



## Understanding Cybercrime Victimization: The Role of Self-Control and Risky Online Behavior

*Peter S. Lehmann, Ph.D. ; Raymond D. Partin, M.S.  
Ryan C. Meldrum, Ph.D. ; Sinchul Back, Ph.D.  
Elisa M. Trucco, Ph.D.*

The internet has emerged as one of the most important aspects of modern life, revolutionizing how we socialize, obtain goods and services, and acquire information. However, migrating many of our daily routines to the online environment has come with certain risks. According to the Federal Bureau of Investigation's Internet Crime Complaint Center (2019), over 467,000 complaints were filed in 2019, with financial losses totaling more than \$3.5 billion. Some of the most prevalent complaints pertaining to cybercrime include phishing, non-payment/non-delivery, extortion, and personal data breaches. Beyond its monetary impacts, cybercrime victimization is associated with a host of other negative outcomes, including depression and suicidal ideation (Tennant et al., 2015; Wright, 2016), compromised academic achievement among youth (Gardella et al., 2017), fear of subsequent victimization (Abdulai, 2020), and avoidance of internet usage for shopping, banking, and other activities (Böhme & Moore, 2012). Given these observations, coupled with an ever-increasing reliance on the internet in our lives, identifying the factors that contribute to cybercrime victimization is imperative.

### Theory and Prior Research

A growing body of research has explored the factors associated with victimization in online contexts. Some of this work has revealed that engaging in certain activities, such as playing online games (Chang et al., 2015) and using social media (Bossler et al., 2012; Ngo et al., 2020), is associated with an increased likelihood of cybercrime victimization. Additionally, purchasing goods and services online (Pratt et al., 2010) and internet banking (Reyns, 2013) involve placing personal information on the internet, which can increase the risk of fraud, malware infection, hacking, and online harassment. Moreover, deviant or otherwise risky online behaviors, including downloading pirated media and accessing pornographic websites, also have been found to be positively associated with these forms of victimization (e.g., Choi & Lee, 2017; Leukfeldt & Yar, 2016; Ngo & Paternoster, 2011). Thus, while something as routine as spending more time online can increase the likelihood of victimization (Milani et al., 2020), individuals also may engage in risky online behaviors or otherwise put themselves into situations that are conducive to cybercrime victimization.

To understand these patterns of findings theoretically, scholars have engaged routine activity theory (Cohen & Felson, 1979), which contends that crime—and therefore criminal victimization—requires the convergence of motivated offenders, suitable targets, and a lack of capable guardianship in both time and space. Generally, researchers have found support for this perspective in the context of offline forms of crime and victimization (e.g., Culatta et al., 2020; Franklin et al., 2012; Mustaine & Tewksbury, 1998; Rice & Csmith, 2002), thus suggesting that individuals' behavior and routines can place them at heightened risk of victimization experiences (see Pratt et al., 2014). In the online environment, however, the presence of motivated offenders arguably is not necessary to understand the temporal aspect of victimization because cyberspace is constantly populated (Yar, 2005).

Crucially, risk of cybercrime victimization may be dependent not only on routine online activities but also individual traits such as low self-control. Gottfredson and Hirschi's (1990) concept of low self-control is characterized by several interrelated dimensions, including impulsivity, high risk tolerance, action orientation, a quick temper, and self-centeredness. As a theory of crime, self-control theory has received substantial empirical support (see Pratt & Cullen, 2000; Vazsonyi et al., 2017). However, it has been argued that low self-control can explain both crime *and* victimization, as individuals who are lower in self-control may place themselves in situations where risk of victimization is heightened (see, e.g., Schreck, 1999). Indeed, much empirical evidence indicates that low self-control is correlated with both personal and property victimization (e.g., Higgins et al., 2009; Pratt et al., 2014; Schreck et al., 2006; Watts & Iratzoqui, 2019). Most pertinent for present considerations, several studies have found low self-control to be positively associated with cybercrime victimization (e.g., Bossler & Holt, 2010; Louderback & Antonaccio, 2021; van Wilsem, 2013a).

Both routine activity theory and self-control theory appear useful for understanding the causes of cybercrime victimization. While researchers have found success integrating these two perspectives in investigations of offline victimization (e.g., Clodfelter et al., 2010; Reisig & Golladay, 2019; Turanovic & Pratt, 2014), some scholars have sought to integrate self-control theory and routine activity theory to understand cybercrime victimization. Specifically, it is thought that those who are lower in self-control might be more inclined to make risky online choices, and these behaviors can, in turn, place individuals at heightened risk of victimization (Holt et al., 2021; Reyns et al., 2018, 2019; van Wilsem, 2013b). To date, however, limited attention has been devoted to assessing whether the association between low self-control and cybercrime victimization operates indirectly through risky online behaviors/lifestyles, and the research in this area is hampered by certain methodological shortcomings that warrant additional scrutiny. These limitations include a need for more comprehensive measures of cybercrime victimization, a focus on a broader set of risky online behaviors, and a reliance on more formal methods of assessing mediation/indirect effects.

### Methodology

This study makes use of data collected on a sample of 385 adults enrolled in criminology and criminal justice (CCJ) courses in Spring 2021 at a large, public four-year university in the southern United States. Data collection occurred between January 31 and March 5. Instructors of 13 sections of four different CCJ courses (three introductory courses and one upper-level course) were contacted, and all agreed to distribute a survey web link to students enrolled in their courses and to offer extra credit as an incentive to participate. Anonymity was ensured by collecting participants' identifying information for extra credit purposes separately from the main survey.

The combined enrollments of the 13 course sections included 637 students; however, because students could be simultaneously enrolled in sections of up to all four courses, the true sampling frame for this study is smaller. An examination of the collected course enrollment information revealed that 90 participants were enrolled in two of the courses sampled, three participants were enrolled in three courses, and two were enrolled in sections of all four courses. Thus, without considering the students who were enrolled in multiple courses but who chose not to participate in the study, the sampling frame includes 535 participants. Using this sampling frame, the participation rate is 72.0%. Cases with missing data were removed using listwise deletion, thus producing a final sample of 362 participants. The descriptive statistics for each of the study variables can be found in Table 1.

**Table 1. Descriptive Statistics and Bivariate Correlations**

Variables	Mean/%	SD	Range
Low Self-Control	1.97	0.46	1–3.31
Risky Online Behavior	3.65	2.73	0–14
Cybercrime Victimization	3.68	2.85	0–15
Age	23.54	6.79	18–62
Biological Sex (Male =1)	30.9%	—	0–1
Race/Ethnicity (White, non-Hispanic =1)	42.8%	—	0–1
Typical Weekday Time Online	5.52	3.07	0–12
Typical Weekend-Day Time Online	5.78	3.18	0–12

Notes: N=362

**Low Self-Control.** The independent variable of interest, *low self-control*, consists of 16 items from the Grasmick et al. (1993) self-control scale, specifically, the four subscales reflecting impulsivity, risk-seeking, self-centeredness, and anger. The response options for each of the items were “Strongly disagree” (= 1), “Disagree” (= 2), “Agree” (= 3), and “Strongly agree” (= 4). Following the example of prior research, the arithmetic mean of the 16 items was taken to generate a global score ( $\alpha = 0.86$ ); higher scores reflect being lower in self-control.

**Risky Online Behavior.** Given our interest in focusing explicitly on behaviors that possess face validity as indicators of *risky online behavior*, participants reported whether they had done each of the following within the prior 12 months: (1) sent personal information over a website or app to someone they had never met in person; (2) downloaded pirated software, e-textbooks, or games; (3) sent photos or videos of themselves over the internet to someone they had never met in person; (4) purchased items from unsecured websites; (5) chatted with strangers using websites such as chatroulette, ChatBlink, talkwithstranger, or any other online platform; (6) accepted friend requests from someone they did not know on sites like Facebook or LinkedIn; (7) opened e-mail file attachments from a company or person they did not know; (8) clicked links within e-mails from a business, organization, or person they did not know; (9) used an open wireless network that was not secure or password protected; (10) visited websites that allowed users to illegally download music, e-textbooks, games, or movies; (11) attempted to hack into a person’s or organization’s computer or e-mail systems; (12) posted mean or negative information about someone else online

with the intent of damaging their reputation; (13) pretended to be someone else online other than who they really are; and (14) posted their personal information on social network sites or other websites. Response options for each item were limited to “No” (= 0) and “Yes” (= 1) on the survey. Scores for the dichotomized items were added together to create a single index ranging from 0 to 14, with higher values indicating that a participant engaged in a wider variety of risky online behaviors within the prior year.

**Cybercrime Victimization.** To measure *cybercrime victimization*, participants were asked if they had experienced each of the following within the past 12 months: (1) received e-mails or messages from someone they did not know that were threatening, insulting, or harassing; (2) received e-mails where they were asked to send someone money (e.g., “Nigerian scams”), excluding legitimate organizations; (3) had their computer infected with a virus or malware; (4) had an online account hacked or compromised in another manner; (5) experienced a significant increase in the amount of “spam” e-mail they receive; (6) had a debit or credit card account compromised that required their bank or credit card company to issue them a new card and account number; (7) experienced a noticeable decline in the speed/performance of their computer when running programs, browsing the internet, etc.; (8) received unwanted pornographic material from someone they did not know via e-mail or on a social media website or app; (9) had someone post false or derogatory information about them on a website, chat room, or social media platform for the purpose of damaging their reputation; (10) been a victim of identity theft or had their personal information compromised; (11) purchased an item online and then never received the purchased item; (12) received phone calls claiming that they had an outstanding debt that must be paid immediately otherwise they would face certain financial consequences; (13) had fraudulent purchases appear on their credit or debit card statements; (14) experienced defacement of a personal website or social media page; and (15) experienced a ransomware attack where their computer or files were frozen, and they were required to send money or bitcoin to have their computer or files freed. As with the items used to measure risky online behavior, response options for each form of cybercrime victimization were limited to “No” (= 0) and “Yes” (= 1). Scores for the dichotomized items were added together to create a single index ranging from 0 to 15, with higher values indicating that a participant experienced a wider variety of different forms of cybercrime victimization within the prior year.

**Covariates.** Five covariates are included in the analyses. These include a continuous measure of *age* (mean = 23.5) and dichotomous measures of biological sex (Male = 1, 30.9%) and race/ethnicity (*White, non-Hispanic* = 1, 42.8%). In addition, we account for separately measured ordinal-coded indicators for *typical weekday time spent online* and *typical weekend-day time spent online*. Response options for each of the two items ranged from “0 Hours” (= 0) to “12+ Hours” (= 12).

**Analytic Plan.** To test the study hypothesis that the association between low self-control and cybercrime victimization operates indirectly through risky online behavior, a model was estimated using the PROCESS macro (model 4; Hayes, 2018) for SAS v9.4. The model was analyzed with low self-control and each of the covariates predicting: (1) risky online behavior and (2) cybercrime victimization. In addition, we analyzed the indirect effect of low self-control on cybercrime victimization through risky online behavior. A significant indirect effect is established when the confidence interval for the estimate does not straddle zero. Additional support for our hypothesis would be found if the direct effect of low self-control on cybercrime victimization is non-significant, which along with a significant indirect effect would provide evidence that the effect of low self-control on cybercrime victimization is entirely indirect.

Results

The model accounted for approximately 14% of the variance in risky online behavior and 25% of the variance in cybercrime victimization (see Table 2 and Figure 1). Pertinent to our hypothesis, there was evidence of a significant positive association between low self-control and risky online behavior ( $b = 1.76, p < .001$ ); the coefficient can be interpreted as that for every one-unit increase in low self-control (e.g., moving from a score of 1 to a score of 2), there is a corresponding expected increase of 1.76 risky online behaviors. Spending greater weekday time online was also positively associated with risky online behavior ( $b = 0.16, p < .01$ ). Also relevant to our hypothesis, there was evidence of a significant positive association between risky online behavior and cybercrime victimization ( $b = 0.48, p < .001$ ); the coefficient can be interpreted as that for every additional risky online behavior reported, there is a corresponding expected increase of 0.48 cybercrime victimization experiences. Age also emerged as a significant, positive predictor of cybercrime victimization ( $b = 0.11, p < .001$ ).

Table 2. PROCESS Model of Cybercrime Victimization

Variables	Risky Online Behavior (M)			Cybercrime Victimization (Y)		
	b	SE	p	b	SE	p
Low Self-Control	1.76	0.31	<.001	0.36	0.31	0.26
Risky Online Behavior	—	—	—	0.48	0.05	<.001
Age	-0.04	0.02	0.05	0.11	0.02	<.001
Biological Sex (Male = 1)	-0.45	0.29	0.12	-0.24	0.29	0.40
Race/Ethnicity (White, non-Hispanic = 1)	0.09	0.27	0.74	0.06	0.27	0.81
Typical Weekday Time Online	0.16	0.06	<0.01	-0.01	0.06	0.80
Typical Weekend Day Time Online	-0.07	0.06	0.21	-0.03	0.05	0.55
Constant	0.76	0.88	0.38	-0.98	0.86	0.25
Adjusted R <sup>2</sup>	0.14			0.25		
F-test	(6, 355) = 9.75, $p < .001$			(7, 354) = 17.24, $p < .001$		

Notes: N = 362; M = mediating variable; Y = dependent variable.

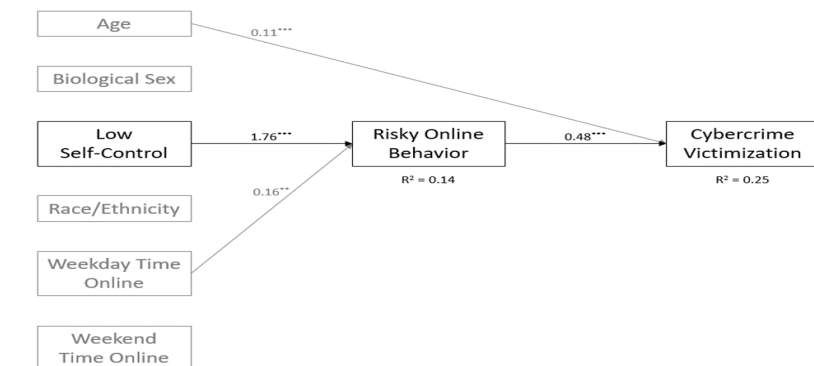


Figure 1. PROCESS Model of Cybercrime Victimization

Notes: Estimates shown are from Table 2; \*\*  $p < .01$ , \*\*\*  $p < .001$  (two-tailed).

In addition, there was support for our hypothesized model of indirect effects whereby the association between low self-control and cybercrime victimization

was mediated by risky online behavior (indirect effect = 0.85, 95% CI = 0.49 – 1.24). Moreover, while the total effect of low self-control on cybercrime victimization was statistically significant ( $b = 1.20, p < .001$ ), the direct effect of low self-control on cybercrime victimization was not statistically significant ( $b = 0.36, p = 0.26$ ). Cumulatively, these results indicate that, in these data, the association between low self-control and the variety measure of cybercrime victimization operates entirely and indirectly through the variety measure of risky online behavior.

Discussion and Implications

In response to the increasingly ubiquitous nature of online social interactions, criminologists have become attuned to the importance of understanding crime victimization in cyberspace. The goal of the current research was to provide several enhancements to this growing body of literature through the use of more comprehensive measures of the constructs of interest as well as a method to formally assess the direct and indirect effects of interest. Our analyses of data collected on a sample of university students provide strong support for the hypothesized direct and indirect effects. First, we observed a robust association between low self-control and our variety measure of risky online behavior, a finding which mirrors prior work showing similar linkages between this trait—and impulsivity more specifically—and various risky activities on the internet (e.g., Holt et al., 2021; van Wilsem, 2013b). This association may be interpreted as reflecting the poor risk calculations and the inclination to participate in dangerous activities characteristic of those who are low in self-control.

A second key finding from this study is that risky online behavior is strongly associated with the variety index measure of cybercrime victimization used in these analyses. Corresponding with routine activities theory, this relationship suggests that those who engage in risky behaviors in cyberspace place themselves in situations that are conducive to various forms of victimization. This association mirrors the patterns observed in some prior research, which has shown that a wide range of dangerous online behaviors are risk factors for fraud, identity theft, harassment, and computer virus infection (Milani et al., 2020; Ngo et al., 2020; Pratt et al., 2010; Reyns, 2013). The consistency of these findings affirms the relevance of routine activities theory for understanding crime targeting and victimization in an online environment, and the results from this study extend understandings of these associations to the wide variety of cyber victimization outcomes captured in these analyses.

Finally, and most importantly, our findings reveal that the association between low self-control and cybercrime victimization is indirect and operates entirely through involvement in risky online activities. This pattern is consistent with prior research pertaining to offline contexts (e.g., Turanovic & Pratt, 2014), which likewise has found that risky lifestyles fully mediate the effects of low self-control on criminal victimization. The results from the current study imply that the connection between low self-control and an increased likelihood of online victimization can be explained by the fact that individuals who are lower in self-control place themselves into situations and engage in activities in online environments that make them more susceptible to becoming targets of victimization at the hands of motivated offenders.

The present study has several noteworthy implications. First, our findings emphasize the consequences of such behaviors as sharing personal information, chatting with strangers online, using unsecured web links, websites, or wireless networks, hacking, and cyberbullying for various forms of cybercrime victimization, including identity theft, fraud, online harassment,

and malware infection. These results underscore the need to educate internet users about the risks which attend these behaviors, and such efforts might result in a reduction of victimization in cyberspace. Moreover, focusing these efforts among college students would be an especially fruitful endeavor given the heightened amount of time spent online by members of this unique population. Second, this study's findings regarding the effects of low self-control on risky behavior and victimization could indicate a need to confront deficits in self-control via certain interventions; some prior work has demonstrated that such programs can be efficacious, even into young adulthood (e.g., Friese et al., 2017; Piquero et al., 2010, 2016). Thus, programming aimed at increasing self-control may prove fruitful in preventing engagement in antisocial behavior and victimization in offline as well as online contexts.

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## Authors

**Peter S. Lehmann, Ph. D.** is an assistant professor in the Department of Criminal Justice and Criminology at Sam Houston State University. He received a B.A. in Sociology from Furman University and his M.S. and Ph.D. in Criminology from Florida State University. His research interests include juvenile justice and delinquency, race/ethnicity and punishment, and public opinion on crime and criminal justice policy.

**Raymond D. Partin, M. S.** is a doctoral candidate in the Department of Criminology and Criminal Justice at Florida International University in Miami, Florida. He received his B.S. and M.S. in Criminal Justice from the University of Cincinnati. His research interests include cybercrime, the Dark Web, and health criminology.

**Ryan C. Meldrum, Ph. D.** is a professor and the director of research and communications within the Department of Criminology and Criminal Justice at Florida International University. He received his B.S. in Sociology from Oregon State University and his M.S. and Ph.D. from Florida State University. His primary research interests surround the causes and consequences of deficits in self-control.

**Sinchul Back, Ph. D.** is an assistant professor and the director of cybercrime and cybersecurity Studies at the University of Scranton. He received his B.S. in Leadership from Northeastern University and his M.S. in Criminal Justice from Bridgewater State University and his Ph.D. in International Crime and Justice from Florida International University. His primary research interests focus on cybercriminal profiling, cybersecurity, digital forensics investigation, homeland security, and counter-terrorism.

**Elisa M. Trucco, Ph. D.** is an associate professor and the associate director of clinical training within the Department of Psychology at Florida International University. She received her B.A. in Psychology from the University of Pennsylvania, her M.A. and Ph.D. in Clinical Psychology from the University at Buffalo, and completed her clinical internship at Yale University. Her program of research focuses on the etiology of adolescent externalizing behavior and substance use.

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