HOW COMMUNITY VIRTUALITY INFLUENCES PRIVACY RISK BELIEFS IN VIRTUAL COMMUNITIES

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ABSTRACT

This research explores several aspects of an individual-oriented virtual community (e.g., social networking site) that may influence an individual's evaluation of privacy risks, which may in turn influence individual private disclosure. Based on the notion of discontinuity, this study develops the concept and measurement of perceived community virtuality. Evidence from a study of 271 individual-oriented virtual community members indicates that individuals would assess information privacy risk beliefs based on their perceptions of various aspects of the community's virtuality. In addition, such information privacy risk beliefs positively influence individuals' private disclosure. Among the four dimensions, culture virtuality, geographic virtuality, and relationship virtuality load significantly on the perceived community virtuality construct. This result implies that individuals' perceptions on these three dimensions have effects on their assessment of how virtual their communities are. The finding from this study reveals that, when an individual perceives that his/her virtual community members' cultural background, geographic location, and/or the relationship networks are different from his/her physical life, the individual may consider higher information privacy risks in the virtual community. From a practical standpoint, this study provides guidance to individual-oriented virtual community platform organizations on how to reduce individuals' privacy risk beliefs via refining the platform environment. Organizations that host virtual community platforms may want to develop initiatives to decrease individuals' perceptions of a community's virtuality specifically for the relationship and copresence discontinuities. Limitations and future research are discussed.

Keywords: Virtual Community, Information Privacy, Private Disclosure

INTRODUCTION

A virtual community is a focused gathering of people who interact through the Internet (based on the work of Gu, Konana, Rajagopalan, & Chen, 2007; Ma & Agarwal, 2007; Phang, Kankanhalli, & Sabherwal, 2009). Examples of virtual communities include an online forum on photography, a weblog about music, and an individual's network in a social networking site. Individual-oriented virtual communities a type of virtual community focused around sharing personal and private information (i.e., information about one's thoughts, values, experiences, etc... that the individual can reasonably expect will not be made public) for relationship development (i.e., social networking).

Building on the notion of software-based platforms (Tiwana, Konsynski, & Bush, 2010), this study refers to a virtual community platform as an Internet-based system that provides functionality that allows an individual to build a virtual community. Examples include a social networking site in which an individual can create a friend group, a website where an individual can create a software project for online collaboration, and a bulletin board system in which an individual can create his or her own discussion board.

Based on the work of Chudoba et al. (2005) and Watson-Manheim et al. (2002, 2012), we define *perceived community virtuality* as the degree to which an individual perceives a lack of cohesion or discontinuities in aspects of an individual-oriented virtual community. The definition is based on the concept that individuals expect to interact asynchronously with people in virtual communities who are geographically dispersed and from diverse cultural background, etc. Research has found some factors that influence the formation of information privacy risk beliefs (e.g., Malhotra, Kim, & Agarwal, 2004). Also, privacy (the selective control of access to the self; Altman, 1975) has been identified as one of the main obstacles to information sharing in virtual communities (Dwyer, Hiltz, & Passerini, 2007; Posey, Lowry, Roberts, & Ellis, 2010). However, empirical research has not explored how aspects of virtual communities and information privacy risk beliefs are associated in virtual communities. Therefore, the research question proposed is: *how does community virtuality influence an individual's information privacy risk beliefs in a virtual community?* To answer the research questions, this study explores several aspects of individual-oriented virtual communities that may influence an individual's evaluation of privacy risks, which will in turn influence an individual's private disclosure (Derlega, Metts, Petronio, & Margulis, 1993; Posey et al., 2010).

This research contributes to the privacy and virtual community discipline by developing and incorporating the community virtuality construct. In addition to theoretical contributions, this study has managerial implications especially for organizations that host virtual community platforms (e.g., Twitter, Facebook). Research suggests that individuals develop relationships by sharing private information (Derlega et al., 1993). Therefore, organizations that host virtual community platforms might use the findings from this study to increase the number of users by encouraging users to share private information.

The next section presents a theoretical framework, followed by the research model and the hypotheses. Subsequently, we present the empirical study and findings. The final section discusses the findings, the theoretical contributions, the practical implications, and limitations.

BACKGROUND

Privacy Calculus

The concept of privacy used in research in discussing how an individual regulates access to the self (Margulis, 2003; Smith, Dinev, & Xu, 2011) and how he/she regulates the interaction between the private self and the public (Westin, 1967). Thus *individual privacy in individual-oriented virtual communities* is the freedom of an individual in an individual-oriented virtual community to determine to what extent one's private information is shared with others.

Researchers using the privacy calculus perspective have found that individuals use self-disclosure and misrepresentation to manage privacy (Jiang, Heng, & Choi, 2013) often because of the ease of developing relationships online and enjoyment with the virtual community platform (Krasnova, Veltri, & Günther, 2012). Krasnova et al. (2012) applied the privacy calculus to the context of Social Networking Sites (SNSs) and also treated users' perceptions of trust as being uniformly applied across all areas within SNSs and towards all other users participating on these sites.

Community Virtuality

Based on the work of Chudoba et al. (2005) and Watson-Manheim et al. (2002), this study defines *perceived community virtuality* as the degree to which an individual perceives a lack of cohesion or discontinuities in aspects of a virtual community. The term "virtual" has been applied to a variety of groups (such as teams, organizations, or communities) to differentiate them from a traditional (physical) ones (Watson-Manheim et al., 2002).

Watson-Manheim et al. (2002) argue that the common theme across studies using the term "virtual" is the notion of discontinuity (i.e., a gap or a lack of coherence). Watson-Manheim et al. (2002) analyzed the literature studying virtual contexts and identified seven discontinuities – physical location, temporal location, work group membership (who you work with), organizational affiliation, relationship with an organization (e.g., permanent or temporary relationship), and culture. Further, Chudoba et al. (2005) proposed measuring the concept of virtuality based on the notion of discontinuities to assess how 'virtual' a team is. They conceptualized and measured team virtuality based on six discontinuities – geography, time zone, culture, work practices (i.e., have similar perspectives about how work should be done and can work together smoothly), organization, and technology.

Following Watson-Manheim et al.'s (2002) concept of discontinuities and Chudoba et al.'s (2005) concept of virtuality, this study conceptualizes community virtuality as a second-order construct consisting of five dimensions: geographical discontinuity, temporal discontinuity, relationship discontinuity, cultural discontinuity, and co-presence. The seven discontinuities and their corresponding dimensions of perceived community virtuality are presented in Table 1.

The discontinuities of organizational affiliation and relationship with an organization are not applicable in virtual communities because perceived community virtuality considers individual perceptions about a virtual community (not an organization or the organization that hosts the virtual community platform). The discontinuities of work practice in team virtuality (Chudoba et al., 2005) is not applicable in virtual communities because not necessarily all virtual communities' main purpose/interest is to work together.

Table 1. Mapping Discontinuities to Perceived Community Virtuality

Discontinuities (Watson-Manheim et al., 2002)	**Team Virtuality** (Chudoba et al., 2005)	**Perceived Community Virtuality**
Physical Location	Geography	Geographical Discontinuity
Temporal Location	Time Zone	Temporal Discontinuity
Culture	Culture	Cultural Discontinuity
Work Group Membership	(Not Applicable)	Relationship Discontinuity
Organizational Affiliation	Organization	(Not Applicable)
Relationship with an Organization		
(Not Applicable)	Technology	Co-presence (Ma & Agarwal, 2007)
(Not Applicable)	Work Practice	(Not Applicable)

Geographic discontinuity reflects the degree to which an individual perceives that community members are in different geographic locations (Chudoba et al., 2005). This dimension reflects the idea that community members may be located close to each other geographically or may be dispersed over a variety of geographic areas.

Temporal discontinuity reflects the degree to which an individual perceives that community members are in different time zones (Chudoba et al., 2005). Similar to geographic discontinuity, temporal discontinuity reflects the idea that virtual community members may be in the same time zone or may be in different time zones. It is important to note that virtual community members may be located over a wide area but still be in the same or adjacent time zone(s). For example, virtual community members may be located in Canada and Argentina. Although these two nations are geographically disperse, virtual community members may still be in the same time zone.

Relationship discontinuity reflects the degree to which an individual perceives that the people in the relationship network in the virtual community differ from the people he or she has relationships within his or her physical life. This dimension is developed based on the idea of group membership discontinuity (Watson-Manheim et al., 2002). In a virtual community with low relationship discontinuity, the people in the individual's virtual community resemble the people and relationships in his or her physical life.

Cultural discontinuity is the degree to which an individual perceives that virtual community members represent different cultures (Chudoba et al., 2005). This dimension reflects the idea that virtual community members may be from the same cultural background, or may have diverse cultural backgrounds. There are many aspects of cultural background that make an individual perceive cultural discontinuity. For example, an individual may perceive virtual community members come from a variety of countries, have different native languages, and/or ethnic origins. Cultural discontinuity reflects the perception that virtual community members are not cohesive in terms of their cultural background but does not refer to any specific aspect of culture.

Co-presence reflects the degree to which an individual has a feeling of being with other members of the virtual community (Ma & Agarwal, 2007). Unlike the former four dimensions that reflect the features of virtual community members, co-presence captures the features of the technology, or IT artifacts, in a virtual community. Two technological features can promote co-presence: interactivity and medium vividness (Khalifa & Shen, 2004; Ma & Agarwal, 2007). Interactivity is a technological feature of communication tools such as real-time chat rooms or instant messengers that synchronize interaction and give individuals a sense of actually being together. Medium vividness gives individuals a sense that they are with other virtual community members in a manner similar to the physical world (Ma & Agarwal, 2007). Medium vividness provides information about the communication environment (e.g., allowing members to know who is currently online, where are they, and what they are doing).

MODEL AND RESEARCH HYPOTHESES

The research model is presented in Figure 1. We begin by developing the hypotheses from left to right in the model.

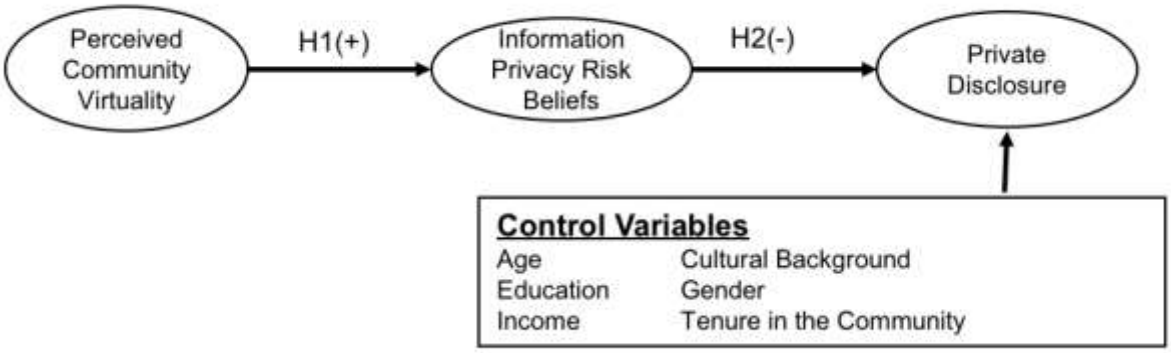

Figure 1. Research Model

Perceived Community Virtuality and Privacy Risks

Recall that *perceived community virtuality* is defined as the degree to which an individual perceives a lack of cohesion or discontinuities in aspects of an individual-oriented virtual community. When an individual perceives high community virtuality, he or she feels that the virtual community members and the communication environment are not cohesive or united. As a result, the individual may feel that it is difficult to manage privacy practices with his or her virtual community members (i.e., confidants). Without a clear understanding or agreement about the privacy management practices the individual does not have a feeling of being attuned with the other members of the virtual community. The individual may interpret the ambiguity as a lack of cohesion and perceive that virtual community members will interpret privacy practices in various ways. In these circumstances, the individual may perceive a higher likelihood of loss due to sharing private information. In an environment of low cohesion and high ambiguity, the individual is less likely to expect that the virtual community members will treat his or her private information appropriately. Therefore, we posit that:

> *H1: In an individual-oriented virtual community, an individual's perceived community virtuality will increase his or her information privacy risk beliefs.*

Privacy Risk Beliefs and Private Disclosure

Private disclosure refers to an individual's voluntary and intentional behavior of revealing private information to others (Derlega et al., 1993; Petronio, 2002; Posey et al., 2010). Research has found that an individual who perceives a high likelihood of loss due to sharing private information (i.e., information privacy risk beliefs) is less likely to share private information (Malhotra et al., 2004; Posey et al., 2010). We confirm this relationship in the virtual community context so that we can compare it with that of the territory privacy risk beliefs – territory coordination relationship.

> *H2: In an individual-oriented virtual community, an individual's perceived information privacy risk beliefs will decrease his or her disclosure of private information.*

RESEARCH METHOD

Our goal is to develop a model for explaining the relationship between perceptions of community virtuality, privacy risk beliefs and private disclosure. Since the emphasis is on explaining the variance and in developing causal relationships, the field study methodology is adopted and statistical analysis is performed using structural equation modeling.

Measure Development

We followed the procedures suggested by Schwab (2005) to develop measures and to make inferences about the measures' construct validity. Table 2 provides the summary of constructs definitions, and measure sources. We adapted the measures from Malhotra et al's (2004) information privacy risk beliefs and Posey et al.'s (2010) private disclosure to the virtual community context, because they have been proved to be valid and reliable measures. We developed the measure for perceived community virtuality based on Chudoba et al.'s (2005) measure of team virtuality, Ma and Agarwal's (2007) measure of copresence, and the notion of group membership discontinuity (Watson-Manheim et al., 2002).

Table 2. Summary of Constructs and Measures

Construct and Definition	No. of Items	Measure
Perceived Community Virtuality: The degree to which an individual perceives a lack of cohesion or discontinuities in aspects of a virtual community.	19	Developed
Information Privacy Risk Beliefs: An individual's perception of the likelihood of loss due to sharing private information with the virtual community members.	4	Adapted from Malhotra et al. (2004)
Private Disclosure: An individual's voluntarily and intentionally revealing private information to virtual community members.	20	Adapted from Posey et al. (2010)

Private disclosure consists of five dimensions: amount, depth, honesty, intent and valence (Wheeless, 1978; Wheeless & Grotz, 1976). The *amount* dimension concerns how frequently and how much an individual reveals about himself/herself. The *depth* dimension concerns how intimate the revealed information is. The *honesty* dimension concerns how accurate the information about oneself is. The *intent* dimension reflects the degree to which an individual has control and is aware of his or her revealing of information. The *valence* dimension concerns how positive in nature the disclosed information is.

The measures present content validity when items and the construct definition are aligned. For this purpose, each item has been reviewed by two IS research. In addition, for face validity, the wording of the items has been reviewed and discussed among three virtual community members until consensus was reached. A seven-point Likert type scale was adopted in all items. Appendix A presents the measurement items for each construct.

Based on previous research (Child, Pearson, & Petronio, 2009; Malhotra et al., 2004) and the principles by Jarvis et al. (2003) and MacKenzie et al. (2005), information privacy risk beliefs is operationalized as first-order reflective constructs. Perceived community virtuality and private disclosure are operationalized as reflective first-order and formative second-order constructs. Control variables included are gender, age, education, cultural background, tenure in the virtual community, and income. These variables are expected to influence private disclosure (Malhotra et al., 2004; Posey et al., 2010; Xu, Lu, Goh, Jiang, & Zhu, 2009).

Data Collection

This study collected data from individuals using Amazon Mechanical Turk. Research has shown that a Mechanical Turk sample is more diverse than convenience samples and student samples (Berinsky, Huber, & Lenz, 2012; Buhrmester, Kwang, & Gosling, 2011). In terms of data quality, Mechanical Turk participants appear to respond in a manner consistent with convenience samples (Berinsky et al., 2012). Also, the data from Mechanical Turk provides reliability and validity that are similar to those from other traditional data sources such as student and consumer samples (Buhrmester et al., 2011; Steelman & Hammer, 2014).

All participants were over 18 and under 65 years of age, as this age range appropriately represents the population of individual-oriented virtual communities (Carmichael, 2011; Chappel, 2011). The participants had also visited individual-oriented virtual communities within the previous 30 days. The participants were provided a definition of a virtual community and asked to pick the virtual community he or she visits the most often, and the second most often as the focal virtual community to think of when responding to the questions. Participants were randomly asked to focus on the first or second most often visited virtual community as a way to avoid the restriction of all participants being situated in the same virtual community (e.g., Facebook). Because this study examines privacy issues in individual-oriented virtual communities, only the responses where social networking sites are the focal virtual communities will be used for data analysis. Appendix A presents the research instrument instructions.

Data was collected using an online self-report survey instrument. To minimize the possibility of common method variance, data was collected in two stages (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), with at least a 14 day span, as empirical evidence suggests that a separation of two to three weeks between the measurement of variables is an effective technique for reducing common method variance (Johnson, Rosen, & Djurdjevic, 2011, study 2). Also, to reduce common method bias, we counterbalanced the order of the measurement of the constructs in the first-stage questionnaire to avoid implying privacy risk beliefs as the outcomes of other constructs.

RESULTS

Sample Characteristics

Overall, 507 participants (211 from student and 296 from Mechanical Turk) took the first-stage survey and 404 participants (142 from students and 262 from Mechanical Turk) took the second stage survey. Considering 779 recruited participants[1] (331 from students and 448 from Mechanical

[1] There was a recruiting and screening stage before the first stage of data collection to ensure an appropriate sample for the study.

Turk), the overall response rate was 51.9%. Of the 404 participants who took both stages 289 (71.5%) participants' focal virtual communities were individual-oriented virtual communities. As a result of data cleaning, 271 were valid for further analysis. The median tenure in the focal individual-oriented virtual community was 1-2 years. There were slightly more male participants (54%) than female participants (46%). Of the responses, 57% were 18-25 year old, 29% were 26-35 year old, and 9% were 36-45 year old. In terms of native language, 59% was American English, and 33% were languages from Asia (e.g., India, China). See Table 3 for the detailed demographics.

Table 3. Demographics

Gender	Male = 54%	Age	18-25 = 57%
	Female = 46%		26-35 = 29%
Education	Some School, No Degree = 5%		36-45 = 9%
	High School Diploma = 20%		46-65 = 5%
	Associate Degree = 18%	Native Language	American English = 59%
	Bachelor Degree = 35%		Asian Languages = 33%
	Graduate Degree = 22%		Spanish = 3%
Tenure in Virtual Community	Less than 1 years = 3%		Other = 8%
	1-2 years = 41%	Annual Individual Income	Less than $10,000 = 55%
	3-4 years = 35%		$10,001 – $35,000 = 28%
	5 years or more = 21%		$35,001 or more = 17%

Measurement Model Assessment

Evidence of reliability is presented when both the Cronbach's alpha and composite reliability are greater than 0.70 (Bagozzi & Yi, 1988; Garver & Mentzer, 1999). Overall, the measures are reliable, as the composite reliabilities of all the constructs/dimensions ranged from 0.83 to 0.94. See Table 4 for the AVE's, Composite Reliability and Cronbach's Alpha.

Table 4. AVEs, Construct Reliabilities, and Cronbach's Alpha

	AVE	Composite Reliability	Cronbach's Alpha
IPRB	0.8174	0.9471	0.9255
PCV_Copresence	0.5615	0.8318	0.7853
PCV_Culture	0.6978	0.8728	0.7829
PCV_Geographic	0.6360	0.9125	0.8841
PCV_Relationship	0.6942	0.9314	0.9113
PD_Amount	0.7102	0.8800	0.7946
PD_Depth	0.7602	0.9266	0.8945
PD_Honsty	0.7136	0.9085	0.8653
PD_Intent	0.7453	0.8976	0.8288
PD_Valence	0.5937	0.8491	0.8004

A factor analysis was performed to examine the factorial validity of the measures (see Appendix A for factor loadings). We used two approaches for evaluating convergent validity. First, according to (Fornell & Larcker, 1981), the standardized loadings are at least 0.70 or the average variance

extracted (AVE) is greater than 0.50. Second, according to (Gefen & Straub, 2005), all items or dimensions load significantly on their latent constructs (see Table 5 for path coefficients).

Table 5. Path Coefficients of Dimensions on Latent Constructs

Construct	Dimension	Type	Path Coefficients		
			B	t-value	p
Perceived Community Virtuality	Copresence	Reflective First-Order, Formative Second-Order	0.0283	0.8407	NS
	Culture		0.2200	15.1542	$p < 0.001$
	Geographic		0.4528	18.7353	$p < 0.001$
	Relationship		0.5468	19.1366	$p < 0.001$
Private Disclosure	Amount	Reflective First-Order, Formative Second-Order	0.2301	3.4349	$p < 0.001$
	Depth		0.4010	3.2841	$p < 0.01$
	Honest		0.4851	6.7894	$p < 0.001$
	Intent		0.2100	2.3479	$p < 0.05$
	Valence		0.2421	2.7451	$p < 0.01$

In addition, we used two approaches for ensuring discriminant validity. First, the square root of each AVE is larger than its correlation with any other latent constructs/dimensions (Chin, 1998a, 1998b; Fornell & Larcker, 1981) (see Table 6). Second, the correlation of a measurement item with its latent construct/dimension is greater than its correlation with other latent constructs/dimensions (Chin, 1998a, 1998b; Gefen & Straub, 2005). As described, perceived community virtuality is a constructs with formative dimensions and reflective indicators. For reflective indicators, significant item weights on their dimensions were not necessary (Diamantopoulos & Winklhofer, 2001; Petter, Straub, & Rai, 2007). Although the path coefficient of copresence discontinuity was not significant (see Table 5), the dimension was retained to ensure content validity (Bollen & Lennox, 1991; Cohen, Cohen, Teresi, Marchi, & Velez, 1990; Edwards & Bagozzi, 2000; Fornell, Rhee, & Yi, 1991; Petter et al., 2007; Roberts & Thatcher, 2009).

Table 6. Construct Correlations and Square Roots of AVEs

	1	2	3	7	9	10	11	12	13	14	15	16	17	18	19	28
1. Age	N/A															
2. Education	0.38	N/A														
3. Gender	-0.06	-0.08	N/A													
7. IPRB	-0.22	-0.07	0.05	0.90												
9. Income	0.25	0.25	-0.07	-0.01	N/A											
10. Language	0.21	0.29	0.04	0.05	0.07	N/A										
11. PCV_Copresence	-0.11	-0.26	-0.02	0.14	0.02	-0.14	0.75									
12. PCV_Culture	0.08	0.24	-0.03	0.11	0.01	0.20	-0.02	0.84								
13. PCV_Geographic	0.11	0.30	-0.12	0.06	-0.02	0.04	-0.12	0.47	0.80							
14. PCV_Relationship	0.04	0.18	-0.17	0.16	0.07	0.02	0.19	0.49	0.47	0.83						
15. PD_Amount	-0.02	0.05	0.01	-0.14	0.04	0.02	-0.12	0.16	0.07	0.01	0.84					
16. PD_Depth	0.04	0.18	-0.20	-0.07	0.00	0.12	-0.13	0.22	0.14	0.25	0.43	0.87				
17. PD_Honesty	0.15	0.10	0.13	-0.19	-0.07	0.05	-0.18	0.10	0.19	-0.02	0.22	0.30	0.84			
18. PD_Intent	0.20	0.13	0.15	-0.15	0.12	0.07	-0.10	-0.05	-0.01	-0.08	-0.04	-0.10	0.39	0.86		
19. PD_Valence	0.15	0.15	0.11	-0.17	-0.04	0.16	-0.24	0.02	0.03	-0.13	0.07	0.06	0.34	0.42	0.77	
29. Tenure	-0.27	-0.37	0.06	0.04	-0.01	-0.18	0.10	-0.14	-0.25	-0.25	0.06	-0.21	-0.06	-0.09	-0.04	0.04

The VIFs for the dimensions in the perceived community virtuality and private disclosure constructs ranged from 1.11 to 1.58 and were well below the 3.3 cut-off criterion (Diamantopoulos & Siguaw, 2006; Petter et al., 2007). Therefore, the formative indicators were not highly correlated.

This study performed a marker variable test to assess the threat of common method variance, as suggested by Lindell and Whitney (2001). Two variables were expected to have no relationship with the constructs of interest: (1) satisfaction with car insurance company; and (2) intention to take a long trip soon. The smallest correlation was 0 (second marker variable with the intent dimension in private disclosure). The result suggested that common method bias is not a serious concern.

Structural Model Assessment

Partial least square was used to evaluate the research model and test the hypotheses. To examine the hypotheses, the significance of the path coefficients was assessed through bootstrapping of 1500 subsamples (Chin, 1998a, 1998b). The results are summarized in Figure 2 and Table 7. The research model explained 21.4% of the variance in private disclosure and 3.0% of the variance in the information privacy risk beliefs. Perceived community virtuality significantly increased individuals' information privacy risk beliefs (β = 0.173, t = 4.233), which significantly decreased individuals' intention to disclose private information (β = -0.198, t = 2.193). None of the control variables has significant effect on private disclosure.

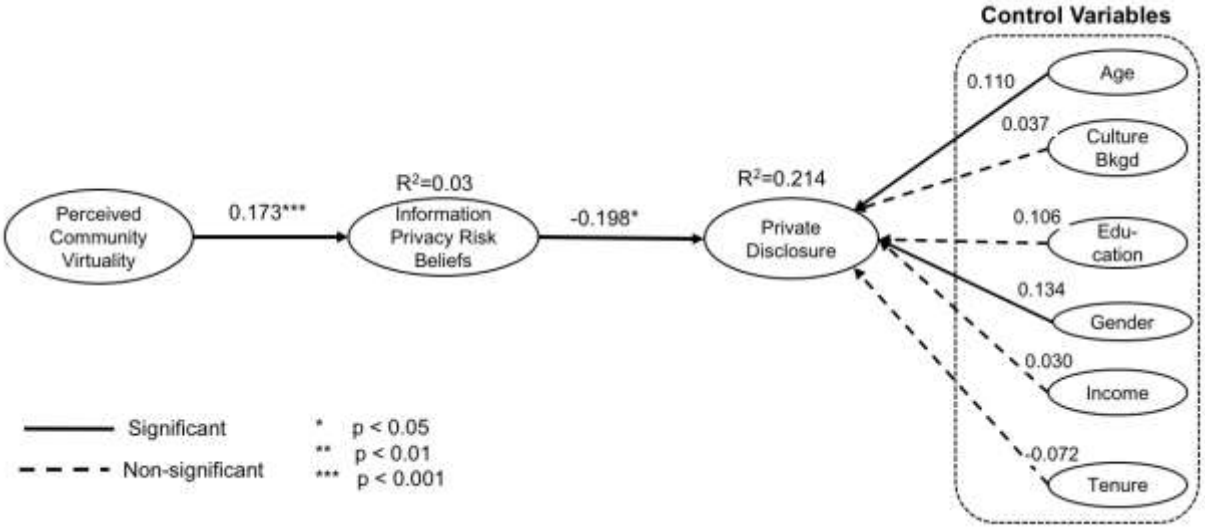

Figure 2. Results of Path Analysis

Table 7. Summary of Hypotheses Testing Results

Hypo-thesis	Relationships between Constructs (Relationship Direction)	Results	Support
H1	Perceived Community Virtuality → Information Privacy Risk Belief (+)	β = 0.173 t = 4.233	Supported ($p < 0.001$)
H2	Information Privacy Risk Belief → Private Disclosure (-)	β = -0.198 t = 2.193	Supported ($p < 0.05$)

DISCUSSION

Hypothesis 1 indicates that given the context of individual-oriented virtual communities, individuals would assess information privacy risk beliefs based on their perceptions of various aspects of the community's virtuality. Our findings suggest that, when an individual perceives the community as highly virtual (e.g., community members are not friends in their physical life, are from different locations, represent different cultures, and/or do not feel as if they are together), the individual will perceive a high level of information privacy risk beliefs. Hypothesis 2 predicted that information privacy risk beliefs positively influence private disclosure. This finding shows that the theoretical framework of private disclosure in prior research (e.g., Posey et al. 2010) holds for the individual-oriented virtual community context.

IMPLICATIONS

Based on the notion of discontinuities, this study developed the perceived community virtuality construct. Among the four dimensions, culture virtuality, geographic virtuality, and relationship virtuality load significantly on the perceived community virtuality construct. This result implies that individuals' perceptions on these three dimensions have effects on their assessment of how virtual their communities are. However, the co-presence dimension does not load significantly on the perceived community virtuality construct. One of the reasons may be the fact that our sample participants are mainly from social networking sites. The result from our research provide suggestions to future research for collecting data from a variety of virtuality types ranging from high co-presence (e.g., MetaWorld or Second Life) to low co-presence (e.g., online forums).

Second, the finding from this study reveals that different aspects of perceived community virtuality may increase an individual's information privacy risk beliefs. In other words, when an individual perceives that his/her virtual community members' cultural background, geographic location, and/or the relationship networks are different from his/her physical life, the individual may consider higher information privacy risks in the virtual community. Relatively fewer research regarding the antecedents of information privacy risk beliefs discussed the effect of community environment on individual privacy risk beliefs. The result of this study offers an interesting research perspective to the extant research.

In addition to theoretical contributions, there are also implications for practice. The results suggest virtual community platform organizations how to mitigate individuals' information privacy risk beliefs. This study found for our sample that the higher the perceived community virtuality the

stronger the information privacy risk beliefs, which further decrease private disclosure. Therefore, for organizations that host virtual community platforms to encourage community interactions among community users, these organizations should develop initiatives to decrease individuals' perceptions of a community's virtuality and mitigate individuals' information privacy risk beliefs. In addition, the research results suggest how to decrease individuals' perceptions of a community's virtuality. The result shows that an individual's perception of community virtuality is comprised of his/her assessment of four discontinuities, including co-presence, culture, geography, and relationship discontinuities. These four discontinuities provide organizations that host virtual communities guidance regarding how to develop initiatives that decrease individuals' perceptions of a community's virtuality.

For example, to mitigate the co-presence discontinuity, organizations could design tools for individuals to encourage instant chatting, sound sharing, and video meetings. Not only these tools should facilitate synchronous communications, the design of these tools should allow individuals to see, to hear, or to feel what their communication counterparts experience in real time. These tools may also mitigate individuals' perception of geography discontinuity. To mitigate the culture discontinuity, organizations consider providing instant language translation tool and embedding the tool in instant chatting. Building an inclusive community culture may also help mitigate culture discontinuity. To mitigate the relationship discontinuity, organizations could encourage individuals to invite their friends in their physical life to become individual-oriented virtual community members or provide opportunities to have Face Time chat sessions to increase familiarity and build relationships.

Limitations and Future Research

First, the findings cannot be extended beyond the boundary of the sample (individual-oriented virtual communities). Perceived community virtuality captures an individual's perception of discontinuities in individual-oriented virtual communities (i.e., social networking sites). However, other types of virtual communities are not evaluated and examined in this study. Future research could examine how community virtuality may be applied to other virtual communities (e.g., SourceForge or metaworld).

Another characteristic of the sample to consider is the native language of the participants. The participants' native languages are mainly languages in (American) English (59%) and Asia (33%). Therefore, the applicability of the findings to groups other than these two may be limited.

Steps were taken to control for common method variance in the research design and in the data analysis to ensure that common method bias was not a concern in the data. However, a longitudinal research design could further validate the casual relationships.

CONCLUSION

This study investigated how individual-oriented virtual community members perceive their community environment and cope with threats to their privacy. The research model proposed that perceived community virtuality that may influence an individual's evaluation of privacy risks, which in turn influence individual private disclosure. From a practical standpoint, this study

provides guidance to virtual community platform organizations on potential ways to encourage users to share private information as a mechanism to increase their community population.

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APPENDIX A

MEASURES

Items and factor loadings are listed in the Table A1, A2, and A3. SPSS was used for the Factor analysis (a principal components analysis with Varimax rotation) was used (Gefen & Straub, 2005; Rai, Patnayakuni, & Seth, 2006). For second-order constructs, the items were grouped under their respective second-order construct for factor analysis (as demonstrated in Rai et al. 2006). An item was retained if its loading was above 0.6 on the latent construct/dimension and below 0.4 on the other constructs/dimensions (Hair, Anderson, Tatham, & Black, 1998).

Table A1. Perceived Community Virtuality (Developed)

Items and Factor Loadings

Construct: Dimension	**Question**	**Item #**	**Geo-graphic**	**Cultural**	**Relation-ship**	**Co-presence**
Perceived Community Virtuality (PCV): Geographic Discontinuity	The majority of virtual community members are in different geographic locations.	PCV 1	.667	.311	.096	.103
	Virtual community members are in a variety of geographic locations.	PCV 2				
	I am geographically far away from the majority of the virtual community members.	PCV 3	.834	.025	.137	-.035
	The majority of virtual community members are in different time zones.	PCV 4	.767	.345	.230	.038
	Virtual community members are in a variety of time zones.	PCV 5				
	I am in a different time zone than the majority of virtual community members.	PCV 6	.862	.076	.210	-.018
	The majority of virtual community members need to go to bed late or get up early in order to have real-time communication with other virtual community members.	PCV 7	.691	.064	.232	-.325
	I need to go to bed late or get up early in order to have real-time communication with the majority of virtual community members.	PCV 8	.682	.064	.271	-.294
Perceived Community	Virtual community members are from a variety of cultural backgrounds.	PCV 9	.105	.794	.143	.031

Virtuality (PCV): Cultural Discontinuity	My cultural background makes me feel like I am an outsider in the virtual community.	PCV 10	Drop			
	The majority of virtual community members have different native languages or dialects from my own.	PCV 11	.302	.654	.351	-.156
	Virtual community members have a variety of native languages or dialects.	PCV 12	.175	.832	.256	-.049
	If you are reading this, please do not answer and continue to the next question (i.e., "the majority of...").	PCV 13	N/A			
Perceived Community Virtuality (PCV): Relationship Discontinuity	The majority of virtual community members have never met each other face to face.	PCV 14	.228	.220	.733	.117
	I have never met the virtual community members face to face.	PCV 15	.261	.067	.813	.062
	Virtual community members do not know who each other really is.	PCV 16	.215	.124	.817	.139
	Virtual community members do not know who I really am.	PCV 17	.179	.137	.844	.144
	The majority of virtual community members' friends in the virtual community are with different individuals than in their physical life.	PCV 18	.054	.239	.749	.021
	Members in the virtual community differ from the people I know in my physical life.	PCV 19	.179	.126	.784	.012
Perceived Community Virtuality (PCV): Copresence Discontinuity	I use instant-messaging tools to talk with virtual community members frequently. (r)	PCV 20	Drop			
	I use chat rooms to talk with virtual community members frequently. (r)	PCV 21	Drop			
	I am usually aware of who is logged in to the virtual community. (r)	PCV 22	-.023	-.017	.043	.790
	I pay attention to others' online or offline status in the virtual community. (r)	PCV 23	-.022	.025	-.026	.862
	I find that virtual community members respond to my private messages quickly. (r)	PCV 24	-.118	.000	.168	.749
	I find that virtual community members respond to my posts quickly. (r)	PCV 25	-.068	-.073	.156	.634

Table A2. Private Disclosure (Developed)

Items and Factor Loadings

Construct: Dimension	Question	Item#	AMT	DPT	HON	INT	VAL
Private Disclosure (PD): Amount	I do not often talk about myself in the virtual community. (r)	PD1	.900	-.041	.141	.015	.071
	I usually talk about myself for fairly long periods at a time in the virtual community.	PD2	.680	.349	.071	-.075	-.038
	Whenever I talk about myself, I make the conversation short. (r)	PD3	Drop				
	I often talk about myself in the virtual community.	PD4	.836	.348	.046	.003	-.013
	I often discuss my feelings about myself in the virtual community.	PD5	Drop				
Private Disclosure (PD): Depth	I intimately disclose who I really am, openly and fully in my conversation in the virtual community.	PD6	.208	.844	.119	.034	.071
	I often disclose intimate, personal things about myself without hesitation in the virtual community.	PD7	.151	.876	.139	-.024	-.002
	I feel that I sometimes do not control my disclosure of personal or intimate things I tell about myself in the virtual community.	PD8	.042	.799	.070	-.120	-.054
	Once I get started, I intimately and fully reveal myself in the virtual community.	PD9	.184	.839	.152	-.088	-.057
Private Disclosure (PD): Honesty	I always feel completely sincere when I reveal my own feelings and experiences in the virtual community.	PD10	Drop				
	My disclosures in the virtual community are completely accurate reflections of who I really am.	PD11	.071	.223	.801	.147	.128
	I am not always honest in my disclosures in the virtual community. (r)	PD12	.053	-.009	.781	.092	.086
	My statements in the virtual community about my own	PD13	.131	.195	.809	.145	.106

	feelings, emotions, and experiences are always accurate self-perceptions.						
	I am always honest in my disclosures in the virtual community.	PD14	.048	.104	.838	.227	.090
	If you are reading this, please do not answer and continue to the next question (i.e., "When I...").	PD15	N/A				
Private Disclosure (PD): Intent	When I express my personal feelings in the virtual community, I am always aware of what I am doing and saying.	PD16	-.004	-.132	.250	.738	.199
	When I reveal my feelings about myself in the virtual community, I consciously intend to do so.	PD17	.006	-.018	.189	.835	.160
	When I am disclosing in the virtual community, I am consciously aware of what I am revealing.	PD18	-.054	-.063	.134	.868	.214
Private Disclosure (PD): Valence	I usually disclose positive things about myself in the virtual community.	PD19	.061	.133	.180	.173	.766
	I normally reveal “bad” feelings I have about myself in the virtual community. (r)	PD20	Drop				
	I normally express my “good” feelings about myself in the virtual community.	PD21	.000	.123	.292	.076	.744
	On the whole, my disclosures about myself in the virtual community are more negative than positive. (r)	PD22	-.032	-.375	-.013	.152	.700
	On the whole, my disclosures about myself in the virtual community are more positive than negative.	PD23	.000	-.066	-.012	.235	.848

Table A3. Items for Information Privacy Risk Beliefs

Construct	Questions	Item#
Information Privacy Risk Beliefs (Malhotra et al. 2004)	In general, it is risky to give my private information to virtual community members.	IPRB1
	There is a high potential for loss associated with giving my private information to virtual community members.	IPRB2
	There is too much uncertainty associated with giving my private information to virtual community members.	IPRB3
	Sharing my private information in the virtual community involves many unexpected problems.	IPRB4

Control Variables:

Age: 18-25; 26-35; 36-45; 46-55; 56-65; other.

Cultural Background: native language? Arabic; Chinese; English; French; Hindi; Korean; Portuguese; Spanish; other, please specify _____.

Education: highest level of education attained? Some school, no degree; High school diploma; Associates degree; Bachelor's degree; Graduate degree.

Gender: male; female; other.

Income: Annual income in US$? Less than $10,000; $10,001 - $35,000; $35,001 - $60,000; $60,001-$85,000; $85,001 − $110,000; $110,001 or more.

Tenure in the Virtual Community: Years participated in virtual community? Less than 1 year; 1-2 years; 2-3 years; 3-4 years; 4-5 years; 5-6 years; 6-7 years; 7 or more).

QRBD

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