The effects of perceived health status on privacy concerns and opt-in intention toward Health Information Exchanges (HIEs)

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Abstract

Literature has highlighted that sensitivity of health information, which is shared through health information exchanges (HIEs), has caused security and privacy concerns. However, little is known about how perceived health status can affect patients’ privacy concerns and opt-in intentions toward HIEs. The interaction of perceived health status and privacy concerns may significantly affect the national adoption of HIEs by consumers and the widespread diffusion of electronic exchange models by healthcare organizations in the future. To investigate the role of health status in the adoption equation, we conducted an online survey in the United States using 826 samples. The result shows that patients’ opt-in decision is significantly driven by concern for information privacy and the perceived health status moderates this relationship. Interestingly, on the contrary to our hypothesis, individuals who perceive themselves unhealthy are less likely to consider negative effects of concern for information privacy in their tendency to opt-in toward HIEs.

Keywords

HIE, CFIP, perceived health status, opt-in intention.

Introduction

Health information exchange (HIE) systems are the process designed to manage data collection and electronic information sharing across various electronic health record (EHR) technologies and different organizational boundaries to improve care coordination, reduce medical errors, and support clinical care delivery (Unertl et al. 2011). Adoption of different HIE models on a large scale is highly affected by several obstructions such as privacy and security challenges. These concerns are reported as a barrier to consumer acceptance of HIEs. Several studies indicate that HIEs can worsen privacy and security concerns in society and consumers may withhold personal information that could compromise privacy if they have control over them (Wright et al. 2010). Consumers may feel uncomfortable with HIEs as sharing for healthcare purposes denotes that health information is identified and accessible by a great number of organizations. If individual needs for privacy and security of data exchange are not met, consumers may intentionally prefer to hide relevant health information from their healthcare providers since they know such information could be shared electronically. Mismanagement, lack of security safeguards, and privacy violations of sensitive health information have caused lot of incidents in various healthcare organizations. Statistics show that although several privacy rules and security regulations are in play, still enormous privacy violations have been reported in the healthcare environment (Pussewalage and Oleshchuk 2016). Thus, privacy concerns can be considered as a core barrier to consumers’ opt-in intentions to HIE initiatives, which designed to exchange digital health information among healthcare organizations.

In today’s information-intensive healthcare systems, it is essential for both researchers and managers to understand the dimensions and effects of patients’ concern for information privacy associated with the development of HIEs. According to Van Slyke et al. (2006), concern for information privacy (CFIP) is a...
multi-dimensional construct that has been considerably used in IS literature. CFIP measures consumers’ concern about organizations’ information collection practices, protection strategies, and use policies (Stewart and Segars 2002). This construct identifies a broad concern about the general policies of organizations on how and why they collect and use personal information. Thus, CFIP does not capture the practice patterns of a company in particular. As stated by Smith et al. (1996), due to the complexity of privacy concern, CFIP is measured based on four second-order factors (i.e., collection, unauthorized secondary use, improper access, and error). In brief, CFIP includes concerns on how information is collected, who can access and share such information, whether personal information is used for other purposes when a permission is not obtained, and how such information is protected seamlessly during the exchange process (Esmaeilzadeh 2018a).

Furthermore, the relationship between CFIP and opt-in intention toward HIEs may vary based on individual’s perceived health status. According to Kim et al. (2015a), perceived health status is as an indicator of health that refers to individual’s overall health condition. There is evidence in prior studies that individuals with chronic diseases are more willing to request for robust security safeguards in order to protect their health information throughout an electronic exchange process. (Whiddett et al. 2006). Nevertheless, there are few studies that investigate how perceived health status can play a role in information disclosure intention (Zhang et al. 2017). As stated by Bansal and Gefen (2010), people with poor health are more likely to become sensitive about their medical records, and in turn, are more prone to be concerned about disclosing such information. Tsnado et al. (2006) indicate that people who are suffering from serious illnesses and perceive their health records to be highly sensitive, are more willing to hide their actual health reports from others. The main objective of this research is to shed light on how individuals’ adoption intentions toward HIEs are influenced by their health status.

**Research Model and Hypotheses**

There is vigorous debate amongst entities in the healthcare industry about the topic of opt-in versus opt-out of digital health records and electronic exchange of such information (Cundy and Hassey 2006). This debate argues whether health providers or patients should have the right to decide if the digital health information can be exchanged (Wilkinson 2006). Yet, patients have the unconditional right to be aware of the data-handling practices of medical providers (Angst and Agarwal 2009). However, public perspectives are important to researchers and policy makers because consumers are one of the main key stakeholders and the widespread adoption of HIEs is not possible without their positive attitudes toward this technology. Literature highlights that privacy and security concerns are common toward different electronic exchange models and patients are more willing to opt-in to various mechanisms for data sharing as long as they are persuaded that their privacy is protected (Ancker et al. 2012). For instance, patients will have favorable attitude toward community-wide data sharing or query-based exchange if the exchange model matches privacy protection requirements (Campion et al. 2013). Consistent with the setting and objective of this study, we examine CFIP regarding the strategies and policies of healthcare entities that participate in HIE efforts, not a specific provider involved in state-based or regional HIE initiatives. According to the aforementioned factors of CFIP, high privacy concern is a function of 1. collecting too much data, 2. sharing erroneous data, 3. using sensitive health data for undisclosed purposes, and 4. failing to protect medical records. None of the four dimensions necessarily needs to covary. For instance, a patient could have a high concern about unauthorized access, but low concern about errors (Kim et al. 2015b; Park et al. 2013). Consistent with prior studies (Van Slyke et al. 2006), we model CFIP as a formative second-order construct. In line with the discussion above, we hypothesize that individuals who demonstrate high levels of CFIP are less willing to opt-in toward HIEs. Thus,

**H1:** Individual’s opt-in intention toward HIEs is negatively affected by CFIP.

Poor health status play an important role in decreasing the utility of HIEs by reinforcing the negative linkage between CFIP and opt-in intention. According to Rindfleisch (1997), people with poor health conditions are more susceptible to privacy concerns as related to the sharing of their sensitive medical records. Individuals who consider themselves very feeble due to chronic diseases believe that if the medical reports about their health conditions are exchanged among a wide range of healthcare organizations, they can no longer keep them secret (Esmaeilzadeh 2018b). Consumers with different health conditions have different attitude toward the privacy issues regarding data sharing (Zhang et al. 2017).
Healthy people are less likely to be worried about the distribution of their digital medical records among healthcare entities than unhealthy individuals with sensitive health data. Accordingly, individuals with good health conditions are less likely to deliberate over privacy and security issues. This makes them more likely to allow their health data to be shared electronically through HIEs. Oppositely, unhealthy individuals are more willing to consider their sensitive medical reports to be shared in a more private manner. Thus, poor health condition accentuates the impact of CFIP on opt-in intention because individuals who perceive themselves to be very ill and weak may believe that their medical records could be more vulnerable due to the dimensions of CFIP (such as secondary use), if shared with other healthcare organizations electronically. Consistent with this argument and the suggestions of previous research, it could be argued that the strength and direction of the linkage between CFIP and opt-in intention can be affected by perceived health status. Therefore,

**H2:** The relationship between CFIP and individual’s opt-in intention toward HIEs is positively moderated by perceived health status.

Figure 1 depicts the research model developed in this study based on the mentioned hypotheses. The proposed model examines the role of CFIP and perceived health status in predicting consumers’ opt-in intentions.

**Methods**

The research hypotheses were tested using a survey. The existing literature was mainly used to measure constructs, however, minor changes were made to the instrument to fit the HIE context. Items reflecting opt-in intention were adapted from Angst and Agarwal (2009), items measuring perceived health status adapted from Bansal and Gefen (2010), and items measuring the four first-order factors of CFIP adapted from Stewart and Segars (2002). We used Amazon’s Mechanical Turk (MTurk) to recruit respondents. 853 responses were initially collected within the United States. Incomplete responses and those failed the response quality questions (27) were excluded from further analysis. The final set of useable responses contained 826 samples.

**Results and Discussion**

The majority of respondents were female (64%), White (62%), and had a full time job (61%). Close to 85% of the respondents had daily access to a computer and around 82% used the internet on a daily basis. We used SmartPLS to perform CFA and test the hypotheses using structural equation modeling (SEM) analysis. The results of CFA showed that the model fulfilled the requirements of convergent and discriminant validity. The findings of SEM analysis indicated that the $\chi^2$ of the model was 814.131 with 362 degrees of freedom ($\chi^2/df = 2.24$). The indices value for CFI = 0.913, NFI= 0.923, RFI= 0.919, TLI= 0.933 were above 0.9 and SRMR = 0.044 and RMSEA= 0.043 were below than the cut-off value of 0.08. All these measures of fit were in the acceptable range, only GFI= 0.832, and AGFI= 0.813 were in the margin. Based on Kline and Santor (1999), at least four of the statistical values met the minimum recommended values which supported a good fit between the hypothesized model and the observed data. Table 1 displays the standardized path coefficient of the structural model under investigation which
supports the significant negative relationship between CFIP and OPINT (β = -0.455). This result indicates that individuals who demonstrate higher privacy concern are less willing to allow their medical information to be exchanged among healthcare entities using HIEs. In line with prior studies in the other contexts (e.g.: Van Slyke et al. 2006), we show that CFIP is a significant barrier to widespread adoption of HIEs in the healthcare industry by hindering consumers’ opt-in intentions to HIE.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Path</th>
<th>Standardized Coefficient</th>
<th>S.E.</th>
<th>C. R.</th>
<th>P-Value</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>CFIP → OPINT</td>
<td>-0.455***</td>
<td>0.186</td>
<td>-2.45</td>
<td>0.000</td>
<td>Supported</td>
</tr>
</tbody>
</table>

Table legend: CFIP= Concern for information privacy; OPINT= Opt-in intention. *** P<0.001

Table 1. Parameter Estimated

Interestingly, the findings in Table 2 show that the negative linkage between CFIP and OPINT was not significant among individuals who perceived their health status to be poor (β = -0.03), nevertheless, this negative relationship was stronger among those who considered themselves healthy (β = -0.28). The findings also indicate that the relationship between CFIP and OPINT was significantly different between the two groups (i.e., healthy versus unhealthy individuals) as critical ratio of difference between two groups = 4.613, P<0.001. This evidence suggests that individuals with poor health conditions had a lower level of privacy concern about the implementation of HIEs than those with good health status. This result supports our initial hypothesis (H2) on the moderating role of perceived health status in the relationship between CFIP and OPINT but in the reverse direction. This is inconsistent with the results of previous studies in other contexts (e.g.: Zhang et al. 2017). One plausible explanation for the observed contradiction is that people suffering from chronic diseases may expect to see more benefits (such as expedited and accurate treatments, efficient services, and convenient care delivery) from allowing their medical data to be shared across different providers via HIEs. Therefore, individuals with poor health conditions become less likely to capture the unfavorable effects of perceived privacy (i.e., vulnerability to excessive collection, errors, unauthorized access, and secondary use) on their opt-in decisions as they expect to receive more health-related values from the implementation of HIEs.

<table>
<thead>
<tr>
<th>H2: Moderating role of perceived health status</th>
<th>Healthy individuals</th>
<th>Unhealthy individuals</th>
<th>Critical ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Path: CFIP → OPINT</td>
<td>-0.28***</td>
<td>-0.03</td>
<td>4.613***</td>
</tr>
</tbody>
</table>

***P<0.001

Table 2. Comparison Analysis for Two Groups (Healthy vs Unhealthy Individuals)

Conclusion

This study examines the role of consumers’ perceived health status in shaping their privacy concerns and opt-in intentions to HIEs. This work extends the application of CFIP to the HIE domain by developing and testing a model centered on the four dimensions of CFIP (collection, errors, unauthorized access, and secondary use) to predict individuals’ opt-in intention in the presence of the perceived health status’ effects. The results demonstrate that CFIP significantly impedes consumers' opt-in intentions toward HIEs by explaining 34% of the variance (R² = 0.34). Interestingly, the negative effect of consumers’ privacy concerns on their opt-in intentions is stronger among healthy individuals than people with poor health conditions. Finally, our results can serve as a foundation not only for making decisions related to HIE design, diffusion, and implementation, but also as a basis for future empirical studies on the role of perceived health status in HIE adoption by consumers.

References


