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Social media and mental health in democracy movement in Hong Kong: A population-based study



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ABSTRACT

Social media use has proliferated in the past ten years and studies are beginning to investigate the associations of social media use with political movements and mental health. This study extends this literature by testing a novel hypothesis that social resource loss on social media (e.g., “unfriending”) may be associated with increased symptoms of depression and anxiety in social upheaval. A population-based sample of 1,208 Chinese Hong Kong citizens (mean age = 46.89; 52.4% female) was recruited by random digit dialing in February 2015, two months after the conclusion of the Umbrella Movement in Hong Kong. Respondents reported social resource loss on social media, and anxiety and depressive symptoms. Hierarchical regression analyses revealed that social resource loss on social media was positively associated with depressive symptoms but not anxiety symptoms. Age moderated the positive association between social resource loss on social media and depressive symptoms. Simple slope tests revealed that the association was significant only among middle-aged (39–55 years) and older (≥ 56 years) adults but not younger (18–38 years) adults. The current findings shed light on the role of social media in mental health during political movements across different age groups.

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1. Introduction

Social media plays an increasingly important role in social and political movements. Social media is often used to seek politically-related news or information (Lenhart, Purcell, Smith, & Zickuhr, 2010). It is also involved in shaping political movements. For example, picture sharing and status updates on Facebook were instrumental for mobilizing the Occupy Wall Street movement because these allowed for rapid dissemination of related information (Gaby & Caren, 2012). Online discussions/debates and dissemination/receipt of information through social media (i.e.,

Facebook and Twitter) were also implicated in the development of the Arab Spring and the Egyptian Revolution in 2011 (Eltantawy & Wiest, 2011; Khondker, 2011). Likewise, social media most recently provided a platform for updates, opinions, and rallying points for participations in the Umbrella Movement in Hong Kong (Chen & Reese, 2015). Even though the usage of social media sites differs in different age groups, Facebook served as one of the primary vehicles for news especially during the Umbrella Movement (Tsui, 2015).

The Umbrella Movement, originally called “Occupy Central”, emerged between September 28th and December 15th, 2014 in Hong Kong Special Administrative Region. Hong Kong citizens blocked traffic at three major business/administrative districts by building encampments that were occupied for nearly three months. An estimated 20.1% of the 7.2 million citizens reported having

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stayed in the occupied areas ([The Chinese University of Hong Kong, 2014](#)). Due to the fact that “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, the Umbrella Movement encouraged spirited debate and polarized opinions that may have disrupted social harmony.

The ambiguity could increase the chance of political disagreement, while debate and exchange of opinions could take place both face-to-face and on social media. Among 569 protestors (age = 18–40 years) in the occupied areas in November 2014, the majority (80%) reported debating with acquaintances and friends who were opposed to the Umbrella Movement on Facebook and mobile chat groups and 30% did so frequently. Approximately 30% of the respondents reported having experiences of “unfriending” with acquaintances or friends on Facebook due to opposing political viewpoints ([Lee & Chan, 2015](#)). Given that the literature points to an association between losses of social resources and poor mental health ([Hall, Bonanno, Bolton, & Bass, 2014](#); [Hall, Murray, Galea, Canetti, & Hobfoll, 2015](#); [Hou, 2010](#)), we might expect this association following social upheaval. Although people may disagree about political issues and end an online friendship, this may be an emotionally painful loss. However, no previous study has linked this “unfriending” behavior with mental health outcomes.

Social media use has pronounced effects on mental health. Facebook has been used to gain bridging social capital (i.e., fragile connections with heterogeneous groups that foster social inclusion) and maintain both close and long-distance social bonding ([Ellison, Steinfield, & Lampe, 2007](#)). The intensity of Facebook use and the number of Facebook friends was associated with higher life satisfaction and subjective happiness respectively among different samples of American college students ($n = 391$; $n = 2,603$) ([Kim & Lee, 2011](#); [Valenzuela, Park, & Kee, 2009](#)). Facebook network size was positively associated with estimated audience for status updates which, in turn, predicted higher life satisfaction ([Manago, Taylor, & Greenfield, 2012](#)). Among 401 college Facebook users in the United States, Facebook network size was associated with higher levels of perceived social support, contributing in turn to higher life satisfaction ([Nabi, Prestin, & So, 2013](#)). Valence (positive/negative) of others' reactions on profiles was positively associated with life satisfaction indirectly through increasing or decreasing self-esteem among adolescents in the Netherlands ([Valkenburg, Peter, & Schouten, 2006](#)). Perceived social connectedness derived from the use of Facebook was inversely associated with anxiety and depressive symptoms and positively associated with life satisfaction among 274 college students in Australia ([Grieve, Indian, Witteveen, Tolan, & Marrington, 2013](#)). Research has yet to evaluate the association between social media use and mental health in non-college student, community samples.

It remains unclear whether and how social media use is associated with mental health during social upheaval. Social network could be a platform for social resource loss during the Umbrella Movement, which could adversely impact mental health among the affected population. According to the conservation of resources (COR) theory, resource loss is the underlying mechanism driving poor adaptation to stressful events ([Hobfoll, 1998](#)). Resources broadly include those personal, social, and material resources that we centrally value and are often divided between internal and external resources ([Hobfoll, 1998](#)). Despite the possibility that social protests could create passageways for increased political resources ([Hobfoll, 2012](#)), that is, democracy and universal suffrage in the case of the Umbrella Movement, they also have the power of depleting personal (i.e., perceived control and optimism) and social

(i.e., relationship intimacy and connectedness) resources, which have a central impact on the citizens' mental health. Preventing depletion of these resources is key to maintaining healthy functioning ([Hobfoll, 1998](#); [Hobfoll et al., 2009](#); [Hou & Lam, 2014](#); [Hou, Law, & Fu, 2010a](#); [Hou, Law, Yin, & Fu, 2010b](#); [Hou, Ng, & Wan, 2014](#); [Hou et al., 2015](#)). General losses of social resources has been found to be associated with increased risk of higher depressive symptoms two months after the conclusion of the Umbrella Movement ([Hou et al., 2015](#)).

Different age groups engage with social media differently. The number of young (i.e., 18–29 years old) social networking sites users is still expanding in the United States, and there is a rapid increase in social networking sites use among respondents between 30 and 49 years of age (from 48% to 78%), between 50 and 64 years of age (from 25% to 60%), and 65 years or above (from 13% to 43%) ([Brenner & Smith, 2013](#); [Madden & Zickuhr, 2011](#)). Socio-emotional selectivity theory suggests that social networks could be distinctly different between younger and older adults. Individuals tend to devote more emotional resources to close social partners rather than expanding peripheral social relationships as they age — decrease in social contact is considered a natural, adaptive aging process ([Carstensen, 1993, 1995](#)). Older adults tend to be more satisfied with their current network size and are also less likely to add people to their existing network compared with younger counterparts ([Lansford, Sherman, & Antonucci, 1998](#)). For instance, older adults maintain a small social network with close social partners whereas younger adults maintain and expand their social network to include both acquaintances and more distant friends. In addition, there could also be an age-related advantage of psychological resilience during social upheaval. Among 2,752 respondents in New York City, a random-digit-dialing telephone survey revealed that individuals aged 65 years or above were three times more likely to be resilient, i.e., did not demonstrate clinically significant psychological distress, than those aged 18–24 years after the September 11 terrorist attack ([Bonanno, Galea, Bucciarelli, & Vlahov, 2007](#)). Younger Holocaust survivors reported higher Post-traumatic Stress Disorder symptomology and distress levels compared with the older ones ([Dekel & Hobfoll, 2007](#)). Age was also found to be inversely associated with anxiety and depressive symptoms among a population-representative sample two months after the conclusion of the Umbrella Movement ([Hou et al., 2015](#)). Taken together, these trends in social media use and age-related social network size and mental health, justifies an investigation into the modifying effect of age in the association between social media and mental health.

The present study aims to investigate (1) the association between social resource loss on social media and anxiety and depressive symptoms, and (2) whether the association between social resource loss on social media and anxiety and depressive symptoms was moderated by age in a population-representative sample of Hong Kong citizens two months after the conclusion of the Umbrella Movement. We hypothesize the following:

Hypothesis 1. Social resource loss on social media will be positively associated with anxiety and depressive symptoms, controlling for demographic characteristics and general social resource loss (i.e., not specific to social media loss).

Hypothesis 2. The positive association between social resource loss on social media and anxiety and depressive symptoms will be moderated by age, controlling for demographics and general social resource loss. The positive association between social resource loss on social media and anxiety and depressive symptoms will be stronger among younger respondents relative to older respondents.

2. Methods

2.1. Respondents and procedure

Upon obtaining the Ethics Committee's approval from The Education University of Hong Kong, 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 (CATI) 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 was "no answer", "busy", or "eligible unavailable" (i.e., willing to participate but unavailable) while no further attempts were made following two refusals. Voluntary participation without incentives was emphasized. Oral informed consent was obtained at the onset of interview. All interviews were conducted in Cantonese, the most commonly spoken Chinese language and the mother tongue of about 90% of the population in Hong Kong (Census and Statistics Department, 2016). Among the total 34,101 telephone numbers attempted, 18,053 (52.9%) of them were ineligible based on the inclusion criteria; 14,168 (41.6%) were unconfirmed eligible, meaning that they were never reached and their status as eligible or not was never evaluated. Among the 1,880 (5.5%) eligible numbers, interviews were completed for 1,208 (64.3%), whereas 533 (28.3%) 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 1,208 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; eight (0.7%) did not report education level. 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, 167 (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 (6.8%) a part-time employment, 24 (2.0%) being unemployed, and the remainder being students ($n = 81$; 6.7%), housewives ($n = 148$; 12.2%), or retired ($n = 249$; 20.7%); eight (0.7%) did not report employment status. 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). The rounded-up percentages were for reference only with some not adding up to a total of 100% for a variable.

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. Loss of social resources

The Conservation of Resources Evaluation (COR-E) (Hobfoll & Lilly, 1993) was forward- and back-translated into Chinese to assess actual loss of social resources since the start of the Umbrella Movement (Hou et al., 2015). Two items assessed general intimacy with family and friends: "Intimacy with one or more family members"; "Intimacy with at least one friend". One item assessed intimacy with family and friends on social media: "Bonding with at least one family member/friend on social media e.g., Facebook, Twitter, Line, Whatsapp, etc". 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). General social resource loss was calculated by summing across the two items (range = 0–8). Social resource loss on social media was indicated by the scores on the single item. In the current administration, alpha was 0.64 for general social resource loss.

2.2.3. 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 & 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 & Bekker, 1992). Alpha was 0.71 for the current administration.

2.2.4. 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 ($\alpha > 0.80$) (Nan, Lee, Ni, Chan, & Lam, 2013; Yeung et al., 2008). In this study, alpha was 0.86.

2.3. Analytic plan

The study data was weighted by sex, age, and education level based on the latest population census of Hong Kong (Census and Statistics Department, 2014). Due to rounding errors caused by weighting, the sample sizes and percentages might not add up to 1,208 or 100%, respectively. In order to utilize the available data, missing data (<0.01% in any study variable) were replaced by multiple imputations using SPSS (Version 21; SPSS Inc., Chicago, IL).

To address *Hypothesis 1*, separate hierarchical regression analyses were conducted to examine the associations of social resource loss on social media with anxiety and depressive symptoms respectively, controlling for sociodemographic variables and general social resource loss. In each model, sociodemographic variables were entered in the first step, general social resource loss in the second step, and social resource loss on social media in the third step. To examine the extent to which age (in years) moderated the associations between social resource loss on social media and anxiety/depressive symptoms (*Hypothesis 2*), hierarchical multiple regression analyses were conducted with sociodemographic

correlates entered in the first step, general social resource loss in the second step, social resource loss on social media and age in the third step, and an interaction term, social resource loss on social media \times age in the fourth step. To avoid multicollinearity, centered scores on social resource loss on social media and age were used in the calculation of the interaction term (Aiken & West, 1991). Simple slope tests were conducted on all significant interactions. To examine differences between meaningful age groups, ages at 0.5 SD above and below the mean indicated older (≥ 56 years) and younger (18–38 years) adults, whereas ages within 0.5 SD of the mean indicated middle-aged adults (39–55 years). All analyses were performed using SPSS (Version 21; SPSS Inc., Chicago, IL).

3. Results

Descriptive statistics on social resource loss on social media are summarized in Table 1. Among the 1,208 respondents, 815 (67.5%) reported no social resource loss on social media, 300 (24.9%) reported loss to a small degree, and 92 (7.6%) reported loss to a moderate to great degree. Addressing Hypothesis 1, both hierarchical multiple regression models of anxiety and depressive symptoms were significant [anxiety symptoms: $F(10, 1089) = 7.80, p < 0.001$; depressive symptoms: $F(10, 1089) = 11.74, p < 0.001$]. However, social resource loss on social media was significantly associated with depressive symptoms ($\beta = 0.10, p = 0.005$; R^2 change = 0.007) but not anxiety symptoms ($\beta = 0.04, p = 0.269, R^2$ change = 0.001), controlling for sociodemographic characteristics and general social resource loss (Table 2).

The interaction term of social resource loss on social media \times age was tested in a separate hierarchical regression model of depressive symptoms (Table 3). The overall model was significant, $F(9, 1091) = 13.98, p < 0.001$. The interaction term was

significantly associated with depressive symptoms ($\beta = 0.10, p = 0.001$; R^2 change = 0.010). Simple slope tests revealed that the positive association between social resource loss on social media and depressive symptoms was significant only among the middle-aged adults ($\beta = 0.11, p = 0.003$) and older adults ($\beta = 0.16, p < 0.001$) but not among younger adults (Fig. 1).

4. Discussion

This study examined the association between social resource loss on social media and psychological distress and the possible age differences in the association. The results partially supported the study hypotheses. Controlling for sociodemographic characteristics and general social resource loss, regression analyses revealed that social resource loss on social media was positively associated with depressive symptoms but not anxiety symptoms two months after the conclusion of the Umbrella Movement (Hypothesis 1). Age demonstrated a significant moderating effect on the association between social resource loss on social media and depressive symptoms (Hypothesis 2). Simple slope tests revealed that the positive association between social resource loss on social media and depressive symptoms was significant only among middle-aged and older adults but not younger adults.

Previous studies have investigated the role of social media in mental health among preadolescents, adolescents, and college students ($n = 88$ –2,603) (Ellison et al., 2007; Grieve et al., 2013; Kim & Lee, 2011; Manago et al., 2012; Nabi et al., 2013; Valenzuela et al., 2009; Valkenburg et al., 2006). Social media serves as a vehicle for obtaining and disseminating information relating to political movements as well as a platform for heated debates that develops and/or mobilizes political movements (Eltantawy & Wiest, 2011; Gaby & Caren, 2012; Khondker, 2011; Lee

Table 1
Descriptive statistics on social resource loss on social media.

	N	Not at all/not applicable	Loss to a small degree	Loss to a moderate to great degree
Total	1208	815 (67.5%)	300 (24.9%)	92 (7.6%)
Sex				
Female	633	421 (66.5%)	173 (27.4%)	39 (6.1%)
Male	575	394 (68.6%)	127 (22.1%)	53 (9.3%)
Age group				
18–24	129	96 (74.3%)	27 (21.2%)	6 (4.5%)
25–34	188	124 (65.8%)	57 (30.1%)	8 (4.0%)
35–44	227	151 (66.5%)	55 (24.1%)	21 (9.4%)
45–54	242	156 (64.3%)	61 (25.3%)	25 (10.4%)
55–64	193	134 (69.3%)	36 (18.5%)	24 (12.3%)
≥ 65	213	143 (67.4%)	62 (29.0%)	8 (3.6%)
Missing	16	12 (75.9%)	3 (19.7%)	1 (4.4%)
Marital status				
Unmarried	438	306 (70.0%)	111 (25.4%)	20 (4.6%)
Married	756	498 (65.8%)	188 (24.8%)	71 (9.4%)
Missing	14	11 (81.4%)	2 (11.6%)	1 (7.0%)
Education level				
\leq Primary	215	148 (68.8%)	55 (25.5%)	12 (5.7%)
Secondary	543	366 (67.5%)	135 (24.9%)	41 (7.5%)
\geq Tertiary	442	296 (66.9%)	109 (24.5%)	38 (8.6%)
Missing	8	5 (64.3%)	2 (24.2%)	1 (11.5%)
Employment status				
Employed	697	455 (65.3%)	180 (25.9%)	61 (8.8%)
Unemployed	24	19 (79.4%)	2 (9.9%)	3 (10.8%)
Dependent	478	335 (70.0%)	117 (24.4%)	27 (5.7%)
Missing	8	6 (72.6%)	1 (15.5%)	11 (11.9%)
Family income				
\leq HK\$20,000	332	222 (67.0%)	81 (24.4%)	29 (8.6%)
HK\$20,000–\$29,999	194	130 (66.9%)	49 (25.4%)	15 (7.7%)
HK\$30,000–\$39,999	168	123 (73.6%)	34 (20.5%)	10 (5.9%)
HK\$40,000–\$49,999	118	77 (65.4%)	36 (30.4%)	5 (4.3%)
\geq HKD\$50,000	296	188 (63.4%)	80 (26.9%)	29 (9.7%)
Missing	101	75 (74.8%)	21 (20.6%)	5 (4.6%)

Note. Sample sizes and percentages slightly deviate from the original ones due to roundups after weighting.

Table 2
Hierarchical regression analyses of factors related to anxiety and depressive symptoms.

	Anxiety symptoms		Depressive symptoms	
	R ² change	β	R ² change	β
Step 1: Sociodemographic characteristics	0.050***	—	0.052***	—
Gender		−0.01		0.04
Age (in year)		−0.20***		−0.14**
Marital status		−0.05		−0.07*
Education level		−0.03		−0.15***
Employment status		0.04		−0.06
Family income		−0.14***		−0.08*
Years of residence in Hong Kong		−0.06		−0.05
Step 2: General social resources loss	0.016***	—	0.038***	—
Gender		−0.01		0.04
Age (in year)		−0.20***		−0.14***
Marital status		−0.05		−0.07*
Education level		−0.02		−0.14***
Employment status		0.04		−0.06
Family income		−0.13***		−0.08*
Years of residence in Hong Kong		−0.05		−0.05
Loss of social intimacy (family members)		0.13***		0.13***
Loss of social intimacy (friends)		0.002		0.11**
Step 3: Social resource loss on social media	0.001	—	0.007**	—
Gender		−0.01		0.04
Age (in year)		−0.20***		−0.15***
Marital status		−0.05		−0.07*
Education level		−0.03		−0.15***
Employment status		0.03		−0.07*
Family income		−0.13***		−0.08*
Years of residence in Hong Kong		−0.05		−0.05
Loss of social intimacy (family members)		0.12***		0.11**
Loss of social intimacy (friends)		−0.02		0.06
Social resource loss on social media		0.04		0.10**
Total R ²	0.067***		0.097***	

Note. *p < 0.05; **p < 0.01; ***p < 0.001.

Table 3
Hierarchical regression analysis testing for moderation by age for depressive symptoms.

	R ² change	β
Step 1: Sociodemographic characteristics	0.037***	—
Marital status		−0.10**
Education level		−0.10**
Employment status		−0.04
Family income		−0.08*
Step 2: General social resources loss	0.038***	—
Marital status		−0.10**
Education level		−0.09*
Employment status		−0.04
Family income		−0.06
Loss of social intimacy (family members)		0.13***
Loss of social intimacy (friends)		0.10**
Step 3: Social resource loss on social media	0.018***	—
Marital status		−0.07*
Education level		−0.16***
Employment status		−0.07*
Family income		−0.08*
Loss of social intimacy (family members)		0.11***
Loss of social intimacy (friends)		0.05
Social resource loss on social media		0.10**
Age (in year)		−0.15***
Step 4: Social resource loss on social media x Age	0.010**	—
Marital status		−0.06
Education level		−0.16***
Employment status		−0.07*
Family income		−0.08*
Loss of social intimacy (family members)		0.10**
Loss of social intimacy (friends)		0.04
Social resource loss on social media		0.11**
Age (in year)		−0.15***
Social resource loss on social media × Age		0.10**
Total R ²	0.096***	

Note. *p < 0.05; **p < 0.01; ***p < 0.001.

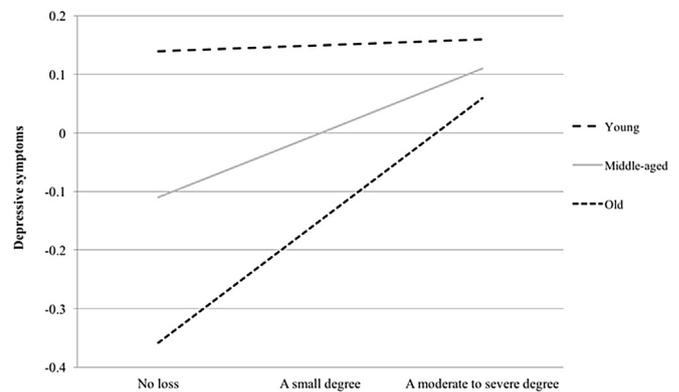


Fig. 1. Plot of the moderating effect of age on the association between social resource loss on social media and depressive symptoms.

& Chan, 2015). This study helps to fill a gap in the current literature by investigating whether social media is associated with mental health among middle-aged and older adults, and specifically during social and political upheaval. For example, loss of personal and social resources was consistently associated with psychological distress in time of social or political unrest. Loss of social resources (i.e., intimacy with at least one friend) predicted greater odds of major depression among Palestinians who were exposed to prolonged political violence and social upheaval (Canetti et al., 2010). Personal and social resource loss were found to be predictors of probable depression among Israeli settlers who were forced to move to Gaza due to ongoing terrorism (Hall et al., 2008). Based on the COR theory, this population-based study extends previous evidence by focusing on loss of interpersonal intimacy on social media and demonstrating a significant association of social

resource loss on social media with depressive symptoms, independent of sociodemographic characteristics and general social resource loss. Considering the fast growing middle-aged and older social media users (Brenner & Smith, 2013; Madden & Zickuhr, 2011), social media use could demonstrate a similar impact on mental health of people in different age groups during social and political upheaval. Future studies should investigate whether social resource loss on social media is associated with mental health among people of different ages in other stressful conditions.

Younger and older adults have demonstrated differential size and composition of network on social media in the past decades. Older adults tend to have less friends on social networking sites like Facebook (Barker, 2012; Chang, Choi, Bazarova, & Löckenhoff, 2015; McAndrew & Jeong, 2012). Among them, social media serves the function of connecting with family and close friends. Connecting with grandchildren has also been found to be the motivation for older adults to use information communication technology (ICT) (Quadrello et al., 2005). Older adults reported that ICT was for communicating with family and close friends only (Vroman, Arthanat, & Lysack, 2015). Relative to younger adults, older adults reported smaller networks of friends but they are more likely to perceive friends on Facebook as actual friends (Chang et al., 2015). In contrast, among American college students, only 21% of friends on social network were reported to be close connections, 27% were acquaintances, and 24% were connections gained through activities (Manago et al., 2012). A population-based survey conducted during the Umbrella Movement found that polarization of political views increased with age (The Chinese University of Hong Kong, 2014). In the present sample, the middle-aged and older respondents could have political views different from younger respondents. The ambiguity on universal suffrage could have triggered heated debate in both face-to-face and online interactions. Because older adults' networks on social media tend to be made up of family members and it is more upsetting to be at odds with a loved one than an acquaintance, disagreements and debates could bring older adults greater psychological distress than younger counterparts whose online networks may be comprised mainly of acquaintances. Beyond the focus of the current study, our data analysis found that loss of intimacy with family but not loss of intimacy with friends was significantly associated with depressive symptoms (Table 2). Similarly, the findings on social resource loss on social media could represent loss of intimacy with family on social media since the onset of the Umbrella Movement. As online and offline interpersonal interactions intertwine increasingly in our everyday life (Ellison et al., 2007; Reich, Subrahmanyam, & Espinoza, 2012; Subrahmanyam, Reich, Waechter, & Espinoza, 2008; Valkenburg & Peter, 2007), losing an online relationship might also indicate the status of actual relationship.

5. Limitations and conclusion

Several limitations warrant cautions. First, the present cross-sectional analyses could not determine causality between social resource loss on social media and psychological distress. This study did not assess respondents' preexisting mental health conditions, which might deplete social resources obtained from social networks, forming a resource-distress loss spiral (Dekel & Hobfoll, 2007; Hobfoll, 1998). Second, the telephone survey relied on self-reports. Respondents' identity and genuineness of the information they provided could not be verified. Response bias and social desirability could influence respondents' answers and discount data validity, though phone-based interviews have been found to be a valid method for assessing psychological variables in both cross-sectional and longitudinal designs (Hobfoll et al., 2011; Muskens et al., 2014). Third, it was possible that some

respondents could have been living abroad for long time and have limited understanding about the Umbrella Movement. Nevertheless, year(s) of residence in Hong Kong was included as one of the covariates in the current statistical analyses and random digit dialing has been considered a reliable mean to obtain representative sample in population-based epidemiological studies (Olson, Kelsey, Pearson, & Levin, 1992). Fourth, reliability of the single item measure of social resource loss on social media is questionable, while no information was provided on which platforms (i.e., Facebook, Twitter, Line, Whatsapp, etc.) and with whom the respondents experienced social resource loss, although this is one of the first epidemiologic studies on social media in a population-representative sample and single-item scales could be minimally different from multiple-item scales in terms of construct validity and predictive value (Bergkvist & Rossiter, 2007; Gardner, Cummings, Dunham, & Pierce, 1998).

Notwithstanding these limitations, the current study sheds light on whether social media is associated with mental health during social upheaval. This is one of the first studies that investigates social media in other age groups aside from college age populations. The findings suggest that given the fast growing population of middle-aged and older social media users, future psychological studies on information and communication technology should include representative samples in different age groups. This study also presents the first empirical investigation on the association between social media and psychological distress during social upheaval. Our findings highlight social resource loss on social media and its association with higher depressive symptoms among middle-aged and older adults, independent of general social resource loss. Future studies could investigate the psychological impact of social resource loss on social media in other stressful situations.

Conflict of interest

None declared.

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