

# Exploring the Security of Information Sharing on Social Networking Sites: The Role of Perceived Control of Information

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**Abstract** Social networking sites (SNS) have challenged ethical issues about users' information security and privacy. SNS users are concerned about their privacy and need to control the information they share and its use. This paper examines the security of SNS by taking a look at the influence of users' perceived control of information over their information-sharing behaviors. Employing an empirical study, this paper demonstrates the importance of perceived control in SNS users' information-sharing behaviors. Specifically, perceived control has been found to be negatively related to perceived privacy risk and attitude toward information sharing, which in turn has an impact on their information-sharing behaviors. In addition, gender has been shown to be an important factor that moderates the influences of both perceived control and perceived privacy risk on SNS users' attitudes toward information sharing. Theoretical and practical implications are discussed.

**Keywords** Perceived control · Privacy risk · Information sharing · Social networking sites · Gender difference

## Introduction

Social networking sites (SNS) have challenged traditional ideas about online privacy and ethical conduct, as they have collected and continued to collect a great deal of information about users, including personally identifiable information and anonymous facts. The collected information may be shared and used widely without users' consent. SNS are online platforms where users share content, knowledge, and experiences with other people (Hajli 2014a). These online activities could rapidly become profiles and fodder for business purposes without users' knowledge. According to a national survey conducted by the Consumer Reports National Research Center in 2010, more than 40 % of SNS users share their private information online, which makes them vulnerable to various online dangers such as scams and identity theft. Users' private information could be easily collected, disclosed, and used with or without their knowledge and consent by some businesses and organizations. Identity theft and privacy invasion are critical problems that SNS firms need to prevent. SNS are also raising ethical issues in this regard. Individual SNS users claim that certain information should not be collected at all. They need better control over the use of the information they share on SNS. Online information sharing has become the main activity that causes ethical debates about the security of information on SNS.

Online information sharing has become a novel channel through which firms can acquire useful data to assist with business trend analysis and decision making. Many firms and organizations are managing individuals' shared information to generate useful data for their business strategies. Ethical businesses protect the privacy of their customers and do not share or sell customer information to others. SNS providers are taking measures to help users control

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their personal information and protect their privacy through both designed features (e.g., privacy settings) and privacy policies. Protecting users' privacy is important for SNS providers to increase information security and prevent privacy invasion.

Prior research has reported SNS users' concerns about their privacy and security, which is a signal that users need better protections for their information shared on SNS (Barnes 2006). There is no doubt that SNS users are in great need of control over their personal information to protect their privacy. Having the ability to control what and how much information people may know about us is important for users to evaluate the security of SNS. Security issues have traditionally been a topic of ethics studies in business research (e.g., D'Arcy and Hovav 2009; Roman 2007). Specific to SNS, more and more people share their personal information online, raising such ethical issues as, "Who has the right to use online shared information on SNS?"; "Could the personal information shared on SNS be used by business purposes?"; "Who owns the information shared on SNS?" All these questions concerning the security of information lead users to think about the perceived ethics of usage behavior on SNS. Thus, a deeper understanding of information security has important implications for both academics and practitioners to gain insight on ethical issues raised by information sharing on SNS. This paper aims to provide a deeper understanding of SNS information security by focusing on the impacts of users' privacy risks and their perceived control of information on their information-sharing behaviors.

"Privacy risk" is defined as "an individual's interests and abilities in controlling the handling of data about themselves" (Westin 1968; Bélanger and Crossler 2011). Perceived privacy risk has been a critical barrier for users' information disclosure on SNS (Krasnova et al. 2010). The current research of information privacy risk has focused on explaining and predicting theoretical contribution and lacks for an understanding of design and action contributions (Bélanger and Crossler 2011). Perceived control has been studied with privacy concerns and trust (Xu 2007; Xu and Teo 2004). However, the effects of perceived control of information on SNS users' information-sharing behaviors have not yet been empirically tested. In the information systems (IS) discipline, perceived control has been generally interpreted as the actual behavioral control (Kamis et al. 2008; Pavlou et al. 2006) that focuses on individuals' perception of their ability to perform a given behavior (Ajzen 1991). It is said that "such a focus on actual behavior control has excluded the psychological perception of control that may not directly involve behavioral attempts to effect a change" (Xu et al. 2012, p. 1346). In psychology, perceived control is generally considered to be a more powerful predictor of influencing people's emotions and

behaviors than actual control (Burger 1989; Averill 1973; Skinner 1996). Considering a lack of research on perceived control from the psychological perspective, we focus on SNS users' psychological perceptions of control of information rather than their actual behavior controls. Thus, the main objective of this study is to examine the influence of users' psychological perceived control of information on their perceived privacy risk and information-sharing behaviors on SNS.

Additionally, prior studies have shown that women and men differ in their perceptions of risk (e.g., Gustafson 1998). Gender differences have been shown to exist in risk-related behaviors in various domains such as financial decisions (Dwyer et al. 2002; Powell and Ansic 1997) and online purchase behaviors (Lin et al. 2013a). Specific to SNS, little research has examined gender differences in users' perceptions of security issues and differences influence on SNS usage. Prior studies have shown that men and women use SNS differently and base their adoption/post-adoption decisions on different factors and different weights of the same factors (e.g., Zhang et al. 2009; Lin et al. 2013b). Therefore, the secondary objective of this study is to examine gender differences in users' information-sharing behaviors. Altogether, this study seeks to provide a deeper understanding of users' security concerns about information sharing on SNS by accomplishing the following two objectives:

- 1) To propose a research model that explains the influence of perceived control of information on users' information-sharing behaviors on SNS from the psychological perspective; and
- 2) To investigate gender differences in SNS users' information-sharing behaviors.

The remainder of this paper is organized as follows: First, a literature review is presented regarding perceived control, privacy risk, and information sharing, leading to our conceptual research model and justifications of the hypotheses. Next, the chosen research methodology, data analysis, and results are presented. Finally, this study concludes with a discussion of the research and practical implications.

## Literature Review and Research Model

### Perceived Control Versus Actual Control

Perceived control stems from the belief about the extent to which people have control over the environment (Skinner 1996). It refers to "a person's belief to significantly alter and predict a situation" (Perry et al. 2001; Burger 1989) and describes the extent of a person's beliefs about the

influence he or she has over his or her life (Folkman 1984; Skinner 1996). Meanwhile, perceived control, a generic term, is often used for the individual's perception of control to assimilate specific theories of control, such as locus of control, self-efficacy, and self-competence (Connell 1985; Weisz and Stipek 1982). In other words, individuals who would like to take action but do not have the actual power or control are unable to behave accordingly (Ajzen 2001; Ajzen 1991). As a result, perceived behavioral control has a direct impact on the behavioral intention. Prior empirical studies have shown that perceived control affects human behavior much more than actual control (Skinner 1996). Alternatively, perceived control can be seen as the amount of control people feel they have over a situation or another person (Bugental et al. 1989). Previous research has indicated that those with a high sense of control believe they have a strong impact on their surroundings, whereas those with low sense of control resort to luck, chance, fate, or powerful others (Wallston et al. 1978; Specht et al. 2013).

Perceived control has been thoroughly defined within many theories such as social learning (Rotter 1966), person-environment framework (Wallhagen 1992), lifespan theory of control (Schulz and Heckhausen 1996), self-efficacy (Bandura 1997), and the theory of planned Behavior (Ajzen 2002). Previous literature has indicated that perceived control is composed of three interconnected beliefs, including the behavioral, cognitive, and decisional controls (Averill 1973). Behavioral control refers to one's aptitude to change neutrally the nature of a forthcoming event, whereas cognitive control refers to people's perception of whether they are able to understand and predict the nature of a forthcoming event. Decisional control generalizes expectations that one can gain a desirable outcome after dealing with an event (Lee 2012; Thompson et al. 1993; Skinner et al. 1988). The conceptualization of perceived control is borrowed from social psychology and is a cognitive/subjective construct that differs from practical usage of control (Langer 1975). Specific to SNS, perceived control of information is considered to be a cognitive construct and is defined as "the extent to which an individual feels that SNS allows that individual to control the use of information through privacy settings" in this study.

Actual control is regularly used within theory and research to describe whether the nature of control over eventuality is truly within a person's control or not (Seligman 1975) and whether the person really (Bandura 1982) has the ability to wield control over diverse situations or events (Connell et al. 1985; Weisz et al. 1982). Ajzen argues that given the extent that perceived behavioral control is accurate, perceived control can serve as a proxy of actual control and can be used for the prediction

of behavior (Ajzen 2002). The primary distinction between actual behavior and perceived behavior is that, given a sufficient degree of actual control over the behavior, people are expected to carry out their intentions when obligatory opportunities and resources such as time, money, and skills are available (Hsu and Chiu 2004). Perceived behavioral control, the third antecedent of behavioral intention, is a construct defined as the individual's belief concerning how easy or difficult performing the behavior will be, which often reflects actual behavioral control. Prior studies have already examined the differences between perceived control and actual control and their results in people's outcomes. Scott and Weems (2010) show that patterns of actual and perceived control are differently related to youth's emotional and behavioral problems. For example, youth with high perceived and low actual control exhibit more anxiety than youth with both high actual and high perceived control. Specific to SNS, Hoadley et al. (2010) distinguish between actual control and perceived or "illusory" control on Facebook users' behaviors and privacy attitude toward the introduction of the controversial News Feed and Mini Feed features. Facebook's old and new interfaces, though still corresponding in terms of actual control over who had access to what information, News Feed and Mini Feed induce lower levels of perceived control over personal information due to easier information access, leading to a subjectively higher probability of privacy intrusion. A more recent study conducted by Liu et al. (2011) measures the disparity between the desired and actual privacy settings and shows that privacy setting match users' expectations only 37 % of the time, quantifying the magnitude of the problem of managing privacy on Facebook. As such, users' perceived control has become an important role in predicting SNS users' usage behaviors as the actual control does not always meet users' expectations of privacy protection.

In IS research, perceived control over personal information is part of the debate over information privacy studies (Belanger et al. 2002) particularly with the emergence of social media. Prior studies have shown that perceived control has important effects in alleviating users' privacy concerns regarding their personal information on SNS (e.g., Hoadley et al. 2010; Krasnova et al. 2010). Losing such control over personal information exposes users to privacy invasion. SNS enable users to control their information and privacy but many individuals are not aware of control of information (Govani and Pashley 2005). This ignorance is crucial because, in reality, the literature has reported that perceived control in the context of Internet users in SNS is believed to be the most significant factor affecting privacy concerns (Malhotra et al. 2004). Though a handful of research on both privacy concern and perceived control has been discussed in

previous literature, very few have integrated perceived control into privacy research, which is the motivation behind this research. In this study, we investigate the consequences of perceived control of information from the psychological perspective, more specifically users' decisions in their information sharing on SNS.

### Privacy Risk on SNS

In the context of SNS, privacy risk has been considered an important factor that influences users' social interactions and usage behaviors. SNS record all users' interactions for potential use in data mining for business and other purposes. Some users manage their privacy concerns by trusting their abilities to control the information they share on such SNS as Facebook (Acquisti and Gross 2006). The authors have also shown that Facebook users reveal a lot of personal information without awareness of Facebook's privacy options. Users' privacy risks are related to their usage behaviors on SNS. Such privacy risks have been shown to influence people's psychological perceptions and intentions to use information technology (e.g., Van Slyke et al. 2006). To examine the influence of privacy risk on the security concerns about SNS users' use behaviors, we added this construct to our research model.

### Information Sharing on SNS

Information sharing has been broadly researched in business. Research has shown that information sharing positively impacts business activities such as influencing the quality of the relationship between business partners and the quality of decision making (Miranda and Saunders 2003; Lee and Kim 1999; Hajli et al. 2014; Hajli 2014b). The antecedents of information sharing have gained researchers' attention. For example, in B2B e-commerce, the supply chain partner's increased absorptive capacity positively increases the level of information sharing with that supply chain partner (Arnold et al. 2010). Specific to SNS, users' information-sharing behaviors are considered an important way that businesses attain valuable data for analysis and forecasting. Many businesses engage on SNS to make close connections with their customers, which they can leverage to receive feedback (Hajli 2014c).

### Research Model

The thesis of our research model (Fig. 1) is based on the argument that the influence of perceived control of information depends on how much it mitigates users' perceptions of perceived privacy risks regarding information sharing on SNS. Specially, we examine the influences of users' perceived control of information on their perceived

privacy risks and attitudes toward information sharing, which in turn impact SNS users' actual information sharing. In this paper, we focus on quantity of information sharing (Chiu et al. 2006).

## Hypothesis Development

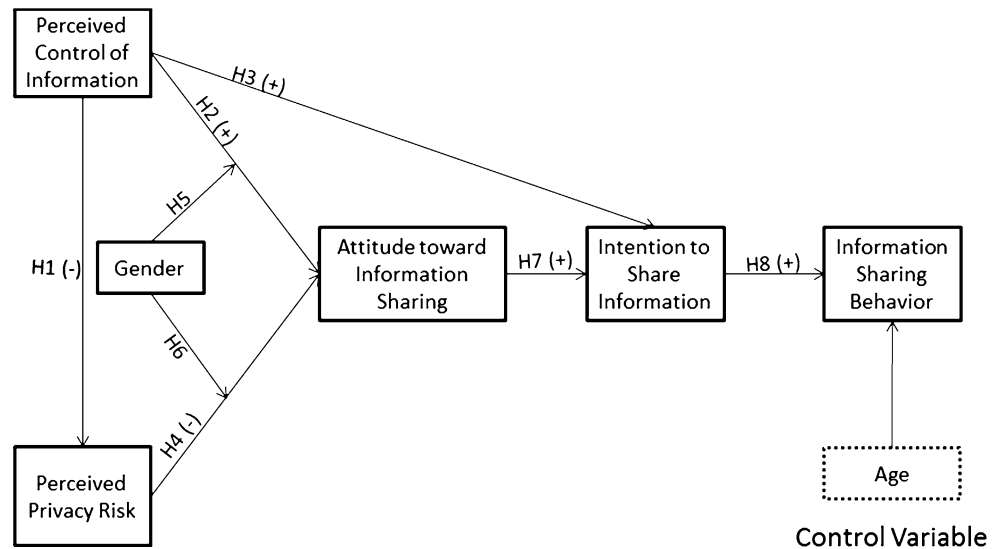
### Effect of Perceived Control on Privacy Risk

Perceived control of information could be viewed as an active component of information privacy on SNS. People's perceptions of privacy concerns have been empirically demonstrated to be diminished by effective controlling mechanisms (Xu et al. 2008). There is evidence that the Newsfeed feature on Facebook induces lower levels of perceived control over SNS users' private information due to easier access to information, which leads to a higher conception of privacy intrusion (Hoadley et al. 2010). Users' high perception of control of information will likely alleviate their privacy concerns and improve the perceived security of SNS usage (Krasnova et al. 2010; Malhotra et al. 2004). As such, the higher SNS users' perceived control of information is, the less their perceived privacy risks.

**H1** Perceived control of information is negatively related to perceived privacy risk.

### Effect of Perceived Control on Attitude and Intention

Prior psychology research has indicated that people's perceived control influences their emotions and behaviors (Averill 1973; Skinner 1996). Additionally, an individual's perceived control over the environment formulates a desired outcome such as user acceptance of information systems (Baronas et al. 1988). In contrast, individuals' psychological perception of control contributes to their desire for an actual behavior. Regarding information sharing decision making on SNS, a user's perceived control helps trigger that user's desire to share information online. SNS users' control over information is essential when they make decisions about disclosing information on SNS websites such as Facebook and Twitter (Lin et al. 2013b; Krasnova et al. 2010). A higher perception of information control generates a more positive attitude, as SNS users will be less worried about data collection when they share their personal information on SNS. Similarly, a higher perception of information control influences users' intentions to share their personal information on SNS. Specifically, SNS users tend to share their personal information if they have higher perceived control of information.

**Fig. 1** Research model

**H2** Perceived control of information positively impacts users' attitudes toward information sharing on SNS.

**H3** Perceived control of information is positively related to users' intentions to share information on SNS.

#### Effect of Privacy Risk on Attitude

In some prior studies, perceived privacy risk focuses on the potential for the illegitimate disclosure and use of user's personal information (e.g., Pavlou et al. 2007; Yin et al. 2011). Such information privacy concerns have been found to negatively influence an individual's attitude such as the willingness to conduct online transactions (Van Slyke et al. 2006) and the willingness to share personal information online (Dinev and Hart 2006). Online users' privacy concerns are negatively associated with their willingness to provide their private information online. In the context of SNS, users' private information can be easily collected, distributed, and used without their consents. SNS users may perceive high privacy risk that will decrease their willingness to share their personal information online. Therefore, with higher privacy risk, users will have lower attitudes toward information sharing online.

**H4** Perceived privacy risk negatively impacts users' attitudes toward information sharing on SNS.

#### Effect of Perceived Control and Privacy Risk on Attitude across Gender

Gender differences have been reported in people's risk-taking behaviors (Powell and Ansic 1997; Dwyer et al. 2002). Women are believed to have consistently higher levels of concern about risks while men are more willing to take risks (Davidson and Freudenburg 1996; Dwyer et al.

2002). Dwyer et al. (2002) conducted a national study of mutual fund investors and found that women take fewer risks than men in their mutual fund investment decisions. Garbarino and Strahilevitz (2004) found that women perceive a significantly higher level of risk and higher level of negative outcomes in online shopping. Some recent studies have also shown gender differences in the use of newly invented technology. Women bloggers have shown to have higher levels of privacy concerns in their knowledge-sharing behaviors (Chai et al. 2011).

Specific to SNS, women are expected to have more concerns about their privacy and security issues. They are more sensitive to potential information invasion when they share information online. As such, perceived privacy risk will influence users' attitudes toward information sharing more strongly for women than for men. On the other side, due to their nature of less risk-taking, women will love to have high control of information. As such, perceived control of information will be more important in the formation of attitude toward information sharing for women than for men. Thus, a higher perceived control of information and a lower perceived privacy risk will definitely increase users' attitudes toward information sharing.

**H5** The positive relationship between perceived control of information and attitude toward information sharing is stronger for women than for men.

**H6** The negative relationship between perceived privacy risk and attitude toward information sharing is stronger for women than for men.

#### Attitude, Intention, and Behavior

Generally, an individual's attitude toward information sharing is associated with that individual's intention to

**Table 1** Demographics of the respondents

Measure	Items	Freq.	Percent
Gender	Male	232	57.3 %
	Female	173	42.7 %
Age	Below 22	317	78.3 %
	23–28	39	9.6 %
	28+	49	12.1
Computer experience (AVG. in years)	11.5		
SNS experience	Less than 3 years	58	14.3 %
	3–5	150	37.1 %
	5+	197	48.6 %

share information online (Fishbein et al. 1975). Attitude has been found to have a positive influence on behavior intention decisions in various domains, including technology adoption (Hsu and Lin 2008). Transferring to SNS, users' attitudes are positively related to their intention to share information.

Theory of reasoned action suggests that individuals' behavior intention is associated with their actual behavior. Prior research confirms the positive relationship between intention and behavior in the IS discipline (Venkatesh et al. 2000). In the context of SNS, individuals will be more likely to share information if they have a greater intention to share information on SNS than others.

**H7** Users' attitude is positively associated with their intention to share information on SNS.

**H8** Users' intention to share information is positively associated with their actual information sharing on SNS.

## Research method

### Data Collection

We conducted an online survey at a large university in the northwestern United States. Approximately 500 college students were invited to take the survey. A total of 428 responses were received, resulting in an 85.6 % response. They were asked questions about their perceptions of SNS usage and their information-sharing behaviors on SNS. They received nominal course credit for participating in this study. After incomplete surveys were deleted, 405 valid responses remained. All the participants were SNS users and active in sharing their information on at least one SNS. More than half of the participants (62 %) were currently active in sharing information in two or more SNS, such as Facebook, Twitter, and LinkedIn. Table 1 summarizes the respondents' demographic profile.

### Measurement

The utilized measures were adapted from prior studies with each item measured using a seven-point Likert scale with anchors "strongly disagree/agree". The measurement items utilized, their sources and psychometric properties are shown in Table 2. A pilot study ( $N = 90$ ) was performed to validate the instrument. In addition, cross loadings for measurement indicators are presented in Appendix A.

### Data Analysis and Results

The measurement model was estimated using factor analysis to test whether the constructs have sufficient validation and reliability. Partial least square (PLS) was used to test the structural model.

#### Measurement Model Analysis

The measurement model could be tested and evaluated by convergent and discriminant validity. Factor loading and average variance extracted were used to test the convergent validity and reliability of each variable in this study. We used established reliability and validity criteria to test the reliability and validity of the measurement instrument (Hair et al. 2006). Table 2 shows that all the factor loadings are higher than 0.7, which is the common rule of thumb for acceptable item loading.

Average variance extracted (AVE), composite reliability (CR), the root of AVE, and correlations among each construct are reported in Table 3. The AVE for each construct is above 0.5, which indicates that the latent factors can explain at least 50 % of the measured variance. All the CRs are higher than 0.9, which is greater than the critical value of 0.7. To satisfy the discriminant validity, the square root of AVE should be greater than the inter-scale correlation (Fornell et al. 1981). The elements along the diagonal are much greater than the off-diagonal elements. The analyses confirmed convergent validity and reliability of the measurement model. Discriminant validity is also satisfied.

Considering the relatively high correlation among some variables, we also checked for multicollinearity by calculating the variance inflation factor (VIF). The resultant VIF values are between 1.1 and 1.5, which are all acceptable, suggesting that multicollinearity is not a problem for the data of this study.

#### Structural Model Analysis

PLS was used to analyze the structural model and test the proposed hypotheses. Figure 2 shows the results of structural model test. The  $R^2$  shows that the research model explains 8.5 % of the variance in privacy risk, 13.4 % of

**Table 2** Constructs, items with factor loadings and sources

Constructs		Loading	Source
Perceived control of information (Cronbach's Alpha = 0.89)	CON1. I feel in control over the information I provide on SNS.	0.88	(Krasnova et al. 2010)
	CON. Privacy setting allows me to have full control over the information I provide on SNS	0.92	
	CON. I feel in control of who can view my information on SNS.	0.91	
Privacy risk (Cronbach's Alpha = 0.94)	PR1. I am concerned that SNS is collecting too much personal information about me.	0.93	(Pavlou et al. 2007; Yin and Cheng 2011)
	PR2. I am concerned about the privacy of the personal information that SNS captures about me.	0.95	
	PR3. I suspect that my privacy is not well protected by SNS.	0.89	
	PR4. I'm worried that unknown third parties will access my personal information on SNS.	0.91	
Attitude (Cronbach's Alpha = 0.94)	Notes: this construct uses 7-point semantic differential scale		(Fishbein 1963)
	ATT1. Sharing information is a (bad/good) idea.	0.93	
	ATT2. Sharing information is a (foolish/wise) idea.	0.91	
	ATT3. Sharing information is (unpleasant/pleasant).	0.90	
Intention to share information (Cronbach's Alpha = 0.87)	ATT4. I (dislike/like) the idea of Sharing information.	0.92	(Venkatesh et al. 2012)
	BII. I intend to continue sharing information on SNS in the future.	0.91	
	BI2. I plan to continue sharing information on SNS frequently.	0.88	
Information Sharing (Cronbach's Alpha = 0.93)	BI3. I will always try to share information SNS in my daily life.	0.91	(Chai et al. 2011 Davenport et al. 2000; Hsu et al. 2007)
	SHARE1. I frequently participate in information/knowledge sharing activities on SNS.	0.78	
	SHARE2. I usually spend a lot of time updating new information on SNS.	0.92	
	SHARE3. I frequently update information on SNS.	0.92	
	SHARE4. I frequently share my experience or knowledge with others on SNS.	0.92	
	SHARE5. When participating on SNS, I usually actively share my information and knowledge with others.	0.87	

the variance in attitude toward information sharing, 22.5 % of the variance in intention to share information, and 46.5 % of the variance in information-sharing behavior. Table 4 presents detailed information on the standardized path coefficients and t-values for each path of the research model.

To test statistically the hypotheses involving differences between male and female groups, we used multigroup PLS (Qureshi and Compeau 2009). This is accomplished by comparing the corresponding path coefficients in the structural model of the two groups using the following procedure employed by Keil et al. (2000). Several more recent studies have also demonstrated that multigroup PLS is a valid technique for testing subgroup differences (Lin et al. 2013b; Ahuja and Thatcher 2005). Table 5 shows the results of gender-based subgroup analysis of our study.

$$S_{pooled} = \sqrt{\frac{N_1 - 1}{N_1 + N_2 - 2} \times SE_1^2 + \frac{N_2 - 1}{N_1 + N_2 - 2} \times SE_2^2}$$

$$t = \frac{PC_1 - PC_2}{S_{pooled} \times \sqrt{\frac{1}{N_1} + \frac{1}{N_2}}}$$

where  $S_{pooled}$  = pooled estimator for the variance

$t = t$  – statistic with  $N_1 + N_2 - 2$  degrees of freedom

$SE_i$  = standard error of path in structural model of gender  $i$

$PC_i$  = path coefficient in structural model of gender  $i$

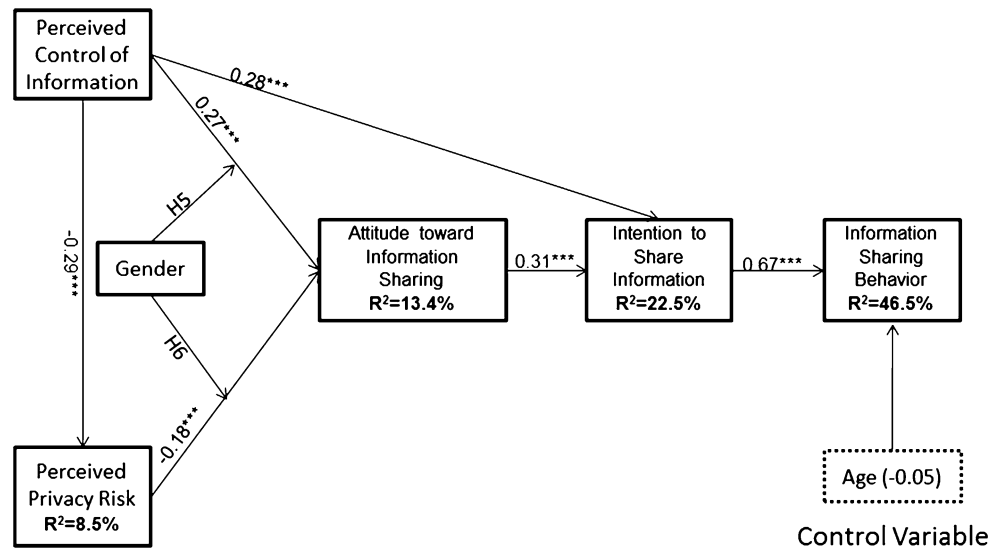
Our research results indicate that all the hypotheses are supported. Perceived control of information has been found to impact users' attitudes significantly toward information sharing and their intentions to share information, which in turn influence their actual information-sharing behaviors

**Table 3** Correlations matrix with CR and AVE

Constructs	AVE	CR	Correlations					
			1	2	3	4	5	
1. Attitude	<b>0.84</b>	0.95	0.92					
2. Perceived control of information	0.82	0.93	0.32	<b>0.91</b>				
3. Information sharing behavior	0.78	0.95	0.39	0.39	<b>0.88</b>			
4. Intention to share information	0.79	0.92	0.4	0.37	0.6	<b>0.89</b>		
5. Perceived privacy information risk	0.84	0.96	-0.26	-0.29	-0.09	-0.11	<b>0.92</b>	

Notes: Square root of AVE shown in bold as the diagonal

**Fig. 2** Research results for the structural model testing \*0.05 significance; \*\*0.01 significance; \*\*\*0.001 significance; NS = statistically not significant



**Table 4** Path coefficients and t-values for the whole sample

Hypothesis	Constructs	Standardized path coefficient	t-value	Support or not
H1	Perceived control → Privacy risk	-0.29***	4.8	Yes
H2	Perceived control → Attitude	0.27***	4.68	Yes
H3	Perceived control → Intention to share information	0.28***	4.41	Yes
H4	Privacy risk → Attitude	-0.18***	3.5	Yes
H7	Attitude → Intention to share information	0.31***	5.57	Yes
H8	Intention to share information → Information sharing behavior	0.68***	18.69	Yes

\* 0.05 significance; \*\* 0.01 significance; \*\*\* 0.001 significance; NS = statistically not significant

**Table 5** Test of differences between male and female groups

Hypothesis	Constructs	Women (n = 173)		Men (n = 232)		Standardized comparisons of paths (t-value)	Support or not
		Standardized path coefficient	t-value	Standardized path coefficient	t-value		
H5	Perceived control → Attitude	0.29***	3.31	0.27***	3.5	2.36*	Yes
H6	Privacy risk → Attitude	-0.2**	2.64	-0.16*	2.26	-5.53***	Yes

\* 0.05 significance; \*\* 0.01 significance; \*\*\* 0.001 significance; NS = statistically not significant



on SNS. Perceived privacy risk partially mediates the effect of perceived control on SNS users' attitudes toward information sharing. Further, data analysis confirms that perceived control of information has a greater positive effect on female SNS users' attitudes toward information sharing than on male SNS users'. It also confirms that perceived privacy risk has a greater negative impact on female SNS users' attitudes toward information sharing than on male SNS users'. This demonstrates that female users place significantly greater importance on perceived control of information and perceived privacy risk when they share information on SNS. In conclusion, perceived control of information has significant influence on users' information-sharing behaviors, and gender differences exist in the context of SNS.

The results are robust after controlling for age, computer experience, and experience of using SNS. None of these control variables significantly impacts SNS continuance intention for the whole sample, female group, and male group.

Common method variance was also checked, as it could be a potential threat to the research because data were collected via survey. Employing Harman's one-factor test, the results of un-rotated principal components factor analysis shows that the largest factor accounts for 38.75 % of the variance explained. It is posited that, if a single factor accounts for less than 50 % in both independent variables and dependent variables, the potential for common method variance is low (Harman 1976). Therefore, common method variance is not a threat to this study.

## Discussion, implication, and limitation

The objectives of this study are to understand how perceived control of information influences users' information-sharing behaviors on SNS and the moderating effects of gender on the influence of perceived control and privacy risk on attitude. Both of these objectives are accomplished and all hypotheses are supported. Consistent with prior studies, our research demonstrates the importance of perceived control of information in SNS users' information-sharing behaviors. Our study also contributes to the existing literature by discovering and explaining gender differences in information-sharing behaviors on SNS. The contribution to both theory and practice concludes as follows.

### Theoretical Contribution

This study provides a deeper understanding of information sharing by developing a theoretical model that incorporates perceived control of information and privacy risk into

users' decisions about sharing information on SNS. Unlike previous studies (e.g., Kamis et al. 2008, PAVLOU et al. 2006) that focused on users' perceived behavior controls, this study explicitly explains how perceived control of information affects users' online information-sharing behaviors from the psychological perspective. Grounded in relevant literature, we systematically illustrate how users' perceived control affects their information-sharing behaviors directly and indirectly. The research results highlight the importance of such psychological control in user behaviors on SNS. Perceived control is shown to mitigate SNS users' perceived privacy risks, which in turn influences their information-sharing behaviors. Perceived control of information has also been found to affect users' decisions about information sharing. Rather than focusing on the relationship between perceived control and privacy risk, this study takes a first step to examine the influence of perceived control of information on users' behaviors on SNS.

Security and privacy have been primary topics of many SNS studies (e.g., Acquisti and Gross 2006; Dwyer et al. 2007; Hoadley et al. 2010). Security and privacy studies are generally concerned about important ethical and moral actions of individuals, firms, and organizations. This study reveals ethical issues raised by users' concerns about security and protection of privacy on SNS. Many ethical issues about users' actions on SNS remain under-presented, such as, "Under what conditions should we invade the privacy of others?" and, "To what extent should firms and organizations use individuals' information?" Therefore, our study contributes to the perceived ethicality literature by extending it to SNS and focusing on users' perceived control and privacy risks. In today's information era, usage of user-shared information has been the key action that raises ethical issues such as privacy invasion on SNS. It is time for future research to investigate such ethical issues about users' online behaviors, as ethical issues are challenged by new technologies.

This paper reveals the differences between men and women regarding the importance they place on perceived control and privacy risks in their decisions about information sharing. While prior studies assume that males and females base information- and knowledge-sharing decision making on the same criteria (e.g., Chiu et al. 2006; Hsu et al. 2007), such differences indicate the values of devoting attention to the needs of gender differences in online security and privacy risks of SNS. The research results well support the moderating role of gender in users' perceived privacy risks and provide insight for future research to examine gender differences in perceived ethicality of SNS, as gender has been traditionally considered in ethics studies (e.g., Betz et al. 1989; Berings and Adriaenssens 2012).

## Practical Contribution

Given the popularity of information sharing on SNS, this study has some important implications for practice. SNS pose a very unique challenge to maintaining users' personal information because they encourage users to share a great deal of information about their personal lives. By obtaining the insights on how users' perceived control of information affects their information-sharing behaviors, SNS providers will be able to manage more effectively users' perceived privacy risks and increase users' trust in them. For example, SNS providers may reduce users' perceived privacy risks by providing more effective ways for them to control information, such as implementing effective privacy settings and privacy policies. This will promote the sustainability of information sharing on SNS, as users will have high perceived control of information and its use. This will also provide opportunities for firms and organizations engaged on SNS to gain some business values. When users have perceived a higher level of control of information and lower level of perceived privacy risk, they will be more willing to share their information on firms' and organizations' SNS pages. Firms and organizations will have more interactions and better communications with their customers and gather more useful information for business strategy.

This study highlights the importance of users' perceived control of information, rather than actual control of information, in reducing users' perceived privacy on SNS. While SNS providers want to collect more information about their users, they need to respect the privacy of customers' individual information and better protect their privacy. Invading users' privacy has become a common issue in today's online environment, because it is easier for other businesses to access users' personal information and to transfer it for use than ever before. SNS users have a high expectation of privacy and a strong desire to control the use of their posted information. Users' control over their personal information is the heart of privacy, which is the moral right of individuals and the core of the perceived ethicality of SNS. Many users share their information on SNS with the sense that it will only be shared among their friends, family, and other people they choose. However, their information is probably shared with many other individuals and businesses. When perceived control is low relative to actual control, then sharing is less than the optimum. As such, SNS providers are able to collect more data, invading their privacy. This study suggests that firms need to balance users' perceived control and actual control of information by implementing more functional design features in privacy settings. Users will be able to manage

their privacy and have greater control of information and the use of information.

Further, gender is a significant factor that moderates the effects of both perceived control and privacy risk on users' information sharing. Women place significantly greater importance on perceived control and privacy risk when sharing information on SNS. This finding provides some important information to purveyors of SNS as well as businesses engaged on SNS. If they are aware of gender differences, SNS designers could develop more user-friendly design features and businesses could more effectively collect consumer information.

## Limitations and Suggestions for Future Research

This study has limitations that may create interesting opportunities for future research. College students were employed as the research sample. While college students could present the largest segment of SNS users, future research may generalize research findings to other user populations in different environments (e.g., the workplace). Second, this study focuses on users' usage of general SNS and is not specific to a particular site. Future research may further examine the information of security on specific SNS. Third, SNS are global environments. It will be interesting to look at cultural differences of SNS usage in future studies.

## Conclusion

Ethical issues about users' information security and users' privacy concerns will prevail as long as information is shared on SNS. Users' perceived control is an important factor that will help SNS providers to increase the perceived security of SNS by users. Our study systematically illustrates users' perceived control of information and its influence on their information-sharing behaviors on SNS. Our research results offer insights into the security issues of SNS. However, new ethical issues may emerge as they are challenged by rapidly changing technologies. Researching the security issues about new technologies will have important implications for practice. Users' perceived control remains an important factor in researching such security issues and privacy concerns.

## Appendix

See appendix Table 6.

**Table 6** Cross loadings for measurement indicators

	ATT	CON	INTENT	PRISK	SHARE
ATT1	<b>0.93</b>	0.3	0.36	-0.22	0.36
ATT2	<b>0.91</b>	0.28	0.34	-0.23	0.36
ATT3	<b>0.9</b>	0.3	0.34	-0.24	0.32
ATT4	<b>0.92</b>	0.3	0.4	-0.26	0.39
CON1	0.3	<b>0.88</b>	0.33	-0.24	0.35
CON2	0.29	<b>0.92</b>	0.32	-0.26	0.36
CON3	0.29	<b>0.91</b>	0.36	-0.29	0.36
INTENT1	0.35	0.31	<b>0.86</b>	-0.05	0.52
INTENT2	0.37	0.34	<b>0.94</b>	-0.12	0.64
INTENT3	0.34	0.34	<b>0.86</b>	-0.12	0.64
PRISK1	-0.23	-0.25	-0.1	<b>0.93</b>	-0.1
PRISK2	-0.24	-0.26	-0.11	<b>0.95</b>	-0.11
PRISK3	-0.25	-0.29	-0.13	<b>0.89</b>	-0.09
PRISK4	-0.23	-0.27	-0.07	<b>0.91</b>	-0.04
SHARE1	0.29	0.34	0.5	-0.03	<b>0.78</b>
SHARE2	0.33	0.36	0.6	-0.08	<b>0.92</b>
SHARE3	0.37	0.32	0.61	-0.1	<b>0.92</b>
SHARE4	0.36	0.36	0.63	-0.08	<b>0.92</b>
SHARE5	0.36	0.35	0.64	-0.11	<b>0.87</b>

Notes: Boldface values indicate factor loadings. *ATT* Attitude toward sharing information, *CON* Perceived control of information, *INTENT* Intention to share information, *PRISK* Privacy risk, *SHARE* Information Sharing

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