Computers in Human Behavior 75 (2017) 527–537

Contents lists available at ScienceDirect

Computers in Human Behavior

journal homepage: www.elsevier.com/locate/comphumbeh

Full length article

The stress-buffering effect of self-disclosure on Facebook: An examination of stressful life events, social support, and mental health among college students

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ARTICLE INFO

Article history:
Received 28 February 2017
Received in revised form
11 May 2017
Accepted 29 May 2017
Available online 31 May 2017

Keywords:
Self-disclosure
Facebook
Social support
Mental health
Stressful life events

ABSTRACT

Stressful life events are viewed as the leading cause of psychological distress. Self-disclosure, however, could buffer the deleterious impact of stress on mental health. Recent studies show that college students are likely to engage in self-disclosure on social network sites (SNSs), but it is unclear to what extent they benefit from doing that. This study examined the effect of self-disclosure on SNSs on young adults' mental health. Survey data were collected from a probability sample of 560 university students. The results show that people tend to open up on Facebook when in times of stress and that self-disclosure on Facebook moderates the relationship between stressful life events and mental health. Facebook disclosure was also positively associated with enacted social support on Facebook, which led to increased perceived social support, enhanced life satisfaction, and reduced depression. SNSs, therefore, serve as a promising avenue for delivering health care and intervention.

1. Introduction

Studies have found that most lifetime mental disorders have first onset at the age of 18–24 (Kessler et al., 2005). Mental disorders have accounted for nearly half of the disease burden for young adults in the U.S. (Lozano et al., 2013). In 2015, the prevalence of major depression is 10.3% among U.S. adults aged 18 to 25, much higher than that in other age groups (Center for Behavioral Health Statistics and Quality, 2016). This problem is more salient in Asian countries. A large-scale survey in Hong Kong shows that the prevalence of depression, anxiety, and stress was 21%, 41%, and 27% respectively among first-year university students (Wong, Cheung, Chan, Ma, & Wa Tang, 2006). Among a variety of risk factors, stressful life events have been documented as the leading cause of psychological distress (Watson & Pennebaker, 1989). Daily hassles, traumas, and other stressors can trigger acute physical and mental illness (Kendler et al., 1995). However, openly expressing one's problems and negative feelings could help to mitigate distress and improves mental health (Jourard, 1971; Perls, 1969). Self-disclosure can also elicit social support otherwise unavailable if others do not know about someone's difficulties (Derlega, Metts, Petronio, & Margulis, 1993). Because of its therapeutic function, self-disclosure has been labeled the "talking cure" (Corcoran, 2000).

As the Internet is becoming deeply woven into people's daily life, an increasing number of self-disclosures are taking place in computer-mediated communication (CMC). Social network sites (SNSs), such as Facebook and Twitter, enable individuals to share their stories and feelings instantaneously (Choi & Toma, 2014) and express their support-based needs to a wide variety of contacts (Vitak & Ellison, 2012). In recent years, studies have found that college students are likely to talk about their mental health problems on SNSs (Lewis, Kaufman, & Christakis, 2008; Moreno et al., 2011). In evaluating undergraduates' status updates on Facebook, Moreno et al. (2011) found that approximately 25% of the observed profiles displayed depressive symptoms and 2.5% met the criteria for a major depressive episode. While the therapeutic function of self-disclosure has been well documented in traditional studies (e.g., Corcoran, 2000; Jourard, 1971), less certain is whether it still holds in the context of SNSs. In particular, it remains unclear to what extent the public sharing of distress on Facebook contributes to one's psychological well-being.

Social support obtained from online and offline ties can also influence one's mental health. Valkenburg, Peter, and Schouten (2006) found that time spent on Facebook had an indirect effect on adolescents' self-esteem and well-being, depending on the

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http://dx.doi.org/10.1016/j.chb.2017.05.043
0747-5632/

feedback received from their friends. Similarly, Park et al. (2015) demonstrated that failing to get responses such as "likes" and "comments" from Facebook friends can exacerbate users' depression (Park et al., 2015). Therefore, it is important to examine to what extent self-disclosure on Facebook contribute to one's social support and whether social support helps to improve mental health.

Given these limitations in the existing literature, this study proposes a conceptual model to examine the relationship between self-disclosure on SNSs and mental health, marrying the antecedents of SNS disclosures with their outcomes. The first objective of this study is to examine how stressful life events facilitate self-disclosure on SNSs and whether the stress-buffering effect of self-disclosure still holds in the context of SNSs. Since self-disclosure is a multifaceted construct (Wheeless & Grotz, 1976), the different roles of varying disclosure attributes in affecting mental health are taken into consideration. This study also explores the extent to which self-disclosure on Facebook contributes to social support, which in turn influences levels of depression and life satisfaction. Last but not least, the present study delineates the prevalence of depression among university students in Hong Kong and uncovers their sources of stress, thereby providing a context-rich understanding of the implications of SNSs in Chinese societies.

2. Literature review

2.1. Mental health and stressful life events

Studies have documented stressful life events as a trigger of acute mental illness such as major depression and anxiety disorders (Brown & Harris, 1978; Costello, 1982; Kendler et al., 1995). Stressful life events refer to the socially undesired events "whose advent is either indicative of, or requires a significant change in, the ongoing life pattern of the individual" (Holmes & Masuda, 1974, p. 36). Stressful life events can be related to health, social relations, and environments, such as personal illness and death of a close family member (Holmes & Rahe, 1967). Stressful life events could evoke "adaptive efforts by the human organism that are faulty in kind or duration, lower 'bodily resistance' and enhance the probability of disease occurrence" (Holmes & Masuda, 1974, p. 68).

Stressful life events also have significant effects on subjective well-being (Abbey & Andrews, 1985; McCullough, Huebner, & Laughlin, 2000). People under stress are likely to have decreased satisfaction with life (McCullough et al., 2000). As a major component of subjective well-being, life satisfaction refers to people's evaluation of their lives being purposeful and relationships rewarding (Diener, 2000). Such contentment comes from a cognitive judgment of one's life as a whole, which is primarily based on a person's own set of criteria rather than on standards set by others (Diener & Suh, 1997; Shin & Johnson, 1978). Although individuals' appraisal of their lives may depend on dispositional factors (Costa & McCrae, 1980), major life events can lead to a change in life satisfaction over and above the effects of personality (Headey & Wearing, 1989).

Scholars have pointed out that populations in a developmental transition are especially vulnerable to the occurrence and effects of negative events (Cohen, Burt, & Bjorck, 1987). Therefore, college students are likely to experience a wide spectrum of stressors that result in psychological distress and low life satisfaction. Grounded on previous literature, two hypotheses are proposed to examine the effects of stressful life events on depression and life satisfaction among college students:

H1. The intensity of stressful life events is (a) positively related to depression and (b) negatively related to satisfaction with life.

This study also aims to provide a timely assessment of the prevalence of depression among university students in Hong Kong. Studies conducted in Beijing and Hong Kong found that 43.9% of freshmen in Hong Kong exhibited depressive symptoms while the figure was 24.8% in Beijing (Song et al., 2008). Worries of educators and parents reached a peak as 22 Hong Kong students committed suicide within six months in 2016, signaling the alarming yet baffling mental health problems among young adults and the urgent need for prevention and intervention efforts. Therefore, a research question is proposed:

RQ1. How prevalent is depression among university students in Hong Kong?

2.2. Self-disclosure on social network sites (SNSs)

Self-disclosure is defined as "the act of revealing personal information to others" (Jourard, 1971, p. 2). It is what individuals verbally reveal about themselves to others, including thoughts, feelings, and experiences (Derlega et al., 1993). Studies show that individuals who are unable or unwilling to express their intense, negative emotions are more likely to develop psychological and physical problems (Locke & Colligan, 1986). Self-disclosure has been documented as a multidimensional construct, including amount, depth, honesty, intent, and valence (Wheeless & Grotz, 1976; Wheeless, 1978). *Amount* refers to the frequency and duration of an individual's disclosures, while *depth* indicates the degree of intimacy. *Honesty* reflects the accuracy and credibility of the disclosed information. *Intent* is the self-awareness and self-consciousness of an individual's disclosure. *Valence* of disclosure refers to if the information being revealed is negative or positive. This conceptualization of self-disclosure has been validated and widely used by subsequent research (e.g., Fusani, 1994; Gibbs, Ellison, & Heino, 2006; Leung, 2002) and thus is adopted in the present study.

In recent years, substantial research has demonstrated that computer-mediated communication (CMC) largely facilitate self-disclosure (Joinson, 2001; Tidwell & Walther, 2002). Certain characteristics of CMC, such as lack of nonverbal cues and controllability, prompt individuals to engage in selective self-presentation, resulting in more frequent and intimate disclosures (Tidwell & Walther, 2002). In their functional model of self-disclosure on SNSs, Bazarova and Choi (2014) claimed that people pursued strategic goals when self-disclosing on SNSs. For example, public status updates are largely driven by social validation and self-expression/relief goals, while relational development is the primary goal for self-disclosing in wall posts and private messages. However, previous research primarily focused on individuals' self-presentation on Facebook while overlooking this site as an outlet for negative feelings.

Therefore, this study aims to fill this gap and focuse on Facebook disclosures motivated by self-expression/relief goals. Traditional studies have documented life stress as a trigger of self-disclosure (Persons & Marks, 1970; Stiles, 1987). In his "fever model of disclosure", Stiles (1987) contended that people tend to disclose more when they are distressed, as "upsetting or stressful events generate a subjective sense of pressure, of something being bottled up" (p. 261). Given that the depth and accuracy of the disclosure largely determine how much understanding they can get from others (Stiles, 1987), people tend to disclose intimately and honestly in order to make the most of self-disclosure. Therefore, it is reasonable to assume that individuals in times of stress are likely to make more frequent, more intimate, and more honest disclosures on SNSs.

Studies have also suggested that people tend to disclose deliberately when revealing negative aspects of themselves. In his

stigma management framework, Goffman (1963) argued that individuals strategically manage their identity through techniques of information control. They tend to share nothing to outsiders and share everything to people who provide them social support (Goffman, 1963). This is partly because sharing negative events makes a discloser less desirable, as people do not like others who are unhappy or constantly grumbling (Lerner & Simmons, 1966; Strack & Coyne, 1983). Guided by a "best outcome" formula, people attempt to present themselves in a way that maximizes either others' view of them or their own sense of fitting in well with the social norms (Goffman, 1959). Therefore, people are likely to engage in more consciously intended disclosures when experiencing stressful life events than when they are not.

In view of the abovementioned literature, it is hypothesized that:

H2. People with higher intensity of stressful life events tend to make (a) greater amounts, (b) more intimate, (c) more honest, and (d) more consciously intended self-disclosure on Facebook.

2.3. Self-disclosure on SNSs and mental health

Studies on the mental health implications of SNS use produce mixed results. Some scholars found a positive relationship between SNS disclosures and well-being (Kim & Lee, 2011; Valkenburg et al., 2006), while others argued that Facebook interactions led to greater psychological distress (Chen & Lee, 2013; Forest & Wood, 2012). Such inconsistency may due to the fact that previous studies only focused on the bivariate association between SNS use and mental health, while overlooking the effects of individual predispositions such as stressful life events. In fact, studies in psychotherapy have suggested a stress-buffering effect of self-disclosure (Derlega et al., 1993; Kahn & Hessling, 2001; Stiles, 1987), indicating that self-disclosure shielded people from being acutely plagued by life stress. Therefore, stressful life events should be taken into account when examining the effects of self-disclosure on SNSs on mental health.

The buffering effect of self-disclosure can be attributed to two mechanisms. First, venting negative feelings can unburden oneself and generate a sense of relief. Just like shouting out loud towards a valley, adverse events and negative feelings become less toxic when expressed, which documented as the "cathartic effect" (Stiles, 1987, p. 263). Second, self-disclosure may provide a release from thinking about upsetting events, allowing the person to reevaluate what they are going through and rearrange their memory, such that their understanding of the event and the self is enhanced (Feldman, Joormann, & Johnson, 2008).

Despite the stress-buffering effect of self-disclosure, less certain is whether this therapeutic function still holds in the context of SNSs. Moreno, Jelenchick, and Kota (2013) have argued that students with mild depression experienced an emotional relief after self-disclosing on Facebook, yet those with more severe depression did not benefit from their actions. Moreover, Park et al. (2015) found that failing to get supportive responses from their Facebook friends might exacerbate individuals' depressed mood instead of attenuating it. Given the sparse and inconsistent empirical studies, a research question is formulated:

RQ2. How does self-disclosure on SNSs moderate the effect of stressful life events on (a) depression and (b) satisfaction with life?

2.4. Responsiveness and social support

Apart from the psychological benefits of self-disclosure, individuals also gain social benefits from others' responses (Derlega et al., 1993). Although the mere expression of negative feelings helps to alleviate stress, disclosers often expect to obtain particular resource from others, be it emotional support or tangible assistance (Clark & Mills, 1979). According to Derlega et al. (1993), "self-disclosure is a vehicle for obtaining social support that might not be available if other people did not know about one's difficulties" (p. 111). Lin (1986) defined social support as "perceived or actual instrumental and/or expressive provisions supplied by the community, social networks, and confiding partners" (p. 18). Previous classifications of social support fall into two camps: by function and by the degree of subjectivity (Barrera, 1986; Song, Son, & Lin, 2011; Tardy, 1985). The functional components of social support refer to the particular functions interpersonal relationships serve, usually encompassing emotional, instrumental, and informational support (House, 1981). In addition, scholars have made a distinction between perceived social support and enacted social support according to the degree of subjectivity (Barrera, 1986).

While perceived social support assesses individuals' perceptions of the general availability of support (Sarason, Sarason, & Pierce, 1990), enacted social support refers to the specific supportive behaviors provided to individuals by their social networks (Barrera, 1986). Perceived social support is thought to be an evaluative process which is "subject to individual differences in perceptual, judgment, and memory processes that may result in idiosyncratic perception of supportive events" (Haber, Cohen, Lucas, & Baltes, 2007, p. 133). Enacted social support, however, gauges specific supportive behaviors rather than the general impression, which might accurately reflect actual support provided by one's social networks (Barrera, 1986; Haber et al., 2007).

Despite the distinction between enacted social support and perceived social support, few studies of the support-based implications of SNS use drew a clear line between the two. Li, Chen, and Popiel's (2015) recent study examined the extent to which Facebook interactions contribute to enacted social support on Facebook and perceived social support in general. They argued that actually receiving assistance from SNS friends served as a more accurate measure to gauge the support-based benefit of SNSs compared with perceived social support in general. This study is, to the best of our knowledge, the only one that distinguished enacted social support from perceived social support in examining the support-based implications of SNSs.

SNSs have been lauded for augmenting individuals' online social support (Ellison, Steinfield, & Lampe, 2007; Vitak & Ellison, 2012). The broadcasting affordance of SNSs enables individuals to express their support-based needs to a whole network of friends. The interactive features of SNSs such as "like" and "comment" allow users to respond to others' requests in a timely manner, extending tangible or intangible assistance to those in need of help (Gray, Ellison, Vitak, & Lampe, 2013). Moreover, it is reasonable to believe that enacted social support on SNSs is related to perceived social support. Traditional studies found that perceptions of social support were largely determined by actual assistance received from others (Thoits, 1986). Enacted social support on SNSs may serve as contextual cues that activate individuals' perceived social support. For example, Barrera, Glasgow, Mckay, Boles, and Feil (2002) found that actual support received from Internet-based interactions predicted perceived support among people with health-related concerns. Drawing on previous studies, it is assumed that self-disclosure on Facebook could contribute to enacted social support on Facebook, which is associated with one's perceived social support in general. Thus, the following hypotheses are proposed:

H3. Self-disclosure on SNSs is positively related to enacted social support on SNSs.

H4. Enacted social support on Facebook is positively related to perceived social support.

Both perceived and enacted social support have been found to improve mental health (Andrykowski & Cordova, 1998; Kornblith et al., 2001). Nabi, Prestin, and So (2013) found that Facebook network size was associated with higher perceptions of social support, which led to reduced stress and greater well-being. Failing to obtain positive responses from others, however, might exacerbate one's psychological well-being rather than ameliorate it (Franzoi & Davis, 1985). According to the stress-support matching hypothesis (Cohen & McKay, 1984; Cutrona & Russell, 1990), the actual assistance provided by others help to reduce stress by promoting coping strategies, as long as the form of assistance matches the demands of the stressor. For example, getting advice from a Facebook friend serves as a coping strategy when an individual is in times of stress, which could reduce his or her level of depression. In view of the previous literature, the present study proposed the following hypotheses:

H5. Perceived social support in general is (a) negatively related to depression and (b) positively related to satisfaction with life.

H6. Enacted social support on Facebook is (a) negatively related to depression and (b) positively related to satisfaction with life.

Moreover, this study attempted to uncover the antecedents of depression and life satisfaction in a multivariate fashion. The following research question is asked:

RQ3. In what way(s) do stressful life events, self-disclosure on Facebook, enacted social support on Facebook, and perceived social support predict (a) depression and (b) satisfaction with life?

3. Methodology

3.1. Sample and sampling procedure

This study employed paper-based survey for data collection. Using stratified sampling method, the researcher first chose one university from eight universities in Hong Kong and then randomly selected 10 departments. Within each department, two or three middle-sized or big classes with more than 50 students were randomly selected, totaling 17 classes. Prior approvals were sought from course instructors, and alternative courses were used if the instructors refused to participate. Pilot tests of the questionnaire were executed among 73 students to validate the instruments and optimize the research design.

The survey was conducted in classrooms during class time or class break in April 2016. The researcher entered the classrooms and gave instructions to students before distributing the questionnaires. Participation of the survey was on a voluntary basis and students could withdraw from the study at any time. Students were informed that the survey results were only used for academic purpose and all personal information would be kept confidential. An informed consent form was attached to each questionnaire, explicating the purposes, procedures, benefits, and risks of the study. A total of 850 questionnaires were distributed. After deleting blank and incomplete questionnaires, 573 valid questionnaires were collected, yielding a response rate of 67.4%.

Among the 573 respondents, 59.7% were female and 40.3% were male. 98.3% of the students were between 18 and 25 years old (Mean = 2.0, S.D. = 0.13). The sample consisted of 28.8% freshmen, 31.1% sophomore, 23.6% junior, and 16.2% senior (Mean = 2.27, S.D. = 1.05). Almost half of the respondents majored in social science and humanity (48.9%) and the other half were from departments of engineering and science (51.1%). As for residence, 51.5% lived at home and 48.5% lived on campus. The majority of the respondents were local students in Hong Kong (92.1%), followed by 33 (5.8%) students from Mainland China and 12 (2.1%) international students. Of the 573 undergraduates, 560 (97.7%) were Facebook users.

3.2. Measures

3.2.1. Facebook use

Respondents were first asked if they had a Facebook profile. Those who didn't have one were directed to questions regarding mental health, while eligible participants were asked how many minutes per day on average they spent on Facebook in the past week. A six-point scale is used, with 0 = less than 10 min, 1 = 10–30 min, 2 = 31–60 min, 3 = 1–2 h, 4 = 2–3 h, 5 = more than 3 h (mean = 2.66, S.D. = 1.56). Participants were also asked to indicate how many total Facebook friends they have by rating a six-point scale, where 0 = less than 10, 1 = 11–100, 2 = 101–200, 3 = 201–300, 4 = 301–400, 5 = more than 400 (mean = 3.78, S.D. = 1.40).

3.2.2. Self-disclosure on Facebook

To capture the multidimensional nature of self-disclosure on Facebook, this study used Wheeless and Grotz's (1976) General Disclosiveness Scale (GSD). Four of the subscales were used, including amount, intimacy, honesty, and intent. Items were modified to refer to interactions on Facebook based on previous studies (Gibbs et al., 2006; Vitak & Ellison, 2012). A 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree were used.

The factor structure of Facebook disclosure was examined via a principle components factors analysis (with Varimax rotation) of these items, which yielded three dimensions with an eigenvalue greater than 1.0, accounting for 78.13% of the variance. As shown in Table 1, the first factor was “Facebook disclosure amount/intimacy” (eigenvalue = 3.72; 46.51% of the variance explained; alpha = 0.85), consisting of four items reflecting the width and depth of Facebook disclosures. “Facebook disclosure honesty” was the second factor (eigenvalue = 1.62, alpha = 0.82), explaining 20.22% of the variance. It included two items indicating that the respondents self-disclosed on Facebook accurately and honestly. The third factor “Facebook disclosure intent” (eigenvalue = 1.02; 11.40% of the variance explained; alpha = 0.82) included two items illustrating whether the disclosures on Facebook were consciously intended.

3.2.3. Stressful life events

A list of eight stressful life events was derived from past research (Ross, Niebling, & Heckert, 1999) and pre-survey focus groups sessions. Respondents were asked to indicate whether they have experienced the listed events during the previous six months. If it was the case, they were asked to assess the relative stressfulness of each event that happened to them. Items were rated on a 5-point scale, with 1 = did not occur and 5 = occurred and extremely stressful. Principal components factor analysis was conducted to generate three dimensions of stressful life events, explaining 77.35% of the total variance (see Table 2). The three-factor solution was labeled “academic stressor”, “interpersonal stressor”, and “environmental stressor”. Cronbach's alpha values ranged from .70 to .74.

3.2.4. Depression

Depression was measured with the Patient Health Questionnaire (PHQ-9; Kroenke, Spitzer, & Williams, 2001). The nine-item clinical screen is based on DSM-IV criteria for a major depression episode and inquiries about the frequency of depression symptoms

Table 1
Factor analysis of self-disclosure on Facebook.

How much do you agree with the following statements?	Factor Loadings			Mean	S.D.
	1	2	3		
Disclosure amount/intimacy				1.79	.77
1. My conversation lasts a long time when I am discussing myself on Facebook.	.86	.10	.16	1.85	.91
2. I often talk about myself on Facebook.	.85	.09	.12	1.98	1.03
3. I often disclose intimate, personal things about myself on Facebook without hesitation.	.78	.35	-.08	1.57	.80
4. I intimately disclosure who I really am, openly and fully on Facebook.	.72	.38	.02	1.76	.94
Disclosure honesty				2.40	1.04
5. My self-disclosures on Facebook are accurate reflections of who I really am.	.25	.87	.14	2.30	1.10
6. I am always honest in my self-disclosures on Facebook.	.23	.84	.25	2.49	1.16
Disclosure intent				3.16	1.11
7. When I reveal my feelings about myself on Facebook I consciously intent to do so.	.12	.11	.91	3.25	1.22
8. When I am self-disclosing on Facebook, I am always aware of what I am revealing.	.02	.21	.89	3.07	1.19
Eigenvalue	3.72	1.62	1.02		
Variance explained	46.51	20.22	11.40		
Cronbach's alpha	.85	.82	.82		

Notes: Principal components factor analysis with Varimax rotation, explaining 78.13% of the variance. Individual items ranged from 1 = strongly disagree to 5 = strongly agree, scales constructed by taking means of items. N = 560.

Table 2
Factor analysis of stressful life events.

How often did the following stressful life events occur to you in the past 6 months?	Factor Loadings			Mean	S.D.
	1	2	3		
Academic stressor				3.39	.79
1. Schoolwork overload	.88	.14	-.02	3.53	.85
2. Poor academic performance	.87	.09	.14	3.25	.93
Interpersonal stressor				2.26	.88
3. Trouble with friends/classmates	.10	.88	.15	2.36	1.02
4. Trouble with parents/teachers	.14	.84	.22	2.15	.96
Environmental stressor				2.18	.90
5. Change in sleeping/eating habits	-.07	.16	.86	2.41	1.09
6. Change in living environment	.21	.20	.80	1.94	1.02
Eigenvalue	2.43	1.33	1.00		
Variance explained (%)	40.50	22.19	14.66		
Cronbach's alpha	.74	.73	.70		

Notes: Principal components factor analysis with Varimax rotation, explaining 77.35% of the variance. Individual items ranged from 1 = did not occur to 5 = occurred and extremely stressful, scales constructed by taking means of items. N = 560.

experienced in the past two weeks. Respondents were asked to rate a 4-point scale ranging from 0 (= not at all) to 3 (= nearly every day). An overall score was calculated by summing responses to all of the items, ranging from 0 to 27. A score of less than 5 suggests no depression, 5–10 suggests mild depression, 11–15 indicates moderate depression, and a score over 15 signals severe depression. Previous studies have suggested a score of ≥10 to be the optimum cutoff point for differentiating depressed and non-depressed individuals (Kroenke et al., 2001). The mean PHQ-9 total score for the study sample was 8.45 (SD = 0.10) and Cronbach's alpha was .86.

3.2.5. Satisfaction with life

Respondents were asked to judge the quality of their lives with a five-item Satisfaction with Life Scale (SWLS) (Diener, Suh, & Oishi, 1997; Pavot & Diener, 1993). The five items included: (a) in most ways my life is close to my ideal, (b) the conditions of my life are excellent, (c) I am satisfied with my life, (d) so far I have gotten the important things I want in life, and (e) if I could live my life over, I would change almost nothing (Cronbach's alpha = 0.84). Responses were rated on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree).

3.2.6. Social support

Enacted social support on Facebook was measured using four items developed by Li, Chen, and Popiel (2015), indicating the frequency of receiving social support on Facebook via a 5-opoint Likert scale (1 = never to 5 = all the time). The four items included (a) encouragement from Facebook friends to feel better about yourself, (b) tangible help from Facebook friends to deal with difficulties, (c) advice from Facebook friends to solve problems, and (d) information provided by Facebook friends to understand a situation (Cronbach's alpha = 0.85). Perceived social support was measured by taking 5 items out of a battery of 19 items from a modified version of Medical Outcome Study (MOS) social support scale (Sherbourne & Stewart, 1991). Each item was measured by a five-point Likert scale from 1 = never to 5 = all the time. The items included (a) someone to give you good advice about a crisis, (b) someone to help with daily chores if you were sick, (c) someone to confide in or talk to about yourself or your problems, (d) someone to show you love and affections, and (e) someone to have a good time with (Cronbach's alpha = 0.84).

4. Results

In our sample, 97.7% of the undergraduate students were Facebook users. As the focal point of this study is self-disclosure on Facebook, the remainder of our analyses was based only on data from Facebook members (N = 560). To answer RQ1, the prevalence of depression among college students in Hong Kong was delineated. PHQ-9 score of 5, 10, and 15 represents the cutoff point of mild, moderate, and severe depressive symptoms, respectively. As shown in Table 3, 22.1% of the respondents had total scores

Table 3
PHQ-9 screening results.

Classification	Depressive symptoms	Number	Percentage
Non-depressed	No depression	124	22.1%
	Mild depression	236	42.1%
Depressed	Moderate depression	119	21.3%
	Severe depression	81	14.5%

Notes: The non-depressed are those with a PHQ-9 score <10, while the depressed have a PHQ-9 score ≥10. A score of 0–4 suggests no depression, 5–9 indicates mild depression, 10–14 suggests moderate depression, and 15–27 indicates severe depression. N = 560.

indicating no depressive symptom, whereas 42.1% met criteria for mild depression. 21.3% and 14.5% of the sample have moderate depression and severe depression, respectively. Given that previous studies have suggested a score of ≥10 to be the score signaling a major depression (Gilbody, Richards, Brealey, & Hewitt, 2007), respondents were further categorized into two groups—the depressed (35.8%) and the non-depressed (64.2%).

4.1. Hypotheses testing

Zero-order correlations among each of the major variables were examined to check for evidence of multicollinearity. All correlations were less than .5, well below the recommended threshold of .7 (Tabachnick, Fidell, & Osterlind, 2001), indicating that there was no problem of confounding (see Table 4).

H1a and H1b proposed that the intensity of stressful life events was positively related to the level of depression and was negatively related to satisfaction with life. Results of hierarchical regression analysis in Table 5 reveal that, after controlling for demographics, time spent on Facebook, and Facebook network size, depression was significantly associated with academic stressors ($r = 0.37$, $p < .001$), interpersonal stressors ($r = 0.15$, $p < .01$), and environmental stressors ($r = 0.13$, $p < .01$). Moreover, life satisfaction was significantly related to academic stressors ($r = -.26$, $p < .001$) and interpersonal stressors ($r = -.18$, $p < .001$), yet was not related to environment stressors ($r = -.06$, $p > .05$). Thus, H1a and H1b were largely supported.

H2 hypothesized that people with higher intensity of stressful life events made (a) more frequent (b) more intimate (c) more honest and (d) more consciously intended self-disclosure on Facebook. Since factor analysis shows a considerable overlap between amount and intimacy, an amount/intimacy subscale is used in this analysis. Results of hierarchical regression analysis in Table 5 show that interpersonal stressors ($\beta = 0.12$, $p < .01$) and environmental stressors ($\beta = 0.16$, $p < .001$) were significantly and positively related to amount/intimacy of self-disclosure on Facebook. Environmental stressors ($\beta = 0.11$, $p < .01$) were also significantly and positively associated with intent. However, life stressors had nothing to do with honesty. Therefore, H2a and H2b were supported, H3c was rejected, and H3d received little support.

To explore the stress-buffering effect of self-disclosure on Facebook (RQ2), the interaction between Facebook disclosure and

Table 4
Zero-order correlations among all key variables.

	2	3	4	5	6	7	8	9	10	11	12
1. Academic stressors	.27***	.18***	.42***	-.33***	-.07	.00	.03	.04	.06	-.03	-.04
2. Interpersonal stressors		.41***	.30***	-.22***	-.12**	.06	.11**	-.02	.09*	.08*	.03
3. Environmental stressors			.25***	-.06	.04	.17***	.13**	-.01	.13**	-.01	.05
4. Depression				-.38*	-.11**	-.03	.02	-.07	.04	.02	.00
5. Satisfaction with life					.25***	.14***	.06	.07	-.03	-.04	-.03
6. Perceived social support						.15***	-.11*	.02	.07	.05	.12**
7. Enacted social support on FB							.41***	.44***	.40***	.09*	.13**
8. Amount/intimacy								.50***	.20***	.15***	.04
9. Honesty									.38***	.09*	.02
10. Intent										.24***	.29***
11. Time spent on Facebook											.33***
12. Facebook network size											

Notes: ***p < .001; **p < .01; *p < .05; N = 560.

Table 5
Hierarchical regression analysis of mental health and self-disclosure on Facebook.

	Mental Health		Self-disclosure on Facebook		
	Depression β	Satisfaction with life β	Amount/intimacy β	Honesty β	Intent β
Block 1: *Control variables*					
Gender (male = 1)	-.03	-.04	.12**	.08	.04
Year in school	.05	.02	.07	.05	.02
Major (social science = 1)	.05	.10*	.00	-.05	.03
Residence (on campus = 1)	.00	.01	.08	-.01	.08
Time spend on Facebook	.03	-.03	.15***	.10*	.16***
Facebook network size	-.03	-.06	-.01	.00	.21***
$\triangle R^2$	*.00*	*.01*	*.03*	*.01*	*.10*
Block 2: *Stressful life events*					
Academic stressors	.37***	-.26***	.02	.04	.05
Interpersonal stressors	.15**	-.18***	.12**	-.03	.02
Environmental stressors	.13**	.06	.16***	.00	.11**
$\triangle R^2$	*.23*	*.11*	*.07*	*.00*	*.02*
R^2	.24	.13	.11	.03	.13
Adjusted R^2	.23	.12	.10	.01	.12
F	18.86***	9.07***	7.29***	1.58	8.35***

Notes: ***p < .001; **p < .01; *p < .05; N = 560.

Table 6
Moderation effect of self-disclosure on Facebook between stressful life events and depression/satisfaction with life.

	Depression β	Satisfaction with life β
Block 1: *Control variables*		
Gender (male = 1)	-.03	-.04
Year in school	.08*	-.01
Major (social science = 1)	.02	.12**
Residence (on campus = 1)	-.01	.01
Time spend on Facebook	.03	-.05
Facebook network size	-.03	-.05
$\triangle R^2$	*.00*	*.01*
Block 2: *Main effect*		
Stressful life events (composite)	.45***	-.30***
Amount/Intimacy	.01	.09
Honesty	-.08	.05
Intent	.00	-.01
$\triangle R^2$	*.19*	*.07*
Block 3: *Interaction terms*		
Amount/Intimacy * stressful life events	-.05	.13*
Honesty * stressful life events	.03	-.18**
Intent * stressful life events	-.09*	.10*
$\triangle R^2$	*.01*	*.02*
Total R^2	.22	.12
Total Adjusted R^2	.20	.10
F	11.74***	5.61***

Notes: All variables were standardized by calculating z-scores in order to simply the interpretation of coefficients. ***$p < .001$; **$p < .01$; *$p < .05$; N = 560.

stressful life events was examined. Hierarchical regression analyses were performed with control variables entered in the first block and the main effects of stressful life events and sub-dimensions of Facebook disclosures in the second block. To gauge the overall effect of stressful life events, the three types of stressors were merged together to form a composite construct. The interaction terms were formed by standardizing the main effects first to avoid multicollinearity, and then multiplying the two main effects based on the traditional method of testing interaction effects (Hayes & Matthes, 2009). As shown in Table 6, intent of Facebook disclosure significantly moderated the relationship between stressful life events and depression ($\beta = -.09$, $p < .05$), suggesting that people with high levels of stressful life events experienced fewer depressive symptoms if they made more consciously intended self-disclosures on Facebook. Disclosure amount/intimacy ($\beta = 0.13$, $p < .05$), honesty ($\beta = -.18$, $p < .01$), and intent ($\beta = 0.10$, $p < .05$) moderated the relationship between stressful life events and satisfaction with life. When in times of stress, those who engaged in more intimate and more intentional disclosures on Facebook experienced higher levels of life satisfaction than those who seldom self-disclosed. These interaction effects are plotted in Fig. 1.

H3 proposed that self-disclosure on Facebook was positively related to enacted social support on Facebook. This hypothesis was largely supported by results in Table 7, showing that disclosure amount/intimacy ($\beta = 0.23$, $p < .001$), disclosure honesty ($\beta = 0.25$, $p < .001$), and disclosure intent ($\beta = 0.24$, $p < .001$) were significantly and positively related to enacted social support on Facebook. H4 proposed that enacted social support on Facebook was positively related to perceived social support, which was also fully supported ($\beta = 0.19$, $p < .001$; see Table 7). In addition, a negative relationship was found between amount/intimacy of self-disclosure on Facebook and perceived social support ($\beta = -.17$, $p < .01$), suggesting that intimately talking about oneself on Facebook decreased perceived social support. Interpersonal stressors ($\beta = -.19$, $p < .001$) were negatively related to perceived social support, while environmental stressors ($\beta = 0.10$, $p < .05$) positively associated with it. Gender (being male, $\beta = -.24$, $p < .001$) and year in school ($\beta = -.09$, $p < .05$) were also significant predictors of perceived social support, indicating that female students with the lower year in school had higher levels of perceived social support.

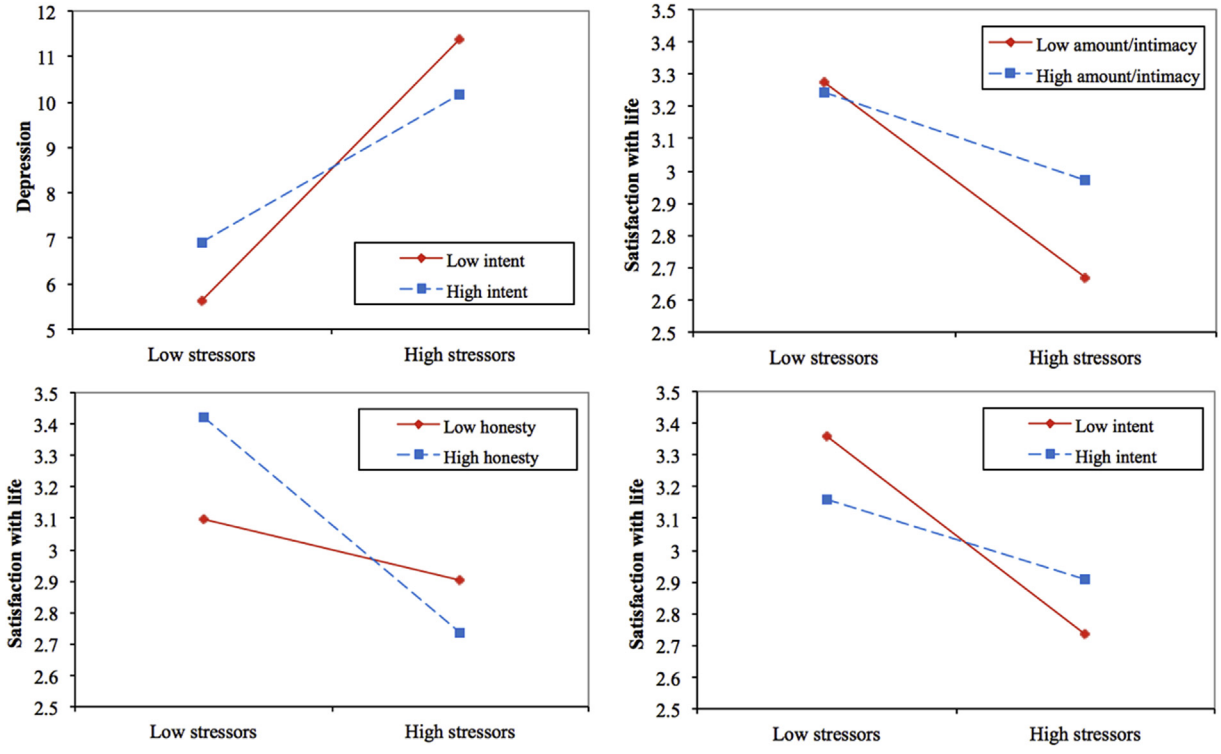

Fig. 1. Interaction of self-disclosure on Facebook and stressful life events.

Table 7
Hierarchical regression analysis on social support and mental health.

	Social support		Mental health	
	Enacted social support on FB β	Perceived social support in general β	Depression β	Satisfaction with life β
Block 1: *Control variables*				
Gender (male = 1)	-.02	-.24***	-.05	.00
Year in school	.01	-.09*	.05	.04
Major (social science = 1)	-.01	-.04	.05	.12**
Residence (on campus = 1)	.06	-.06	-.01	.01
Time spend on Facebook	-.05	.04	.04	-.04
Facebook network size	.05	.04	-.03	-.07
$\triangle R^2$	*.02*	*.05*	*.00*	*.01*
Block 2: *Stressful life events*				
Academic stressors	-.06	-.07	.36***	-.24***
Interpersonal stressors	-.01	-.19***	.13**	-.13**
Environmental stressors	.11**	.10*	.14**	.01
$\triangle R^2$	*.02*	*.05*	*.23*	*.11*
Block 3: *Facebook disclosure*				
Amount/Intimacy	.23***	-.17**	-.01	.07
Honesty	.25***	.04	-.08	.03
Intent	.24***	-.01	.03	-.06
$\triangle R^2$	*.26*	*.01*	*.00*	*.00*
Block 4: *Social support*				
Enacted social support on FB	–	.19***	-.04	.12**
Perceived social support	–	–	-.09*	.25***
$\triangle R^2$	–	*.02*	*.01*	*.07*
R^2	.31	.15	.26	.21
Adjusted R^2	.30	.13	.24	.19
F	20.68***	7.25***	12.98***	10.45***

Notes: ***$p < .001$; **$p < .01$; *$p < .05$; N = 560.

H5 proposed that perceived social support was (a) negatively related to depression and (b) positively related to satisfaction with life. As shown in Table 7, a significant and negative relationship was found between perceived social support and depression ($\beta = -.09$, $p < .05$), confirming H5a. Perceived social support and life satisfaction was significantly and positively related ($\beta = 0.25$, $p < .001$), lending support to H5b. Thus, H5a and H5b were fully supported. H6 proposed that enacted social support on Facebook was (a) negatively related to depression and (b) positively related to satisfaction with life. Results show that enacted social support on Facebook was not significantly related to depression ($\beta = -.04$, $p > .05$), but was significantly and positively associated with life satisfaction ($\beta = 0.12$, $p < .01$). Therefore, H6a was rejected and H6b supported.

4.2. Predicting depression and satisfaction with life

Last, this study examined predictors of depression and life satisfaction in a multivariate fashion. Results in Table 7 show that stressful life events are the strongest predictors of depression, accounting for 23% of the variance. Academic stressors ($\beta = 0.36$, $p < .001$), interpersonal stressors ($\beta = 0.13$, $p < .01$), and environmental stressors ($\beta = 0.14$, $p < .01$) were all positively related to depression. Adding perceived social support only contributed .01 adjusted R^2 to the equation, suggesting that perceived social support was not conducive to reduced depressive symptoms.

Further, satisfaction with life was predicted by major ($\beta = 0.12$, $p < .01$), academic stressors ($\beta = -.24$, $p < .001$), interpersonal stressors ($\beta = -.13$, $p < .01$), enacted social support on Facebook ($\beta = 0.12$, $p < .05$) and perceived social support ($\beta = 0.25$, $p < .001$). The adjusted R^2 for control variables and stressful life events was .12; adding enacted and perceived social support raised this statistic to .19. Interestingly, self-disclosure on Facebook had no effect on depression and life satisfaction, suggesting that revealing one's feelings and problems didn't directly contribute to improved mental health.

5. Discussion and conclusion

This study proposed a conceptual model linking the antecedents of self-disclosure on SNSs with its outcomes. Stressful life events were found to facilitate self-disclosure on Facebook, in particular intimate and intentional disclosures. Opening up on Facebook protected people from the slings and arrows of stressful life events and helped people mobilize social support. This study extended the stress-buffering effects of self-disclosure from offline to online settings and presented a comprehensive examination of the mental health implications of self-disclosure on SNSs. The present study first assessed the prevalence of depression among college students in Hong Kong and the effects of stressful life events on mental health. The results show that 35.8% of the respondents met the criteria for a major depression. Students faced with more stressors reported higher levels of depression and lower levels of life satisfaction than those with fewer stressors. Academic stressors are the most salient problems among Hong Kong students, followed by interpersonal stressors and environmental stressors.

The high prevalence of depression among young adults in Hong Kong echoes previous studies showing that 43.9% of freshmen in Hong Kong exhibited depressive symptoms (Song et al., 2008). More alarmingly, a city-wide survey shows that 51% of secondary school students in Hong Kong showed signs of depression at different levels (Cheung, 2015). Among a number of contributing factors, Hong Kong's pressure-cooker education system is largely to blame. The exam-driven curriculum and score-oriented assessments compel university students to work hard in order to secure a prosperous job. More importantly, mental health services in Hong Kong and other Asian countries lag significantly behind Western countries, as evidenced by the fact that there are only 345 working psychiatrists in Hong Kong, which has a population of over 7 million (Heifetz, 2016). Policy makers should reflect on the current education and healthcare system and pay more attention to students' mental health.

Stiles's (1987) fever model of disclosure was generally supported by this study, suggesting that stressful life events motivated self-disclosure on Facebook. In particular, this study found that in times of stress individuals share greater amounts of intimate information and have more intentional disclosures on Facebook. This may be caused by the heightened negative emotions generated by stressful life events so intense that need to be shared. This finding also highlighted the need for information control when individuals engaging in self-disclosure (Goffman, 1963; O'sullivan, 2000). Although people feel compelled to confide in others when faced with stress, they tend to deliberately construct what they post on Facebook in order to reduce potential risks and manage their image. This resonated with a most recent study suggesting that young adults tended to engage in deceptive like-seeking behavior (e.g., photo-editing) to gain attention and validation on Instagram (Dumas, Maxwell-Smith, Davis, & Giulietti, 2017). Similarly, scholar also found that students with or without distress posted roughly the same number of positive and negative posts, perhaps due to self-presentation concerns (Bazarova, Choi, Whitlock, Cosley, & Sosik, 2017). Therefore, the goals of self-presentation and impression management are still salient in stress-reducing disclosures on Facebook.

Furthermore, this study uncovered a stress-buffering effect of Facebook disclosure. Moderation analyses show that intentional disclosures moderate the stress-depression linkage, suggesting that deliberately sharing one's experiences and emotions helps decrease depressive symptoms in times of stress. Moreover, the amount/intimacy, honesty, and intent of self-disclosure were found to moderate the relationship between stressful life events and life satisfaction. When confronting stressful life events, individuals who made intimate and intentional disclosures on Facebook experienced increased life satisfaction. These findings are in line with existing evidence that people are likely to be healthier and happier if they talk about their problems with others (Coates & Winston, 1987), presumably because of the catharsis effect that expressing one's concerns makes a person feel unburdened and relieved (Stiles, 1987).

Whereas intimate and intentional disclosures buffer stress, honest disclosures have a detrimental effect. For individuals with high levels of stressful life events, disclosing more honestly on Facebook led to lower life satisfaction compared with those who were less honest. This echoed Gibbs et al.'s (2006) study showing that honesty has a negative effect on perceived online dating success. Similarly, individuals who disclose negative aspects of themselves bear the risk of being disliked by others (Strack & Coyne, 1983; Winer, Bonner, Blaney, & Murray, 1981). It is possible that speaking candidly about oneself may reveal flaws in or negative characteristics of themselves, making him or her a less desirable partner or friend. Therefore, honest disclosure may not benefit the discloser; rather, it can lead to judgment and rejection by intimates and strangers (Coates, Wortman, & Abbey, 1979). These findings spoke to and extended Dumas et al.'s (2017) study on deceptive like-seeking behaviors on Instagram, highlighting the side effect of honest disclosure and the significance of strategic disclosure on social media.

The present study also demonstrated that self-disclosure on Facebook helped people obtain supportive responses from their friends on this site. This result resonated with a recent study by Li et al. (2015), who found a strong and positive relationship between Facebook interaction and actual support received from Facebook friends. Earlier research has suggested that the quality of others' responses is related to the depth and extent of the disclosure (Hendrick, 1987; Stiles, 1987). In the context of SNSs, however, the depth, honesty and intent all matter. Intimately and honestly talking about one's difficulties informs others what is needed so that they can act accordingly. Intentional disclosures enable individuals to control the flow of information and get the most out of their social networks.

Results also show that enacted social support on Facebook contributed to increased satisfaction with life, above and beyond the effects of stressful life events. This finding substantiated previous studies suggesting that receiving positive feedback from one's Facebook friends enhanced self-esteem and one's sense of well-being (Steinfield, Ellison, & Lampe, 2008; Valkenburg et al., 2006). It is also important to note that receiving assistance from one's social networks on SNSs can translate into perceived social support, making an individual feel being supported. In this sense, getting "likes" or "comments" from Facebook friends is by no means superficial communication; instead, it satisfies users' need for connectivity. Broadly speaking, Facebook interaction alone may not be rewarding. It is the feedback obtained from one's social networks that really matters.

This study highlights SNSs as a novel and promising venue for identifying students at risk of depression or suicide and conducting interventions accordingly. Given that students are likely to talk about themselves on Facebook when they get stressed out, signs of emotional problems or suicidal ideation become detectable. Therefore, educators, parents, and peers could easily identify at-risk students and provide support or intervention in a timely manner. Such efforts could help to offset the ineffectiveness of mental wellness campaigns on campus, which largely rely on leaflets and talks. In fact, people with emotional problems may not be willing to attend these activities and thus are hard to be reached by social workers (Park, Lee, Kwak, Cha, & Jeong, 2013). The wide accessibility and public visibility of Facebook open up new possibilities for early diagnosis and prevention of mental illness that are vital to reducing the suicide rate.

6. Limitations and suggestions for future research

Despite its contributions and implications, this study has several limitations. First, given the cross-sectional nature of this research, it is impossible to establish causal relationships between the key variables. Depression and life satisfaction are regarde d as dependent variables in this study. However, previous studies have suggested that the opposite might be true – people who are depressed and have low life satisfaction are more likely to self-disclose on Facebook (Ellison et al., 2007). Therefore, longitudinal studies are called for to gauge the causal relation between Facebook disclosure and mental health.

Furthermore, because the present study was conducted at one university, it would be premature to draw conclusions about the prevalence of depression among college students in Hong Kong. In order to provide a more systematic and accurate assessment of mental health among university students in Hong Kong, a large-scale, city-wide survey is required. Moreover, the focus on college students makes it impossible to generalize the findings to other populations. Adolescents are worth studying in the future because depression and anxiety are also prevalent among secondary school pupils (Chan, Chan, & Kwok, 2015).

While this work focuses on the effects of self-disclosure on mental health, there are other factors, such as personality traits, that may influence individuals' well-being. For example, self-esteem has been found to be an internal factor protecting youth from the deleterious effects of stress (Dumont & Provost, 1999). Others have shown that low self-esteem is directly related to depression (Asarnow, Carlson, & Guthrie, 1987). Individuals' psychological attributes have been widely conceptualized as a personal resource that has a direct or indirect effect on mental health (Dean, 1986; Lin, Dean, & Ensel, 1986). Therefore, future work should take

personality factors into consideration when examining the effect of self-disclosure on mental health.

Methodological concerns also arise from the self-report measure of self-disclosure on Facebook. Disclosure characteristics, such as intimacy and honesty, may not always be consciously held by respondents (Bazarova & Choi, 2014). Also, people's responses may be subject to social desirability bias. Although most of the existing empirical work has relied on self-reports of disclosure behaviors (Waters & Ackerman, 2011), it would be more accurate to observe people's actual communication behaviors online. For example, Park et al. (2013) developed a Facebook web application—EmotionDiary—to gather demographic and social activity data from Facebook users and provide online screening for depression. Another study employed a similar approach to collect participants' status updates, wall posts, and private messages on Facebook, and asked participants to rate the intimacy and personal relevance of each post (Bazarova, Choi, Schwanda Sosik, Cosley, & Whitlock, 2015). Future studies might also consider this approach of data collection.

Last but not least, it would be meaningful to broaden the scope of research by examining other forms of CMC. Because this study only focused on Facebook, it is hard to generalize the findings to other SNSs such as Instagram. Pew Research Center, (2015) shows that young adults have diversified their SNS use instead of clinging to one platform. Individuals' self-disclosure behaviors may vary according to the affordances and network characteristics of different SNSs. For example, anonymous websites, such as online support groups and Facebook confession boards, enable users to discuss taboo topics and explore stigma-related identity, giving rise to new opportunities and risks (Birnholtz, Merola, & Paul, 2015; Chang & Bazarova, 2016). Future research should consider examining the mental health implications of self-disclosure across multiple online communities.

Acknowledgements

This research was supported by the School of Journalism and Communication at the Chinese University of Hong Kong. The author is grateful to Louis Leung, Lo-Ven Hwei, Michael Chan, Barry Wellman, and Ziwei Liu for their support and insights.

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