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“What do they *snapchat* about?” Patterns of use in time-limited instant messaging service



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ABSTRACT

The use of *Snapchat* – a time-limited instant messaging service – has been rapidly rising amongst adolescents. However, the exact nature of *Snapchat* use remains difficult to examine due to the self-destructive nature of content sent and received via this service. We report an online survey conducted with the use of a memory sampling method to enquire about the specific details of the very last image or video each participant sent and received via *Snapchat*. We found that users mainly share ‘selfies’, typically embed text and ‘doodles’ with photos they share, use it mostly at home, and primarily for communication with close friends and family as an ‘easier and funnier’ alternative to other instant messaging services. We also found that high intensity of *Snapchat* use was more associated with bonding rather than bridging social capital. We discuss those findings in the context of existing studies on the use of instant messaging services and social networking sites.

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1. Introduction

Instant messaging (IM) has become an ubiquitous feature of rapid communication in the ‘Global Village’ with the fast adoption of internet-enabled mobile phones at the beginning of the 21st century. IM is a type of online chat which offers real-time exchange of text, images, video and voice transmission over the Internet, but it is also used for exchanging emotions via emoticons, information provision, behaviour change interventions and surveying (Cole-Lewis & Kershaw, 2010; Hawn, 2009; Ramirez & Broneck, 2009; Ogara, Koh, & Prybutok, 2014). In 2014 there were reportedly 50 billion IM sent per day – twice as many as conventional text messages (Curtis, 2014) and it is estimated that IM apps will account for 75% of mobile traffic by 2018 (Juniper Research, 2014). IM capability has been also integrated into almost every major social networking site with smartphone app services such as Facebook Messenger, Twitter, Google+ or LinkedIn. There are also a large number of popular, standalone IM mobile services such as WhatsApp, Skype, or Instagram.

In the majority of existing IM services listed above, the content that users exchange is stored on both senders’ and receivers’

devices creating a communication history, with the exception being a real-time, streaming voice and video chat communication service such as Skype. However, a new category of IM has recently risen to prominence – *Snapchat* (<http://www.snapchat.com>). What makes *Snapchat* stand out from other IM services is that the content users share only persists for a limited period of time.

1.1. The overview of snapchat

The rise in *Snapchat* use has been one of the most rapid and unprecedented in the history of instant messaging services and social networking sites. Its estimated that *Snapchat*’s base of active users grew from 10 million in mid-2012 to over 70 million in early 2014, and 100 million in early 2015 (according to *Wall Street Journal* evaluation – *Snapchat* doesn’t reveal its numbers; Macmillan & Rusli, 2014; Wohlsen, 2015). In December 2013 more than 400 million ‘snaps’ (the common term for video messages and photos sent via *Snapchat*) were received on *Snapchat* every day (Shontell, 2013). By comparison, it takes Facebook and Instagram combined to match the same number of photos shared in the same period. *Snapchat* reportedly rejected an acquisition offer worth \$3 billion from Facebook (Rusli & Macmillan, 2013) and was valued to be worth \$10 billion by two independent companies in August 2014 (Rusli & Macmillan, 2014), and \$19 billion in early 2015 (Wohlsen, 2015).

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The process of sharing on *Snapchat* works as follows: the sender makes an image/video using the *Snapchat* smartphone app and then choose how long the image/video will be viewable by the receivers' device (between 1 and 10 s, as of April 2015). Sequences of images/videos can also be sent. When the sender posts an image/video to the receiver, this image/video automatically vanishes from the senders' smartphone. The only information that persists on the senders' device is a timestamp of when the snap was sent. The receiver now has an option to view the content but the viewing time is limited to the specific duration chosen by the sender (i.e. between 1 and 10 s). After the receiver views the image/video for this particular duration, the image/video disappears from the receivers' phone.

There are a number of additional features that make *Snapchat* a unique IM service. *Snapchat* is exclusively a smartphone app (available on *Apple iOS* and *Google Android* enabled devices) and therefore it is not possible to use it with the browser (unlike *Twitter* or *Facebook Messenger*). Any image/video is only shared with the friend, or a group of friends, selected by the sender and those friends have to be a *Snapchat* users. This way the sender always decides who is going to receive and view the content. If the receiver makes a screen capture of the image, the sender is notified about this action. Additionally, the recipient must maintain tactile contact with the device's touchscreen, thereby hindering their ability to take a screenshot or use an external camera. However, it has been widely reported that third-party apps such as *Snapsaved* allow the receiver to make a hidden screen capture of 'snap' without sender being aware of this (Cook, 2014b). *Snapchat* users can also embed 32 characters-long text messages, or create a finger-drawn 'doodles', layered on the top of the photos they capture. Video chat is also possible: users see a pulsating blue bubble that indicates whether their friend is 'active' in *Snapchat*, and can engage in video chat.

1.2. *Snapchat* use, privacy and social capital

Beside the effortless and easy-to-use interface design of *Snapchat*, the most unique features relate to the personal sharing of content that disappears after specified period (you choose specific person/group of people to share it, rather than share with a large group of people or publicly by default). Informal media reports suggest that the self-destructive nature of messages may remove some inhibition from users who would otherwise not share such content. It's been widely reported in social media and market analysis that *Snapchat* is particularly popular amongst children and teenagers, with half of the users aged between 13 and 17 (Statista, 2014). At the same time, there are informal reports that *Snapchat* may be frequently used for 'sexting' (the act of text messaging someone in the hopes of having a sexual encounter with them later; with initially casual content transitioning into highly suggestive and even sexually explicit content – UrbanDictionary, c2008). Some market research conducted in the UK supports these claims: half of all 18 to 30-year-old respondents reported receiving nude pictures, while 67% had received images of "inappropriate poses or gestures" (Kemp, 2013). This issue has been broadly discussed in the context of online security and privacy in the media, especially with reference to the incident in October 2014 – a major privacy breach where 100,000 'snaps' were published

online allegedly by hackers who compromised *Snapsaved* servers (Buchanan, 2014). This event has been termed 'the Snappening'.¹ It was widely reported that a significant proportion of leaked 'snaps' were explicit in nature (Cook, 2014a) and due to the young *Snapchat* demographics there were concerns that the stolen photos would include indecent images of children.

However, a single study to date that examined privacy issues with *Snapchat* use contradicts the assumption that adult *Snapchat* users engage in 'risky' and explicit sharing. Roesner, Gill, and Kohno (2014) surveyed 127 adult *Snapchat* users and found that most users reported that they did not send sensitive content (although 25% reported they might do so experimentally). Specifically, they found that the majority of users were not willing to send content classified as 'sexting', photos of documents, messages containing legally questionable content, or content considered insulting. Additionally, researchers found that security was not a major concern for the majority of respondents – most of the users understood that the messages could be recovered and that screenshot taking was a common and expected practice Roesner et al. (2014).

The issues of privacy and online sharing lead to another important question – what is the nature and role of *Snapchat* use in facilitating social interactions and networking? One of the major impacts of emerging social networking sites and digital communication technologies is their function as a "social lubricant" – facilitating the building of social capital between users (Lee, Kim, & Ahn, 2014; Steinfield, Ellison, & Lampe, 2008). Social capital has been defined as the "connections and the associated norms of reciprocity among people" (Putnam, 2001). Putnam distinguished between two types of social capital: bonding and bridging. Bonding social capital refers to strong-tie relationships such as family, partners and close friends, where people share strong personal, or intimate, connections and provide emotional support to each other. On the other hand, bridging social capital refers to weak-tie relationships such as previous coworkers or former classmates, where people don't share a similar background or emotional reciprocity. Previous research has shown that all kinds of social capital yields positive outcomes such as self-esteem, life satisfaction, and even health (Ellison, Steinfield, & Lampe, 2007; Kim, Subramanian, Gortmaker, & Kawachi, 2006; Valenzuela, Park, & Kee, 2009).

Social capital has been extensively examined in the online context especially with the use of social networking sites (SNS), particularly *Facebook*. A large number of studies on *Facebook* have found a strong association between the use of *Facebook* and social capital, especially for the creation and maintenance of bridging social capital (Ellison et al., 2007; Ellison, Vitak, Gray, Lampe, 2014b; Vitak, Ellison, & Steinfield, 2011). For instance, it has been established that high frequency and duration of use of *Facebook*, high routine access and high emotional connectedness to *Facebook* is strongly associated with social capital (Ellison et al., 2007). Social capital has been also examined in the context of SNS connection strategies (Ellison et al., 2014b) and the frequency of features use on *Facebook* (Lee et al., 2014). For instance, Lee et al. (2014) found a strong association between the frequency of using features such as *Wall Posts*, *Comments*, *Messages* and *Status Updates* with both bonding and bridging social capital.

While *Snapchat* has rapidly risen to popularity since 2012 (Duggan, 2013) the exact nature of its use is still unknown, and its also not clear how this use is associated with bridging and bonding of social capital. The study by Roesner et al. (2014) mainly focused on perceived privacy and security amongst *Snapchat* users: whether users send sensitive content, how aware are they of the security drawbacks of *Snapchat*, how frequently they make and accept the making of screenshots. Utz, Muscanell, and Khalid (2015) compared *Snapchat* and *Facebook* use in the context of romantic jealousy, and showed that *Snapchat* was used more for flirting and

¹ Term 'Snappening' comes from combination of words snap and 'happening', in reference to an event that happened shortly before in August 2014 – 'the Fap-pening' (combination of 'fap' – the onomatopoeic term for masturbation, and 'happening') where a large number of nude celebrities photos and videos leaked to 4chan.org (Kosur, 2014).

finding new love interests, whereas *Facebook* was still the main social networking site used for keeping in touch with friends. The only other available publications are informal blogs, online magazines stories and market analysis reports. There is a paucity of details such as specific patterns of *Snapchat* use, reasons for *Snapchat* use, the context in which people use it and the frequency of use or type of content users share. No other research has so far been conducted on *Snapchat* use, although there are extensive studies on the use of other popular social networking sites and instant messaging services. Therefore, the primary aim of the study described in this article was to examine how people use *Snapchat*, what content they tend to share, what they use it for, with whom, how frequently, and what value it presents for them. A primary objective was to gain a better understanding of what content people send specifically, why they send it, and what they mainly use *Snapchat* for. Our secondary objective was to examine how *Snapchat* use is associated with bridging or bonding social capital, following an approach similar to one used by (Ellison et al., 2007, Ellison, Gray, Lampe, Fiore, 2014a) with *Facebook*. To this end we conducted an exploratory survey to examine patterns of *Snapchat* use by employing elements of a memory retrieval method taken from a qualitative Critical Incidence Technique. We then conducted a follow-up survey where we looked at the association between the intensity of *Snapchat* use with a range of other factors, and bonding and bridging of social capital.

2. Methods

2.1. Participants

We used a short invitation e-mailed to 2194 first-year students at the University of the West of England (UWE). The e-mails were provided to us with the permission of both Student Services and Business Intelligence and Planning at UWE and were distributed directly via Qualtrics Research Suite system (Qualtrics, 2013) preserving full participants' anonymity. We used only first-year students due to UWE regulations regarding the survey distribution and also because existing market research point to a large proportion of *Snapchat* users amongst young age groups (Statista, 2014). A total of 209 participants (139 female and 70 male) agreed to participate in an online survey. The only requirement for participation in the survey was that the person is, or was, a *Snapchat* user. The study received ethical approval from the University Ethics Review Board.

2.2. Measures for the exploratory survey and critical incidence technique

The survey was constructed using the Qualtrics Research Suite (Qualtrics, 2013) and took approximately 10 min to complete. Each participant was presented with a brief instruction on the purpose of the study and the approximate time needed for completion. Participants were informed that the information they provided would be secured under the Data Protection Act 1998. Participants were asked to confirm that they understood the instructions by ticking a box before they started the survey. The survey incorporated both open-ended and closed-ended questions with mixed-type response scales and was split into two parts: (1) general socio-demographic questions and general information about the use of *Snapchat* and other SNS/IM platforms, and (2) a memory retrieval task for the last snap sent and received.

Demographics and the general use of Snapchat and SNS. General sociodemographic data was collected on: gender, age, ethnicity, marital status, sexual orientation, employment status, whether participants were students or not, highest education level, country

of residence, and location/area of residence. General questions about the use of *Snapchat* and other SNS included four items which questioned participants about: (1) the reason they started using *Snapchat*, (2) how many people they actively interacted with on *Snapchat*, (3) whether they used other SNS to share photos/videos and (4) how frequently they used various IM or chat services on their smartphone.

Critical Incidence Technique. One of the major challenges of conducting a study on *Snapchat* is the transient nature of any content generated or received on the platform. In studies investigating the 'digital traces' of human behaviour on social networking sites, such as photos or 'likes' on *Facebook* (Kosinski, Stillwell, & Graepel, 2013; Lambiotte & Kosinski, 2015), the content is present in the recorded history of the user's profile, with visibility varying only based on the privacy setting. However, there are no such 'digital traces' for *Snapchat*, except from a timestamp with the information on when the snap was sent/received. In such cases it is only possible to employ introspective methods which have obvious shortcomings: users can be biased, they may not remember clearly, or they can omit important content. In order to maximise the possibility of capturing a representative sample of *Snapchat* experiences' we utilised elements of Critical Incidence Technique (CIT; Flanagan, 1954) as a part of the online survey questionnaire. First described by John C. Flanagan in 1954, CIT is a well-established qualitative research tool used in the fields of health science, education and market research. Critical incidents can be gathered in various ways, but typically respondents are asked to tell a story about an experience they have had. The key idea is that the observations collected from participants should be recorded as close as possible to the time when they occurred, which improves memory retrieval. The recollection should also be structured to provide better contextual layout to the event – memory is improved if the observers know in advance that they will need to report (FitzGerald, Seale, Kerins, & McElvaney, 2008).

Application of CIT was ideal in our study because we didn't have direct access to content that participants shared and we were not certain what factors were important in the use of *Snapchat*. At the same time it was easy to isolate a single 'incidence' of *Snapchat* use as a recollection of the last snap that was sent and received. This approach was especially relevant because the only 'digital trace' that is left on a user's smartphone is a timestamp of their recent communication. Therefore, we used a set of questions to enquire about participants' memories of the last snap image/video they sent and received. This set of questions was designed following the guidelines from Flanagan (1954) and FitzGerald et al. (2008) to facilitate a detailed memory retrieval of the last snap incidence.

The *Snapchat* memory retrieval task started with the following question: 'do you have access to your *Snapchat* app at the moment?' If participants replied 'no' to this question, they were asked to give a rough estimate of the date when they sent the last snap (day, month and year). If they replied 'yes', they were asked to open the *Snapchat* app, look at the interaction history, and record the exact date (day, month, year) and time (hour, minute) when the last snap was sent. This task therefore also aimed to create a better 'anchor' for memory retrieval for the last snap sent (Flanagan, 1954; Gremler, 2004).

After participants recorded a timestamp (or estimate of when they sent the last snap), they were asked a number of questions about the last *Snapchat* they've send. Questions related to five different description categories: time of sending the snap; the content of the snap (whether it was photo or video, what was on the snap, whether they 'doodled' on it, whether it was a reply to another snap, and whether they made a screenshot of the received snap); the reason for sending the snap; participants' location when they sent the snap; and socially-related factors (whether they sent

it to single person or a group of people, who this were specifically, what their mood was when they sent it, and whether they had been drinking alcohol when they sent it). The open-ended responses obtained with CIT were classified by two separate judges and Cohen's κ was used to calculate agreement amongst the judges. Cohen's κ result for inter-rater reliability are provided with each figure that corresponds to the relevant items.

2.3. Measures for the follow up survey on social capital

After obtaining the initial results, we decided to examine how our participants used *Snapchat* to build bridging and bonding social capital. We contacted 209 participants who completed the first part of the survey and asked them to participate in a short, 5 min follow-up survey. A total of 96 participants completed the follow up survey (67 female, 30 male). The follow up survey included following three scales: (1) *Snapchat* use Intensity, (2) Bridging (3) and Bonding social capital on *Snapchat*. We also asked participants how much time on average they spend every day using the internet and *Snapchat*.

The *Snapchat* Use Intensity scale was adopted from Ellison et al. (2007) Facebook Use Intensity Scale to obtain a better measurement of *Snapchat* use than frequency or duration indices. The Ellison et al. (2007) Facebook Use Intensity Scale has a broad scope of questions that are easily generalised to any other social network – which is why we decided to apply it with *Snapchat*. This measure included two self-reported assessments of *Snapchat* behaviour, designed to measure the extent to which the participant was actively engaged in *Snapchat* activities: (1) the number of *Snapchat* friends and (2) the amount of time spent on *Snapchat* in a typical day. In addition, the measure also included a series of Likert-scale attitudinal questions designed to examine the extent to which the participant was emotionally connected to *Snapchat* and the extent to which *Snapchat* was integrated into their daily activities. Those remaining questions included the following items: (3) *Snapchat* is part of my everyday activity; (4) I am proud to tell people I'm on *Snapchat*; (5) *Snapchat* has become part of my daily routine; (6) I feel out of touch when I haven't logged onto *Snapchat* for a while; (7) I feel I am part of the *Snapchat* community; and (8) I would be sorry if *Snapchat* shut down. The eight-item index was found to be reliable (Cronbach $\alpha = 0.89$) and descriptive results for this scale are summarised in Supplementary Table 4.

Bonding and Bridging social capital with *Snapchat* was measured using a 10-item scales adapted from Williams (2006). We chose this particular scale because of its broad and generic nature. Additionally, a large number of studies adapted Williams (2006) scale to examine social capital on Facebook (e.g. Brooks, Hogan, Ellison, Lampe, & Vitak, 2014; Ellison et al., 2014a), WhatsApp (Aharony, 2015), and Twitter (Hofer & Aubert, 2013).

Items for Bonding social capital with *Snapchat* asked respondents to rate, on a five-point Likert scale, the extent to which they agreed or disagreed with the following statements: (1) There are several people on *Snapchat* I trust to help solve my problems; (2) There is someone on *Snapchat* I can turn to for advice about making very important decisions; (3) There is no one on *Snapchat* that I feel comfortable talking to about intimate personal problems; (4) When I feel lonely, there are several people on *Snapchat* I can talk to; (5) If I needed an emergency loan of £500, I know someone on *Snapchat* I can turn to; (6) The people I interact with on *Snapchat* would put their reputation on the line for me; (7) The people I interact with on *Snapchat* would be good job references for me; (8) The people I interact with on *Snapchat* would share their last dollar with me; (9) I do not know people on *Snapchat* well enough to get them to do anything important; and (10) The people I interact with on *Snapchat* would help me fight an injustice. The ten-item index was

found to be reliable (Cronbach $\alpha = 0.86$) and descriptive results for this scale are summarised in Supplementary Table 4.

Items for Bridging social capital with *Snapchat* asked respondents to rate, on a five-point Likert scale, the extent to which they agreed or disagreed with the following statements: (1) Interacting with people on *Snapchat* makes me interested in things that happen outside of my town; (2) Interacting with people on *Snapchat* makes me want to try new things; (3) Interacting with people on *Snapchat* makes me interested in what people unlike me are thinking; (4) Talking with people on *Snapchat* makes me curious about other places in the world; (5) Interacting with people on *Snapchat* makes me feel like part of a larger community; (6) Interacting with people on *Snapchat* makes me feel connected to the bigger picture; (7) Interacting with people on *Snapchat* reminds me that everyone in the world is connected; (8) I am willing to spend time to support general *Snapchat* community activities; (9) Interacting with people on *Snapchat* gives me new people to talk to; and (10) On *Snapchat*, I come into contact with new people all the time. The ten-item index was found to be reliable (Cronbach $\alpha = 0.91$) and descriptive results for this scale are summarised in Supplementary Table 4.

3. Results

3.1. Exploratory survey

The majority of participants (89%) were aged between 16 and 25 years, of white ethnic origin (89%), not in a relationship (72%), heterosexual (88%), and living in an urban or suburban area (83%). The summary of demographic details for participants is shown in Table 1.

Over 47% of participants reported that they started using *Snapchat* because their friends were using it, and because it's fun to use (17%), with other reasons being: easy and free (8%), curiosity (6%), communication (5%), and privacy (2%). Almost 80% of users reported that they use *Snapchat* to interact with no more than 12 people on a regular basis (Fig. 1). The majority of participants also use Facebook (96%), Instagram (59%) and Twitter (58%) to share photos or videos using a smartphone, with less frequently used SNS being Tumblr (13%), Pinterest (8%), Flickr (4%) and WhatsApp (1%). Participants reported SMS, Facebook Messenger and *Snapchat* as the most frequently used instant messaging services, as seen in Fig. 2.

When required to recall the context and description of the last snap participants sent, almost all users reported their they last snap was a photo (95%) with a 'doodle' embedded (74%) which was mostly in the form of a text message (94%) and rarely a drawing (6%). Half of the participants reported that the last snap they sent was a 'selfie',² while the remaining participants sent a broad range of content such as screenshots (7%), food images (7%), or various other objects (6%) – see Fig. 3a for more details. Almost 55% of participants reported that the snap they sent was a reply to one they received. Similar to the 'sent' content, a selfie was the most frequently reported snap received (63%; Fig. 3a) and almost all (96%) participants reported that they did not screenshot the 'snap' they received. The result of inter-rater reliability Cohen's κ showed a substantial degree of agreement between raters for judging both 'send' ($\kappa = 0.69$, $z = 26.1$) and 'received' content ($\kappa = 0.54$, $z = 14.5$).

The majority of participants reported that communication (48%) and desire to share funny, personal or emotional content (40%) were the main reasons for sending the snap, with other reasons being boredom (5%); 7% of participants did not remember why they sent it. Interestingly, most participants reported being in various

² Selfie is a photograph that one has taken of oneself, typically one taken with a smartphone or webcam and shared via social media (Eftekhar et al., 2014).

Table 1

Sociodemographic characteristics (given in % and *N* size) for participants who completed main exploratory survey (*n* = 209), and follow-up social capital survey (*n* = 96).

	Main % (<i>N</i>)	Follow-up % (<i>N</i>)
Gender		
Female	67 (139)	69 (67)
Male	33 (70)	31 (30)
Age		
16–20	62 (130)	58 (56)
21–25	27 (57)	27 (26)
26–30	6 (13)	10 (10)
31–35	2 (5)	3 (3)
36–40	1 (2)	2 (1)
41 or more	1 (2)	2 (1)
Ethnicity		
White	89 (187)	88 (85)
Asian/Asian British	4 (9)	2 (2)
Mixed/multiple ethnic groups	2 (5)	3 (3)
Black/African/Caribbean	2 (4)	4 (4)
Other ethnic group	1 (2)	2 (2)
I prefer not to say	1 (2)	1 (1)
Marital status		
Single	72 (150)	68 (66)
Relationship – not co-habiting	15 (26)	15 (15)
Relationship – co-habiting	12 (31)	14 (14)
Divorced	0.5 (1)	1 (1)
I prefer not to say	0.5 (1)	1 (1)
Working status		
Full Time	11 (22)	10 (10)
Part Time	46 (97)	44 (43)
Not Employed	42 (87)	42 (41)
I prefer not to say	1 (3)	1 (3)
Area of living		
Urban	54 (112)	52 (50)
Suburban	29 (60)	32 (31)
Rural	18 (37)	16 (16)
Sexual orientation		
Heterosexual	88 (183)	84 (81)
Gay	8 (16)	10 (10)
Bisexual	3 (9)	5 (5)
I prefer not to say	1 (1)	1 (1)

locations at their home (75%), such as in their room or bed, while sending the last snap (Fig. 3d). The majority of 'snaps' were sent in the late morning/early afternoon hours between 10 am and 2 pm (27%), and in the evening between 7 pm and 11 pm (32%), as seen on Fig. 3e.

The majority of participants reported that the recipient of the snap was a single person (73%) with close friend (55%) and partner (18%) being the most common recipients (Fig. 3b). Participant's who sent their snaps to a group of people (27%) sent it mainly to close friends (62%), although a mix of random people was also

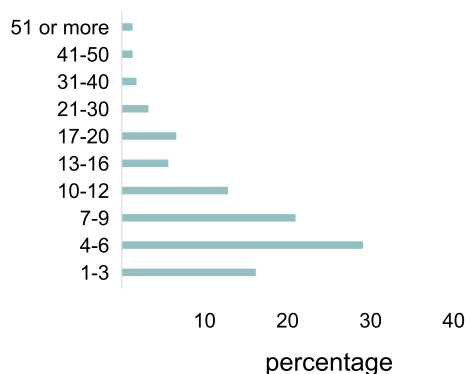


Fig. 1. The number of people participants regularly interact with on Snapchat (*n* = 209).

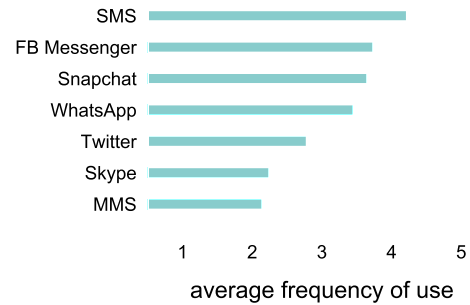


Fig. 2. The average frequency of use for various instant messaging services (*n* = 209).

highly reported as a recipient (29%; Fig. 3c). The majority of participants reported being in a good or very good mood (76%) when they sent the snap (18% reported neither good nor bad mood, and 5% reported being in bad mood). The majority of participants had not have been drinking when they sent the snap (92%) and those that did (8%) had an equivalent of four pints of lager on average.

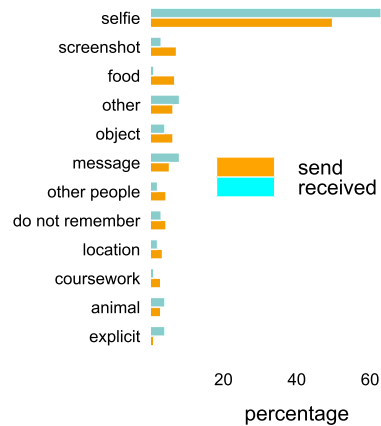
3.2. Follow-up social capital survey

In the follow up survey we examined whether *Snapchat* is used for bridging and bonding social capital and we collected more details on the intensity of *Snapchat* use. As we described in the Methods section 2.1, we recruited a subset of participants (*n* = 97) who took the main exploratory survey and this subgroup had very similar sociodemographic characteristics (see Table 1 for detailed comparison).

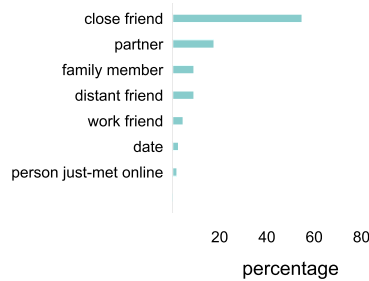
In order to explore the relationship between *Snapchat* use and the various forms of social capital, we conducted a number of regression analyses. In each regression, we controlled for socio-demographic, Internet and IM use factors, and intensity of *Snapchat* use, in order to see if the use of *Snapchat* accounted for variance in social capital over and above these other independent variables. A descriptive summary of the results for intensity of *Snapchat* use, bonding, and bridging can be found in the Supplementary Table 4.

Due to relatively small sample size included in the regression analysis we first conducted regression diagnostics to establish whether any of the four assumptions of linear regression were violated. To this end we applied a global test procedure G^2_4 developed by Peña and Slate (2006). The test can be viewed as a Neyman smooth test and it only relies on the standardised residual vector (Rayner & Best, 1990). If the global procedure indicates a violation of at least one of the assumptions, the components of the global test statistic can be utilised to gain insights into which assumptions have been violated (Peña & Slate, 2006). The advantage of such procedure is that it reduces the oftentimes subjective assessment of the validity of model assumptions when using existing graphical techniques (Peña & Slate, 2006). We found that none of the assumptions were violated in our linear model for bonding (Skewness ($G^2_4 = 0.71$, $p = 0.4$); Kurtosis ($G^2_4 = 0.03$, $p = 0.85$); Link Function ($G^2_4 = 0.24$, $p = 0.62$, Heteroscedasticity ($G^2_4 = 0.05$, $p = 0.83$) and bridging social capital (Skewness ($G^2_4 = 1.44$, $p = 0.23$); Kurtosis ($G^2_4 = 2.3$, $p = 0.13$); Link Function ($G^2_4 = 0.72$, $p = 0.4$, Heteroscedasticity ($G^2_4 = 0.58$, $p = 0.45$)).³

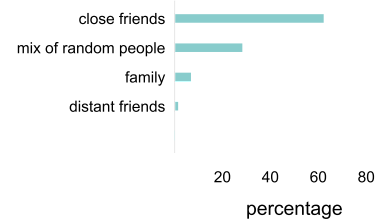
³ It's important to note that although the assumptions in linear model were not violated, we didn't introduce interactions due to small sample size (*n* = 97) used in the follow-up survey. As Leon and Heo (2009) showed in a relevant simulations, we would require a sample size of at least "*n*" = 208 for theoretical statistical power of 80% to detect the interaction in a mixed-effects linear regression model.



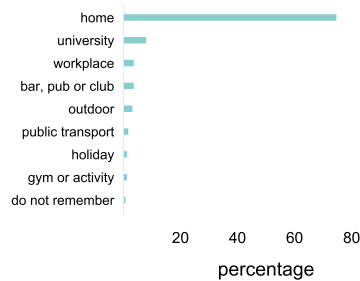
(a) What did you send ($\kappa = 0.69$, $z = 26.1$) and receive? ($\kappa = 0.54$, $z = 14.5$)



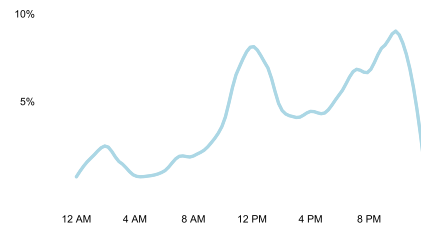
(b) Which *single person* specifically did you send it to?



(c) Which *group* specifically did you send it to?



(d) Where were you when you sent it?



(e) What time of the day did you send it?

Fig. 3. Percentage of participants who (a) sent ($n = 209$) received ($n = 114$) specific snap, which (b) single person (73%; $n = 153$) or (c) a group of people (27%; $n = 56$) they sent it to, (d) location ($n = 209$), and (e) time of the day when they sent it ($n = 203$).

We first investigated the extent to which socio-demographic factors, and basic Internet/IM use, predicted the amount of bonding social capital reported by participants. In the regression analysis predicting bonding social capital (Table 2), those control variables accounted for 12% of the variance with significant effects of age (scaled $\beta = -0.37$, $p < 0.05$), although this effect disappeared after adding *Snapshot* use intensity into the model. R^2 increased to 36% with the addition of *Snapshot* use intensity variable (scaled $\beta = 0.51$, $p < 0.01$). This indicates that intensity of the *Snapshot* use is positively associated with bonding social capital. When *Snapshot* use intensity variable was added to the model, we also found a

significant effect for gender (scaled $\beta = -0.41$, $p < 0.05$). This indicates that female participants reported greater bonding social capital than their male counterparts.

We used exactly the same independent variables as predictors in bridging social capital (Table 3). In the regression analysis predicting bridging social capital, those control variables also accounted for 12% of the variance but with no significant effects. The *Snapshot* use intensity variable was again positively associated with bridging social capital (scaled $\beta = 0.43$, $p < 0.01$) accounting for 28% of the variance.

Table 2
Relation between *Snapchat* use and bonding social capital.

	Model 1: Controls	Model 2: Controls + <i>Snapchat</i> intensity
Gender	– 0.342(0.204)	– 0.406** (0.175)
Age	– 0.369** (0.182)	– 0.136 (0.162)
Sexual orientation	0.112 (0.239)	0.162 (0.206)
Employment	– 0.105 (0.171)	– 0.134 (0.147)
Relationship	0.114 (0.185)	– 0.084 (0.163)
Hours of internet/day	0.022 (0.034)	0.028 (0.029)
Frequency of IM use	0.055 (0.136)	– 0.147 (0.123)
<i>Snapchat</i> Intensity		0.510*** (0.092)
Constant	3.778*** (0.662)	2.891*** (0.590)
Observations	92	92
R ²	0.122	0.361
Adjusted R ²	0.049	0.299
F Statistic	1.668 (df = 7; 84)	5.858*** (df = 8; 83)

Note: Gender was coded as 0 = female, 1 = male ** p < 0.05; *** p < 0.01.

4. Discussion

We report the findings of the first study on the patterns of *Snapchat* use by means of a detailed survey and analysis of the last snap sent and received. We also looked at more general aspects of *Snapchat* use, as well as the association between intensity of *Snapchat* use and social capital.

To start with, *Snapchat* was reported to be amongst the top three IM services that respondents used most frequently – on a par with *Facebook Communicator* and conventional text messaging (SMS). Almost all participants also shared their photos on *Facebook*. Those results were not surprising – as [Quan-Haase and Young \(2010\)](#) pointed out, users tend to employ a broad range of digital communication tools that become integrated into a bundle of media use.

Snapchat was mainly used to communicate with a single person rather than a group of people, and this person mainly includes close friends, partners and family members. The overall number of contacts people interacted with using *Snapchat* was relatively small in comparison to *Facebook*. These results are in line with [Roesner et al. \(2014\)](#) and [Utz et al. \(2015\)](#) who also found that users have small and close social networks on *Snapchat*. Small networks typically consist of people who are in our closest social circles ([Sutcliffe, Dunbar, Binder, & Arrow, 2012](#)). [Dunbar \(1992, 1998\)](#) hypothesized that small networks are easier to manage due to inherent cognitive limitations in the number of people with whom one can maintain stable social relationships. The importance of small-network size was also highlighted in studies looking at the differences in gratification from use of IMs and SNS. With IM, users can engage in more intimate and private conversations, allowing

them to share their problems with communication partners more easily, and allowing for better intimacy and a sense of connection ([Hu, Wood, Smith, & Westbrook, 2004](#)). In contrast, SNS more closely resemble a mix of e-mail and an online forum, where messages are visible to the entire community. [Quan-Haase and Young \(2010\)](#) argue that this is a key distinction in the use of SNS and IM – that IM platforms such as *Snapchat* allow communication partners to engage in deeper exchanges with affection, whereas SNS such as *Facebook* tend to support the exchange of short messages via a public wall. Although messages can be exchanged privately via tools such as *Facebook Communicator*, this feature is similar to e-mail and hence does not really support emotional closeness.

The argument about the more intimate use of *Snapchat* was further supported by our findings on the relationship between *Snapchat* use and social capital. Similarly to [Ellison et al. \(2007\)](#), who examined social capital on *Facebook*, we found a positive association between intensity of *Snapchat* use and social capital. However, *Snapchat* appeared to be more useful for bonding rather than bridging of social capital, which is opposite to what [Ellison et al. \(2007\)](#) found for *Facebook*. *Facebook*, used with large social networks, serves to accelerate the intensity of relationships and lowers barriers for participation in social groups, but appears to be less useful in creating the close kind of relationships associated with bonding capital ([Vitak et al., 2011](#)). *Snapchat*, used to forge small networks of close relationships, is more a facilitator for the bonding of social capital. As highlighted above in the context of IM vs SNS differences, *Snapchat* offers a more intimate, private and ‘conversation-like’ mode of communication, and therefore its intensity of use is associated more with bonding rather than bridging of social capital. Bridging social capital is typically associated with the informational benefits of a diversified network of so called “weak ties”. Those “weak ties” are loose connections between individuals who may provide useful information or new perspectives for one another but not necessarily emotional support ([Granovetter, 1983](#); [Steinfeld et al., 2008](#)). Bridging has been highly associated with the intensity of *Facebook* use, where users typically communicate with a large and diverse network of people, contrasting with small networks in *Snapchat*. To summarise, a stronger association with intensity of *Snapchat* use and bonding, rather than bridging, may well stem from the fact that people use *Snapchat* mainly to enhance a “strong” emotional ties with friends, partners and family, rather than cultivate a large and “weak” networks, like in case of *Facebook*.

We also found that general demographics, Internet and IM use were not significant predictors of bonding social capital, suggesting that only certain kinds of uses of the Internet support the generation and maintenance of bonding and bridging of social capital ([Ellison et al., 2007](#)). However, we found that bonding social capital was predicted not only by *Snapchat* intensity of use, but also by being female. This was surprising because majority of existing studies have found no relationship between gender and bridging or bonding social capital on SNS (e.g. [Ellison et al., 2007](#); [Lee et al., 2014](#)). However, women and men tend to have different styles in valuing and sustaining relationships ([Duck & Wright, 1993](#); [Eagly & Steffen, 1984](#)), so one expects there might be differences in the way they use the Internet for interpersonal communication. Indeed, previous research have suggested that males and females use the same ICT for different purposes, with females reported using email to maintain relationships while males used it to organise meetings offline ([Boneva, Kraut, & Frohlich, 2001](#)). It may be that females are more adept at using the affordances of new ICT, including *Snapchat*, in order to build bonding social capital, although more research is required to better understand the exact nature of this effect with time-limited IM services.

Table 3
Relation between *Snapchat* use and bridging social capital.

	Model 1: Controls	Model 2: Controls + <i>Snapchat</i> intensity
Gender	0.189 (0.208)	0.136 (0.189)
Age	– 0.329 (0.186)	– 0.133 (0.175)
Sexual orientation	0.251 (0.244)	0.294 (0.222)
Employment	– 0.055 (0.175)	– 0.080 (0.159)
Relationship	0.247 (0.189)	0.081 (0.176)
Hours of internet/day	0.007 (0.035)	0.013 (0.031)
Frequency of IM use	0.228 (0.139)	0.058 (0.132)
<i>Snapchat</i> Intensity		0.427*** (0.099)
Constant	1.552** (0.675)	0.810 (0.637)
Observations	92	92
R ²	0.120	0.281
Adjusted R ²	0.046	0.212
F Statistic	1.630 (df = 7; 84)	4.061*** (df = 8; 83)

Note: Gender was coded as 0 = female, 1 = male ** p < 0.05; *** p < 0.01.

When examining the specific incidence of the last snap that participants shared via *Snapchat*, we found that users typically send (and receive) a selfie – a self-portrait photograph. The practice of taking and sending selfies has progressively developed with the proliferation of digital media and now represents a recognised element in culture, particularly amongst young people. Luders, Proitz, and Rasmussen (2010) pointed out that smartphones have become a common medium that contribute to this disciplined, yet playful, visual self-authoring. While research on selfies has been limited, especially in the psychological domain, existing studies show that photos shared on social networking sites are a practical and informative means of representing self-image, interpersonal impressions, and identity management (Eftekhar, Fullwood, & Morris, 2014; Saslow, Muise, Impett, & Dubin, 2012; Tosun, 2012; Van Der Heide, D'Angelo, & Schumaker, 2012). One study argues that making and editing a large number of selfies is associated with Dark Triad traits, especially narcissism (Fox & Rooney, 2015). Fox and Rooney (2015) argue that narcissists are prone to social comparison (Krizan & Bushman, 2011), and may present these edited and optimised selfies on SNSs as a strategy to convey their perceived superiority to others (Jonason, Lyons, Baughman, & Vernon, 2014). However, all the studies mentioned above examined selfie posting strategies on *Facebook*, and there is a distinctive lack of studies on making selfies with IM services. *Snapchat* is used with much closer contact groups than *Facebook* or other social networking sites where photos are typically shared with larger groups of people. Hypothetically, the high intimacy level on *Snapchat* discussed above may have a different impact on the strategies and motivation for sharing selfies on SNS such as *Facebook*. More research is needed to better understand differences in users' motivations and strategies for sharing their selfies on various social media sites.

One of the intuitive and attractive features of *Snapchat* design is that it affords the quick and effortless making of selfies, while the ability to add short text comments and doodles makes it even more playful. In fact, the playfulness of *Snapchat* is reflected in a number of other results we obtained including: reason why participants started using it (25% reported in different way that they use *Snapchat* because it's enjoyable activity); positive mood reported while sending their last snap (76% positive); as well as the playful and funny type of content users reported sending. In previous studies measures of playfulness have been used to establish the degree to which user experiences fun when using the technology (Davis, Bagozzi, & Warshaw, 1992; Moon & Kim, 2001; Van der Heijden, 2003). For instance, Sledgianowski and Kulviwat (2009) examined user adoption on *Facebook*, *Friendster*, and *MySpace*. Playfulness has been identified as one of the most critical factor in using those SNS, next to other factors such as critical mass of other users, and trust and perceived ease of use. It's possible that the narrative, conversation-like, and intimate nature of *Snapchat*, with an interface that affords the easy exchange of short impressions, becomes a preferred medium to playfully socialise in a more private setting than public SNS such as *Facebook*. *Snapchat* is immersive to use because you have to hold your finger on the screen to see the content, and you only have one chance to view the received content before it disappears therefore you need to stay focused when receiving message. Arguably, the combination of self-destructing images with an immersive interface that restricts the scope of user interaction with the content makes *Snapchat* an instant narrative vehicle that is similar to verbal story exchange.

We found that just three participants shared and received sensitive content, specifically a naked or semi-naked photo of themselves, and they reported sending it to their partners. We also found that security and privacy were not a user concern and that only 2% of participants reported it as one of the reasons they use *Snapchat*.

This supports Roesner et al. (2014) finding that *Snapchat*'s success is not due to its security properties but because users find *Snapchat* to be fun. This also goes against common misconceptions in the media that self-destructing content lowers inhibitions and therefore increases the chances of sexting.

One limitation of our study is that we only sampled a single snap and therefore it's difficult to say how representative this single incidence is in the broader use of *Snapchat*. While we get a clear pattern of activity that is common across users (such as sharing selfies), some behaviours might be underrepresented. However, because content is unavailable to examine amongst *Snapchat* users, the memory sampling method seemed an appropriate way for obtaining accurate picture of *Snapchat* use. A larger sample size could further refine these results. There are still a number of unanswered questions that could be further explored by employing more direct, qualitative methods of engaging *Snapchat* users, such as focus groups. Do people 'dose' themselves with snaps and how they do it? Is the content that people share on *Snapchat* more spontaneous than content shared on other IM services or SNS? Perhaps content that people share on *Snapchat* is less self-censored than content shared via other SNS? Or maybe *Snapchat* is a part of media disposal culture – younger generations may lack a preference for physical media and perceive instant media as more desirable mode of communication. While young people seem to be a key *Snapchat* user group, it would be interesting to compare the differences between younger and older users. With *Facebook* now releasing similar tools, and *Instagram* offering disposable content, we may be facing a new chapter in how content is generated, shared and stored – one that moves from default public sharing, to the default removal of shared content.

5. Conclusions

Snapchat's rapidly increasing popularity among young age groups rises a number of questions about how users utilise IM services with time-limited and self-destructing content, and how this relates to the use of other popular SNS such as *Facebook*. The current study is amongst the first that investigate a detail patterns of *Snapchat* use by surveying the very last incidence of snap that participants send and receive. The study also examines the relationship between intensity of *Snapchat* use and social capital. Results indicate that *Snapchat* is mainly used as a playful mobile IM service to rapidly communicate and share content, especially selfies, with a small group of close friends, partners and family. Such "strong ties" oriented use is further reflected by a strong association between *Snapchat* intensity of use and bonding, rather than bridging, of social capital. It seems that popularity and patterns of *Snapchat* use highlighted in our study might be a sign of a new form of digital narrative rising amongst younger population of social media users – a narrative that is achieved by seamless and playful use of smartphones to capture and share content-rich moments that cease to exist a second later.

Our study highlights how *Snapchat* become effortlessly embedded within its users daily communication practises and is currently the most popular form of IM in par with SMS and *Facebook Communicator*. Although our study shows that privacy risk for *Snapchat* users are less profound than indicated in the popular media, parents and educational institutions should be aware of risk associated with such services. Due to selfie-oriented use of *Snapchat* that pose a potential risk of unintended disclosure of sensitive personal content, parents of the youngest users should be especially aware of *Snapchat* use. However, the fact that *Snapchat* offers such playful form of communication could be also utilised by educational institutions as a new mean of engagement. In addition to helping young students populations, the use of *Snapchat* could

support variety of other populations, including community members, and others who benefit from maintained ties. However, more research is needed to fully understand how ubiquitous and disruptive such use of self-destructing messaging is in the cultural and socio-psychological context of the digital media use.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.chb.2015.08.026>.

References

- Aharony, N. (2015). Whats App: a social capital perspective. *Online Information Review*, 39, 26–42. <http://dx.doi.org/10.1108/OIR-08-2014-0177>.
- Boneva, B., Kraut, R., & Frohlich, D. (2001). Using e-mail for personal relationships: the difference gender makes. *American Behavioral Scientist*, 45, 530–549. <http://dx.doi.org/10.1177/00027640121957204>.
- Brooks, B., Hogan, B., Ellison, N., Lampe, C., & Vitak, J. (2014). Assessing structural correlates to social capital in Facebook ego networks. 38, 1–15. <http://dx.doi.org/10.1016/j.socnet.2014.01.002>.
- Buchanan, R. T. (2014). *The snapping: Thousands of photos and videos released through third party Snapchat app* (13 Oct 2014). The Independent Online URL <http://www.independent.co.uk/life-style/gadgets-and-tech/the-snapping-thousands-of-teenagers-photos-and-videos-released-through-third-party-app-9790298.html>.
- Cole-Lewis, H., & Kershaw, T. (2010). Text messaging as a tool for behavior change in disease prevention and management. *Epidemiologic Reviews*, 32, 56–69. <http://dx.doi.org/10.1093/epirev/mxq004>.
- Cook, J. (2014a). *Hackers access at least 100,000 snapchat photos and prepare to leak them, including underage nude pictures* (10 Oct 2014). Business Insider URL <http://uk.businessinsider.com/snapchat-hacked-the-snapping-2014-10>.
- Cook, J. (2014b). *Snap saved admits it was the source of 100,000 leaked snapchat photos and videos* (13 Oct 2014). Business Insider URL <http://uk.businessinsider.com/snap-saved-admits-it-was-source-of-leaked-snapchat-photos-2014-10>.
- Curtis, S. (2014). *Instant messaging overtakes texting in the UK* (13 Jan 2014). The Telegraph Online URL <http://www.telegraph.co.uk/technology/news/10568395/Instant-messaging-overtakes-texting-in-the-UK.html>.
- Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and intrinsic motivation to use computers in the workplace. *Journal of Applied Social Psychology*, 22, 1111–1132. <http://dx.doi.org/10.1111/j.1559-1816.1992.tb00945.x>.
- Duck, S., & Wright, P. H. (1993). Reexamining gender differences in same-gender friendships: a close look at two kinds of data. *Sex Roles*, 28, 709–727. <http://dx.doi.org/10.1007/BF00289989>.
- Duggan, M. (2013). *Photo and video sharing grow online* (28 Oct 2013). Pew Research Center URL <http://www.pewinternet.org/2013/10/28/photo-and-video-sharing-grow-online/>.
- Dunbar, R. (1992). Neocortex size as a constraint on group size in primates. *Journal of Human Evolution*, 22, 469–493. [http://dx.doi.org/10.1016/0047-2484\(92\)90081-J](http://dx.doi.org/10.1016/0047-2484(92)90081-J).
- Dunbar, R. I. M. (1998). The social brain hypothesis. *Evolutionary Anthropology*, 6, 178–190. [http://dx.doi.org/10.1002/\(SICI\)1520-6505\(1998\)6:5<178::AID-EVAN5>3.3.CO;2-P](http://dx.doi.org/10.1002/(SICI)1520-6505(1998)6:5<178::AID-EVAN5>3.3.CO;2-P).
- Eagly, A. H., & Steffen, V. J. (1984). Gender stereotypes stem from the distribution of women and men into social roles. *Journal of Personality and Social Psychology*, 46, 735–754. <http://dx.doi.org/10.1037/0022-3514.46.4.735>.
- Eftekhari, A., Fullwood, C., & Morris, N. (2014). Capturing personality from Facebook photos and photo-related activities: how much exposure do you need? *Computers in Human Behavior*, 37, 162–170. <http://dx.doi.org/10.1016/j.chb.2014.04.048>.
- Ellison, N. B., Gray, R., Lampe, C., & Fiore, A. T. (2014a). Social capital and resource requests on Facebook. *New Media & Society*, 13, 873–892. <http://dx.doi.org/10.1177/1461444814543998>.
- Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The benefits of facebook “friends”: social capital and college students’ use of online social network sites. *Journal of Computer-Mediated Communication*, 12, 1143–1168. <http://dx.doi.org/10.1111/j.1083-6101.2007.00367.x>.
- Ellison, N. B., Vitak, J., Gray, R., & Lampe, C. (2014b). Cultivating social resources on social network sites: facebook relationship maintenance behaviors and their role in social capital processes. *Journal of Computer-Mediated Communication*, 19, 855–870. <http://dx.doi.org/10.1111/jcc4.12078>.
- FitzGerald, K., Seale, N. S., Kerins, C. A., & McElvaney, R. (2008). The critical incident technique: a useful tool for conducting qualitative research. *Journal of dental education*, 72, 299–304.
- Flanagan, J. R. (1954). The critical incident technique. *Psychological bulletin*, 51, 327–358. <http://dx.doi.org/10.1037/h0061470>.
- Fox, J., & Rooney, M. C. (2015). The Dark triad and trait self-objectification as predictors of mens use and self-presentation behaviors on social networking sites. *Personality and Individual Differences*, 76, 161–165. <http://dx.doi.org/10.1016/j.paid.2014.12.017>.
- Granovetter, M. (1983). The strength of weak ties: a network theory revisited. *Sociological Theory*, 1, 201–233.
- Gremier, D. D. (2004). The critical incident technique in service research. *Journal of Service Research*, 7, 65–89. <http://dx.doi.org/10.1177/1094670504266138>.
- Hawn, C. (2009). Report from the field: take two aspirin and tweet me in the morning: how twitter, facebook, and other social media are reshaping health care. *Health Affairs*, 28, 361–368. <http://dx.doi.org/10.1377/hlthaff.28.2.361>.
- Hofer, M., & Aubert, V. (2013). Perceived bridging and bonding social capital on Twitter: differentiating between followers and followees. *Computers in Human Behavior*, 29, 2134–2142. <http://dx.doi.org/10.1016/j.chb.2013.04.038>.
- Hu, Y., Wood, J. F., Smith, V., & Westbrook, N. (2004). Friendships through IM: examining the relationship between instant messaging and intimacy. *Journal of Computer-Mediated Communication*, 10(00). <http://dx.doi.org/10.1111/j.1083-6101.2004.tb00231.x>.
- Jonason, P. K., Lyons, M., Baughman, H. M., & Vernon, P. A. (2014). What a tangled web we weave: the Dark Triad traits and deception. *Personality and Individual Differences*, 70, 117–119. <http://dx.doi.org/10.1016/j.paid.2014.06.038>.
- Juniper Research. (2014). *Mobile messaging markets*. Technical Report. URL <http://www.juniperresearch.com/press-release/mobile-messaging-pr1>.
- Kemp, N. (2013). *What marketers should know about Snapchat?* (13 Jun 2013). Marketing Magazine Online URL <http://www.marketingmagazine.co.uk/article/1186152/marketers-know-snapchat>.
- Kim, D., Subramanian, S. V., Gortmaker, S. L., & Kawachi, I. (2006). US state- and county-level social capital in relation to obesity and physical inactivity: a multilevel, multivariable analysis. *Social Science and Medicine*, 63, 1045–1059. <http://dx.doi.org/10.1016/j.socscimed.2006.02.017>.
- Kosinski, M., Stillwell, D., & Graepel, T. (2013). Private traits and attributes are predictable from digital records of human behavior. *Proceedings of the National Academy of Sciences of the United States of America*, 110, 5802–5805. <http://dx.doi.org/10.1073/pnas.1218772110>.
- Kosur, J. (2014). *What is the fapping? its a dirty moment captured in time* (1 Sep 2014). Business2Community URL <http://www.business2community.com/social-buzz/fapping-diving-deep-scandal-0995227>.
- Krizan, Z., & Bushman, B. J. (2011). Better than my loved ones: social comparison tendencies among narcissists. *Personality and Individual Differences*, 50, 212–216. <http://dx.doi.org/10.1016/j.paid.2010.09.031>.
- Lambiotte, B. R., & Kosinski, M. (2015). Tracking the digital footprints of personality. *Proceedings of the Institute of Electrical and Electronics Engineers (IEEE)*, 102, 1934–1939. <http://dx.doi.org/10.1109/JPROC.2014.2359054>.
- Lee, E., Kim, Y. J., & Ahn, J. (2014). How do people use Facebook features to manage social capital? *Computers in Human Behavior*, 36, 440–445. <http://dx.doi.org/10.1016/j.chb.2014.04.007>.
- Leon, A. C., & Heo, M. (2009). Sample sizes required to detect interactions between two binary fixed-effects in a mixed-effects linear regression model. *Computational Statistics & Data Analysis*, 53, 603–608. <http://dx.doi.org/10.1016/j.csda.2008.06.010>.
- Luders, M., Proitz, L., & Rasmussen, T. (2010). Emerging personal media genres. *New Media & Society*, 12, 947–963. <http://dx.doi.org/10.1177/1461444809352203>.
- Macmillan, D., & Rusli, E. (2014). *Snapchat is said to have more than 100 million monthly active users* (26 Aug 2014). Wall Street Journal Blogs URL <http://blogs.wsj.com/digits/2014/08/26/snapchat-said-to-have-more-than-100-million-monthly-active-users/>.
- Moon, J. W., & Kim, Y. G. (2001). Extending the TAM for a world-wide-web context. *Information and Management*, 38, 217–230. [http://dx.doi.org/10.1016/S0378-7206\(00\)00061-6](http://dx.doi.org/10.1016/S0378-7206(00)00061-6).
- Ogara, S. O., Koh, C. E., & Prybutok, V. R. (2014). Investigating factors affecting social presence and user satisfaction with mobile instant messaging. *Computers in Human Behavior*, 36, 453–459. <http://dx.doi.org/10.1016/j.chb.2014.03.064>.
- Peña, E. A., & Slate, E. H. (2006). Global validation of linear model assumptions. *Journal of the American Statistical Association*, 101, 341–354. <http://dx.doi.org/10.1198/016214505000000637>.
- Putnam, B. Y. R. (2001). Social capital measurement and consequences. *Canadian Journal of Policy Research*, 2, 41–51. <http://dx.doi.org/10.1017/S1474746403001052>.
- Qualtrics. (2013). *Qualtrics*. URL <http://www.qualtrics.com>.
- Quan-Haase, A., & Young, A. L. (2010). Uses and gratifications of social media: a comparison of Facebook and instant messaging. *Bulletin of Science, Technology & Society*, 30, 350–361. <http://dx.doi.org/10.1177/0270467610380009>.
- Ramirez, A., & Broneck, K. (2009). ‘IM me’: instant messaging as relational maintenance and everyday communication. *Journal of Social and Personal Relationships*, 26, 291–314. <http://dx.doi.org/10.1177/0265407509106719>.
- Rayner, J. C. W., & Best, D. J. (1990). Smooth tests of goodness of fit: an overview. *International Statistical Review*, 58, 9. <http://dx.doi.org/10.2307/1403470>.
- Roesner, F., Gill, B., & Kohno, T. (2014). Sex, lies, or kittens? Investigating the use of snapchats self-destructing messages. In N. Christin, & R. Safavi-Naini (Eds.), *Financial Cryptography and data security* (pp. 64–76). Springer Berlin Heidelberg. volume 8437 of Lecture Notes in Computer Science.

- Rusli, E., & Macmillan, D. (2013). *Snapchat spurned \$3 billion acquisition offer from facebook* (13 Nov 2013). Wall Street Journal Online URL <http://blogs.wsj.com/digits/2013/11/13/snapchat-spurned-3-billion-acquisition-offer-from-facebook/>.
- Rusli, E., & Macmillan, D. (2014). *Snapchat fetches \$10 billion valuation* (26 Aug 2014). Wall Street Journal Blogs URL <http://www.wsj.com/articles/snapchat-fetches-10-billion-valuation-1409088794>.
- Saslow, L. R., Muise, A., Impett, E. A., & Dubin, M. (2012). Can you see how happy we are? Facebook images and relationship satisfaction. *Social Psychological and Personality Science*, 4, 411–418. <http://dx.doi.org/10.1177/1948550612460059>.
- Shontell, A. (2013). *The Truth about Snapchat's active users* (The numbers the company doesn't want you to see; 9 Dec 2013). Business Insider URL <http://www.businessinsider.com/snapchat-active-users-exceed-30-million-2013-12?IR=T>.
- Sledgianowski, D., & Kulviwat, S. (2009). Using social network sites: the effects of playfulness, critical mass and trust in a Hedonic context. *Journal of Computer Information Systems*, 49, 74–83.
- Statista. (2014). *Age distribution of Snapchat users worldwide as of July 2014*. Technical Report. URL <http://www.statista.com/statistics/315398/snapchat-user-age-distribution/>.
- Steinfeld, C., Ellison, N. B., & Lampe, C. (2008). Social capital, self-esteem, and use of online social network sites: a longitudinal analysis. *Journal of Applied Developmental Psychology*, 29, 434–445. <http://dx.doi.org/10.1016/j.appdev.2008.07.002>.
- Sutcliffe, A., Dunbar, R. I., Binder, J., & Arrow, H. (2012). Relationships and the social brain: integrating psychological and evolutionary perspectives. *British Journal of Psychology*, 103, 149–168. <http://dx.doi.org/10.1111/j.2044-8295.2011.02061.x>.
- Tosun, L. P. (2012). Motives for Facebook use and expressing “true self” on the internet. *Computers in Human Behavior*, 28, 1510–1517. <http://dx.doi.org/10.1016/j.chb.2012.03.018>.
- UrbanDictionary. (2008c). Definition of ‘sexting’. URL <http://www.urbandictionary.com/define.php?term=sexting>.
- Utz, S., Muscanell, N., & Khalid, C. (2015). Snapchat Elicits more jealousy than facebook: a comparison of snapchat and facebook use. *Cyberpsychology, Behavior, and Social Networking*, 18, 141–146. <http://dx.doi.org/10.1089/cyber.2014.0479>.
- Valenzuela, S., Park, N., & Kee, K. F. (2009). Is There social capital in a social network site?: facebook use and college student's life satisfaction, trust, and participation. *Journal of Computer-Mediated Communication*, 14, 875–901. <http://dx.doi.org/10.1111/j.1083-6101.2009.01474.x>.
- Van Der Heide, B., D'Angelo, J. D., & Schumaker, E. M. (2012). The effects of verbal versus photographic self-presentation on impression formation in facebook. *Journal of Communication*, 62, 98–116. <http://dx.doi.org/10.1111/j.1460-2466.2011.01617.x>.
- Van der Heijden, H. (2003). Factors influencing the usage of websites: the case of a generic portal in The Netherlands. *Information and Management*, 40, 541–549. [http://dx.doi.org/10.1016/S0378-7206\(02\)00079-4](http://dx.doi.org/10.1016/S0378-7206(02)00079-4).
- Vitak, J., Ellison, N. B., & Steinfield, C. (2011). The ties that bond: re-examining the relationship between Facebook use and bonding social capital. In *Proceedings of the 2011 44th Hawaii International Conference on system sciences* (pp. 1–10). Washington, DC, USA: IEEE Computer Society. <http://dx.doi.org/10.1109/HICSS.2011.435>.
- Williams, D. (2006). On and off the Net: scales for social capital in an online Era. *Journal of Computer-Mediated Communication*, 11, 593–628. <http://dx.doi.org/10.1111/j.1083-6101.2006.00029.x>.
- Wohlsen, M. (2015). *Im too old for snapchat, which is exactly why it should be worth \$19B* (23 Feb 2015). Wired Online URL <http://www.wired.com/2015/02/im-old-get-snapchat-exactly-worth-19b/>.