College students’ disclosure of location-related information on Facebook

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**A B S T R A C T**

This study drew on existing research and three behavioral intention models to develop the beginning of a new model to explain why college students share their locations on Facebook. Findings showed that students were more likely to disclose their location on Facebook if their friends did so, a concept called subjective norm. Results also showed that subjective norm had an indirect effect on whether people disclosed their location, mediated through people's attitude toward disclosure, while controlling for usefulness of disclosing. Collectively, this model explained 61% of the variance in why college students share locations on Facebook. Findings are discussed in relation to behavioral-intention models, and practical implications for social media companies are offered.

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1. Introduction

With the increasing prevalence of mobile devices and wireless Internet access in recent years, location-based services (LBS) have provided gigantic opportunities for the advertising and marketing industries. For example, by providing advertisements and coupons to nearby potential customers, restaurants may be able to gain more revenue than they can with traditional promotions. Gigaom, a website providing in-depth analysis of technologies and marketing, estimated that LBS would bring in $10 billion by 2016 due to their extraordinary potential (Kim, 2011). Since LBS mainly rely on users’ voluntary disclosure of location-related information, there is a need for studies investigating the factors that influence whether users will disclose their locations. With 1.23 billion monthly active users, according to Facebook Reports Fourth Quarter and Full Year 2013 Results, Facebook is one of the social media giants and poses a highly profitable LBS market for the future. Studying Facebook users’ disclosure of location-related information may have important implications for social media companies, advertisers, and marketers.

Prior research has examined a variety of LBS, including Four-square, Socialight, and Yelp (e.g. Hu & Ester, 2013; Humphreys & Liao, 2011; Noulas, Mascolo, Scellato, & Pontil, 2011). Much of that research has focused on privacy issues (e.g. Sadeh et al., 2009) as well as how accurately people disclose their locations and what these disclosures reveal about their social ties (e.g. Hecht, Hong, Suh, & Chi, 2011; McGee, Caverlee, & Cheng, 2013). Other studies have examined why people use LBS. Findings suggest that people are more likely to use LBS if their friends do (Humphreys & Liao, 2011; Lindqvist, Cranshaw, Wiese, Hong, & Zimmerman, 2011). Research that explores why people adopt new technologies suggests that attitude toward the technology and how useful people find the application are also important factors (Armitage & Conner, 2001; Chi, Yeh, & Yang, 2011; Lee, Kozar, & Larsen, 2003; Lu, Zhou, & Wan, 2009; Peslavik & Ceccucci, 2011; Premkumar & Bhattacharjee, 2008; Tsai, Kelley, Cranor, & Sadeh, 2009).

However, what has not been fully explored is how this process occurs. This current study aimed to fill this gap by proposing and testing a mediation model that explained why young people disclose location-based information on Facebook. This new model is necessary because earlier models have not specifically addressed LBS in this way. To do this, we surveyed 141 college students, using questions drawn from prior LBS research and three theoretical models. The three models have moderate to strong power to predict why people adopt a behavior, and they have been applied to new technology (e.g. Armitage & Conner, 2001; Chi et al., 2011; Lee et al., 2003; Lu et al., 2009; Peslavik & Ceccucci, 2011; Premkumar & Bhattacharjee, 2008). These models are the theory of reasoned action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975), theory of planned behavior (Hoyer & MacInnis, 2011), and the technology acceptance model (Davis, 1989). For this study, we focused specifically on Facebook because it is the number one website in the world, according to Alexa.com, and its users frequently disclose their location (King, 2012).
First, we offer a brief history of LBS. Then we review the literature on a variety of LBS and show how this research relates to this current study. Then we explain and propose our theoretical model, drawing on existing literature and the three theoretical models. Finally, we explain how we tested the model and how our results fit existing research and expand our understanding of why people disclose information on LBS.

2. Literature review

2.1. Location-based services

As an overarching category, LBS are mobile or online platforms that use global positioning systems (GPS) to allow users to share their location in real time with others (Tsai et al., 2009). These services grew in number, starting in 2006, as more people switched to mobile phones, and more cellular phone towers made it easier to pinpoint users’ locations, according to Tsai et al. (2009), who studied 89 such services. Many of these services work by allowing people to “check in” when they arrive at a location to alert their friends (Cramer, Rost, & Holmquist, 2011; Noulas et al., 2011). Platforms include CitySense, GeoMe, and Google Latitude, and most offer an option to “friend” other users (Tsai et al., 2009). Facebook Places launched in August 2010 and allowed users to “check in” to certain restaurants, coffee shops, and other stores to receive coupons or special offers (Sharon, 2010). A year later, Facebook discontinued “Places” (Gizmodo, 2011), facing competition from Foursquare, which offered users a similar experience. However, Facebook did not completely give up its location-related services; instead, Facebook evolved, integrating the function of location disclosure and including some of the services the “Places” application had offered (Beese, 2011).

Since it discontinued “Places,” Facebook has allowed its users to not only “check in” at various places, but also to tag their specific locations on individual status updates or photo/video posts. Most importantly, location disclosure on Facebook is no longer limited to mobile device users. By customizing the function of location disclosure on its site, Facebook has differentiated itself from Foursquare, successfully encouraging its users to publish their geographical locations on Facebook. In 2012, it was estimated that 200 million Facebook users employed location tagging on a monthly basis (King, 2012). Facebook has 48 times more users compared to Foursquare, which suggests that Facebook may dominate the LBS industry in the near future.

2.2. Prior LBS research

Researchers have examined LBS activities on Foursquare, Twitter, SociaLight and other services. Overall, studies suggest LBS users are leery of sharing their location because of privacy concerns (e.g. Sadeh et al., 2009; Tsai et al., 2009), but they may look beyond this worry if their friends are on the platform (Lindqvist et al., 2011). For example, Cramer et al. (2011) surveyed and interviewed Foursquare users and found that people had utilitarian reasons for using the program, including meeting to carpool, as well as more social reasons, such as sharing time with friends. Similarly, Lindqvist et al. (2011) interviewed and surveyed Foursquare users and found that people joined the service because their friends had done so, and connecting with friends on the LBS remained a stronger reason to use it. Users of Socialight also reported that using this application helped reinforce their social connections (Humphreys & Liao, 2011). Another study examined LBS in China and found that people use LBS if friends recommended it (Zhou, 2012).

Taken together, these studies suggest that part of the reason people use LBS is because of a subjective norm set by their friends. In other words, they disclose on LBS because their friends do, and they want to fit into the norm of their peer group. As a result, subjective norm was one of the main factors considered in this study. Subjective norm is the social pressure from other people important to the user, such as relatives and friends, to do something (Hoyer & MacInnis, 2011).

Other studies of LBS suggested that people’s attitude toward disclosing their location and perception of the usefulness of LBS (Tsai et al., 2009) also play a role in whether they share their locations. As a result, these concepts were main factors considered in this current study. Davis (1989) defined perceived usefulness as the extent to which a person believes a technology enhances job performance, although we tailored this definition to mean performance in general. Attitude toward a technology is defined as viewing that service or its features positively (Hoyer & MacInnis, 2011). In many of the studies of LBS, attitude toward the technology is implicit in whether people accept it. For example, Tsai et al. (2009) asked people to perceive the benefits and risks of LBS to understand their attitudes toward these applications. Similarly, Lindqvist et al. (2011) found that people checked into a location, thereby disclosing their location, only if the benefits of earning badges, making connections, and finding new places outweighed worries about privacy. Therefore, it seems clear that attitude toward revealing one’s location and perceived usefulness of disclosure may play a role in whether people disclose their locations on Facebook.

2.3. Theoretical framework

Based on the above literature regarding LBS, we drew on three theoretical models that help explain why people enact certain behaviors and that have been frequently applied to computer-mediated communication and technologies (e.g. Chi et al., 2011; Peslak & Ceccucci, 2011). The theory of reasoned action (TRA; Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) assumes people evaluate their behavior before they act, so actions are rational. The TRA model assumes users’ attitudes toward a behavior and subjective norms predict whether people will adopt the behavior (Hoyer & MacInnis, 2011). The theory of planned behavior (TPB; Armitage & Conner, 2001) grew out of TRA and also proposed that attitudes toward a behavior and subjective norms predict users’ behavioral intention (Hoyer & MacInnis, 2011). In addition, the technology acceptance model (TAM; Davis, 1989) is an extension of TRA that claims that perceived usefulness of a technology is one of several factors in whether people adopt new applications (Stewart, 1986; Tornatzky & Klein, 1982).

Based on the social media literature regarding LBS and these theoretical models, we proposed that people who feel greater subjective norm to disclose their location on Facebook through social pressure would be more likely to do so. Similarly, people who have a more positive attitude toward sharing their location will be more likely to do so, and people who perceive disclosing their location as useful, will be more likely to share it. Therefore, we hypothesized:

H1. (a) Subjective norm, (b) positive attitude toward, (c) and perceived usefulness of disclosing one’s location on Facebook will show a direct positive relationship with intending to share one’s location.

After establishing the role of the three focal variables in this research, the next step was to put forth the beginning of a proposed theoretical model that explained intention to disclose one’s location on Facebook. Prior research on a variety of LBS (e.g. Cramer et al., 2011; Lindqvist et al., 2011; Tsai et al., 2009; Zhou, 2012) suggested that subjective norm, positive attitude toward disclosing one’s location, and perceived usefulness of the technology all likely play a role in understanding why people share their locations.
Based on this earlier research and the three behavioral intention models that form our theoretical framework, we proposed that subjective norm would lead indirectly to intention to disclose location on Facebook, mediated through positive attitudes toward disclosure. The justification for this causal order is based on prior research (e.g., Humphreys & Liao, 2011; Lindqvist et al., 2011; Zhou, 2012) that found people would disclose their locations if they feel social pressure from those they know. We propose that it is logical that this social pressure, or subjective norm, will influence people’s attitudes toward disclosure more positively and lead indirectly to intention to use the application. In other words, we posited that the subjective norm in part shapes people’s attitudes toward disclosure, making them more likely to do it. Perceived usefulness was considered a control variable based on prior research (Tsai et al., 2009) that found people do not see LBS as useful until after they have tried them. Therefore, it seems illogical that perceived usefulness could be a main predictor, so we sought only to control for any effect it may have. Therefore, we proposed the following hypothesis:

**H2.** Subjective norm will show an indirect effect on intention to share one’s location on Facebook, mediated through positive attitude toward disclosure, while controlling for perceived usefulness of disclosure.

### 3. Method

This study used an online survey to gather data in January and February of 2013. The questionnaire consisted of 25 standardized multiple-choice questions.

#### 3.1. Sample

Previous studies regarding Facebook have used samples of college students because of the prevalence of Facebook use among this group (Chang & Heo, 2014; Kim, Kim, & Nam, 2010; Sheldon, 2008; Stutzman, 2006). In order to reach Facebook users more easily, the subject population for this study was college students 18 years or older in the United States. To make the data collection more manageable, a convenience sample was used by recruiting 141 participants from a public Southern university.

#### 3.2. Procedure

**3.2.1. Preparation**

An online questionnaire was designed for data collection based on the hypotheses in this study. A pretest was administered by recruiting 10 college students from the researchers’ university. Minor problems, such as unclear questions, were addressed to help participants answer questions truthfully and to the best of their knowledge.

**3.2.2. Administration**

The participants were recruited from classes, the library, and the posting of URL links on one researcher’s Facebook and Twitter pages. Participants completed the questionnaire on their own computers at their convenience. Each participant spent 5–10 min completing the survey.

#### 3.3. Independent variables

Aside from the screening questions, all survey questions were measured on 7-point scales (e.g., 1 = strongly disagree; 2 = moderately disagree; 3 = slightly disagree; 4 = neutral; 5 = slightly agree; 6 = moderately agree; and 7 = strongly agree).

### 3.3.1. Attitude toward location disclosure on Facebook

Four questions using 7-point semantic differential scales were asked in this section based on prior research from TRA and TPB (Armitage & Conner, 2001; Hoyer & Maclnnis, 2011). They were “Tagging my locations or ‘checking in’ on Facebook is a good/bad idea,” “Tagging my locations or ‘checking in’ on Facebook is a wise/foolish idea,” “I like/dislike the idea of tagging my locations or ‘checking in’ on Facebook,” and “Tagging my locations or ‘checking in’ on Facebook would be pleasant/unpleasant.” Responses were averaged into an index with high reliability (M = 3, SD = 1.34, α = .94).

**3.3.2. Subjective norm of Facebook users toward location disclosure**

Two 7-point Likert scale questions were asked in this section based on prior research from TRA and TPB (Armitage & Conner, 2001; Hoyer & Maclnnis, 2011). These questions were “People who influence my behavior (such as friends) would think that I should tag my locations or ‘check in’ on Facebook,” and “People who are important to me (such as family members) would think that I should tag my locations or ‘check in’ on Facebook.” Responses were averaged into an index with acceptable reliability (M = 2.77, SD = 1.36, α = .82).

**3.3.3. Perceived usefulness of location disclosure on Facebook**

Five 7-point Likert scale questions were asked. These questions, adapted from the TAM (Davis, 1989), were “Tagging my locations or ‘checking in’ on Facebook would increase my efficiency in either my everyday life or job,” “Tagging my locations or ‘checking in’ on Facebook would improve either the quality of my life or my job performance,” “Tagging my locations or ‘checking in’ on Facebook would enhance my effectiveness either on my everyday life or job,” “Tagging my locations or ‘checking in’ on Facebook would make it easier for either my everyday life or job,” and “I would find tagging my locations or ‘checking in’ on Facebook useful for either my everyday life or job.” Responses were averaged into an index with high reliability (M = 2.54, SD = 1.28, α = .97).

### 3.4. Dependent variable

**3.4.1. Intention to disclose location-based information on Facebook**

Three 7-point Likert scale questions were developed from Zhou’s (2012) study on the usage of location-based services to measure participants’ disclosure intention of location-related information on Facebook. These questions were “Given the chance, I intend to tag my locations or ‘check in’ on Facebook in the next 6 months,” “I expect my use of location tagging or location check-in on Facebook to continue in the next 6 months,” and “I have the intention to use location tagging or location check-in on Facebook in the next 6 months.” Responses were averaged in an index with high reliability (M = 3.16, SD = 1.74, α = .95).

### 4. Results

To test H1, first bivariate relationships were assessed using Pearson’s r correlation coefficients. Results showed moderate to strong positive relationships between intention to disclose location and all three independent variables (positive attitude toward disclosure, r = .75, p < .001; subjective norm, r = .52, p < .001; and perceived usefulness of disclosure, r = .50, p < .001), offering support for H1.

Results from Ordinary Least Squares (OLS) regression confirm partial support for this hypothesis. All three independent variables, subjective norm, positive attitudes, and perceived usefulness, were entered into the equation together because the aim was to assess the cumulative effect. Collectively, the three variables accounted for 61% of the variance in the dependent variable, intention to...
disclose location, $R^2 = .61$, $F = 70.22$, $p < .001$. The strongest predictor of intention to disclose location on Facebook was positive attitude toward disclosure ($b = .63$, $p < .001$) followed by subjective norm ($b = .16$, $p = .02$). Perceived usefulness did not show a statistically significant relationship with intention to disclose. These findings suggest that both subjective norm, the social pressure to disclose location, and attitude toward disclosure positively predict whether people will disclose their locations on Facebook. However, the positive effect of perceived usefulness disappeared once these other variables were taken into account. Therefore, H1 was partially supported. This finding also provided further support for using perceived usefulness only as a control in our proposed theoretical model tested below.

H2 predicted that subjective norm would lead indirectly to intention to disclose location on Facebook, mediated through positive attitudes toward disclosure, while controlling for perceived usefulness. PROCESS model 4 (Hayes, 2013), a mediation modeling tool that estimates direct and indirect effects using OLS path analysis, was used to test this hypothesis. Subjective norm was entered as the predictor, attitude toward disclosure was treated as a mediator, and intention to disclose location on Facebook was the outcome or dependent variable. Perceived usefulness was entered as a control. Bias-corrected bootstrap confidence intervals based on 5,000 bootstrap samples were used to test for indirect effects.

As shown in Fig. 1 and Table 1, full support was found for the model. People who felt greater social pressure through subjective norms to disclose their locations were more likely to have a positive attitude toward disclosure ($b = .31$, $p < .001$) and were more likely to report an intention to disclose their location on Facebook ($b = .20$, $p = .02$). People who saw disclosing their location as useful also had a more positive attitude toward disclosure ($b = .35$, $p < .001$), but they were not more likely to intend to share their location ($b = .14$, $p = .13$). In addition, subjective norm showed an indirect effect on intention to disclose location mediated through attitude toward disclosure ($b = .25$) as the bootstrap confidence intervals for the indirect effect were entirely above zero, which constitutes a statistically significant indirect effect (Hayes, 2013). Therefore, H2 was supported.

5. Discussion

This study drew on existing literature regarding LBS and three theoretical behavioral intention models to develop the beginnings of a new model to explain why college students share their locations on Facebook. Our main finding was support for this proposed model, which posited that college students would be more likely to disclose their locations if their friends did so, in a concept called subjective norm. It also proposed that subjective norm would directly influence people to have an intention to disclose their location, mediated through positive attitudes toward disclosure, while controlling for the perceived usefulness of disclosure. In essence, our model suggested that the subjective norm toward location disclosure shapes the attitudes, which then in turn lead to intention to disclose. Our model explained 61% of the variance in why college student share their locations on Facebook. Therefore, the main contribution of this study was proposing and testing a new model that draws on prior research but offered a greater understanding of why people use LBS.

First, we will discuss how our findings fit within the existing LBS literature and then explain how they extend theory in this area of research. Finally, we will provide practical ramifications of this research, address limitations, and suggest future areas for inquiry.

5.1. Theoretical ramifications of findings

The study found that subjective norm, attitude toward disclosure, and perceived usefulness of disclosure all individually predicted whether people would share their locations on Facebook. This supports existing literature, which suggests that a main factor in whether people use LBS is whether their friends of family do so (e.g. Lindqvist et al., 2011; Zhou, 2012). Similarly, our results mirrored earlier findings that people are more likely to engage in a technological activity if they have positive attitudes toward it or see it as useful (e.g. Armitage & Conner, 2001; Chi et al., 2011; Lee et al., 2003; Lu et al., 2009; Peslak & Ceccucci, 2011; Premkumar & Bhattacharjee, 2008; Tsai et al., 2009). However, when we examined all three variables together, we found that only subjective norm and positive attitude showed significant positive relationships with intention to disclose. Similarly, when we tested our full path model, using perceived usefulness as a control, perceived usefulness had an effect only on attitude toward disclosing, not intention to disclose. This offered some new insight into the role of perceived usefulness in understanding technology acceptance. This finding suggested that perceived usefulness influences the attitude toward a technology or its application, but it is the attitude that leads to the actual behavioral intention.

Furthermore, our findings confirmed aspects of the three behavioral intention models we relied on as our theoretical support, TRA, TPB, and TAM. Our study found support for three key concepts in these models, subjective norm, positive attitude, and perceived usefulness. However, our study extended this body of knowledge by suggesting a new causal order for how these variables influence behavioral intention. We found that subjective norm leads to a positive attitude, which in turn leads to an intention to share one’s location. This differed from earlier research that has shown subjective norm and attitudes operating at the same time (e.g. Armitage & Conner, 2001; Hoyer & MacInnis, 2011). Why our results differed from these earlier models is unclear and needs further study.

One possible explanation is that the disclosure of location-related information on Facebook is different from the adoption of general information technology. For example, deciding to disclose one’s location on Facebook is different from adopting a new technology because online disclosure of one’s physical location may be considered highly risky. Therefore, the subjective norm may need to precede the attitude, as it does in our model, to outweigh these risks and lead to location disclosure.
Table 1

<table>
<thead>
<tr>
<th>Mediator</th>
<th>Outcome Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subjective Norm</td>
<td>Intention to Disclose Location</td>
</tr>
<tr>
<td>Attitude Toward Disclosure</td>
<td>Coeff. SE</td>
</tr>
<tr>
<td>Perceived Usefulness of Disclosure</td>
<td>Coeff. SE</td>
</tr>
<tr>
<td>0.31***</td>
<td>0.09</td>
</tr>
<tr>
<td>0.35**</td>
<td>0.09</td>
</tr>
<tr>
<td>$R^2 = 0.31$</td>
<td>$R^2 = 0.61$</td>
</tr>
<tr>
<td>$F(2, 138) = 30.59$</td>
<td>$F(3, 137) = 70.22$</td>
</tr>
</tbody>
</table>

Coeff. = Unstandardized OLS path analysis coefficients. SE = standard error.
$p < .05$.
" $p < .01$.
"" $p < .001$.

5.2. Practical ramifications of findings

Based on the findings of this study, social media companies should consider enhancing their users' attitudes and subjective norm toward disclosing location-based information, as well as reinforcing the usefulness of their location-related services to better collect users' geographical data for targeted advertising and marketing. To enhance users' attitudes, social media companies may first need to declare their policies on privacy protection of users' location-related information to gain social media users' trust in the services. Social media companies may also need to examine users' beliefs and evaluations of online location disclosure, as both of them may shape users' attitudes. By better understanding how users' different beliefs and evaluations of location disclosure can be weighed, social media companies will have a better understanding of how to improve users' attitude.

Likewise, this study clearly demonstrated that users' relatives and friends have an important influence on whether people will share their locations on social media. Social media companies may need to encourage positive word-of-mouth communication among their users, such as the sharing of user experiences. Also, the results of this study indicated that understanding what kinds of location-related services are considered useful to social media users is crucial. Social media companies can either provide as many geographical services as possible (e.g., GPS map, information related to nearby shopping stores, location-based alerts) or conduct studies exploring their users' specific preferences to reinforce the usefulness of location-related services on social media.

5.3. Limitations and future research

As with most studies, this study has its limitations. First, the measuring scales for predictors used in this study were all developed from previous studies on the adoption of information technology. Nevertheless, the disclosure of location-related information on social media may not be the same as general technology adoption. Since there is still a paucity of studies developing measuring scales for either the use of social media or LBS based on the constructs of these three behavioral intention models, future studies should develop scales specifically for them. Second, the use of a convenience sample and college students as participants hinders the generalizability of the results found in this study. Since social media use has gradually become more popular in the general population, there is an urgent need for future studies to explore the reasons influencing the general population's disclosure of location-related information on social media.

This research suggested several avenues for future research. We found that attitude toward disclosure was the strongest predictor of whether people would share their locations on Facebook, and that subjective norm leads to this attitude. However, our full model left unexplained 39% of the variance in why people share locations on Facebook. Future research should explore what other variables make up this gap. For example, online disclosure can be risky to its users and, consequently, users' trust in social media may be a major reason explaining why their attitudes outweigh other predictors. Because worry about privacy is such an important aspect of LBS use (Sadegh et al., 2009; Tsai et al., 2009), this variable should be added to our proposed model and tested. In addition, it is worth examining whether age, gender, or personality types such as extraversion may influence whether people disclose location because prior research has found these variables have effect on how people use social media (Amichai-Hamburger & Vinitzky, 2010; Haerkamp, Eimler, Papadakis, & Kruck, 2012; Schrammel, Koffel, & Tscheigi, 2009; Walton & Rice, 2013).

References
