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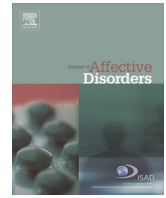
Research report

Threat to democracy: Physical and mental health impact of democracy movement in Hong Kong

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ABSTRACT

Background: This study examined the prevalence and critical predictors of anxiety and depressive symptoms and self-rated health, following the Umbrella Movement in Hong Kong. *Methods:* Random digit dialing recruited a population-representative sample of 1208 Chinese Hong Kong citizens (mean age=46.89 years; 63% female) in the first two weeks of February 2015. Respondents gave their informed consent and reported personal, social, and economic resource loss since the Umbrella Movement (Conservation of Resources-Evaluation), current anxiety symptoms (State-Trait Anxiety Inventory) and depressive symptoms (Patient Health Questionnaire-9), and self-rated health (1=*very good*, 4=*very bad*).
Results: A total of 47.35% (95% CI=44.55, 50.17) respondents reported moderate/severe anxiety symptoms and 14.4% (95% CI=12.54, 16.50) reported moderate/severe depressive symptoms; 9.11% (95% CI=7.61, 10.86) reported "poor" or "very poor" health. Multivariable regressions revealed that personal and social resource loss was associated with higher anxiety and depressive symptoms and greater odds of "very poor" health (adjusted odds ratios/incidence rate ratios=5–102%), independent of lower education level and income and being unmarried.
Limitations: This study was cross-sectional in nature and thus could not determine causality from the associations between resource loss and outcome variables. Second, the telephone survey relied on self-reports; response bias and social desirability could influence respondents' answers and discount data validity. Third, potential confounders such as preexisting mental and physical health issues and concurrent predictors like exposure to the Umbrella Movement were not assessed.
Conclusions: This is one of the first studies following any recent political movement (e.g., The Arab Spring) to quantify distress and the associated correlates of distress among affected citizens. Perceived psychosocial resource losses were critical predictors of poor outcomes.

1. Introduction

A pro-democracy movement, originally named "Occupy Central" and then the "Umbrella Movement/Revolution," emerged in Hong Kong Special Administrative Region between September 28 and December 15, 2014 after the People's Republic of China (PRC) government's decision to reserve the right to pre-approve the candidates for Chief Executive Election in 2017. Citizens blocked traffic at three major business/administrative districts by building encampments that were occupied for nearly three months. An estimated 17% of the 7.2 million Hong Kong citizens joined the protests (The Chinese University of Hong Kong, 2014). The Umbrella Movement was probably the first large-scale pro-democracy movement among Chinese since the Tiananmen Square protests in 1989. The impact on mental and physical health and specific predictors of these outcomes following political movements are unknown for Chinese populations, or indeed following similar movements elsewhere in the world (e.g., the

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Arab Spring).

The conservation of resources (COR) theory suggests that resource loss is the central mechanism driving adaptation to stress. Resources broadly include those personal, social, and material resources that we centrally value and are often divided between internal and external resources (Hobfoll, 1998; Hou and Wan, 2012). Internal or personal resources consist of entities that are possessed by the self and can be mobilized on one's own such as sense of self-worth, sense of control over one's life, and optimism (Diener et al., 2003). External resources consist of entities that are embedded within the physical environment or interpersonal interactions, such as social relationships, money, and employment (House et al., 1988). A summary of media reports revealed that people supported the Movement because they foresaw threat of resource loss including abolishment of the rule of law and deprivation of freedom (e.g., speech and press) (Bertolini, 2015; Cheung, 2014). Use of tear gas and pepper spray, physical assaults to suppress the protestors, and cases of selective law enforcement (e.g., non-action to some violence against the protestors by anti-protestors) further heightened people's perceived threat of potential political oppression if there was no universal suffrage in 2017. The Umbrella Movement could be understood as an investment of internal or external resources to create passageways for political resources, i.e., democracy and universal suffrage, among some Hong Kong citizens (Hobfoll, 2012). A recent study focusing on the Arab Spring in North Africa and the Middle East has shown that the timing of social protest is linked to a particular increase in food prices (Lagi et al., 2011). This suggests that the inability to provide for oneself and family, the lack of self-sufficiency, and the fear of economic loss and deprivation are also some of the prime drivers of social action. Perhaps the most potent example of the consequences of the depletion of internal and external resources was the actions of Mohammed Bouazizi, a street vendor, in Tunisia on December 17, 2010. He, after having had his wares confiscated by municipal workers, set fire to himself, thus setting in motion the events that led to the Arab Spring (Dupont and Passy, 2011).

Despite the possibility that social protests could create resource passageways, they also have the power of depleting internal and external resources, which has central impact on the citizens' psychological and physical well-being. Preventing depletion of these resources is key for maintaining healthy functioning (Hobfoll, 1998; Hobfoll et al., 2009; Hou and Lam, 2014; Hou et al., 2010a, 2010b, 2015). In Cairo, Egypt, citizens who were injured in political demonstrations reported higher levels of psychiatric symptoms than patients who experienced physical trauma from other causes. In both groups ($N=120$ each), similar levels of perceived external control over life (e.g., other important persons, fate, chance) were reported and predicted higher symptoms, suggesting the adverse impact of possible depletion of personal resources (Papanikolaou et al., 2013).

There is limited study of the psychological and health impact of political movements with reference to resource loss (de la Sablonnière et al., 2013). Prior studies reported the association between resource loss and psychological functioning during major social upheaval. Among 145 Russian women in the midst of Russian economic transition, loss of economic resources (e.g., housing, stable employment) predicted depressive symptoms both directly and indirectly through a reduction of a personal sense of mastery over their life situations (Shteyn et al., 2003). Among Israeli settlers ($N=190$) who had faced terrorism and armed conflict and were subsequently evacuated by force from Gaza, a place that provided them with economic compensation and ideological and religious meaning, loss of economic resources (e.g., economic suffering, property damage) predicted clinically significant depressive symptoms, whereas loss of personal and social resources (e.g., confidence in coping with major crises, social intimacy) predicted both depressive and posttraumatic stress symptoms (Hall et al., 2008). A recent population-representative study

conducted among 643 adults living in the Palestinian Authority found that the most salient predictor of new cases of posttraumatic stress disorder was social resource loss (Hall et al., 2015). A study among 4838 East and West Germans found that loss of social and economic resources (e.g., partner relationships, standard of living) between 1986 and 1996 after the fall of the Berlin Wall predicted lower life satisfaction and higher negative affect (Westerhof and Keyes, 2006).

This is the first study to investigate physical and mental health following social/political movement in the Greater China Region, and one of the first following any recent political movement (e.g., The Arab Spring), to quantify distress and the associated resource loss and correlates of distress. The goals of this study were to describe the prevalence of anxiety and depressive symptoms and self-rated health, and investigate the associations of personal, social, and economic resource loss and preexisting socioeconomic resources with anxiety and depressive symptoms and self-rated health during the immediate period following the Umbrella Movement in Hong Kong. We hypothesize the following:

Hypothesis 1. : Following the Umbrella Movement, prevalence of anxiety and depressive symptoms and poor self-rated health will be higher than published population norms and typical of what studies find for populations under significant stress.

Hypothesis 2. : Loss of personal, social, and economic resources will be positively associated with anxiety and depressive symptoms and inversely associated with self-rated health.

Hypothesis 3. : Possessing preexisting socioeconomic resources will be inversely associated with anxiety and depressive symptoms and positively associated with self-rated health.

2. Methods

2.1. Respondents and procedure

Upon obtaining the Ethics Committee's approval from The Hong Kong Institute of Education, respondent recruitment and telephone interviews were conducted by the Centre for Communication and Public Opinion Survey of The Chinese University of Hong Kong, an experienced survey institute, during the first two weeks of February 2015. A Computer-Assisted Telephone Interview system was used. A database of the telephone numbers from the latest residential telephone directories was created by erasing the last two digits and appending two random digits to each number. This method allowed new or unlisted telephone numbers to be included. A person was considered eligible if he/she was (1) a Hong Kong Chinese Citizen, (2) 18 years of age or above, and (3) Cantonese-speaking. If multiple household members were eligible after successful contact, the one with the closest birthday to the interview date was selected. Five attempts were made to a number that were "no answer," "busy," or "eligible unavailable" (i.e., willing to participate but unavailable) while no further attempts were made following two refusals. Voluntariness of participation without incentives was emphasized. Oral informed consent was obtained at the onset of interview. All interviews were conducted in Cantonese. Among the total 34,101 telephone numbers attempted, 18,053 (52.9%) of them were ineligible based on the inclusion criteria; 14,168 (41.5%) were unconfirmed eligible, meaning that they were never reached and their status as eligible or not was never evaluated. Among the 1880 (5.5%) eligible numbers, interviews were completed for 1208 (64.3%), whereas 533 (28.4%) indicated refusal and 139 (7.4%) indicated unavailability. The sampling error was within $\pm 2.8\%$ at 95% confidence level. A response rate of 38% was recorded along with a cooperation rate of 69.4%.

The 1208 respondents ranged in age between 18 and 95 years ($M = 46.89$, $SD = 17.20$, median $= 46.01$); 633 (52.4%) were female and 756 (62.6%) were married. Forty-nine (4.1%) respondents reported receiving no formal education, 165 (13.7%) primary education, 543 (44.9%) secondary education, and 442 (36.6%) tertiary education or above. One hundred fifty-six (12.9%) reported an average monthly household income less than HK$10,000, 176 (14.5%) reported $10,000–$19,999, 194 (16.1%) reported $20,000–$29,999, 168 (13.9%) reported $30,000–$39,999, 118 (9.8%) reported $40,000–$49,999, 114 (9.5%) reported $50,000–$59,999, 182 (15.1%) reported an income exceeding $59,999 (US$1 $\approx$ HK$7.80); 101 (8.3%) did not report income. A total of 615 (50.9%) reported full-time employment, 82 (21.8%) a part-time employment, 24 (2%) being unemployed, and the remainder being students ($N = 81$; 6.7%), housewives ($N = 148$; 12.2%), or retired ($N = 250$; 20.7%). Respondents lived in Hong Kong for an average of 39.95 years ($SD = 16.97$, range $= 1$–86 years, median $= 39$ years). The current sample resembled the population in terms of sex and age group distributions (Census and Statistics Department, 2014).

2.2. Measures

2.2.1. Sociodemographic characteristics

A standardized proforma was used to obtain demographic information including age in years, sex, marital status (i.e., single, married/cohabited, divorced/separated, widowed), education level, employment status, monthly household income, and years of residence in Hong Kong.

2.2.2. Anxiety symptoms

The Chinese version of the 6-item state version of the State-Trait Anxiety Inventory (STAI-6) was used to assess anxiety symptoms (Marteau and Bekker, 1992; Shek, 1988). Respondents rated the frequency of six emotional states, namely calm, tense, upset, relaxed, content, and worried, during the past two weeks on a 4-point scale ($1 = not\ at\ all$, $2 = somewhat$, $3 = moderately$, $4 = very\ much$). Scores on three positive-worded items were reverse coded. The total summed scores were prorated (i.e., multiplied by 20/6), following scale scoring conventions, in order to obtain scores that were comparable with those from the full 20-item STAI (range $= 20$–80) (Marteau and Bekker, 1992). A cutoff score of 44 was used to indicate moderate to severe symptoms (Knight et al., 1983; Leung et al., 2005; Spielberger, 1983). Alpha was .71, for the current administration.

2.2.3. Depressive symptoms

The Chinese version of the 9-item Patient Health Questionnaire (PHQ-9; Yeung et al., 2008) was used to assess depressive symptoms during the past two weeks on a 4-point scale ($0 = not\ at\ all$, $1 = on\ several\ days$, $2 = on\ more\ than\ half\ of\ the\ days$, $3 = nearly\ every\ day$). Higher scores indicated higher depressive symptoms (range $= 0$–27). The Chinese version has demonstrated high internal consistency among Chinese ($\alpha > .80$; Yeung et al., 2008; Nan et al., 2013). To indicate severity of depressive symptoms, the following cutoff scores were adopted based on previous population-based studies among Chinese (Nan et al., 2013): minimal $= 0$–4, mild $= 5$–9, moderate $= 10$–14, moderately severe $= 15$–19, and severe ≥ 20. In this study, alpha was .86.

2.2.4. Self-rated health

Self-rated health status was assessed using a commonly used single item indicator scored as $1 = very\ good$, $2 = good$, $3 = poor$, and $4 = very\ poor$. Brief self-reported health assessments are robust and valid predictors of mortality (DeSalvo et al., 2005).

2.2.5. Loss of personal, social, and economic resources

The Conservation of Resources Evaluation (COR-E; Hobfoll and Lilly, 1993) was forward and back-translated into Chinese (Table 3) to assess actual loss of personal, social, and economic resources (three items each) since the start of the Umbrella Movement. Personal resource loss items assessed optimism and personal control over the future: "*sense of optimism*," "*Feeling that my future success depends on me*," and "*Feeling that I have control over my life*." Social resource loss items assessed interpersonal intimacy: "*Intimacy with one or more family members*," "*Intimacy with at least one friend*," and "*Bonding with at least one family member/friend on social media e.g., Facebook, Twitter, Line, Whatsapp, etc.*" Economic resource loss items assessed financial status: "*Adequate income*," "*Financial assets (stocks, property, etc.)*," and "*Financial stability*." Respondents rated each item on a 5-point scale ($0 = not\ at\ all/not\ applicable$, $1 = loss\ to\ a\ small\ degree$, $2 = loss\ to\ a\ moderate\ degree$, $3 = loss\ to\ a\ considerable\ degree$, $4 = loss\ to\ a\ great\ degree$). Loss of each type of resource was calculated by summing across the three items (range $= 0$–12). Alphas for the personal, social, and economic resource loss subscales were .74, .74, and .83, respectively.

2.3. Analytic plan

The study data was weighted by sex, age, and education level based on the data of population census in Hong Kong (Census and Statistics Department, 2014). To allow for the best use of the available data, the small portion of missing data (no more than .01% on any study variable) were replaced by multiple imputations. To address Hypothesis 1, the first part of the analyses aimed to report the estimated prevalence of anxiety and depressive symptoms and self-rated health with 95% confidence intervals (95% CI).

To address Hypotheses 2 and 3, the second part of the analyses aimed to investigate the associations of resource loss and pre-existing socioeconomic resources with the risk of reporting anxiety and depressive symptoms and poor self-rated health. Different regression models were used for the three outcomes. Multivariable regression was conducted for anxiety symptoms as a continuous outcome; ordinal logistic regression was conducted for self-rated health as an ordinal outcome. To determine whether our data on depressive symptoms best matched a Poisson or negative binomial distribution, an exploratory zero-inflated Poisson regression was conducted, followed by a zero-inflated negative binomial regression without the assumption of equal mean and variance of the depressive symptoms. The negative binomial model would be used if its goodness-of-fit tests indicated smaller values of the Akaike's Information Criterion (AIC) and Bayesian Information Criterion (BIC) fit indices and a ratio of Pearson chi-square and degree of freedom closer to 1.00 compared with Poisson model. Adjusted odds ratios/incidence rate ratios (aOR/aIRR) with 95% CI were reported to indicate the independent association of each resource loss or demographic with an outcome while adjusting for potential confounders.

In all regression models, loss of resources was recoded into high ($> 1\ SD$ of the mean), medium (within 1 SD of the mean), and low ($< 1\ SD$ of the mean). Education level ($1 = $ primary education or below, $2 = $ secondary education, and $3 = $ tertiary education), employment status ($1 = $ unemployed, $2 = $ dependent, and $3 = $ employed), and marital status (married $= 1$/unmarried $= 0$) were also recoded. Based on the median household income of HK$23,800 (Census and Statistics Department, 2015), income level was recoded into $1 = $ less than HK$20,000, $2 = $ HK$20,000-$29,999, $3 = $ HK$30,000-$39,999, $4 = $ HK$40,000-$49,999, and $5 = $ HK$50,000 or above. Years of residence were adjusted by dividing it by age; higher values indicated longer lifetime residence in Hong Kong (range $= 0$–1). Education level, household income,

employment status, and being married were considered proxies for preexisting socioeconomic resources (Hobfoll, 1998). All analyses were performed using SPSS (Version 21; SPSS Inc., Chicago, IL).

3. Results

3.1. Anxiety and depressive symptoms and self-rated health

To address Hypothesis 1, using a cutoff score of 44 for STAI, a total of 47.35% (95% CI=44.55, 50.17) of the respondents reported moderate to severe levels of anxiety symptoms. Using a cutoff score of 10 for PHQ-9 (Kroenke et al., 2001; Nan et al., 2013), about 14.4% (95% CI=12.54, 16.50) of the respondents reported moderate to severe levels of depressive symptoms. The highest percentages of moderate to severe cases of anxiety (59.69%, 95% CI=51.06, 67.76) and depression (22.48%, 95% CI=12.54, 16.50) were identified between 18 and 24 years of age (N=129), whereas the

lowest percentages of moderate to severe anxiety symptoms (35.23%, 95% CI=28.84, 42.20) and depressive symptoms (12.44%, 95% CI=8.50, 17.84) were identified between 55 and 64 years of age (N=193). Among the 1208 respondents, 300 (24.83%, 95% CI=22.48, 27.35) reported "very good" health, 797 (65.98%, 95% CI=63.26, 68.59) "good" health, 91 (7.53%, 95% CI=6.18, 9.16) "poor" health, and 19 (1.57%, 95% CI=1.01, 2.44) "very poor" health. About 9.11% (95% CI=7.61, 10.86) of the respondents reported very poor/poor health. The results are summarized in Table 1.

3.2. Predicting anxiety and depressive symptomatology and self-rated health

The results of the regression analyses are summarized in Table 2 (Hypotheses 2 and 3). Multivariable regression demonstrated that respondents with medium and high personal resource losses reported 10% and 19% higher in anxiety symptoms, respectively (medium: aOR=1.10, 95% CI=1.06, 1.14, $p < .0001$; high:

Table 1
Prevalence of anxiety and depressive symptoms and self-rated health.

	N	Anxiety symptoms		Depressive symptoms		Self-rated health	
		Low (< 44) (%, 95% CI)	Moderate/high (≥ 44) (%, 95% CI)	Minimal/mild (< 10) (%, 95% CI)	Moderate/severe (≥ 10) (%, 95% CI)	Very good/good (%, 95% CI)	Poor/very poor (%, 95% CI)
Sex							
Total	1208	636 (52.65, 49.83–55.45)	572 (47.35, 44.55–50.17)	1033 (85.51, 83.42–87.39)	174 (14.40, 12.54–16.50)	1097 (90.81, 89.05–92.31)	110 (9.11, 7.61–10.86)
Female	633	333 (52.61, 48.71–56.47)	300 (47.39, 43.53–51.29)	528 (83.41, 80.31–86.11)	105 (16.59, 13.89–19.69)	562 (88.78, 86.09–91.01)	71 (11.22, 8.99–13.91)
Male	575	303 (52.70, 48.61–56.75)	272 (47.30, 43.25–51.39)	506 (88.00, 85.09–90.41)	69 (12.00, 9.59–14.91)	535 (93.04, 90.67–94.85)	39 (6.78, 5.00–9.14)
Age (years)							
18–24	129	52 (40.31, 32.24–48.94)	77 (59.69, 51.06–67.76)	100 (77.52, 69.58–83.87)	29 (22.48, 16.13–30.42)	120 (93.02, 87.27–96.29)	9 (6.98, 3.71–12.73)
25–34	188	95 (50.53, 43.45–57.60)	94 (50.00, 42.92–57.08)	163 (86.70, 81.11–90.83)	25 (13.30, 9.17–18.89)	175 (93.09, 88.53–95.91)	12 (6.38, 3.69–10.82)
35–44	227	112 (49.34, 42.90–55.80)	115 (50.66, 44.20–57.10)	197 (86.78, 81.76–90.58)	30 (13.22, 9.42–18.24)	220 (96.92, 93.77–98.50)	8 (3.52, 1.80–6.80)
45–54	242	134 (55.37, 49.07–61.50)	109 (45.04, 38.90–51.34)	208 (85.95, 81.01–89.77)	35 (14.46, 10.59–19.45)	223 (92.15, 88.06–94.92)	18 (7.44, 4.76–11.45)
55–64	193	125 (64.77, 57.80–71.16)	68 (35.23, 28.84–42.20)	168 (87.05, 81.58–91.07)	24 (12.44, 8.50–17.84)	175 (90.67, 85.74–94.02)	19 (9.84, 6.39–14.86)
≥ 65	213	111 (52.11, 45.43–58.72)	102 (47.89, 41.28–54.57)	182 (85.45, 80.08–89.55)	31 (14.55, 10.45–19.92)	172 (80.75, 74.93–85.48)	42 (19.72, 14.93–25.58)
Missing	16	8 (50.00, 28.00–72.00)	8 (50.00, 28.00–72.00)	14 (87.50, 63.98–96.50)	1 (6.25, 1.11–28.33)	13 (81.25, 56.99–93.41)	3 (18.75, 6.59–43.01)
Education level							
≤ Primary	215	108 (50.23, 43.60–56.85)	106 (49.30, 42.69–55.94)	164 (76.28, 70.16–81.47)	50 (23.26, 18.11–29.34)	172 (80.00, 74.15–84.80)	42 (19.53, 14.79–25.35)
Secondary	543	289 (53.22, 49.02–57.38)	253 (46.59, 42.44–50.80)	465 (85.64, 82.43–88.34)	78 (14.36, 11.66–17.57)	497 (91.53, 88.88–93.59)	46 (8.47, 6.41–11.12)
≥ Tertiary	442	236 (53.39, 48.73–57.99)	206 (46.61, 42.01–51.27)	397 (89.82, 86.65–92.30)	45 (10.18, 7.70–13.35)	420 (95.02, 92.58–96.69)	22 (4.98, 3.31–7.42)
Missing	8	2 (25.00, 7.15–59.07)	6 (75.00, 40.93–92.85)	7 (87.50, 52.91–97.76)	1 (12.50, 2.24–47.09)	7 (87.50, 52.91–97.76)	1 (12.50, 2.24–47.09)

Note. The data was weighted by sex, age, and education level based on the data of population census in Hong Kong. CI=confidence interval.

Table 2

Adjusted odds ratios/incidence rate ratios for higher anxiety and depressive symptoms and poorer self-rated health by personal, social, and economic resource loss, socioeconomic resources (education, income, employment status, and marital status), and other demographics.

Predictor	Anxiety symptoms			Depression symptoms			Self-rated health		
	aOR	95% CI	*p* value	aIRR	95% CI	*p* value	aOR	95% CI	*p* value
Personal resource loss									
High	1.19	1.13, 1.24	0.000	1.94	1.55, 2.43	0.000	1.68	1.10, 2.56	0.016
Medium	1.10	1.06, 1.14	0.000	1.43	1.22, 1.69	0.000	1.24	0.93, 1.67	0.149
Low	1.00	Referent		1.00	Referent		1.00	Referent	
Social resource loss									
High	1.03	0.98, 1.09	0.233	1.61	1.26, 2.05	0.000	1.24	0.77, 2.00	0.383
Medium	1.03	0.997, 1.06	0.081	1.07	0.93, 1.24	0.355	1.01	0.77, 1.32	0.958
Low	1.00	Referent		1.00	Referent		1.00	Referent	
Economic resource loss									
High	1.01	0.96, 1.06	0.735	1.14	0.91, 1.44	0.258	0.90	0.57, 1.41	0.647
Medium	1.01	0.97, 1.06	0.508	1.01	0.83, 1.23	0.896	0.85	0.59, 1.21	0.366
Low	1.00	Referent		1.00	Referent		1.00	Referent	
Education									
Primary or below	1.09	1.03, 1.15	0.003	2.02	1.56, 2.61	0.000	1.69	1.04, 2.75	0.035
Secondary	0.996	0.96, 1.03	0.838	1.16	0.98, 1.38	0.082	1.14	0.84, 1.54	0.394
Tertiary or above	1.00	Referent		1.00	Referent		1.00	Referent	
Income									
HKD$19,999 or below	1.07	1.02, 1.12	0.004	1.23	0.99, 1.54	0.063	1.46	0.98, 2.20	0.065
HKD$20,000–$29,999	1.05	1.00, 1.10	0.033	1.16	0.94, 1.44	0.175	1.44	0.96, 2.15	0.076
HKD$30,000–$39,999	1.03	0.98, 1.08	0.311	1.08	0.86, 1.35	0.511	1.08	0.72, 1.62	0.695
HKD$40,000–$49,999	1.02	0.96, 1.07	0.590	1.08	0.84, 1.38	0.568	1.19	0.76, 1.85	0.457
HKD$50,000 or above	1.00	Referent		1.00	Referent		1.00	Referent	
Employment status									
Unemployed	1.08	0.99, 1.18	0.100	1.48	0.93, 2.35	0.096	1.82	0.71, 4.72	0.216
Dependent	0.96	0.93, 0.99	0.009	1.01	0.86, 1.18	0.896	0.94	0.71, 1.25	0.669
Employed	1.00	Referent		1.00	Referent		1.00	Referent	
Marital status									
Unmarried	1.02	0.99, 1.05	0.283	1.20	1.04, 1.40	0.016	1.55	1.16, 2.08	0.003
Married	1.00	Referent		1.00	Referent		1.00	Referent	
Gender									
Male	1.01	0.98, 1.04	0.697	0.88	0.77, 1.01	0.064	0.69	0.54, 0.90	0.006
Female	1.00	Referent		1.00	Referent		1.00	Referent	
Age	0.997	0.995, 0.998	0.000	0.99	0.98, 0.99	0.000	1.01	1.00, 1.02	0.013
Lifetime residence in Hong Kong	0.91	0.85, 0.97	0.002	0.68	0.50, 0.92	0.012	0.53	0.29, 0.94	0.030

Note. aOR=adjusted odds ratio and aIRR=adjusted incidence rate ratio.

aOR=1.19, 95% CI=1.13, 1.24, $p < .0001$). Respondents with primary education or below reported approximately 9% higher in anxiety symptoms (aOR=1.09, 95% CI=1.03, 1.15, $p=.003$), whereas those with monthly household income less than HK$30,000 reported approximately 5–7% higher symptoms (aOR=1.05–1.07, 95% CI=1.00–1.02, 1.10–1.12, $p < .05$). Anxiety symptoms were approximately 0.3% lower with every one year increase in age (aOR=.997, 95% CI=1.00, 1.00, $p < .0001$) and approximately 9% lower with every one unit increase in lifetime residence in Hong Kong (aOR=.91, 95% CI=.84,.97, $p=.002$). Relative to unemployed respondents, dependent respondents (i.e., students, housewives, or retired persons) reported approximately 4% lower in anxiety symptoms (aOR=.96, 95% CI=.93,.99, $p=.009$).

Compared with Poisson regression, negative binomial regression showed markedly smaller goodness-of-fit indices (AIC=5734.80, BIC=5815.50; Poisson: AIC=7697.29, BIC=7793.13) and a ratio of Pearson chi-square and degree of freedom closer to 1.00 (.93; Poisson: 4.51). The negative binomial regression was adopted to account for the over-dispersion in the count dependent variable. The model revealed that respondents with medium or high personal resource losses, or high social resource loss reported approximately 43%, 94%, and 61% higher in depressive symptoms, respectively (personal – medium: aIRR=1.43, 95% CI=1.22, 1.69, $p < .0001$; personal – high: aIRR=1.94, 95% CI=1.55, 2.43, $p < .0001$; social – high: aIRR=1.61, 95% CI=1.26, 2.05, $p < .0001$). Respondents with primary education or lower reported 102% higher in levels of depressive symptoms

(aIRR=2.02, 95% CI=1.56, 2.61, $p < .0001$). Unmarried respondents reported 20% higher in depressive symptoms (aIRR=1.20, 95% CI=1.04, 1.40, $p=.016$). Depressive symptoms were approximately 1.3% lower with every one year increase in age (aIRR=.987, 95% CI=.98,.99, $p < .0001$) and approximately 32% lower with every one unit increase in lifetime residence in Hong Kong (aIRR=.68, 95% CI=.50, .92, $p=.012$).

The ordinal logistic regression revealed that respondents with high personal resource loss reported 68% higher in the odds of poorer self-rated health (aOR=1.68, 95% CI=1.10, 2.56, $p=.016$). Older age, primary education or below, and being unmarried were associated with 1%, 69%, and 55% higher in the odds of poorer self-rated health, respectively (age: aOR=1.01, 95% CI=1.00, 1.02, $p=.013$; ≤ primary education: aOR=1.69, 95% CI=1.04, 2.75, $p=.035$; unmarried: aOR=1.55, 95% CI=1.16, 2.08, $p=.003$). The odds of poorer self-rated health were 69% lower among men compared with women (aOR=.69, 95% CI=.54, .90, $p=.006$), and for one unit increase in lifetime residence in Hong Kong, the odds of poorer self-rated health were 53% lower (aOR=.53, 95% CI=.29, .94, $p=.03$).

4. Discussion

Social or political unrest has the power of depleting internal and external resources and contributes to poorer mental and physical health (Hall et al., 2014; Hobfoll, 1998, 2009), but very few studies to date have reported the psychological and health impact

of political movements around the world. Two months after the conclusion of the Umbrella Movement in Hong Kong, this study found an alarming 47.30% of moderate to severe levels of anxiety symptoms and almost 15% of moderate to severe depressive symptoms among 1208 respondents, though the majority (> 90%) did not report "poor/very poor" self-rated health (Hypothesis 1). Pertinent to Hypothesis 2, multivariable regressions showed that loss of personal resources was positively associated with the odds of higher anxiety symptoms and poorer self-rated health, whereas loss of both personal and social resources was positively associated

Table 3
Chinese version of selected items on Conservation of Resources-Evaluation (COR-E).

我們想了解您自香港的民主運動(又稱佔領中環或雨傘運動)開始後，實質資源流失的程度。當中的資源包括物件、狀況、個人特質或精力。實質的資源流失指您可用的資源減少，例如個人健康或與另一半的親密程度變差。

請您用 0-4 分表示您在以下每一項經歷資源流失的程度，4 分代表十分大程度的資源流失，3 分代表相當大程度的資源流失，2 分代表中等程度的資源流失，1 分代表很少程度的資源流失，0 分代表資源沒有流失或不適用。

	沒有流失∕不適用	很少程度的流失	中等程度的流失	相當大程度的流失	十分大程度的流失
個人					
1. 樂觀感。	0	1	2	3	4
2. 覺得將來的成功取決於自己。	0	1	2	3	4
3. 覺得自己能掌握自己的人生。	0	1	2	3	4
社交					
4. 與一位或以上的家人之間的親密度。	0	1	2	3	4
5. 與最少一位朋友的親密度。	0	1	2	3	4
6. 與最少一位家人 ∕ 朋友在社交媒體(例如 Facebook、Twitter、Line、WhatsApp)的連繫。	0	1	2	3	4
物質					
7. 充足的收入。	0	1	2	3	4
8. 財政資產(如股票、物業等)。	0	1	2	3	4
9. 財政穩定性。	0	1	2	3	4

Table 4
Scores on STAI that were obtained between 16 May 2003 and 10 Jun 2003 (Leung et al., 2005) after SARS outbreak in Hong Kong and the scores that were obtained in the present study.

	Leung et al. (2005) M (95% CI)	Present study M (95% CI)
Sex		
Female	42.0 (41.0–43.0)	44.36 (43.42–45.3)
Male	40.8 (39.8–42)	44.18 (43.25–45.11)
Age (years)		
18–24	39.8 (38–41.6)	48.95 (46.99–50.91)
25–34	39.2 (37.6–40.6)	46.48 (44.95–48.02)
35–44	41.2 (39.8–42.6)	44.79 (43.24–46.35)
45–54	43.6 (42–45.4)	43.25 (41.74–44.75)
55–64	43.6 (40.4–46.6)	40.35 (38.68–42.02)
≥ 65	41.6 (39.6–43.8)	43.73 (42.24–45.22)
Education level		
Primary or below	43.8 (42.0–45.4)	44.61 (42.96–46.26)
Secondary	40.6 (39.8–41.6)	43.54 (42.52–44.56)
Tertiary or above	39.8 (38.4–41.2)	44.93 (43.9–45.94)

Notes. The total summed STAI scores were prorated, following the scale scoring convention, in order to obtain scores that were comparable with those from the full 20-item STAI (range=20–80). M=mean; CI=confidence interval.

with the odds of higher depressive symptoms. Proxies of lower socioeconomic resources including primary education or below, lower household income, and being unmarried were also positively associated with the odds of higher anxiety/depressive symptoms and poorer self-rated health (Hypothesis 3). Age and lifetime residence in Hong Kong (i.e., total years/age), on the other hand, were inversely associated with the odds of higher anxiety and depressive symptoms.

The significance of the Umbrella Movement on Hong Kong citizens' mental health became obvious when we compared the present data with those in previous population-based studies among Chinese. The most representative data on self-reported anxiety symptoms to date was obtained from 4481 Hong Kong residents at multiple timepoints following the outbreak of severe acute respiratory syndrome (SARS) in 2003 (Leung et al., 2005). SARS generated considerable fear and psychological distress among people in the 29 affected regions (Hawryluck et al., 2004; Koh et al., 2005; Leung et al., 2003). Compared with the data that was obtained among Hong Kong Chinese two to three months after the outbreak of SARS (Leung et al., 2005), higher anxiety symptoms were reported by almost all age groups in this study (Table 4). In a similar vein, compared with the PHQ-9 data on depressive symptoms among a population-based sample of 16,039 Hong Kong Chinese (Nan et al., 2013), higher percentage of depressive symptoms were observed in mild (N=272, 22.5%), moderate (N=116, 9.6%), moderately severe (N=37, 3.1%), and severe (N=21, 1.7%) levels in the present sample (Table 5). On the other hand, we found that only 9.11% of the respondents reported "poor/very poor" self-rated health, which was obviously low compared with population-based data among Chinese in Hong Kong (49.2%, N=4553; Wang et al., 2013), Shanghai (36.2%, N=2040; Jia et al., 2014), and Singapore (24.3%, N=3704; Lim et al., 2007). This could be because Umbrella Movement was short and nonviolent. It is likely that physical health impact is greater in more prolonged and violent cases like Yemen and Syria.

Our findings underscore the impact of resource loss on psychological functioning during a period of social upheaval. Personal resource loss since the start of the Umbrella Movement was associated with higher levels of anxiety and depressive symptoms and the odds of poorer self-rated health by 10–94%. A population-based survey during the Umbrella Movement (N=1050) reported that 38% of the respondents expressed a pessimistic view over the future of Hong Kong, 43% expressed disagreement with the current Chief Executive election proposal (i.e., candidates are selected by a Nomination Committee consisting of 1200 members), and 53% agreed that the government should back down to resolve the situation (The Chinese University of Hong Kong, 2014). The Umbrella Movement did not lead to any concrete political outcomes, while the Hong Kong government has refused to make changes to

Table 5
Scores on PHQ-9 that were obtained in a previous normative study (Nan et al., 2013) and the scores that were obtained in the present study.

	Minimal (0–4)	Mild (5–9)	Moderate (10–14)	Moderately severe (15–19)	Severe (≥ 20)
Nan et al. (2013)					
Total (N=16039)	88.2%	9.7%	1.5%	0.4%	0.2%
Female (N=8727)	86.3%	11.1%	1.9%	0.4%	0.3%
Male (N=7312)	90.3%	8.2%	1.0%	0.4%	0.1%
The present study					
Sex					
Total (N=1208)	762 (63.1%)	272 (22.5%)	116 (9.6%)	37 (3.1%)	21 (1.7%)
Female (N=633)	377 (59.5%)	151 (23.9%)	69 (10.9%)	23 (3.6%)	14 (2.1%)
Male (N=575)	385 (67.0%)	121 (21.0%)	47 (8.1%)	15 (2.5%)	8 (1.3%)
Age (years)					
18–24 (N=129)	64 (49.9%)	36 (27.9%)	19 (14.8%)	6 (4.6%)	3 (2.7%)
25–34 (N=188)	116 (61.5%)	48 (25.3%)	18 (9.4%)	4 (2.1%)	3 (1.8%)
35–44 (N=227)	151 (66.3%)	47 (20.6%)	24 (10.8%)	5 (2.3%)	0 (0.0%)
45–54 (N=242)	168 (69.3%)	40 (16.4%)	21 (8.8%)	8 (3.2%)	6 (2.3%)
55–64 (N=193)	137 (70.9%)	32 (16.5%)	18 (9.5%)	1 (0.4%)	5 (2.7%)
≥ 65 (N=213)	116 (54.3%)	66 (31.2%)	14 (6.7%)	13 (6.2%)	4 (1.6%)
Missing (N=20)	11 (69.4%)	3 (21.9%)	1 (4.4%)	1 (4.4%)	0 (0.0%)
Education level					
Primary or below (N=215)	106 (49.6%)	58 (26.9%)	29 (13.6%)	12 (5.6%)	9 (4.3%)
Secondary (N=543)	356 (65.5%)	109 (20.1%)	54 (10.0%)	18 (3.3%)	6 (1.1%)
Tertiary or above (N=442)	295 (66.7%)	103 (23.2%)	31 (7.1%)	7 (1.7%)	6 (1.3%)
Missing (N=8)	5 (58.6%)	2 (28.3%)	1 (13.1%)	0 (0.0%)	0 (0.0%)

the current Chief Executive election proposal. Worries of respondents could have been manifested in lower levels of optimism and a sense of mastery over one's life and future success. If the current election proposal is implemented or Hong Kong citizens do not adjust their expectation, ongoing personal resource loss could demonstrate increased health impact.

Social resource loss was associated with increased odds of depressive symptoms by 61%, supplementing previous evidence on its predictive utility in posttraumatic stress disorder (PTSD). Like recovery from PTSD, recovery from depressed mood could depend heavily on prevention of social resource loss or restoration of lost social connections following social–political upheaval (Hall et al., 2014). Social resource loss could be attributed to everyday political discussions with close social partners. The Umbrella Movement encouraged spirited debate and polarized opinions that may have disrupted social harmony. Discussions could increase the probability of agreement among close social partners (Morey et al., 2012), but "universal suffrage" was made ambiguous by granting Hong Kong citizens the right to vote and the right to be elected but not the right to nominate candidates. Because of the ambiguity of the issue, the chance of political disagreement increases, while strong ties encourage confrontation of political disagreement that could inadvertently reduce relationship strength and intimacy (Huckfeldt et al., 2004).

Economic resource loss was not associated with anxiety, depression, and self-rated health, while proxies of lower preexisting socioeconomic resources including lower education level and household income and being unmarried were associated with higher anxiety and depressive symptoms and poorer self-rated health. Age and lifetime residence in Hong Kong were associated with lower anxiety and depressive symptoms, whereas lifetime residence was also associated with better self-rated health. These socioeconomic resources take time to accumulate within the local setting and thus were not easily shaken by the Umbrella Movement. On the other hand, economic resource loss indicates specific loss of adequate income, financial assets, and financial stability since the start of the Movement. The findings extend the well-established link between socioeconomic status and physical and mental health to political psychology (Adler et al., 1994). In milder cases of pro-democracy movements, longstanding socioeconomic resources, not momentary loss of income or financial stability, could have a stronger association with mental and physical health.

5. Limitations and conclusion

A number of limitations warrant attention. First, because this study was cross-sectional in nature, we cannot determine causality from the associations between resource loss and outcome variables. Psychological distress could indeed increase resource loss, which then reciprocally enhances psychological distress, forming a loss spiral during political violence (Heath et al., 2012; Hall et al., 2015). Second, the telephone survey relied on self-reports. Response bias and social desirability could influence respondents' answers and discount data validity especially on psychiatric symptoms. However, phone-based structured clinical interviews have been found to be a valid method for detecting and monitoring psychiatric symptoms (Hobfoll et al., 2011; Muskens et al., 2014). Third, potential confounders such as preexisting mental and physical health issues and concurrent predictors like exposure to the Umbrella Movement were not assessed. Unmeasured confounders could dilute the associations between predictors and outcomes, whereas concurrent predictors like exposure to the Movement could accelerate different resource losses.

In conclusion, our findings provide an evidence base for future studies on psychological impact of social uprisings in Arab Spring

or elsewhere in the world. One common feature across pro-democracy movements around the world is protestors' willingness to invest internal and external resources in order to resist oppressive rule and create passageways for social and political resources (Hobfoll, 2012; Pearlman, 2013). In more successful cases of pro-democracy movements, like those of Tunisia, Jordan, and Morocco, protests were relatively shorter and probably caused less psychological and health problems to the peoples. Resource loss among these peoples is down regulated by the positive political outcomes and opportunity of resource gain. Meanwhile, in many places with pro-democracy movements, such as Syria (United Nations, 2015), protests are on-going and yet to result in political success or stability, bringing about more resource loss than opportunity of gain to the peoples. Depletion of resources could have a more significant negative impact on the peoples' physical and mental health.

Author disclosure

Contributors

Dr. Wai-Kai Hou: formulation of the conceptual framework; statistical analysis; write-up. Dr. Brian J. Hall: comments on the conceptual framework and the discussions of the findings; planning of statistical analysis. Dr. Daphna Canetti: formulation of the conceptual framework; ideas on the discussions of the findings. Miss Kam Man Lau and Miss Sin Man Ng: assistance in statistical analysis and preparation of the manuscript. Prof. Stevan E. Hobfoll: formulation of the conceptual framework; statistical analysis; write-up. All authors have approved the final article.

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