

Adoption of Identity Protection Service: An Integrated Protection Motivation – Precaution Adoption Process Model

Full Paper

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Abstract

The Protection Motivation Theory is a leading framework to study individuals' information security behaviors such as identity theft protection, but the effects of its two components, namely threat appraisal and coping appraisal, vary across studies. This study examines the issue based on an integrated Protection Motivation-Precaution Adoption Process Model. We suggest that the effects of perceived threat (including perceived vulnerability and perceived severity) and perceived coping efficacy (including perceived response efficacy and self-efficacy) on individuals' intentions to adopt identity protection service are influenced by the stage of the person in the behavioral change process: for individuals in the action stage, their intention is influenced more by perceived coping efficacy but less by perceived threat, compared to those in the pre-action stage. An online survey via Qualtrics Research Suite partially confirms our expectation. An implication of the study is to deliver stage-targeted information to individuals to effectively motivate them to adopt the service.

Keywords

Protection Motivation Theory (PMT), Precaution Adoption Process Model (PAPM), Transtheoretical Model (TTM), identity protection, precaution adoption, information security, threat appraisal, coping appraisal

Introduction

The growing concerns on cybercrimes and identity theft (Holt and Turner 2012; Shilling 2016) have led researchers to quest what motivate individuals to adopt precautions (such as protective measures or secure behaviors) against the threats in both personal and business settings (Boss et al. 2015; Chen and Zahedi 2016; Johnston and Warkentin 2010; Roßnagel et al. 2014). Among the endeavors, the Protection Motivation Theory, or PMT (Rogers 1975), has become a leading theoretical foundation (Boss et al. 2015). The basic premises of PMT are that threat appraisal and coping appraisal, comprising basic components such as perceived vulnerability, perceived severity, perceived response efficacy, and self-efficacy, affect one's intentions to cope with threats. However, the effects of perceived threat and perceived coping efficacy are not consistent across studies (Boss et al. 2015; Johnston et al. 2015; Lee and Larsen 2009), and the same issue has been observed in studies on health behaviors of individuals as well (Floyd et al. 2000; Milne et al. 2000). Similar to critiques in the health literature, we are concerned that if such effects were not fully understood, the design of intervention programs, such as identity theft protection education, training, applications and services, would produce unsatisfactory results if people do not comply with the interventions. Given the growing concerns on cybercrime and identity theft, this issue has to be carefully addressed.

We argue that individuals in varying stages of the behavioral change process may respond differentially to perceived threat and perceived coping efficacy, and the stage that an individual belongs to moderates the effects of the threat and coping appraisals on their adoption of identity protection service (Block and Keller 1998; Prochaska et al. 2008; Weinstein et al. 2008). Integrating the Protection Motivation Theory and the Precaution Adoption Process Model (PAPM) (Weinstein et al. 2008), we examine individuals' intention to adopt identity protection service to deal with identity theft (Anandarajan et al. 2012; Lai et al. 2012). PAPM suggests that individuals may be at different stages in the precaution adoption process, so that a single prediction equation may not effectively describe their change in health behaviors; instead, multiple prediction equations should be developed for those stages (Weinstein et al. 2008). Following this theory, we consider an individual is at the pre-action stage when he or she has not heard about identity theft, has never thought about or is undecided about identity theft protection, or has decided not to protect their identity. And, an individual is at the action stage if he or she has decided to take action to protect identity or already taken some actions. We propose that for individuals in the pre-action stage, their intention to adopt identity protection service will be influenced by both perceived threat and perceived coping efficacy; for those in the action stage, their intention will be influenced more by perceived coping efficacy but less by perceived threat. In other words, the effects of threat and coping appraisals are contingent on the identity theft precaution adoption stage that an individual belongs to.

To test the research model, we conducted an online survey via the Qualtrics Research Suite. We collected 616 valid responses from the United States. The result partially confirms our expectation: the stage of the person in the identity theft precaution adoption process moderates the effect of perceived coping efficacy on intentions to adopt identity protection service; the moderating effect of stage on perceived threat, although in the expected direction, does not reach significance. A split-group analysis further shows that coping efficacy has significant effect on behavioral intention in both the pre-action stage and the action stage, and the effect is stronger in the action stage. For perceived threat, it has significant effect in both stages as well, and the effect is stronger in the pre-action stage but weaker in the action stage, although the difference is not statistically significant.

The study extends PMT with PAPM. A theoretical implication of our study is to include the stage of the person in the precaution adoption process as an important contextual factor to examine the person's responses to protection motivations or fear appeals (Boss et al. 2015; Johnston et al. 2015). This helps to understand the roles of threat appraisal and coping appraisal in the behavioral change process and to maximize the effect of the protection information or fear appeal. For practice, it suggests to deliver the stage-targeted information (Eastin et al. 2015; Weinstein et al. 2008) to individuals in order to enhance the effectiveness of the information to motivate individuals to engage in identity protection.

Theoretical Basis and Hypotheses

Theoretical Basis

Precaution Adoption Process Model (PAPM) (Weinstein et al. 2008) helps to address limitations in PMT to predict changes in individuals' health-related behaviors (Block and Keller 1998). The model classifies six stages in one's behavioral change process (such as adoption of identity protection service) based on the mental states of the person (see Table 1). It suggests that for individuals at different stages in the process, the effects of threat appraisal and coping appraisal would be different (Prochaska et al. 2008). For example, in adopting safer-sex practice, individuals in earlier stages of the change process are influenced more by threat appraisal (or perceived threat) of unsafe sex, but in later stages of the process, they are influenced more by coping appraisal (or perceived coping efficacy) of the recommended practice (Block and Keller 1998). Similar effects of the stage model have been observed in a number of behavioral change contexts (Cismaru et al. 2008; Eastin et al. 2015; Martin et al. 2007).

The algorithm used to delimit the stages in the change process, based on the scenario of identity protection, is presented in Table 2. To proceed, the subject is asked with the first question ("*Have you ever heard about identity protection?*"), and depending on the answer (yes or no), the second question is asked or skipped, and so on (see Table 2). An empirical study on home radon testing based on the model was reported (Weinstein et al. 2008), which involves three stages (3, 5, and 6) of behavioral change. Another study on risk information seeking behavior based on PAPM found differences between three

groups of subjects (action, no action, and undecided) in those behaviors (Eastin et al. 2015). To our best knowledge, no study has integrated PAPM and PMT, especially in the identity protection context.

Stage (Weinstein et al. 2008)	Explanation
Stage 1: Unaware	A person in this stage has no knowledge or awareness about identity theft and its protection, and has not formed opinions about it.
Stage 2: Unengaged	A person in this stage has knowledge or awareness about identity theft and protection, but has not become engaged with due to limited time or attention to the issue. He or she may believe the issue is unimportant or irrelevant to them.
Stage 3: Undecided	A person in this stage has knowledge or awareness about identity theft and protection, and has become engaged with. However, the person has not decided what to do, probably due to limited knowledge or awareness of the countermeasures.
Stage 4: Decided not to act	A person in this stage has knowledge or awareness about identity theft, but decides not to take protective actions. For example, they may avoid the issue or take other maladaptive approaches to balance the emotion (Liang and Xue 2009; Wang et al. (forthcoming)).
Stage 5: Decided to act	A person in this stage has knowledge or awareness about identity theft and protection, and decides to take some actions.
Stage 6: Acting	A person in this stage has already taken some steps to protect identity.

Table 1. Stages in the Precaution Adoption Process

<p>1. Have you ever heard about identity protection? [Yes, No (Stage 1)]</p> <p style="padding-left: 40px;">If yes then,</p> <p>2. Have you taken some steps to protect your identity information? [Yes (Stage 6), No]</p> <p style="padding-left: 40px;">If no, then</p> <p>3. Which of the following best describes your thoughts about protecting your identity information?</p> <p style="padding-left: 40px;">I've never thought about protecting my identity information. (Stage 2)</p> <p style="padding-left: 40px;">I'm undecided about protecting my identity information. (Stage 3)</p> <p style="padding-left: 40px;">I've decided I don't want to protect my identity information. (Stage 4)</p> <p style="padding-left: 40px;">I've decided I do want to protect my identity information. (Stage 5)</p>

Table 2. Algorithm to Determine the Change Stage (Weinstein et al. 2008)

In this study, we classify individuals into two broad categories or stages in the process that we refer to as pre-action stage and action stage. The pre-action stage consists of stages 1-4 in PAPM, including individuals who have not heard about identity protection, have never thought about or are undecided about identity protection, or have decided not to protect their identity. The action stage consists of stages 5-6 in PAPM, including individuals who have decided to take actions to protect their identity, or have already done so in certain ways (such as self-protection through one's own efforts). This classification helps to address the lack of qualitative differences between the stages in PAPM (Kraft et al. 1999), as we expect that individuals who decide to take actions would be more attentive to information about coping mechanisms than those who have not decided, and would interpret the potential threats differently

because of the availability of countermeasures. Such a classification also follows prior studies to aggregate stages in empirical tests of transtheoretical models of behavioral changes (Block and Keller 1998; Cismaru et al. 2008; Eastin et al. 2015; Kraft et al. 1999; Martin et al. 2007). In the next section, we develop hypotheses to examine the effect of the integrated PM-PAPM model to predict individual's intentions to adopt identity protection service.

Hypothesis Development

It should be noted that conceptually, perceived vulnerability and perceived severity constitute perceived threat, and perceived response efficacy and self-efficacy constitute perceived coping efficacy. While past research has modeled the direct effects of these first order factors on behavioral intention (Boss et al. 2015; Johnston et al. 2015), other research that focuses on the effects of second order factors, including perceived threat and perceived coping efficacy, has also been reported (Wang et al. forthcoming). In this study we focus on the second order factors and examine the moderating effects of stage on those factors. The hypotheses, along with test results, are presented in Figure 1.

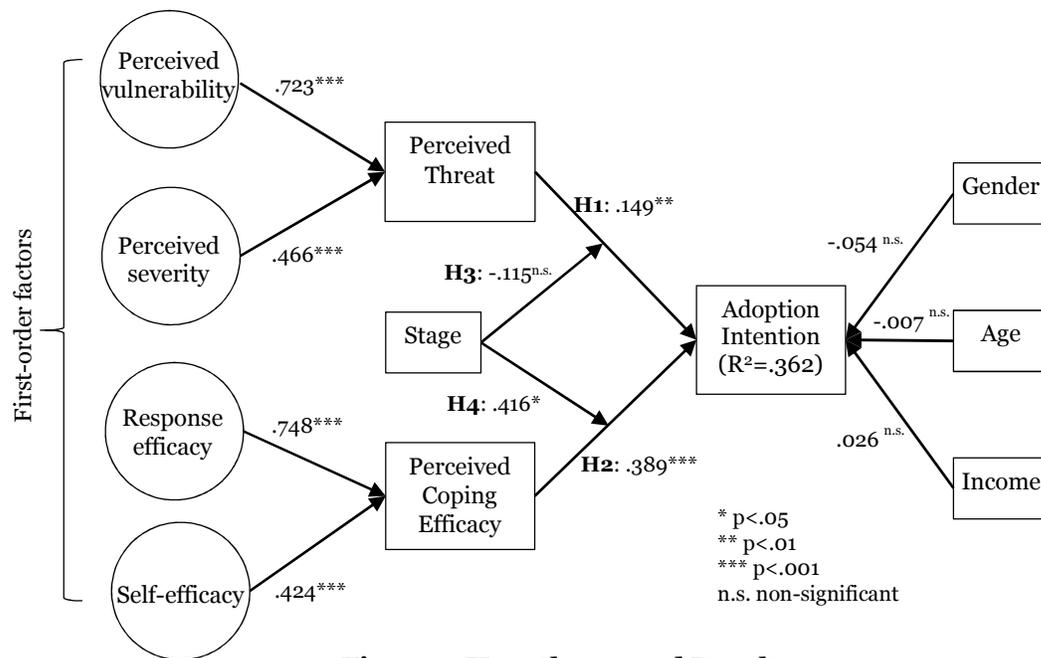


Figure 1. Hypotheses and Results

First, we propose the direct effect of perceived threat and perceived coping efficacy on the intention to adopt identity protection service. Past research on health behaviors has provided abundant evidence for these effects as show in a meta-analysis (Floyd et al. 2000). In general, increases in perceived threat (including perceived threat severity and perceived threat vulnerability) and perceived coping efficacy (including perceived response efficacy and perceived self-efficacy) facilitate adaptive intentions or behaviors.

Similar results are observed in the information security literature (Boss et al. 2015; Chen and Zahedi 2016; Johnston and Warkentin 2010; Johnston et al. 2015). In terms of personal identity protection, Anandarajan et al. (2012) find that perceived severity, response efficacy and self-efficacy have positive effects on intention to adopt identity theft risk reduction methods, and only perceived vulnerability has no significant effect. In another study, Lai et al. (2012) find positive effects of self-efficacy and response efficacy on adopting technologies to reduce identity theft, but the effect of perceived threat was not examined. In terms of identity protection service adoption, research has been scarce (Holt and Turner 2012; Shilling 2016). However, the occurrence of data breach incidents leads to the increased demand on identity protection service (Keenan and Hoshall 2016). Therefore, we hypothesize:

Hypothesis 1: Perceived threat regarding identity theft has a positive effect on the intention to adopt identity protection service.

Hypothesis 2: Perceived coping efficacy regarding identity theft has a positive effect on the intention to adopt identity protection service.

We argue that the effect of perceived threat on behavioral intention diminishes, and the effect of perceived coping efficacy heightens, as one advances in the precaution adoption process. Literature shows that perceived coping efficacy mediates the effect of perceived threat on behavioral intention (Johnston and Warkentin 2010; Johnston et al. 2015). As a person moves to the action stage of behavioral change, his or her focus will be put on coping appraisal to evaluate the effectiveness of countermeasures. At this point, the magnitude of perceived threat may no longer be critical. A meta-analysis on 65 studies (Floyd et al. 2000) shows that perceived vulnerability is becoming less important in later stages of precaution adoption process. Past research also provides dominant evidence of the increasing importance of both response efficacy and self-efficacy in later stages of the precaution adoption process (Block and Keller 1998; Martin et al. 2007). This is because in earlier stages, the person may not accumulate enough knowledge or awareness of the threats of identity theft, and are therefore less inclined to assess the coping mechanisms, so that the effect of coping appraisal would be minimal. When the person accumulates more knowledge or becomes more aware of the identity theft, he or she will search for and assess coping mechanisms, so that coping appraisal starts to play a role. Therefore, we hypothesize:

Hypothesis 3: The stage of a person in the precaution adoption process moderates the effect of threat appraisal on adoption intention. Specifically, perceived threat will have a weaker effect on intention in the action stage than in the pre-action stage.

Hypothesis 4: The stage of a person in the precaution adoption process moderates the effect of coping appraisal on adoption intention. Specifically, perceived coping efficacy will have a stronger effect on intention in the action stage than in the pre-action stage.

Research Method

We conducted an online survey in U.S. via Qualtrics Research Suite to empirically test the hypotheses. During the survey, the participants first acknowledged the content form. Then they were asked to answer

Constructs	Measurement Items
Stage	See Table 2
Perceived vulnerability	It is possible that I will become victimized by identity theft in future. The chance for me to be victimized by identity theft in future is high. I am at risk for becoming victimized by identity theft.
Perceived severity	The loss for me would be significant if I fall a victim to identity theft. The consequence of an identity theft is severe for me.
Response efficacy	Identity protection and fraud monitoring services are effective for protecting me from fraudulent incidents. I am more likely to be protected when using identity protection and fraud monitoring services in future. To my knowledge, identity protection and fraud monitoring services work for protecting me from fraudulent incidents.
Self-efficacy	I am confident about my capability to use and implement identity protection and fraud monitoring services. I am confident that I can deal efficiently issues related to identity protection and fraud monitoring services.
Adoption intention	I am likely to subscribe to identity protection services. It is possible that I subscribe to identity protection services. I am certain that I will subscribe to identity protection services.

Table 3. Measurement Items

questions (see Table 2) to determine their stage in the identity protection process. After that, the participants answered questions measuring other constructs and variables in the research model. The

measurement items, listed in Table 3, were all adopted from existing literature (Boss et al. 2015; Herath and Rao 2009; Johnston and Warkentin 2010; Johnston et al. 2015). Each item was measured with a 5-point Likert scale: for intention measures, the range is from very unlikely to very likely; for all other measures, the range is from strongly disagree to strongly agree. Control variables were each measured with a single item. A total of 616 valid responses were collected.

Data Analysis and Results

Data were analyzed using the Partial Least Squares method on SmartPLS (Ringle et al. 2005). Similar to other literature (Lai et al. 2012), we include several demographic factors as control variables of the behavioral intention, including gender, age, and income. We first examined the psychometric properties of the measurement items. Table 4 shows the Internal Consistency Reliability (Cronbach's α), Composite Reliability, and Average Variance Extracted (AVE) of each latent construct. It also shows the correlations and the square roots of AVEs of the constructs. The table suggests that all the latent constructs exhibit sufficient reliability and convergent validity. All the factor loadings are above the .70 level. There is no significant cross-loading, and the latent variable correlations are less than the square roots of AVEs of the corresponding constructs, indicating sufficient discriminant validity.

	Correlations													
	ICR	CR	AVE	Stage	Vul.	Sev.	Threat	Res.	S.E.	Coping	Int.	Gender	Age	Inc.
Stage	-	-	-	-										
Vulnerability	0.84	0.91	0.76	0.18	0.87									
Severity	0.87	0.94	0.89	0.18	0.38	0.94								
Perceived Threat*	-	-	-	0.22	0.90	0.74	-							
Response Efficacy	0.85	0.91	0.77	0.18	0.10	0.24	0.19	0.88						
Self-Efficacy	0.88	0.94	0.89	0.28	-0.02	0.03	0.00	0.41	0.95					
Coping Efficacy*	-	-	-	0.26	0.07	0.19	0.14	0.92	0.73	-				
Intention	0.93	0.95	0.87	0.32	0.19	0.18	0.22	0.56	0.32	0.55	0.93			
Gender	-	-	-	0.05	-0.05	0.08	0.00	-0.03	-0.08	-0.06	-0.08	-		
Age	-	-	-	-0.04	0.07	0.00	0.05	-0.13	-0.11	-0.15	-0.08	-0.04	-	
Income	-	-	-	0.15	0.11	0.01	0.08	-0.03	0.04	0.00	0.06	-0.07	-0.02	-

ICR – Internal Consistency Reliability (Cronbach's α), CR – Composite Reliability; AVE – Average Variance Extracted; values on the diagonal of the correlation matrix are the square roots of the corresponding AVEs.

* Both perceived threat and perceived coping efficacy are formative second-order constructs. Their ICR, CR and AVE are not reported.

Table 4. Psychometric Properties and Correlation Matrix

The hypotheses were tested using the bootstrapping procedure in SmartPLS with 500 sub-samples. The results are shown in Figure 1. Hypotheses 1, 2, and 4 are supported, but not Hypothesis 3. None the control variables is significant. The variance explained in adoption intention is 36.2%.

We further conducted split-group analysis on the moderating effect. The results are shown in Figure 2 (for subjects in the pre-action stage) and Figure 3 (for subjects in the action stage). A test on the difference between the path coefficients (Paternoster et al. 1998) across the stages shows that the impact of perceived coping efficacy on behavioral intention increased significantly (z -value=2.15, $p < .05$) from the pre-action stage ($\beta = .419$) to the action stage ($\beta = .539$), while the impact of perceived threat on intention decreased from .188 to .094 (z -value=-1.83, $p < .1$). This test supports our earlier conclusion regarding Hypothesis 4, but only provides weak support to Hypothesis 3. The tests also confirm that the coping-appraisal component of the PMT model has greater predictive validity than the threat-appraisal component (Milne et al. 2000).

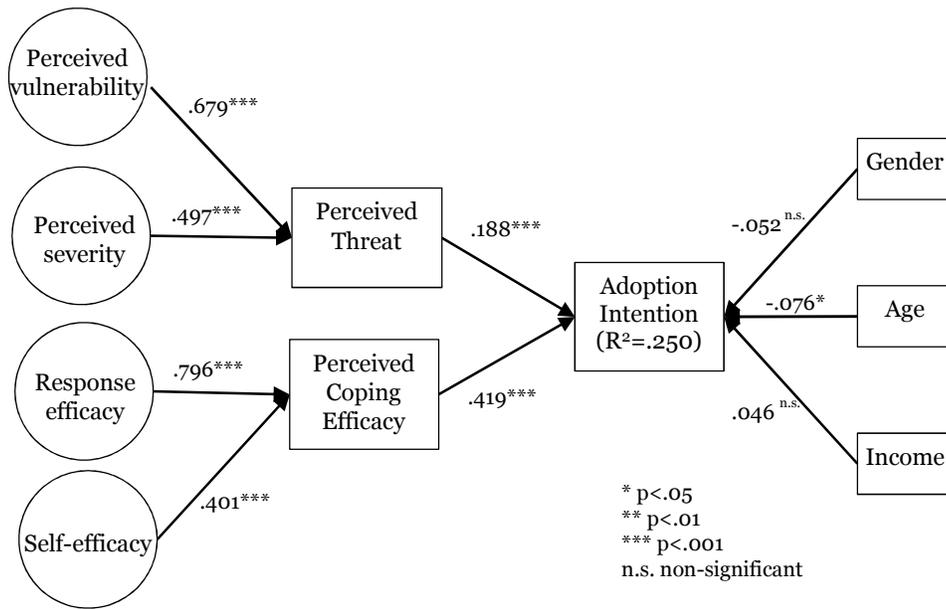


Figure 2. Sub-Sample for the Pre-Action Stage

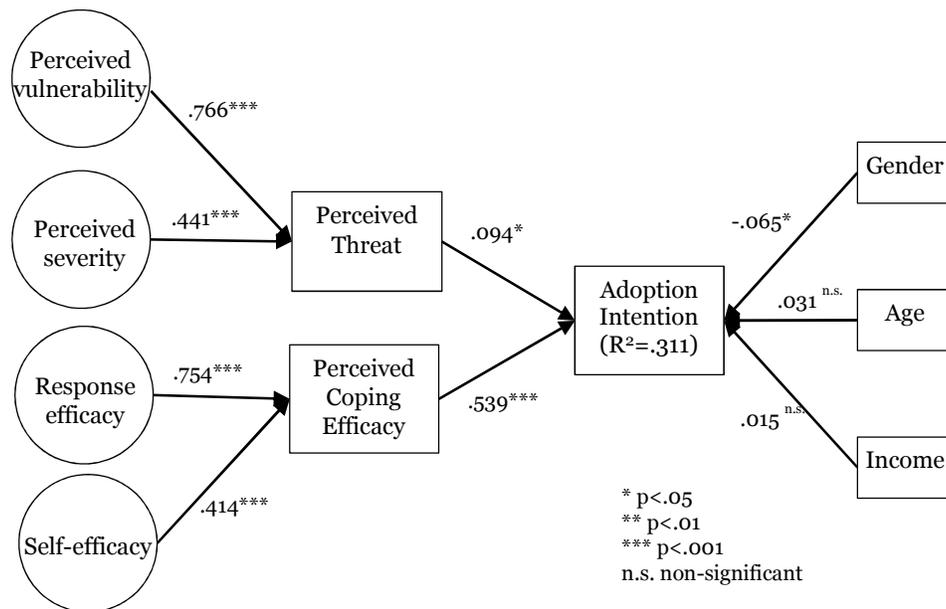


Figure 3. Sub-Sample for the Action Stage

Concluding Remarks

In this study, we developed an integrated Protection Motivation-Precaution Adoption Process Model (PM-PAPM) to examine individuals' intentions to adopt identity theft protection service. We showed that perceived threat and perceived coping efficacy, two key components of PMT, had differential effects on behavioral intentions across one's precaution adoption process. Specifically, one's perceived threat has a slightly weaker effect on behavioral intention in the action stage than in the pre-action stage; on the other

hand, one's perceived coping efficacy has a much stronger effect on intention in the action stage than in the pre-action stage. This confirms an existing claim that "the stage of change in behavior ... seemed to be a greater factor when addressing the impact of coping variables than threat variables (Floyd et al. 2000, p.421)."

The study has theoretical and practical implications. Theoretically, it shows a way to resolve conflicts regarding the impacts of threat appraisal and coping appraisal on individuals' intentions to adopt precaution (such as information security and identity protection) behaviors. This implies that for future research, the stage of a person in the precaution adoption process should be captured when the effects of perceived threat and perceived coping efficacy are investigated. For practice, an important implication is to tailor identity theft precaution messages to individuals at different stages of the process to enhance their acceptance of the information, i.e., delivery of stage-targeted information (Eastin et al. 2015; Weinstein et al. 2008): for individuals in the pre-action stage, information on both identity theft threats and effectiveness of protective solutions should be communicated; for individuals in the action stage, more emphasis should be put on communicating the effectiveness of the solutions.

The study has a few limitations that may be addressed in future research. A limitation is the use of cross-sectional data for empirical test, which may provide weak evidence of the model (Marshall and Biddle 2001). Future research is needed to conduct experiments or longitudinal studies to examine behavioral change. Another limitation is the sole reliance on PMT to study the antecedents to intention of adopting identity protection service. Other factors such as social influence (Johnston and Warkentin 2010; Lai et al. 2012) may also be used to extend the model. Thirdly, future research may be conducted to study factors that influence the stage of a person in the precaution adoption process. And finally, mechanisms that trigger a person to switch from one stage to the other, such as from pre-action stage to action stage, should be recognized.

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