SOCIAL COGNITIVE DETERMINANTS OF NON-MALICIOUS, COUNTERPRODUCTIVE COMPUTER SECURITY BEHAVIORS (CCSB): AN EMPIRICAL ANALYSIS

Princely Ifinedo
Cape Breton University, princely_ifinedo@cbu.ca

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SOCIAL COGNITIVE DETERMINANTS OF NON-MALICIOUS, COUNTERPRODUCTIVE COMPUTER SECURITY BEHAVIORS (CCSB): AN EMPIRICAL ANALYSIS

Complete Research

Princely, Ifinedo, Cape Breton University, Sydney, NS, Canada, princely_ifinedo@cbu.ca

Abstract

This study used a cross-sectional survey to test the relationships among social cognitive variables and employees’ counterproductive computer security behaviors (CCSB). We used data collected from 201 professionals in Canadian organizations. Components from social cognitive theory (SCT) including self-efficacy, observational learning, outcome expectations (organizational and personal), self-regulation, and organizational facilitators could diminish employees’ CCSB. No prior research has examined this phenomenon using SCT. A total of 16 hypotheses were formulated and tested with the partial least squares (PLS) technique; 10 were confirmed. Notably, two SCT variables, i.e., outcome expectations (organizational) and self-regulation had direct negative effects on CCSB. The others did not have direct effects on CCSB; however, outcome expectations (personal) had indirect effect on CCSB through self-regulation. Self-efficacy indirectly impacted CCSB through outcome expectations (organizational). In addition, observational learning and outcome expectations (organizational) had indirect effects on CCSB through self-regulation. The results confirmed that organizational facilitator, i.e., training, have positive effects on self-efficacy. The data showed that intention to engage in CCSB is positively associated with indulgence in the behavior, in this instance, self-reported engagement in CCSB. The social cognitive variables in our research model explained 18% of the variance observed in the intention to engage in CCSB.

Keywords: Employees, Counterproductive Computer Security Behaviors, Social Cognitive Theory, Survey.
1 Introduction

Nowadays, organizations (private and public) utilize information and information systems (IS) as competitive tools. Organizations across the world know how important it is to protect and safeguard such valuable assets from internal and external threats (DTTL, 2012; Inform Security Magazine, 2013). Naturally, organizations deploy resources against threats from outside; however, recent industry reports and academic studies continue to show that a substantial proportion of information security threats actually originate from inside the organization (Bulgurcu et al., 2010; Hu et al., 2011; Siponen and Vance, 2010; Ifinedo, 2012; Inform Security Magazine, 2013; Andrews et al., 2013). According to Inform Security Magazine (2013), “58% information security incidents attributed to insider threat.” Such incidents can cause organizations to incur substantial financial loss, bad publicity, loss of credibility, legal, and regulatory problems (Hu et al., 2011; Andrews et al., 2013; Inform Security Magazine, 2013; Ifinedo, 2013).

The need exists for researchers to pay attention to threats from the inside, i.e. individual behaviors in relation to information and IS security measures given the damage that such, if unattended to, could cause an organization’s IS resources (Hu et al., 2011; Andrews et al., 2013; Ifinedo, 2013; Crossler et al., 2013). Scholarly works on individual information system security behaviors have been loosely classified into two main categories: “white hat” (compliant) behaviors and “black hat” (noncompliant) behaviors (Mahmood et al., 2010; Warkentin et al., 2012). According to Warkentin et al. (2012, p.1), “Those in the latter category may be conducted by insiders (e.g. employees) or by individuals outside the organization’s boundaries, such as hackers, competitors, or national enemies. Security policy violations by insiders may be non-malicious, such as simple accidental oversights or volitional acts conducted without malicious intent.”

This study focuses on non-malicious, counterproductive computer security behaviors (CCSB), which follow a related concept in management discipline called counterproductive work behavior (CWB) (Spector and Fox, 2002). Herein, CCSB refers to employees’ computer use practices and general information security behaviors that go against the legitimate interests of an organization. Examples of CCSB considered in this study include visiting non-related websites at work, not updating work-related passwords regularly, and so forth. Employees threaten an organization’s information and IS resources especially where they choose to engage in behaviors that are counterproductive to organizational ideals (Stanton et al., 2005; Vance et al., 2012; Merhi and Midha, 2012). In fact, “appropriate and constructive behavior by end users, system administrators, and others can enhance the effectiveness of information security while inappropriate and destructive behaviors can substantially inhibit its effectiveness” (Stanton et al., 2005, p.2). This study’s dependent variable i.e. CCSB, is not scoped to include internal, malicious (harmful) behaviors such as computer or IS sabotage, fraud, data theft, and so forth. Information on the taxonomy of IS threats/practices is available in Stanton et al. (2005), Loch et al. (1992), Mahmood et al. (2010), Warkentin et al. (2012), and Crossler et al. (2013).

A great deal of research has been conducted on potential factors influencing employees’ or individuals’ compliance with organizational IS policies and computer abuse or misuse (Siponen and Vance, 2010; Bulgurcu et al., 2010; Hu et al., 2011; Hu et al., 2011; Vance et al., 2012; Andrews et al., 2013; Ifinedo, 2012; 2014), but very few have investigated the determinants of employees’ CCSB at work (Stanton et al., 2004; 2005). Some widely used theories examined in prior IS security management studies include theory of planned behavior (TPB), rational choice model (RCM), protection motivation theory (PMT), general deterrence theory (GDT), situational crime theory (SCrT), and so forth (Ifinedo, 2012; Warkentin et al., 2012). We argue that relevant insights will emerge to complement a growing understanding of CCSB and similar behaviors when a theoretical framework that recognizes that human behaviors, including CCSB, can be influenced by factors with environmental or social and psychological or cognitive dimensions. The foregoing is the underpinning of Bandura’s (1986) social cognitive theory (SCT). The paucity of research in the extant literature
focusing on social cognitive perspectives in understanding the growing phenomenon of employee’s CCSB is the motivation for this study. To that end, we ask the following questions: a) what are the social cognitive determinants of employees’ CCSB? b) Which social cognitive determinants are most important?

2 Literature Review and Background Information

An examination of the relevant literature shows that issues related to computer abuse and misuse (D’Arcy et al., 2009), information security contravention (Workman and Gathegi, 2006), violation of information security policies (Siponen and Vance, 2010; Bulgurcu et al., 2010; Hu et al., 2011; Ifinedo, 2012; 2014), unethical IS use (Leonard and Cronan, 2001), individual lapses and deliberate omissions of information security measures (Workman et al., 2008) have been previously studied. To the best of our knowledge, no previous research has explored the relationships between social cognitive factors and CCSB.

In developing the CCSB considered in this study, we consulted prior literature dealing with such issues (Loch et al., 1992; Stanton et al., 2005; Mahmood et al., 2010; Warkentin et al., 2012; Siponen and Vance, 2012; Vance et al., 2002; Crossler et al., 2013). In particular, the classification presented in Stanton et al. (2005) was considered pertinent to this study. Their taxonomy included "high-end" and "malicious" end user security behaviors, e.g. an employee who breaks into an employer’s protected IT to steal a trade secret or an “employee [who] configures a wireless gateway that inadvertently allows wireless access to the company’s network by people in passing cars”, and so forth. Their "low-end" and "non-malicious" end user security behaviors included choosing a bad password and responding to spam email. From Warkentin et al. (2012), examples of non-malicious CCSB included “failing to log when leaving PC”; Vance et al.’s (2012) CCSB included “allowing children to play with laptop” and “sharing passwords”. As indicated above and for illustration purposes, this study will focus on "low-end" and "non-malicious" issues; other researchers considered such issues to be relevant in end user security behavior literature (Guo et al., 2011).

After searching the relevant literature and engaging in a series of informal discussions with practitioners and IS professors, we drew up a list of CCSB, which was pared down to 12 for illustration purposes (Table 1). The items clearly depict internal (insider), "low-end" and "non-malicious" end user security behaviors (Stanton et al., 2004). In line with our description of CCSB, these acts can lead to disastrous outcomes for an organization’s information resources if allowed to occur. For example, employees who share work-related passwords with others, respond to spam emails (laden with Trojan spyware), and leave their work laptops unattended are inadvertently providing means for outsiders to gain access to their organizations’ IS resources.

| #1 | Responding to spam (i.e. unsolicited emails) |
| #2 | Using weak passwords at work |
| #3 | Not updating work-related passwords regularly |
| #4 | Visiting non-related websites at work |
| #5 | Not updating anti-virus and/or anti-spyware software at work |
| #6 | Not logging out of secure systems after use |
| #7 | Not always treating sensitive data carefully |
| #8 | Allowing one’s family (i.e. children) to play with work laptop |
| #9 | Downloading unauthorized software (i.e. freeware) onto work computer |
| #10 | Pasting or sticking computer passwords on office desks |
| #11 | Disclosing work-related passwords to others |
| #12 | Leaving your work laptop unattended |

Table 1. The list of CCSB considered in the study
3 Theoretical Underpinning

Proposed by Bandura (1986), social cognitive theory (SCT), is used in several disciplines including management, psychology, education, IS, and so forth. SCT posits that individuals acquire and maintain behaviors by emphasizing external and internal reinforcements. The two main determinants of behavior are environmental and psychological/personal determinants. Bandura conceptualized relations among environmental, psychological, and behavioral determinants in a “triadic reciprocal” form. This is sometimes referred to as “reciprocal determinism”, which refers to the dynamic and reciprocal interaction of person (with learned experiences), environment (external social context), and behavior (responses to stimuli to achieve goals) (Figure 1a). As the components of SCT, which at the outset, included such variables as self-efficacy have been expanded to include many aspects of human functioning and behavior i.e. observational learning/modeling, facilitators (and barriers in other instances), self-regulation (Wood and Bandura, 1989; Lent et al., 1994), we scoped our conceptual model (Figure 1b) to include such important variables. They are described next.

![Figure 1](image_url)

**Figure 1.** The relations among behavior (B), cognitive and personal factors (P), and the external environment (E); the study’s conceptual model.

Self-efficacy: This refers to one’s ability to organize and execute courses of action required to produce/perform a specific behavior (Bandura, 1986).

Observational learning/modeling: This is the learning that occurs through observing the behavior of others (Bandura, 1986; Wood and Bandura, 1989). This learning suggests that people can witness and observe a behavior conducted by others and then reproduce those actions. A social model, e.g. co-worker/supervisor, is important in observational learning as a person facilitates cognitive process behavior.

Self-regulation: This refers to the process of taking control of and evaluating one’s own behavior (Wood and Bandura, 1989; Ormrod, 2012). It establishes a link between one’s beliefs about standards and behavior.

Outcome expectations refer to “beliefs about the likelihood of various outcomes that might result from the behaviors that a person might choose to perform, and the perceived value of those outcomes” (Glanz, et al., 2008, p. 172). Following Compeau et al.’s (1999) approach, we divided this variable into two aspects: personal and organizational. Outcome expectations (organizational) are extrinsic, e.g. success of one’s organization, whereas outcome expectations (personal) are intrinsic in nature, e.g. rewards and self-accomplishment.
Organizational facilitators, i.e. training: These include training opportunities and awareness campaigns to facilitate a target behavior. For example, organizations may provide workers with training related to computer security measures to motivate acceptable computer security behaviors (D’Arcy et al., 2009; Merhi and Midha, 2012).

Intention to engage in CCSB: This variable is derived from TPB (Ajzen, 1991). It refers to an individual’s willingness or readiness to perform a given behavior. Other researchers (e.g. Meng et al., 2004; Larose and Kim, 2007; Tsai and Cheng, 2010) using SCT have used this variable as a proxy to actual behavior.

Information on CCSB, which is the study’s dependent variable, was previously noted. Drawing from the foregoing information about social cognitive variables, the research model is presented in Figure 2. The formulated hypotheses are also highlighted in the model.

Figure 2. The research model.

4 Research Hypotheses

SCT posits that self-efficacy positively effects outcome expectations and intention to engage in a behavior (Bandura et al., 1977). It has been shown that outcome expectations (organizational and personal) are positively linked to the stimulation of behaviors (Compeau et al., 1999; LaRose and Kim, 2007; Lin and Huang, 2008). Therefore, it is reasonable to expect that a person’s confidence in his or her ability to successfully perform a behavior will have an impact on their outcome expectations. Favorable outcomes or expectations may not ensue if an individual does not believe that he or she possesses the competence required to execute a target behavior (Lin and Huang, 2008), in this instance, shun CCSB. Similarly, self-efficacy facilitates the intention to engage in a behavior, i.e. computer end user security (Ng et al., 2009). Thus, individuals with knowledge and skills to avoid CCSB and similar behaviors will be less inclined to engage in such. Hence:

H1: Self-efficacy has a positive effect on outcome expectations (organizational)

H2: Self-efficacy has a positive effect on outcome expectations (personal)

H3: Self-efficacy has a negative effect on intention to engage in CCSB

Organizational facilitators, i.e. training and awareness programs related to CCSB play a significant role in shaping individuals’ perceptions regarding acceptable computing practices and information security behaviors (D’Arcy et al., 2009). Ceteris paribus, an individual’s competence level with respect to acceptable computing practices and behaviors will be high where such training and awareness facilities or resources are available. Similarly, an individual’s intention to engage in CCSB is expected to be less with the availability of such organizational resources. Hence:

H4: Organizational facilitators, i.e. training, has a positive effect on self-efficacy
H5: Organizational facilitators, i.e. training, has a negative effect on intention to engage in CCSB

According to SCT (Bandura, 1986), people can expand their skills, outcomes, and so forth, on the basis of information conveyed through the observation of others. In the context of computer software training, Yi and Davis (2003) found that observational learning processes significantly influenced training outcomes. Regarding self-regulation, it is possible that an individual who observes what their peers/superiors do pertaining to acceptable computing practices and behaviors would develop goals that mirror the groups’ values surrounding that behavior (Locke and Latham, 1990; Schunk, 1995; Schunk and Zimmerman, 1997). Likewise, an individual’s self-efficacy regarding acceptable computing practices and behaviors would be high where prescribed behaviors have been demonstrated (Locke and Latham, 1990; Robinson and O’Leary-Kelly, 1998; Bulgurcu et al., 2010; Guo et al., 2011; Ifinedo, 2014). It is asserted that outcome expectations (personal) with respect to acceptable computing behaviors would be favorable where an individual succeeds in modeling his or her computing behaviors after acceptable coworkers’/supervisors’. Zimmerman et al. (1992) and Wood and Bandura (1989) provided evidence in support of the positive relationships between observational learning and behavior. Hence:

H6: Observational learning has a positive effect on self-regulation
H7: Observational learning has a positive effect on self-efficacy
H8: Observational learning has a positive effect on outcome expectations (personal)

Previous research reported that group influence mattered in employees’ desire to comply with their prescribed organizations’ IS rules and procedures (Bulgurcu et al., 2010; Guo et al., 2011). Where sanctioned computer security values, i.e. the shunning of CCSB, pervade an organization, workers tend to bond with colleagues in such matters (Ifinedo, 2014). All things being equal, the learning of acceptable computer-related security behaviors would lead to the shunning of CCSB. Hence:

H9: Observational learning has a negative effect on intention to engage in CCSB

Evidence points to the fact that externally set goals and ideals have positive impacts on self-regulation and personal outcome expectations (Bandura, 1986; Zimmerman et al., 1992). This is because such goals prompt self-monitoring and self-judgment of achievements (Bandura and Cervone, 1983). In accordance with past findings, it is maintained that outcome expectations (organizational), in the context of CCSB, would have positive effects on individual expectations and self-regulations in such matters. Organizations knowing the negative fallouts arising from workers’ indulgence in CCSB frown against such behaviors (DTTL, 2012; Ifinedo, 2013). In an ideal situation, where an organization’s outcome expectations related to CCSB are known, it is likely that workers in such a setting would be less inclined to engage in CCSB. It is worth mentioning that the foregoing expectation may not hold in contexts where “high-end” and “malicious” behaviors are under consideration. Hence:

H10: Outcome expectations (organizational) has a positive effect on self-regulation
H11: Outcome expectations (organizational) has a positive effect on outcome expectations (personal)
H12: Outcome expectations (organizational) has a negative effect on intention to engage in CCSB

People with personal expectations self-regulate; they also tend to have higher personal standards for specified outcomes (Wood and Bandura, 1989; Locke and Latham, 1990; Ormrod, 2012). In the same vein, individuals with favorable outcome expectations related to CCSB could be more likely to keep their computer-related security conducts in line with acceptable personal standards (Wood and Bandura, 1989; Ormrod, 2012). Past studies confirmed that people possessing positive outcome expectations have more intentions to share knowledge in specified areas (Tsai and Cheng, 2010) and may see less need to engage in antisocial computer-related activities (LaRose and Kim, 2007) including CCSB. Hence:

H13: Outcome expectations (personal) has a positive effect on self-regulation
H14: Outcome expectations (personal) has a negative effect on intention to engage in CCSB

A positive link between one’s beliefs about standards and behavior is established (Wood and Bandura, 1989). Broadly, people are motivated by fulfilling valued goals and are dissatisfied by substandard performances and acts (Wood and Bandura, 1989). Thus, through self-evaluated reactions, people monitor and keep their conduct in line with acceptable personal and organizational standards. Accordingly, people who are able to self-regulate in terms of CCSB would likely view such behaviors as anomalies to personal and organizational ideals, and have less tendencies to indulge in such. Hence:

H15: Self-regulation has a negative effect on intention to engage in CCSB

In general, the relationship between intentions and behavior has been shown to be consistently strong across contexts (Sheeran, 2002). Previous studies that used SCT also found intention to engage in a behavior to be positively associated with the target behavior (Tsai and Cheng, 2010). Thus, in the context of CCSB, it is expected that individuals’ intentions to engage in CCSB will have an impact on indulgence in CCSB, i.e. self-reported or otherwise. Hence:

H16: Intentions to engage in CCSB has a positive effect on self-reported indulgence in CCSB

5 Research Methodology

To validate the research model, a field survey was used. In developing the questionnaire, items previously validated in the literature were used. A pre-test of the final questionnaire was carried out by 65 professionals in Canadian organizations. Their comments improved the overall quality of the final questionnaire. Content and face validities of the items used for the dependent variable was assured as knowledgeable professionals perused and commented on the CCSB list drawn up.

The final survey was administered through Fluidsurvey.com. Canadian business professionals from diverse industries with knowledge of CCSB were contacted. The research company gave their panel members points-based incentives redeemable for prizes. The company's web server reported that 2,107 respondents were invited; 1236 opted to participate in the survey by accepting the consent agreement. The survey was designed such that respondents who indicated indulging in less than 5 CCSB in the last 6 months were prevented from continuing to the next step. In total, 708 panels were dropped at this stage. Of the remaining 528 responses, only 201 were used for data analysis. Responses that included monotone or patterned responses, many missing answers, and generally, badly completed surveys, were removed. Overall, the data was checked for violations of assumptions i.e. normality and linearity; the results indicated that these assumptions were met.

Of the 201 respondents in the final sample, 35% were female and 65% were male. 38% and 27% were in the 30 to 40 and 41 to 50 age ranges, respectively. Over 90% of respondents have university education. The average years of computer use among respondents was 19.2 years (S.D. = 6.2) with 6.7 years (S.D. = 6.0) tenure at their current organizations. Some of the participants’ job titles included financial manager, engineer, CEO, project manager, business analyst, IT consultant, senior accountant. Diverse industries such as energy, services, IT, manufacturing, healthcare, and so forth, were included in the sample. The data sample included an even distribution of organization size and annual revenue. Regarding organization size, 48, 36, and 36 of the respondents’ organizations have a total number of employees in the range of 251 to 500, 501 to 1000, and 5000 and above, respectively. The annual revenue of the majority of participating organizations’ is between $1 and $9.9 million (18%). 16% and 6% have revenues between $10 and $39.9 million and $1 billion and above, respectively.

Given that individual’s perceptions of the phenomenon were used in this study, common method bias (CMB) cannot be ruled out. CMB refers to a bias in the dataset due to something external to the measures used in the study. To reduce the effects of CMB, procedural remedies recommended by Podsakoff et al. (2003) were followed. Namely, clear and concise questions were used in the questionnaire and participant’s anonymity was assured to reduce participant’s apprehension.
Additionally, a statistical procedure i.e. the Harmon one-factor test was used to assess if CMB was indeed problematic to the data sample. The test results (i.e. factor loadings) showed that several factors with eigenvalues greater than one are present in the data. The first factor accounted for 24.8% to indicate that CMB was not a problem for the collected data.

5.1 Operationalization of the study’s constructs

The items used to assess CCSB, which are indicated in Table 1, were partly sourced from the literature (Stanton et al., 2005; Warkentin et al., 2012; Siponen and Vance, 2012) and from discussions with knowledgeable professionals familiar with the subject matter. First, the study’s participants were asked to check the CCSB that they indulged in within the last 6 months. As noted above, entries having less than 5 CCSB from the list of 12 options were not used in this study. Second, participants were asked to indicate how often they have indulged in the CCSB listed [the 12 items]. Their responses were assessed on a 7-point Likert scale ranging from “Almost never” (1) to “Almost always” (7). With respect to this exercise, frequently cited CCSB with acceptable weight loadings (more of this later) include items #2, #4, #6, #7, #9, and #10. These were the CCSB items used in the final data analysis.

The self-efficacy (SEFC) construct was adapted from Bandura (1986) and Lin and Huang (2008). Observational learning/modeling (OBSV) was adapted from Yi and Davis (2003). For the self-regulation (SREG) construct, we adapted items from Wood and Bandura (1989) and Williams et al. (1996). The items for organizational facilitators, i.e., training (FACC) was adapted from Triandis (1980) and D’Arcy et al. (2009). Outcome expectations (personal) (OUEP) and outcome expectations (organizational) (OUEO) were taken from Compeau at al. (1999). Measures for the intention to engage in CCSB were adapted from Bulgurcu et al. (2010). All the foregoing variables were assessed on a 7-point Likert ranging from “Strongly disagree” to “Strongly agree”. The descriptive statistics of independent variables are shown in Table 2.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome expectations (personal) (OUEP)</td>
<td>Compeau et al. (1999)</td>
</tr>
<tr>
<td>Outcome expectations (organizational) (OUEO)</td>
<td>Compeau et al. (1999)</td>
</tr>
<tr>
<td>Self-regulation (SREG)</td>
<td>Wood and Bandura (1989) and Williams et al. (1996)</td>
</tr>
<tr>
<td>Observational learning (OBSV)</td>
<td>Yi and Davis (2003)</td>
</tr>
<tr>
<td>Self-efficacy (SEFC)</td>
<td>Compeau et al. (1999)</td>
</tr>
<tr>
<td>Organizational facilitators (FACC)</td>
<td>Triandis (1980) and D’Arcy et al. (2009)</td>
</tr>
<tr>
<td>Intention to engage in CCSB</td>
<td>Bulgurcu et al. (2010)</td>
</tr>
</tbody>
</table>
Social-cognitive determinants of CCSB

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<table>
<thead>
<tr>
<th>INTE</th>
<th>I am likely to engage in some form of CCSB, in the future.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean =4.96; SD= 1.36</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. The questionnaire’s items, their descriptive statistics, and sources

6 Data analysis and Results

The partial least squares (PLS) technique was used for data analysis. PLS is similar to regression analysis; however, it allows the use of latent constructs. It more suitable for prediction and theory development than covariance-based techniques (Chin, 1998). This study used SmartPLS 2.0 (Ringle et al., 2005). PLS supports both formative and reflective models and it recognizes two components of a casual model: the measurement and the structural models.

6.1 Measurement model

Chin (1998) provided information about acceptable psychometric properties for reflective models. The main criteria are (a) item loadings in a confirmatory factor analysis (CFA) exceed 0.70; (b) the internal consistencies exceed 0.70. To ensure these criteria were met in our model, we first checked the PLS results to see whether the item loadings were up to or greater than the threshold value of 0.70. Two items in the self-efficacy construct did not meet the criteria and were dropped from the analysis. Composite reliability (COR) and Cronbach’s alpha (CRA) values above 0.7 are considered adequate for assessing internal consistency of variables (Chin, 1998). The COR and CRA entries in Table 3 show that the study’s data is consistently above 0.7.

To assess convergent validity, Fornell and Larcker (1981) recommended that the average variance extracted (AVE) criterion be followed. An AVE value of 0.50 is considered ideal. This study’s AVEs, as seen in Table 3, were adequate. The discriminant validity is assured when the following two conditions are met: (a) the value of the AVE is above the threshold value of 0.50; (b) the square root of the AVEs is larger than all other cross-correlations. Table 3 shows that the AVE ranged from 0.71 to 0.90, and in no case was any correlation between the constructs greater than the squared root of AVE (the principal diagonal element). Thus, the results indicated that the study’s measures were psychometrically adequate.

<table>
<thead>
<tr>
<th>COM</th>
<th>CRA</th>
<th>AVE</th>
<th>CCSB</th>
<th>FACC</th>
<th>INTE</th>
<th>OBSV</th>
<th>OUEO</th>
<th>OUEP</th>
<th>SEFC</th>
<th>SREG</th>
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<tbody>
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<td>CCSB</td>
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<td>NA</td>
<td>NA</td>
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<td>FACC</td>
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<td>0.84</td>
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<tr>
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<td>0.71</td>
<td>-0.10</td>
<td>0.48</td>
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<td>0.54</td>
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</tr>
<tr>
<td>SEFC</td>
<td>0.88</td>
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<td>0.72</td>
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<td>0.24</td>
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<td>0.35</td>
<td>0.29</td>
<td>0.89</td>
</tr>
<tr>
<td>SREG</td>
<td>0.91</td>
<td>0.85</td>
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<td>-0.16</td>
<td>0.50</td>
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<td>0.61</td>
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</tbody>
</table>

Note: a) Not applicable (NA), Composite reliability (COM), Cronbach’s alpha (CRA), Average valance extracted (AVE); b) Off-diagonal elements are correlations among constructs; c) The bold fonts in the leading diagonals are the square root of AVEs.

Table 3. Composite reliabilities, Cronbach alphas, AVEs, and Inter-construct correlations.

For the study’s formative construct, i.e. CCSB (the dependent variable), the examination of weights in the principal component analysis is suggested in lieu of evaluation of loadings in common factor analysis (Chin, 1998; Petter et al., 2007). For consistency purposes, items with negative loadings were omitted from further analysis. The remaining items’ weights were significantly linked with the CCSB construct. Second, we took note of the fact that formative measurement model are based on a multi-regression that disapproves of multicollinearity (Diamantopoulos and Winklhofer, 2001). The presence of multicollinearity can destabilize the model. A variance inflation factor (VIF) test is
6.2 Structural model

The structural model provides information about the path significance of hypothesized relationships using the path coefficients (β) and squared R (R²). Path significance levels (t-values) are estimated by the bootstrapping method with a sample of 1000 cases. The SmartPLS 2.0 results for the βs and the R² are shown in Figure 3 and Table 4. All independent variables explained 18% of the variance in the intention to engage in CCSB, which explains 8% of the variation the participants’ self-reported CCSB.

Figure 3. The SmartPLS results

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Relationship</th>
<th>β</th>
<th>t-value</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Self-efficacy (+) → Outcome expectations (organizational)</td>
<td>0.15**</td>
<td>3.196</td>
<td>Supported</td>
</tr>
<tr>
<td>H2</td>
<td>Self-efficacy (+) → Outcome expectations (personal)</td>
<td>0.07</td>
<td>0.049</td>
<td>Not supported</td>
</tr>
<tr>
<td>H3</td>
<td>Self-efficacy (+) → Intention to engage in CCSB</td>
<td>0.06</td>
<td>0.485</td>
<td>Not supported</td>
</tr>
<tr>
<td>H4</td>
<td>Organizational facilitators (+) → Self-efficacy</td>
<td>0.22*</td>
<td>2.102</td>
<td>Supported</td>
</tr>
<tr>
<td>H5</td>
<td>Organizational facilitators (-) → Intention to engage in CCSB</td>
<td>-0.01</td>
<td>0.009</td>
<td>Not supported</td>
</tr>
<tr>
<td>H6</td>
<td>Observational learning (+) → Self-efficacy</td>
<td>0.03</td>
<td>0.211</td>
<td>Not supported</td>
</tr>
<tr>
<td>H7</td>
<td>Observational learning (+) → Self regulation</td>
<td>0.20*</td>
<td>1.987</td>
<td>Supported</td>
</tr>
<tr>
<td>H8</td>
<td>Observational learning (+) → Outcome expectations (personal)</td>
<td>0.20*</td>
<td>2.053</td>
<td>Supported</td>
</tr>
<tr>
<td>H9</td>
<td>Observational learning (-) → Intention to engage in CCSB</td>
<td>0.06</td>
<td>0.421</td>
<td>Not supported</td>
</tr>
<tr>
<td>H10</td>
<td>Outcome expectations (organizational) (+) → Self regulation</td>
<td>0.38**</td>
<td>3.280</td>
<td>Supported</td>
</tr>
<tr>
<td>H11</td>
<td>Outcome expectations (organizational) (+) → Outcome expectations (personal)</td>
<td>0.56**</td>
<td>6.204</td>
<td>Supported</td>
</tr>
<tr>
<td>H12</td>
<td>Outcome expectations (organizational) (-) → Intention to engage in CCSB</td>
<td>-0.22*</td>
<td>2.006</td>
<td>Supported</td>
</tr>
<tr>
<td>H13</td>
<td>Outcome expectations (personal) (+) → Self regulation</td>
<td>0.16*</td>
<td>1.963</td>
<td>Supported</td>
</tr>
<tr>
<td>H14</td>
<td>Outcome expectations (personal) (-) → Intention to engage in CCSB</td>
<td>0.08</td>
<td>0.577</td>
<td>Not supported</td>
</tr>
<tr>
<td>H15</td>
<td>Self regulation (+) → Intention to engage in CCSB</td>
<td>-0.31*</td>
<td>2.225</td>
<td>Supported</td>
</tr>
<tr>
<td>H16</td>
<td>Intention to engage in CCSB (+) → Self-reported indulgence in CCSB</td>
<td>0.25*</td>
<td>1.993</td>
<td>Supported</td>
</tr>
</tbody>
</table>

* significant at p < 0.05 level; ** significant at p < 0.001 level; (+) positive effect, (-) negative effect.

Table 4. Summary of the study’s results

7 Discussions and Conclusion

This research offers both theoretical and practical implications for the management and understanding of end user security issues such as CCSB. This study advances the efforts of Stanton et al. (2005) and others who discussed non-malicious CCSB; it adds to the literature related to CWB (Spector and Fox, 2002) with perspectives from end user computer security behaviors. By drawing from SCT to explore the determinants of employee’s CCSB, we hope to have initiated focus on an interesting issue for both academicians and practitioners (Stanton et al., 2005; Bulgurcu et al., 2010; Inform Security Magazine, 2002).
2013; Hu et al., 2011; Andrews et al., 2013). The main contribution of this study is that it is the first to explore non-malicious CCSB using SCT. Congruent to the findings and theoretical claims espoused by proponents of SCT and scholars using it, our study provided support for the dynamic interplay among environmental, personal factors, and CCSB (Bandura, 1986; LaRose and Kim, 2007; Wu and Chen, 2013). This study did not explore CCSB from the perspective of one-sided determinism, i.e. the direct effect of one variable on another (Wood and Bandura, 1989), as is the case in similar studies. Rather, our research model presented a deeper insight of the interacting determinants or factors in Bandura’s conceptualization of interactions among behavior, environment, and personal factors. It is worth mentioning that this study is among the few to include a comprehensive list of core tenets in SCT. Usually, past studies in IS and related disciplines tend to focus attention on select items, i.e. self-efficacy and other constructs (Compeau et al., 1999; Lin and Huang, 2008; Tsai and Cheng, 2010).

Other researchers could be enticed to further explore the phenomenon either from this study’s perspective or incorporate relevant concepts from other theoretical frameworks to the proposed research model. The social cognitive variables in our research model explained 18% of the variance observed in the intention to engage in CCSB, which is adequate for this initial effort. The incorporation of other relevant items such as social support and self control will increase the predictability of the presented research model.

Our study showed that two SCT variables, i.e. outcome expectations (organizational) and self-regulation have direct negative effects on CCSB; the others did not have direct effects on CCSB. In the context of our research conceptualization, we assert that these two variables are important determinants or factors capable of lessening employees’ intent to engage in CCSB at work. Self-regulation (or its lack) was found to be the most important determinant of employees’ intentions to engage in CCSB ($\beta = 0.31$). Other significant results of the study show that observational learning and outcome expectations (organizational and personal) had indirect effects on CCSB through self-regulation. Self-efficacy indirectly impacted CCSB through outcome expectations (organizational). Organizational facilitator, i.e. training, positively effects self-efficacy and intention to engage in CCSB is positively associated with indulgence in the behavior; in this instance, self-reported engagement in CCSB. Overall, the foregoing results lend credence to the notion of reciprocal determinism espoused by Bandura (1986).

Specifically, our result confirmed that self-efficacy has an effect on outcome expectations (organizational) (H1) to suggest that as workers’ competence to deal with CCSB increases, their organizational computer-related security expectations increase accordingly. The data showed that employees’ self-efficacy related to CCSB is positively affected by organizational facilitators, i.e. the availability of training and awareness programs in computer and information security issues (H4). As predicted in H7, the result confirmed that the effect of vicarious or observational learning has a positive effect on self-regulation. Namely, a worker’s ability to self-regulate CCSB positively benefits by observing the behaviors of others. Supporting H8, the data showed that personal outcome expectations regarding CCSB are favorable where an individual is able to model his or her behaviors after those of colleagues’. H10 and H11 are supported to indicate that organizational outcome expectations have positive effects on both self-regulation and personal expectations regarding CCSB. H13 is affirmed to show that personal outcome expectations have a positive effect on an individual’s ability to self-regulate for CCSB. Lastly, H16 was confirmed to show that intention to engage in CCSB is linked to actual indulgence in the behavior.

The following hypotheses, H2, H3, H5, H9, H13, and H14 were not supported by our data. Although past studies have suggested that self-efficacy is vitally important for behavioral change, in the context of negative behavior like CCSB, it might be possible that a person’s intention to engage in a behavior is less dependent on his or her perceived capability than in other scenarios. The results in Wu and Chen (2013) offered a similar explanation. The same may be true for the lack of support for the relationship between self-efficacy and personal outcome expectations. It is somewhat surprising that
organizational facilitators, i.e. training, did not serve to discourage the intention to engage in CCSB. The result might be a reflection of realities in the participants’ settings, i.e. they may perceive a lack of adequate training and awareness needed to curb CCSB. This fact, if true, might have negatively impacted the data; however, we cannot say with certainty that is the case as we did not control for such in the study. Research design of the questionnaire might yet be another reason for a lack of support. For example, the training required to deal with each CCSB may vary depending on perceived vulnerability of threat [D’Arcy et al., 2009; Ifinedo, 2012; Merhi and Midha, 2012]. Overall, contextual influences may offer plausible reasons for the lack of support for some of the unconfirmed hypotheses. For example, it is possible that participants may not have social role models with regard to CCSB to emulate at work or their organizational outcome expectations may not be strong enough to discourage CCSB. On balance, we are hard-pressed to comment on whether the findings provided herein reflect realities or deviate from established results as the body of work in this aspect of research is low or nonexistent.

This study’s findings also have implications for practice. Information about employees’ CCSB from the perspectives of personal or cognitive, environmental influences and intention to engage in such behaviors is beneficial to management who could use such information in controlling and managing similar behaviors in their settings. For instance, organizations should devote attention to promoting and highlighting acceptable, enterprise-wide outcome expectations related to CCSB given the pertinence of such in discouraging employees’ intention to engage in CCSB. Negative consequences of indulgence in CCSB should be proactively communicated to employees to discourage such behaviors. One implication from this study’s findings is that organizational recruitment efforts could be directed toward attracting and retaining workers that are able to set goals and maintain standards for themselves in all areas including CCSB. Such employees, our results suggest possess the ability to resist CCSB. Further to this, there is ample evidence from various domains supporting the notion that when goals and objectives are externally set (e.g. management sets CCSB goals or ideals for employees), such is as strong or forceful in eliciting desired outcomes from a person who self-regulates his or her actions for the same stated goal (Locke & Latham, 1990). Management, in an attempt to discourage workers’ engagement in CCSB, should endeavor to align organizational expectations on such issues with those of their workers. Tools, i.e. mentoring and other incentives that could engender self-regulation in relation to CCSB could be considered.

7.1 Study’s limitations and future research opportunities

Our study has some limitations: a) the data came from a cross-sectional field survey; longitudinal data may facilitate more insight; b) participants might have provided socially desirable responses to some of the questions to negatively impact the results; c) the data came from one country; insights from other regions of the world may differ from what is reported here; d) SCT can be broad-reaching; as such, it is difficult to operationalize all its potential relationships. Future study should endeavor to overcome the noted shortcomings in this study. Attention should be paid to other end user security behaviors, such as high-end, malicious CCSB, in future studies. Studies using direct observations and employees’ actual engagement in CCSB and related behaviors could be more informative. Other relevant aspects of SCT, for example social support, could be explored. An integrative model of SCT and other theoretical frameworks could be considered to deepen our knowledge of CCSB.
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