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When ‘friends’ collide: Social heterogeneity and user vulnerability on social network sites



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ABSTRACT

The present study examines how the use of social network sites (SNS) increases the potential of experiencing psychological, reputational and physical vulnerability online. From our theoretical perspective, concerns over the use of social network sites and online vulnerability stem from the ease with which users can amass large and diverse sets of online social connections and the associated maintenance costs. To date most studies of online vulnerability have relied on self-report measures, rarely combining such information with user's validated digital characteristics. Here, for a stratified sample of 177 UK-based Facebook users aged 13 to 77, digitally derived network data, coded for content and subjected to structural analysis, were integrated with self-report measures of social network heterogeneity and user vulnerability. Findings indicated a positive association between Facebook network size and online vulnerability mediated by both social diversity and structural features of the network. In particular, network clustering and the number of non-person contacts were predictive of vulnerability. Our findings support the notion that connecting to large networks of online ‘friends’ can lead to increasingly complex online socialising that is no longer controllable at a desirable level.

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1. Introduction

1.1. Online vulnerability and social network sites

In an increasingly connected world, online social network sites (SNS; [boyd & Ellison, 2008](#)) provide interactive platforms for the digitally enabled to develop and manage their social spheres online. Surpassing the predominantly text-based methods of early computer-mediated communication, these sites afford users the ability to share a vast array of information in multimedia-rich environments. For the millions of global users who regularly engage with these sites ([Ofcom, 2014](#)), it has been suggested that they provide an online equivalent to face-to-face communication contexts ([Underwood, Kerlin, & Farrington-Flint, 2011](#)), and in doing so carry the potential of delivering a range of social and psychological benefits ([Burke & Kraut, 2014](#); [Ellison, Steinfield, & Lampe, 2007](#); [Valkenburg, Peter, & Schouten, 2006](#)). At the same time, an area of mounting academic interest is addressing the potential associated risks and vulnerabilities of using SNS to interact and

communicate with our social connections ([Debatin, Lovejoy, Horn, & Hughes, 2009](#); [Fogel & Nehmad, 2009](#); [Wilcox & Stephen, 2013](#)).

Online vulnerability is the capacity to experience detriments to psychological, reputational or physical wellbeing ([Davidson and Martellozzo, 2013](#)) due to risks encountered whilst engaging in online activities. Online risks can take on many forms ([Hasebrink, Görzig, Haddon, Kalmus, & Livingstone, 2011](#)) including threats to data privacy, online gossip and rumours, incidents of online harassment such as cyber stalking and exposure to inappropriate and unwanted content ([boyd & Ellison, 2008](#)). Recent and substantial increases in the prevalence of such adverse online experiences ([BBC News, 2015](#); [Jones, Mitchell, & Finkelhor, 2013](#)) have been linked to detrimental consequences such as depression ([Landoll, La Greca, Lai, Chan, & Herge, 2015](#)) and suicide ([Hinduja & Patchin, 2010](#); [Washington Post, 2013](#)).

Studies which have sought to find associations between SNS use and online vulnerability have so far relied mostly on self-report measures ([Binder, Howes, & Smart, 2012](#); [Fogel & Nehmad, 2009](#)). Technological advances in data collection methods ([Hogan, 2008](#); [Rieder, 2013](#)) now render it possible for psychologists and other researchers in non-technical disciplines to combine such information with a user's actual digital characteristics. Recently, technology-derived online network data have been used to explore

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social support mechanisms (Brooks, Hogan, Ellison, Lampe, & Vitak, 2014). The present study will look at how such data can provide an in-depth exploration of online vulnerability that goes beyond the readily available metrics of traditional psychological research.

1.2. Online vulnerability and network heterogeneity

Online vulnerability on SNS has been a frequent source of debate in both the realms of academia (Staksrud, Ólafsson, & Livingstone, 2013; Wilcox & Stephen, 2013) and the popular press (BBC News, 2015; New York Times, 2014). Increased SNS engagement has been seen to lead to increases in online social network size (Madden, Lenhart, Cortesi, Gasser, Duggan, Smith et al., 2013), raising concerns about the consequences of network diversity (Manago, Taylor, & Greenfield, 2012) and about data privacy (Debatin et al., 2009). In the following, we will outline a set of processes that link both network size and diversity to vulnerability.

SNS are typically comprised of a myriad of interconnected ego-networks (Hogan, 2008). An ego-network is a personal network in which an individual, the ego, connects with other people (Arnaboldi, Guazzini, & Passarella, 2013) via a process of online 'friending'. This concept of 'friending' plays on the traditional associations conjured up by offline friendship, mutual trust, common interests and an investment of time (Thelwall, 2008), in order to encourage users to enter into a mutually agreeable digital 'friendship'. Research has suggested that many of the online 'friends' made by an ego follow an offline to online trajectory (Bryant, Sanders-Jackson, & Smallwood, 2006; Ellison et al., 2007). For the average user, SNS are an important means of maintaining pre-existing relationships (Ellison et al., 2007). This affords the ego validation and reassurance that the 'friends' viewing their data are known and trusted contacts. However, this alone may not necessarily be sufficient to guard against online vulnerability.

According to Dunbar's (1998) Social Brain Hypothesis our limited cognitive capacities and the maintenance demands exerted by social relationships impose evolutionary constraints on the size of social networks. As a result, an ego should be best equipped to maintain approximately 150 meaningful connections, i.e., contacts that have some direct relationship with ego and are characterised for the network owner by name, face, and individuating background information. Sociological studies have put the total number of people actively known to an individual, leaving aside meaningfulness, at less than 300 (McCarty, Killworth, Bernard, Johnsen, & Shelley, 2001). In the realms of SNS, however, networks regularly number in their hundreds and even thousands. Recent estimates suggest that the average adult Facebook network contains 338 'friends' (Pew Research, 2014). Whilst large networks have been positively associated with social support and informational resources (Ellison et al., 2007), a potential consequence is that they can become progressively unmanageable. One reason is that with increased size the traffic, or flow of information, through a network is likely to increase. Some proportion of this traffic will be difficult to manage for the ego (consider, for example, inappropriate broadcasting) and this proportion will likewise increase with size. Another reason is that the network's social diversity in itself becomes more difficult to manage because the ego connects to 'friends' from an increasing number of partially incompatible social spheres (Binder et al., 2012).

Each individual is highly likely to belong to a number of different social spheres and these will show up in every egocentric network. From family to friends, classmates to work colleagues, different contacts play different roles and occupy different facets within the ego's social network. As such a social network often affords a complex structure containing multiple contextual social boundaries. In the offline world, these relationships are carefully managed

by the ego enabling them to project desired and moderated representations of the self (Vitak, 2012). On SNS, however, these contextually diverse 'friends' are allowed to digitally mingle. The contextual boundaries of the heterogeneous social spheres in which they reside are collapsed, forming an increasingly homogeneous online existence in the ego's network (Binder et al., 2012; Davis & Jurgenson, 2014; Marwick & Boyd, 2011).

This digital mingling can lead to online vulnerability due to unintended collisions between heterogeneous social spheres. Binder et al. (2012), in a study on UK-based Facebook users, found that social diversity in a Facebook network resulted in increases in online tension over and above the effects of network size. This was attributed to the unrestricted flow of information across the collapsed contextual social boundaries. For example, a 'friend' of the ego posting information pertinent to the sphere in which they reside (e.g. a risqué 'in' joke) might inadvertently cause tension with 'friends' from contextually different spheres within the network.

In a contextually collapsed network, however, it is not just the risk posed by the communications of the ego's friends that can potentially increase vulnerability, but also the communications of the ego themselves. SNS impact on our ability to imagine the audience to which we are communicating (Boyd, 2007; Litt, 2012). When we engage in communication with individuals or small groups (i.e. in face-to-face settings or via small scale technology-mediated communications), the audience to whom we are communicating is unambiguous due to immediate visual and/or auditory validation (Litt, 2012). On social networking platforms, however, audiences have a tendency to become less explicit as the size, diversity and permanence of the networks increasingly decreases their salience (Boyd, 2007).

When an ego posts a communication on an SNS, it is likely that their imagined audience does not consist of the complete social network but rather a subset derived from either technological cues (e.g. the 'Online' friend list, frequent likers/commenters) or cognitive references to offline social contexts (Marwick & Boyd, 2011). For the ego, this potential to misjudge the prospective audience has implications for online vulnerability, due to an increased likelihood in the ego communicating content that is not appropriate for all of the heterogeneous social spheres contained on their network (Binder et al., 2012). On this basis, we expected first of all that network size and social heterogeneity would both be positively related to vulnerability:

H1. Network size will positively predict exposure to online vulnerability.

H2. Social network heterogeneity will positively predict exposure to online vulnerability.

Heterogeneous spheres so far have been defined and measured as social diversity, the different types of contacts that can be identified in a network (Binder et al., 2012; McCarty et al., 2001). This leaves the question how these contacts are arranged and interconnected. SNS carry the unique advantage of digitally mapping out network structures, which allows for the identification and quantification of clusters (Smith, Schneiderman, Milic-Frayling, Mendes Rodrigues, Barash, Dunne et al., 2009). Clusters are discernible subgroups characterised by a high degree of internal interconnections and few external connections to other parts of the network. As such, they provide another indicator of different spheres managed by ego. Clusters may not fully coincide with the social categories listed for a network. For example, a category 'friends known from school' may be located within one cluster representing the social environment of ego at school and another cluster representing an inner friendship circle that is distinct from the wider school context. In this study, we considered not only the

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