1992 Los Angeles riots	2014 Occupy Central/ Umbrella Movement	2014 Occupy Central/ Umbrella Movement	1992 Los Angeles riots	2014 Ferguson Protests	2001 Genoa G8 Summit Protest	2002 Gujarat riot
(A) Selection (max. 3)								
Representativeness of exposed	**1**	**1**	**1**	**1**	**1**	**1**	**0**	**0**
Selection of non-exposed	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Ascertainment of exposure	**1**	**1**	**1**	**1**	**1**	**0**	**1**	**1**
(B) Comparability (max. 2)								
Control for age	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Control for appropriate confounders (e.g. sex)	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
(C) Outcome (max. 1)								
Assessment of outcome	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Total score (max. 6)	**6**	**6**	**6**	**6**	**6**	**5**	**5**	**5**

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Study	Lau, Comput Human Behav 2016	Moussa, J Ment Health 2015	Obilom, J Interpers Violence 2008	Papanikolaou, Prehosp Disaster Med 2013	Yimgang, Am J Public Health 2017	Dhavale, Indian J Soc Work 2002	Kim-Goh,Am J Orthopsychiatry 1995	Straker, Child Dev 1996
Collective action	2014 Occupy Central/ Umbrella Movement	2011 Egyptian Revolution	2001 Ethnoreligious riot in Jos	2011 Egyptian Revolution	2015 Baltimore Protests	1992-1993 Bombay riots	1992 Los Angeles riots	1986 Alexandra Rebellion
(A) Selection (max. 3)								
Representativeness of exposed	**1**	**1**	**1**	**0**	**0**	**1**	**0**	**0**
Selection of non-exposed	**1**	**1**	**1**	**1**	**1**	**0**	**0**	**0**
Ascertainment of exposure	**0**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
(B) Comparability (max. 2)								
Control for age	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Control for appropriate confounders (e.g. sex)	**1**	**1**	**0**	**1**	**1**	**0**	**1**	**1**
(C) Outcome (max. 1)								
Assessment of outcome	**1**	**0**	**1**	**1**	**1**	**1**	**1**	**1**
Total score (max. 6)	**5**	**5**	**5**	**5**	**5**	**4**	**4**	**4**

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Study	Stuber, Community Ment Health J 1997	Bamrah, Prehosp Disaster Med 2013	Ben Khelil, Int J Public Health 2016	Brown, J Psychoactive Drugs 1994	Harvey-Lintz, Soc Sci J 1997	Lavalekar, Psychol Stud 2006	Slone, J Conflict Resolut 2003	Wang, J Anxiety Disord 2011	Bhat, Int J Soc Psychiatry 1984
Collective action	1992 Los Angeles riots	2007-2008 Kenyan crisis	2010 Tunisian Revolution	1992 Los Angeles riots	1992 Los Angeles riots	2002 Gujarat riots	2000 Nazareth riots	2009 Ürümqi riots	1981 Brixton riot
(A) Selection (max. 3)									
Representativeness of exposed	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**
Selection of non-exposed	**1**	**0**	**1**	**1**	**0**	**1**	**0**	**1**	**1**
Ascertainment of exposure	**1**	**1**	**0**	**1**	**1**	**1**	**1**	**1**	**0**
(B) Comparability (max. 2)									
Control for age	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**
Control for appropriate confounders (e.g. sex)	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**
(C) Outcome (max. 1)									
Assessment of outcome	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**0**
Total score (max. 6)	**4**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**

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