

Social Computing Privacy Concerns: Antecedents & Effects

Oded Nov

New York University Polytechnic Institute
New York, NY, USA
onov@poly.edu

Sunil Wattal

Temple University
Philadelphia, PA, USA
swattal@temple.edu

ABSTRACT

Social computing systems are increasingly a part of people's social environment. Inherent to such communities is the collection and sharing of personal information, which in turn may raise concerns about privacy. In this study, we extend prior research on internet privacy to address questions about antecedents of privacy concerns in social computing communities, as well as the impact of privacy concerns in such communities. The results indicate that users' trust in other community members, and the community's information sharing norms have a negative impact on community-specific privacy concerns. We also find that community-specific privacy concerns not only lead users to adopt more restrictive information sharing settings, but also reduce the amount of information they share with the community. In addition, we find that information sharing is impacted by network centrality and the tenure of the user in the community. Implications of the study for research and practice are discussed.

Author Keywords

Privacy concerns, photo sharing, social computing, Flickr, trust.

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

The term Social Computing refers to applications and services that facilitate collective action and social interaction on the internet, such as blogs, wikis, social networks, and discussion forums [17]. As social computing is becoming an important component of peoples' social environment, it has recently been receiving increasing research attention. The success of social computing systems, whose content is created almost entirely by user contribution, depends on the willingness of the participants to share. According to the privacy calculus argument [8], individuals' willingness to provide information, in turn, is governed by their privacy concerns. To address this, we

study the antecedents and consequences of users' privacy concerns in social computing communities. This issue seems to be particularly important given that social networks such as Facebook have been facing increasing criticism over their privacy policies.

While privacy is well researched in the literature, there has been scant research on the social aspects of privacy in social computing communities. Most prior research on online privacy deals with users who share their information with e-commerce websites (e.g. [2,10,13]). In such a context, information sharing is usually mandatory, and is part of a purchase process. Online communities, on the other hand, rely on information voluntarily supplied by their members. While prior research has looked at the motivations of users participating in this voluntary disclosure of information (e.g. [1,15]), there has been little research on how privacy concerns impact this information sharing. This issue is further complicated by the fact that users in online communities share information not only with firms such as Facebook, but also with other members of their online community. Furthermore, it is well understood that privacy is a relative construct and a significant component of an individual's privacy concern depends on observing the behavior of others [20]. Therefore, actions and intentions of other users are likely to affect users' privacy concerns. Social computing communities present us with a unique opportunity to study the antecedents of privacy concerns in a social context.

In the context of e-commerce, privacy concerns are associated with decreased willingness to share information [10]. In social computing communities, however, the impact of privacy is not yet clear. One might believe that community users are not highly privacy conscious, since many of them exhibit the most private information on public venues such as Facebook or Flickr, and appear unconcerned of privacy risks [12]. However, recent public debate suggests that users do attach importance to how the information they share in online communities is used.

In this study, we extend prior research on online privacy: first, we examine the role social norms and trust in other members of a community play in determining users' privacy concerns. Second, we study the role played by privacy concerns, network structure and the length of membership in the community, in users' actual information sharing. The research questions that we address are:

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1. The *antecedents* of privacy concerns: Do social norms contribute to individual's privacy concerns in online communities? Does trust in other network participants affect users' privacy concerns?

2. The *impact* of privacy concerns on information sharing: Do higher levels of privacy concerns in an online community lead to lower levels of information sharing? What role does the position of the user within the network structure play in a user's willingness to share?

RESEARCH MODEL AND HYPOTHESES

Internet Privacy

Malhotra et al [13] developed the Internet Users Information Privacy Concerns (IUIPC) model, and suggest that IUIPC negatively impact a users' trusting and risk beliefs, which ultimately lead to reduced intention to share information with a marketer. Others [9] suggest that individuals are willing to share information if the benefits of this sharing outweigh the privacy concerns and other related costs of information sharing. Malhotra et al [13] suggest that privacy is influenced by users' perception of external factors such as culture, which in-turn vary with individual specific characteristics. It is likely that users with greater internet privacy concerns are also more privacy conscious at a specific website or system. Therefore,

H1: Internet privacy concerns are positively related to community-specific privacy concerns.

Trust in Online Community Members

Pavlou et al [18] suggest that providing information to others is likely to lead to a perception of vulnerability, and that providing information during an e-commerce transaction can increase the user's level of uncertainty. In online communities, users primarily share information with other members of the community. Therefore, an element of uncertainty is introduced in this context because users might not be certain of the intentions of other users. One can argue that users self select their friends on a social network, and therefore that trust may not be an issue. However, empirical evidence shows that users form online groups with large numbers of unknown strangers and that users add other people as friends even though they may not know or trust them [4,12]. This can increase the level of user's uncertainty. Following the view [14] that trust is the key to uncertainty reduction, we propose:

H2: Trust in other community members is negatively related to community-specific privacy concerns.

Social Norms

Communities are vehicles for users to share information about themselves, and the decision whether and to what extent to share information is influenced by the information sharing behavior and social norms within the community. Postmes et al [19] suggest that group norms define communication within computer mediated groups. The theory of social identity suggests that membership in a

group is a part of an individual's concept of self-identity [21]. According to Postmes et al [19] social identity may exert a strong influence on user behavior in computer mediated groups. As Strandburg et al [20] suggest, online communities often develop norms concerning disclosure of personal information. We propose that,

H3: Community social norms of information sharing are negatively related to community-specific privacy concerns.

Information Sharing

As pointed out in prior literature [10,13], privacy concerns are associated with a lower willingness to share information. However, in communities such as Flickr and Facebook, users can choose a variety of privacy settings of who can see what type of information in their profile. For example, on Flickr, users can choose to share their photos with the public, with family and friends, with family only, or with no one. Therefore:

H4a: Community-specific privacy concerns are negatively related to the amount of information shared.

H4b: Community-specific privacy concerns are positively related to more restrictive privacy settings.

Research has shown that individuals with longer tenure will participate more in the information sharing networks [7, 22). However, as Brown and Duguid [5] suggest, a longer tenure also implies cognizance of risks in a system and the ways to resolve these. In the context of communities, this implies that users with longer tenure are likely to be better aware of the privacy controls. Therefore:

H5a: The length of membership in the community is positively related to the amount of information shared,

H5b: The length of membership is positively related to more restrictive privacy settings.

Finally, the network position of a user in a community is likely to influence the amount of information she or he shares [16]. An important measure of an individual's position in a social network is centrality. Centrality is measured as the number of direct ties to a given node [11]. Wasko and Faraj [22] show that an individual's centrality in a network is positively related to her willingness to share information. They suggest that more central individuals are more likely to comply with group norms and cooperate with others. In addition, greater centrality implies that a larger number of community members have access to the users' information. This increases the uncertainty related to information sharing and the user may take steps to mitigate this uncertainty by limiting the number and type of people who can access her information. Therefore,

H6a: Network centrality is positively related to the amount of information shared with the community.

H6b: Network centrality is positively related to more restrictive privacy settings.

METHODOLOGY

We carried out a study of photo sharing on Flickr (www.flickr.com), a popular photo sharing community, using two independent sources: user-reported data (via a web-based survey) and system data on users. Flickr allows users to upload photos and share them with others. It also enables users to designate other users as “contacts”, people whose photos the user follows (contacts are often reciprocal). In addition, Flickr has an Application Programming Interface (API) that enables third party services to communicate with Flickr and access the user’s data (with the user’s permission). Using system data mitigates common method bias - a potential methodological concern in interpreting survey results.

The survey items (Figure 1) were adapted from prior research: community-specific privacy concerns and trust in community members were adapted from Pavlou et al [18], Internet privacy concerns was adapted from Malhotra et al [13], and sharing norm was adapted from Bock et al [3].

Community-specific privacy concerns: I am concerned about my privacy when using Flickr.

Trust in community members: Flickr users I know are trustworthy.

Internet privacy concerns: Compared to others, I am more sensitive about the way online companies handle my personal information.

Sharing norm: Most people who are important to me think that it is fine to share photos on Flickr

Figure 1. Sample questionnaire items

1270 Flickr users were emailed an invitation to participate in the web-based survey. 192 valid responses were received, in line with response rate in similar studies. Users’ data were available via the API. At the end of the web-based survey, respondents were asked to authorize access to their account, and their data was extracted and recorded together with their response to the questionnaire.

The number of a user’s public photos (photos viewable by all Flickr users) was used as an indicator of sharing, the number of a user’s contacts indicates the user’s network centrality, and the ratio between the user’s public photos and all photos (including private) was used as a measure of the restrictive privacy setting determined by the user. Partial Least Squares (PLS) was then used to analyze the data, providing the Structural Equation Modeling tool to test the research model. The PLS algorithm estimates path models using composite variables, (sometimes called latent variables), from a number of indicator items (sometimes called manifest variables) which are measured either by surveys or through system data.

RESULTS

The psychometric properties of the instrument were analyzed first: the composite reliability values of all constructs exceeded 0.79, thus demonstrating good internal

consistency. The convergent validity of the measures was assessed by examining the individual item loadings between an item and its corresponding underlying factor, as well as the average variance extracted (AVE). The results supported the convergent validity of the measures. Discriminant validity was assessed by comparing the square root of the AVE (RAVE) of a particular construct and the correlation between that construct and other latent constructs. We found that constructs’ RAVE was higher than the correlation between the construct and other constructs, thus indicating good discriminant validity.

We then tested the model using the PLS structural model. The significance of structural path estimates was computed using the bootstrapping re-sampling method. Figure 2 shows the results of the PLS analysis: The significance of path estimates was computed using the bootstrapping re-sampling method. The structural model was evaluated on the basis of R^2 for each composite latent variable and statistical significance of structural paths. The numbers near the arrows represent the structural path estimates.. Since we measure information sharing behavior by two variables – the amount of information shared and type of privacy settings chosen – the path coefficients are indicated in Figure 2 as a / b, where a is the coefficient of total number of public photos uploaded and b is the ratio of photos shared to all photos uploaded (including private photos).

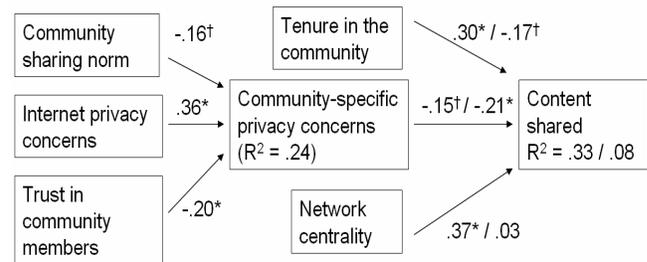


Figure 2. Results (†significant at $p < .10$ * significant at $p < .05$)

As indicated by the R^2 of the “Content Shared” construct, 32.6% of variance in the amount of information shared and 23.6% of variance in the use of restrictive privacy settings were explained. Most of the paths in the model were statistically significant, thus supporting the hypotheses.

DISCUSSION AND IMPLICATIONS

We extended prior literature on online privacy to model privacy in the specific context of social computing communities. While the privacy literature has focused primarily on users’ interaction with online retailers, we find that privacy in communities is a separate construct from internet privacy. We draw on the literatures on trust, privacy and social norms to hypothesize that additional factors impact user privacy in online communities. We found that users’ trust in other community members, and the community’s information sharing norms have a negative effect on community-specific privacy concerns, which in turn, has a negative effect on sharing with other members in the community, and a negative effect on the ratio of

information shared publicly. Thus, the study contributes to research on online privacy, as it goes beyond dyadic privacy relationships between a user and a commercial entity, to the analysis of the privacy relationships between a user and his or her community. This community aspect is becoming increasingly important, as users' web-based activity and sharing takes place in a social context.

The study also demonstrates that users' privacy concerns lead users to choose more restrictive information sharing settings as well as reduce the amount of information they share. Since sustained participation and contribution from individual members is critical for the viability of online communities, this finding should alert managers and designers of social computing outlets, who are therefore recommended to act in order to decrease users' privacy concerns. Furthermore, the study reveals directions for such actions: the findings highlight the importance of sharing norms and the sense of trust in other community members – both of which can be encouraged through design and ongoing operation of social computing communities.

The study has limitations, which may be addressed by further research: first, the study took place in one specific community, namely Flickr, and as such the study's scope is limited. Studying other communities, such as bookmark sharing (e.g. del.icio.us), or video sharing (e.g. YouTube), can help enhance the generalizability of the findings. Second, since some of the survey questions were adapted from existing scales and adjusted to the Flickr context, there is a danger that the new questions may be misinterpreted by respondents and as a result may not measure their intended constructs. We have attempted to address this, by checking the composite reliability, factor loadings, and Average Variance Extracted. Further research, however, would be helpful in validating the changed items.

The findings point to the importance of studying social computing privacy issues separately from more general privacy issues. Further research may extend the model presented to include other determinants of community-specific privacy concerns (such as users' perceived control in this context and users' personality traits), as well as other forms of user behavior affected by privacy concerns.

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