Fear of Cybercrime in Europe: Examining the Effects of Victimization and Vulnerabilities

Suvi M. Virtanen

The European Institute for Crime Prevention and Control, Helsinki, Finland

This study utilizes aspects of Ferraro's risk interpretation model in order to examine how social and physical vulnerabilities and victimization experiences relate to fear of online crime using Eurobarometer survey data. The results of the regression analyses show that individuals with prior cybercrime victimization experiences, women, and individuals with lower social status and lower confidence in their ability to use the Internet report higher levels of fear. Low social status and low confidence was found to have a significant interaction effect with prior victimization experiences in relation to fear of cybercrime. Prior victimization experiences with online fraud appear to increase fear of cybercrime in low social status individuals more than other groups. Experiences with hacked accounts or cyberattacks also intensifies the fear of those with low confidence more than those with a higher amount of confidence. Overall, the results of this study indicate that social and physical vulnerabilities as well as victimization have direct and indirect effects on fear of cybercrime, just as with traditional place-based crimes.

Key words: cybercrime; fear of crime; online crime; risk interpretation model; victimization; vulnerabilities.

Introduction

In 2014, approximately 78% of all individuals in the 28 member states of the European Union (EU), aged between 16 and 74 years, accessed the Internet (Eurostat, 2015). Common online activities include participation in social networking and using email. There has also been a significant growth in the proportion of Europeans who order goods and services over the Internet, with an increase in online purchasing of six percentage points compared with 2011 (Eurostat, 2015). The use of online services is a significant matter at the societal level. The European Commission proclaimed that '[b]ringing down barriers to unlock online opportunities' was to be one of its top priorities in 2015, when the

so-called digital single market strategy was adopted (European Commission, 2016). Designing the optimal environment for developing digital networks and services is important, as there is an acute need for new potential drivers for economic growth in the EU markets (European Commission, 2016).

Several factors may hinder desirable developmental trajectories for Internet penetration and service use, one of which is the rise of cybercrime and the low trust in networks. A recent Eurobarometer survey revealed that Internet users express high levels of concern about cybersecurity, and 85% agree that the risk of becoming a victim of cybercrime is increasing. The two most common concerns are identity theft (68%) and

Correspondence: Suvi Virtanen, The European Institute for Crime Prevention and Control, PO BOX 444, 00531 Helsinki, Finland. Tel: +359408617590. Email: suvi.virtanen@helsinki.fi

malicious software (66%). The levels of concern have risen since 2013, which suggests that Internet users feel that the virtual environment is becoming more unpredictable and less secure (TNS Opinion & Social, 2015).

While getting users to trust service providers is high on the agendas of the EU, governments and industry, only a few criminological academic studies to date have focused on the fear of cybercrime. Most studies on the fear of cybercrime have been conducted with small samples of United States college students, and not many have introduced a theoretical framework through which the results can be interpreted. In particular, the efforts made thus far to explore the cumulative nature of fears concerning several forms of cybercrime have been meager, as most studies have focused only on a specific type of fear. To address these issues, the current study seeks to contribute to the cybercrime literature by using an adaptation of Ferraro's (1995) risk interpretation model on a representative sample of the domestic population in Europe in order to examine the relationship between gender, low social status, confidence in abilities in navigating the online environment, and previous victimization experiences. The main interest in this study is to see if physical and social vulnerability – along with gender, confidence and social status – influence fear of victimization, and whether previous victimization experiences intensify the association between vulnerabilities and fear.

The Concept of Vulnerability and the Risk Interpretation Model

Vulnerability is a concept that is often used in the literature on victimization. Falling victim to a crime may have economic, physical, emotional and social repercussions for an individual. How vulnerable the status of the victim is in relation to the victimization experience has a significant impact on how grave these consequences are. Vulnerability may also refer to the degree of risk of victimization associated with certain groups or

individuals (Honkatukia, 2011). Killeas (1990) provides a useful taxonomy – which is often used in the literature on fear of crime – that explores the physical, social and situational components of the concept of vulnerability and takes into account factors that are both external and internal to the individual. In this taxonomy, vulnerability is seen as the intersection between two axes: risk and harm. Any given individual may be plotted in respect of his or her level of risk of being victimized and the amount of harm the victimization experience may cause. The most vulnerable group has high levels of risk of being victimized and would be most seriously harmed by criminal victimization (Green, 2007). The perceived risk and estimated levels of harm of crime victimization may also be relevant to explaining fear of crime as well. However, while theorizing about victimization and vulnerabilities, it is important to remember that individuals themselves give meaning to their victimization experiences, and that the perceptions behind victimization are shaped by social, economic, historical and political forces (Green, 2007).

Ferraro's (1995) risk interpretation model states that perceived risk of being victimized is the key component which influences fear of crime. The concept of perceived risk is separate from the feeling of fear. In this context, fear can be described as the behavioral outcome *caused* by the cognitive assessment of victimization risk. For example, fear of crime reflects an emotional reaction, such as how concerned or afraid one is of being victimized while walking alone at night, while perceived risk is one's judgment regarding the likelihood of victimization in the neighborhood. The distinction between these two concepts has been demonstrated in several studies, which have found differing correlates for risk perception and fear (Ferraro & Grange, 1987; LaGrange, Ferraro, & Supancic, 1992; Rountree & Land, 1996). The distinction remains crucial, as numerous researchers have used these concepts interchangeably, complicating the interpretation

of previous research findings (Rountree & Land, 1996).

One of the main arguments of the risk interpretation model is that people consistently collect and interpret information about potential victimization through social interaction. Personal characteristics determine how individuals interpret their own situations, and therefore cognition is affected by social factors such as an individual's position in society. The model emphasizes social and physical vulnerabilities: individuals lacking the resources necessary to cope with the economic consequences of becoming a victim of a crime, or those who are relatively unable to deal with the physical or emotional repercussions of an attack, interpret the risk of victimization as being higher than others (Skogan & Maxfield, 1981). This is why minorities and individuals with low socioeconomic status, as well as women and the elderly, are more likely to report higher levels of victimization risk and fear (Clememte & Kleiman, 1976; Sampson, Raudenbush, & Earls, 1997; Schafer, Huebner, & Bynum, 2006), albeit some researchers assert that gender differences are a product of socialization (Sutton & Farrall, 2005). In Ferraro's (1995) model, the theoretical relationship between personal characteristics and fear of crime has two distinct pathways: a direct link between personal characteristics such as gender and levels of fear of crime, and a mediated pathway through risk perceptions wherein belonging to a minority group, for example, is likely to increase one's risk perceptions, which in turn has an effect on levels of fear.

Ferraro (1995, p. 86) also argues that fear of sexual assault is a 'master offence' which ultimately makes women more fearful of various crimes. This so-called 'shadow of sexual assault' hypothesis has gathered some support, as fear of sexual assault does predict fear of other kinds of violence as well (Özascilar, 2013). Additionally, it has been argued that gender differences in risk perceptions and fear should be less prevalent when looking at crimes that entail no face-to-face

contact (Reisig, Pratt, & Holtfreter, 2009). Empirical findings appear to be consistent with this theory, as studies have found women to be more fearful of certain forms of crime such as violence or sexual assault (Heiskanen, 2002; Reid & Konrad, 2004), but not of burglary or crime in general (Kanan & Pruitt, 2002; Rountree & Land, 1996).

While support can be found for gender differences in fear of different types of crimes, it remains unclear whether different types of victimization experiences operate differently as predictors of a general fear of crime – e.g., if women are more affected by experiencing interpersonal forms of crime or if individuals with low socioeconomic status become more fearful when experiencing property-related crimes. There have been few prior studies providing evidence to support the notion that different types of personal crime victimization experiences influence fear of crime in unique ways. Wilcox, Jordan, and Pritchard (2007) found that stalking and sexual assault experiences affect fears of physical and sexual assault differently, while Fox, Nobles, and Piquero (2009) found gender differences when looking at how victimization experiences affect general fear of crime. Few studies to date have explored the effects of property crime as well as personal crime on fear. Kanan and Pruitt (2002) found that prior experiences of becoming a victim of property but not personal crime predict general worry regarding criminal victimization.

In shifting the focus of this field of study to the fear of crime online, one type of social vulnerability relevant to a virtual environment might be confidence in one's abilities to use the Internet. The risk interpretation model suggests that a trait becomes a vulnerability if it somehow compromises the individual's ability to cope with victimization. In an online environment, user abilities are crucial when it comes to dealing with computer-focused crimes in particular, such as computer viruses and hacking. Low confidence in one's abilities to navigate the Internet might also increase risk perceptions – i.e., the more likely one

considers the risk of victimization, the greater the fear – as stated in Ferraro's (1995) theory.

Fear of Cybercrime and Vulnerabilities

As the current study focuses on the concept of the fear of cybercrime, not risk perceptions, this section focuses on reviewing the literature on fear of online crime and its correlates with social and physical vulnerabilities.

Gender

Gender may be classified as a physical vulnerability factor when looking at fear of crime – the higher levels of fear reported by women reflect their perceptions that they are relatively more vulnerable and thus have more difficulties in coping with the physical and emotional repercussions of an attack. When looking at cybercrime, studies have found that women report higher levels of fear of crimes such as cyber harassment and bullying or online interpersonal victimization, and general concerns regarding hacking, thefts and computer viruses (Alshalan, 2006; Henson, Reyns, & Fisher, 2013; Pereira, Spitzberg, & Matos, 2016; Yu, 2014), but not of online identity theft, computer viruses or online scams (Roberts, Indermaur, & Spiranovic, 2013; Yu, 2014). These results suggest that women are more concerned than men about cybercrime that involves interpersonal contact compared to crimes that are more computer-focused and have no interpersonal component. Although Alshalan (2006) did find gender differences in respect of general concerns regarding hacking and computer viruses, the study did not control for some of the important variables which might affect the relationship between gender and fear, such as frequency of Internet use.

Social and Socioeconomic Status

Low social and socioeconomic status may increase levels of fear of crime due to individual judgments concerning how well the costs associated with crime victimization can be

handled. A link between low income and minority status and fear of crime is well established in the traditional literature on crime (Collins, 2016; Kanan & Pruitt, 2002), but only a few studies have explored the association when looking at cybercrime. A study which examines fear of cyber-identity theft found that when controlling for Internet routine activities and fear of traditional crime, belonging to the middle-income class predicted higher levels of fear (Roberts et al., 2013). Alshalan (2006) found no direct association between income or education and general fear of cybercrime. However, those who declined to disclose their income did report higher levels of fear – yet no direct conclusions can be drawn from this finding.

Confidence in One's Ability to Use the Internet

A lack of confidence in one's ability to use the Internet might increase fear of victimization, because unfamiliarity with the Internet forms a poor basis when facing the consequences of cybercrime, especially computer-focused ones such as hacking or computer viruses. Lack of skill might also increase risk judgments, as an individual might perceive him or herself to be more vulnerable online than those who are more skillful. Currently there are no studies that have examined the effects of confidence in one's abilities to use the Internet on fear of cybercrime. However, a few studies have included frequency of Internet use in their analyses, which might be considered as a proxy for familiarity with using the Internet. Roberts et al. (2013) found an association between frequency of Internet use and higher levels of fear of cyber-identity theft and related fraudulent activity. Alshalan (2006) found no significant correlation between fear of cybercrime (computer viruses, hacking and theft) and Internet use, and Henson et al. (2013) found no association between fear of online interpersonal victimization and time spent on the Internet. Thus, the results appear to be mixed.

Previous Victimization Experiences and Fear of Cybercrime

While there have been several studies linking previous victimization experiences to increased levels of fear in the traditional literature on fear of crime (Fox et al., 2009; Russo & Roccato, 2010; Skogan, 1987; Weinrath & Gartrell, 1996), few have examined it in the context of online crime. Henson et al. (2013) found that previous direct and indirect victimization experiences are associated with a more intense fear of online interpersonal victimization by one's intimate partner or acquaintance, but not by a stranger. A study by Yu (2014) found that prior victimization experiences predicted fear of cyberbullying and computer viruses, but not online scams and digital piracy. Only one study to date has examined the interaction between previous victimization experiences and gender in the context of fear of cybercrime (Alshalan, 2006), finding that women who have previously been victimized are more likely than others to be fearful of cybercrime.

Hypotheses and Focus of the Current Study

The current study explores two main research questions. The first is whether or not physical and social vulnerabilities such as gender, social status and lack of confidence in navigating the virtual environment predict higher levels of fear of cybercrime. The second question focuses on exploring the interaction effects between prior victimization experiences and social vulnerabilities on fear of cybercrime. As most prior studies have focused only on fear of one type of cybercrime, the current study adopts eight distinct crime measures aggregated together in order to explore cumulative fear of cybercrime. The current study also explores how being victimized affects levels of fear by adding to the analyses several variables representing distinct victimization experiences.

Cybercrimes are frequently classified in the literature as either *computer-focused* or

computer-assisted, or targeting individuals or property (Yar, 2005). Therefore, four crimes which reflect these classifications were selected: cyber harassment, hacked account, online fraud and cyberattacks. Having one's social media or email account hacked represents a crime against persons more than a crime against property, but it is also classified as more of a computer-focused crime than a traditional crime assisted by computers. Cyber harassment represents a computer-assisted, person-focused crime. Online fraud and cyberattacks can be classified as crimes against property, since the aim is usually to gain some sort of material benefit. Online fraud, where goods purchased are not delivered, or were found to be counterfeit or not as advertised, is a computer-assisted traditional crime. Cyberattacks – in which an individual or group attacks service providers such as online banks with malicious intent – occur only in the virtual world and are thus computer-focused. The hypothesis in the current study is that any experience with cybercrime will increase levels of general fear of crime.

As for social vulnerability, the study draws from Ferraro's (1995) risk interpretation model to predict that individuals with a lower social position will be more fearful of cybercrime. Additionally, if the vulnerabilities hypothesis is correct then women and individuals with low levels of confidence in their abilities in the virtual environment should report being more fearful as well.

To address the second main question, a new angle is added to Ferraro's (1995) theory in order to investigate whether the association between vulnerabilities and fear is actually dependent on prior victimization – and particularly if the type of victimization experience will be found to moderate levels of fear. The proposed moderated risk interpretation model is presented in Figure 1. The hypothesis is that prior victimization will have an intensifying effect on fear of online crime among women, but only when there has been direct contact between the offender and the victim (e.g., online harassment). A similar

Figure 1. Research hypotheses: moderation model predicting fear of online crime in relation to social and physical vulnerabilities and previous victimization experiences.

interaction is hypothesized between social status and victimization experiences, but only with victimization experiences associated with lost property or lost income. Low confidence is assumed to increase levels of fear in combination with any type of prior victimization experiences.

Method

Data

The data used in the current study were obtained from Special Eurobarometer Survey 407 (wave 79.4) conducted on *cyber security* in the 28 EU countries.¹ The data were collected by TNS Opinion & Social between May and June 2013 as a part of the Standard Eurobarometer. The survey ($n = 27\,680$) represents the populations of the residents in each of the member states aged 15 years and over. A multi-stage, random probability sampling model was applied in all states. In each country, a number of sampling points was drawn with probability proportional to population size (for a total coverage of the country) and to population density.² Respondents were interviewed face to face by members of

the TNS Opinion & Social network (the interviews were conducted in the homes of the respondents). Rigorous measurement validity testing was also conducted for the items concerning cybercrime (Empirica, 2007; i2010 High Level Group, 2006). All respondents who indicated that they had used the Internet in some capacity were included in the study sample ($n = 18\,711$). Post-stratification weights (or unit non-response weights) were used for all analyses. For each country, a comparison between the sample composition and a proper universe description regarding socio-demographic criteria was carried out. A national weighting procedure was applied using marginal and intercellular weighting. As such, in all countries, minimum sex, age, basic region, and size of locality data were introduced during the iteration procedure.³ Table 1 presents descriptive statistics of the relevant variables in the current study.

Dependent Variable

Fear of Cybercrime

Fear of cybercrime was measured through eight different questions about how concerned

Table 1. Descriptive statistics ($n = 18,711$).

	Coding	Sample		
		<i>M</i>	<i>SD</i>	% (<i>n</i>)
Fear of cybercrime	Scale (0–24)	10.84	6.15	
Victimization				
Harassment	0 = <i>no</i> , 1 = <i>yes</i>	0.05	0.21	4.7 (928)
Hacked account	0 = <i>never</i> , 1 = <i>occasionally</i> , 2 = <i>often</i>	0.12	0.35	10.9 (2149) [†]
Online fraud	0 = <i>never</i> , 1 = <i>occasionally</i> , 2 = <i>often</i>	0.10	0.32	9.5 (1871) [†]
Cyberattacks	0 = <i>never</i> , 1 = <i>occasionally</i> , 2 = <i>often</i>	0.14	0.37	12.9 (2532) [†]
Personal characteristics				
Female	0 = <i>no</i> , 1 = <i>yes</i>			49.9 (9812)
Age	Scale (range: 15–98)	39.65	15.70	
Social status	Scale (range 1–10)	1.85	1.02	
Internet use	Scale (range 1–15)	7.78	3.50	
Knowledge of risks	Scale (range 0–3)	1.66	0.81	
Confidence	Scale (range 0–3)	1.93	0.96	

Note: [†]Percentage of participants who have experiences with cybercrime either occasionally or often.

the respondents were about falling victim to various online crimes. As noted earlier, it is crucial to make a distinction between the concepts of emotion (fear) and cognitive assessment (perceived risk). The word ‘concern’ in the survey question suggests that this is a measure of an emotionally-based reaction which stems from the perceived risk of cybercrime victimization. Consequently, the question reflects the emotional response – i.e., fear – rather than an objective assessment of risk. The crimes that were asked about were identity theft, fraudulent emails asking for personal details, online fraud, accidentally encountering child pornography, accidentally encountering material that promotes racial hatred or religious extremism, not being able to access online services due to cyberattacks, social media or email account being hacked, or becoming a victim of online banking or credit card fraud. There are four response categories which vary from *Not at all concerned* to *Very concerned*. All items were summed together to form a ‘general fearfulness’ variable, which represents severity of fear of different forms of cybercrime.

Independent Variables

Victimization Experiences

In order to investigate whether different forms of cybercrime victimization have distinct correlations with fear of cybercrime, four different online crimes were selected from the data for further analyses. The crimes selected are hacked account, online harassment, online fraud and cyberattacks. The respondents were asked how often they had experienced or been a victim of various forms of cybercrimes, with the choice of response categories given as *never*, *occasionally*, and *often*.

Sociodemographic and Personal Characteristics

Controlling for effects of sociodemographic factors and personal characteristics on fear of cybercrime was accomplished by including gender, age, and social status from the Standard Eurobarometer section of the survey as covariates to all models. Social status was measured as a continuum between values of

one (lowest) and ten (highest). The respondents were asked to place themselves somewhere in the continuum. This variable was used as a covariate in gender- and confidence-focused models. For the purposes of social status and victimization moderation analyses, the continuous social status variable was dichotomized so that all values below 1 *SD* from the mean were classified as belonging to the low social status category (1 = low, 0 = other).

Internet Use

Since personal attributes associated with Internet use may affect fear of cybercrime, Internet usage, confidence in one's abilities to use the Internet, and information about risks were added as control variables. Internet usage was computed as a sum of three items, asking how often the respondents accessed the Internet at work, home or in public (with six response categories ranging from *every day* to *never*). Confidence in one's abilities to use the Internet was measured by asking the respondents to rate how confident they were about their ability to use the Internet for things such as online banking or buying things online (with four response categories ranging from *very confident* to *not at all confident*). Respondents were also asked how well informed they felt about the risks of cybercrime (with four response categories ranging from *very well informed* to *not at all informed*). For the low confidence and victimization moderation analyses, the confidence variable was dichotomized so that all values below 1 *SD* from the mean were classified as belonging to the low confidence category (1 = low, 0 = other).

Analytic Strategy

The effects of independent variables and interactions between gender, low social status, low confidence and victimization experiences on fear of cybercrime were investigated with twelve different linear

ordinary least squares (OLS) regression models. Four of these models examined the interactions between gender and victimization experiences, another four modeled interactions between low social status and cybercrime victimization, and the last four repeated the same analyses but with the interaction effects between low confidence and victimization experiences on fear of cybercrime.

Results

Gender and Victimization Models

Table 2 presents the results from the linear regression equations predicting fear of cybercrime with gender and four different forms of cybercrime victimization experiences. The covariates and interaction terms between independent variables are also reported.

All types of prior experience with online crime (harassment, hacking, fraud, cyberattacks) predict general fear of cybercrime. In all models, women reported higher levels of fear, but the interaction terms between different victimization experiences and gender do not reach significance. Younger age, lower social status and lower confidence in one's abilities to use the Internet also predict fear of cybercrimes.

Social Status and Victimization Models

The results from the social status and victimization models of fear are presented in Table 3. All of the victimization experiences are significant predictors of fear of cybercrime. Low social status conversely does not predict fear in any of the models. In all models, women reported higher levels of fear, as did younger individuals. Lower confidence in one's abilities to use the Internet is associated with higher fear as well. A significant interaction effect was found between experiencing online fraud and low social status. As seen in Figure 2, membership of the low social status group has a moderating effect on the

Table 2. Linear regression models predicting fear of cybercrime with victimization experiences and gender.

	β	Beta	SE
Victimization experiences			
Online harassment	1.07**	0.04	0.30
Hacking	1.18**	0.07	0.14
Online fraud	1.27**	0.07	0.15
Cyberattack	0.92**	0.05	0.13
Gender	1.06*	0.09	0.09
Interactions			
Gender $\times$ Online harassment victimization	0.16	0.00	0.42
Gender $\times$ Hacking victimization	0.17	0.00	0.25
Gender $\times$ Online fraud victimization	-0.13	-0.01	0.30
Gender $\times$ Cyberattack victimization	0.23	0.01	0.25
Personal characteristics			
Age	-0.02**	-0.05	0.00
Social status	-0.08*	-0.02	0.03
Internet use	-0.00	-0.00	0.02
Knowledge of risks	0.01	0.00	0.06
Confidence in abilities	-0.56**	-0.09	0.05
Model R^2	0.04		

Note: * $p < .05$; ** $p < .01$. For gender coding, male = 0 and female = 1. Four separate regression models were conducted with victimization and personal characteristics variables and four different interaction terms between gender and different victimization experiences. While the interaction terms varied in the regression models, the coefficients of the other predictor variables as well as the R^2 model remained the same, and are thus reported in a single table.

association between frequency of experiencing online fraud and levels of fear of cybercrime.

Confidence in One's Abilities to use the Internet and Victimization Models

The results from the confidence in Internet use abilities and victimization models of fear are presented in Table 4. All of the victimization experiences are again significant predictors of fear of cybercrime. The categorical variable for low confidence does not predict fear in any of the models, but two significant interaction effects on general fear were found with experiencing hacking and cyberattacks (Figures 3 and 4). Along with younger age, being female and having lower social status, frequency of Internet use and knowledge of

the risks of cybercrime also appear to be significant predictors in these models.

Discussion

The current study contributes to the relatively scarce body of literature on fear of cybercrime by exploring the influence of social and physical vulnerabilities and prior victimization experiences on fear. The findings of this study provide evidence to support the hypothesis that key aspects of Ferraro's (1995) risk interpretation model, such as social and physical vulnerabilities, can be used to explain fear of cybercrime. The study addresses two main research questions, the first being whether or not vulnerabilities – gender, social status and confidence – predict higher levels of fear. An aggregated fear measure

Table 3. Linear regression models predicting fear of cybercrime with victimization experiences and low social status.

	β	Beta	SE
Victimization experiences			
Online harassment	1.10**	0.04	0.24
Hacking	1.29**	0.07	0.14
Online fraud	1.27**	0.07	0.14
Cyberattack	0.85**	0.06	0.13
Low social status	0.04	0.01	0.12
Interactions			
Low social status $\times$ Online harassment victimization	-0.10	-0.00	0.52
Low social status $\times$ Hacking victimization	0.17	0.00	0.33
Low social status $\times$ Online fraud victimization	0.84*	0.02	0.40
Low social status $\times$ Cyberattack victimization	0.57	0.01	0.35
Personal characteristics			
Age	-0.02**	-0.05	0.00
Female	1.06**	0.09	0.09
Internet use	-0.01	-0.01	0.01
Knowledge of risks	-0.01	0.00	0.06
Confidence in abilities	-0.55**	-0.09	0.05
Model R²	0.04		

Note: * $p < .05$; ** $p < .01$. For gender coding, male = 0 and female = 1. Four separate regression models were conducted with victimization and personal characteristics variables and four different interaction terms between low social status and different victimization experiences. While interaction terms varied in the regression models, the coefficients of the other predictor variables as well as the model R^2 remained the same and are thus reported in a single table.

Figure 2. Plotted interaction effect between low social status and frequency of experiencing online fraud on mean levels of general fear of different forms of cybercrime.

Note: The covariates in the model are age, gender, frequency of Internet use, confidence in one's abilities to use the Internet, and knowledge about risks.

Table 4. Linear regression models predicting fear of cybercrime with victimization experiences and low confidence.

	β	Beta	SE
Victimization experiences			
Online harassment	1.08**	0.04	0.22
Hacking	1.27**	0.07	0.14
Online fraud	1.23**	0.06	0.15
Cyberattacks	0.88**	0.05	0.13
Low confidence	-0.18	-0.01	0.15
Interactions			
Low confidence $\times$ Online harassment victimization	0.85	0.01	0.88
Low confidence $\times$ Hacking victimization	2.08**	0.03	0.56
Low confidence $\times$ Online fraud victimization	0.72	0.01	0.75
Low confidence $\times$ Cyberattack victimization	1.86**	0.02	0.67
Personal characteristics			
Age	-0.02**	-0.04	0.00
Female	1.08**	0.09	0.09
Social status	-0.11**	-0.03	0.03
Internet use	-0.04**	-0.02	0.01
Knowledge of risks	-0.15*	-0.02	0.06
Model R^2	0.03		

Note: * $p < .05$; ** $p < .01$. For gender coding, male = 0 and female = 1. Four separate regression models were conducted with victimization and personal characteristics variables and four different interaction terms between low confidence and different victimization experiences. While interaction terms varied in the regression models, the coefficients of the other predictor variables as well as the model R^2 remained the same and are thus reported in a single table.

Figure 3. Plotted interaction effects between low confidence in Internet use abilities and frequency of experiencing hacking on mean levels of fear of different forms of cybercrime.

Note: The covariates in the model are age, gender, social status, frequency of Internet use, and knowledge about risks.

Figure 4. Plotted interaction effects between low confidence in Internet use abilities and frequency of experiencing cyberattacks on mean levels of fear of different forms of cybercrime.

Note: The covariates in the model are age, gender, social status, frequency of Internet use, and knowledge about risks.

composed of concerns regarding several different types of cybercrime was examined.

The first hypothesis – that the three vulnerability traits would predict higher levels of fear – is supported in part. As is commonly found in the literature on fear of crime, women reported higher overall fear. Lower social status, but not the lowest social class, is also associated with higher levels of fear. This finding is interesting, as it suggests that the direct association between social status and fear does not in fact concern individuals in the absolute lowest social status, but that somewhat lower social status in general is associated with higher fear. The lowest social class becomes a relevant predictor only when interaction with previous victimization is accounted for. In other words, being placed lowest in the hierarchy of social status has no more effect on fear of cybercrime than ranking just slightly below average; it only mattered if the individual had also been a victim of cybercrime. A similar association was found with confidence; less confident individuals are more fearful, but being in the group

with the lowest confidence in one's abilities is not a direct predictor of fear, again only reaching significance in combination with past victimization. These findings suggest that in order to reduce fear of online crime, individuals with lower social status and women should be prioritized as high-interest targets. It is possible that the association between social and physical vulnerability factors and fear are partly mediated by confidence in one's abilities to use the Internet, but testing this association is beyond the scope of this study, and this is therefore suggested as a topic for future research. If the hypothesis proves to be correct, educating and strengthening the abilities of women and low social status individuals to use the Internet may prove fruitful in reducing fear of cybercrime.

The second research question focuses on the interactions between prior victimization experiences and vulnerabilities on fear of cybercrime. The first finding is that victimization experiences have no impact on the association between gender and fear.

The hypothesis that victimization experiences which have an interpersonal component (online harassment) would increase levels of fear among women more than men is not supported. It appears that women's fear of cybercrime is not dependent on any type of prior victimization, and that experiences with cybercrime intensify fears equally for men and women. It is possible that if the focus of the study was on more 'gendered' crimes such as fear of online harassment, prior victimization could have had a significant impact on women's fear. Therefore, a suggestion for further research is to examine the interactions between victimization and gender on fear of person-focused cybercrime. Furthermore, the findings in this study suggest that prior victimization is an important factor to consider when helping individuals to cope with fear, regardless of the gender of the victim.

The first significant interaction was found between social status and online fraud victimization. The interaction term is positive, meaning that among individuals with no prior victimization experiences, levels of fear are equal. Experiencing cyber fraud, especially occasionally, increases fear among low social status individuals significantly more than in others. This is in line with the hypothesis that individuals of low socioeconomic status are most affected by property-focused victimization. However, low social status had no interaction with cyberattacks, another crime which is classified as property-focused. The main difference is that fraud is more of a traditional crime assisted by computers in which cyberattacks represent a computer-focused type of crime. It is possible that experiencing crimes with more concrete monetary losses have a more prominent effect on individuals of a poor socioeconomic status than crimes that are more indirect (e.g., hackers attacking online banks). In other words, if an individual's economic situation is difficult then losing property of actual value raises more concern than, for example, temporarily being unable to access an online bank account due to

cyberattacks. What is also notable about the interaction is the impact of the frequency of experiencing fraud. The differences between low and other social status groups nearly disappear for those who have been frequent victims of cybercrime. These results suggest that in order to get individuals with lower social status to trust online service providers, it may be helpful to focus cybercrime prevention endeavors on cyber fraud. It would also be beneficial to educate and support those who have had frequent encounters with cyber fraud, no matter which social class they are in.

The other two significant interactions were found between experiencing hacking or cyberattacks and low confidence in one's abilities to use the Internet. The hypothesis that low confidence would have an interaction with all types of victimization experiences is not supported; there appears to be a moderating effect only between computer-focused crimes and low confidence. This relationship seems logical: falling victim to a non-traditional crime online affects the levels of fear among those who already feel uncomfortable in the virtual environment. This finding also highlights the fact that while lower confidence has a direct association with higher levels of fear of cybercrime, it may additionally be harmful because of the indirect effect it has on fear. Improving individuals' confidence in navigating the online environment would thus directly reduce their fear of cybercrime, as well as softening the impact of potential cybercrime victimization. However, it should be noted that since the data is not longitudinal and the association between victimization and confidence is not investigated, proving any causation is impossible; it may be that victimization may have been the cause of low confidence and is thus not independent of it.

The effects of several personal characteristics were controlled in all the analyses as well. When age was examined as a factor, fear of cybercrime appeared to differ from fear of traditional crime. In the traditional

literature, as well as in Ferraro's (1995) model, older individuals have been found to report higher levels of fear than the young, although it should be noted that some researchers have suggested that the extent of fear among older persons may be overestimated (LaGrange & Ferraro, 1989). The present study found the opposite association between age and fear, which has been noted in a few other studies (Henson et al., 2013), but not consistently (Alshalan, 2006; Yu, 2014). Discrepancies in these research findings might reflect the fact that some studies controlled for confounding factors such as frequency of Internet use and some did not, or that the studies had differing populations, since some samples were collected among college students while some studies focused on a general population. In reference to the present study, it is easy to see why younger individuals in the general European population would fear cybercrime more, since they use the Internet in a greater variety of ways and possibly engage in riskier online behavior, and are thus more exposed to the negative side of the digital world. An interesting angle for future studies would be to examine whether there is an interaction between age and prior victimization experiences on fear of cybercrime. The traditional victimization literature suggests that while younger persons may be more at risk of victimization, they are probably quicker at recovering from the harm caused. The elderly are thus more likely to suffer longer-lasting consequences of crime victimization (Newburn, 1993). Since younger individuals have more online knowledge and skills which enable them to cope more effectively with potential victimization, it is possible that cybercrime affects the elderly more than the young.

In order to examine how Internet activities affect the fear of cybercrime, two variables representing individuals' online behavior and feelings of fear were added: frequency of Internet use and knowledge of the risks of cybercrime. Frequency of Internet use and knowledge of risks were not found to be

associated with fear of cybercrime in models with interactions between gender or social status and victimization. Surprisingly, in the four models that take into account the interaction effects between low confidence and victimization experiences, these variables reach significance. One viable explanation is that the effects of Internet use and knowledge of risks are in fact mediated by confidence. These models only include the categorical variable of the lowest level of confidence, which is not significant in itself. Therefore, the effect of confidence was not thoroughly accounted for.

A few limitations of the current study should be addressed. First, the predictive power in the regression models is rather weak, since even at best the models explain only 4% of the variation. Nevertheless, it is quite common to see low proportions of variance explained in models that examine complex phenomena of interest in social sciences. Second, since fear of cybercrime was examined using an aggregated measure, possible differing associations between specific types of victimization and specific types of fear may have been overlooked. Future research efforts would be well advised to examine several different types of fear of online crime in order to see whether they have distinct predictors. Furthermore, most of the predictors in the analyses are composed of single items – for example, confidence as a concept might not be properly captured in a single survey question. The major strengths of this study are a large, representative European sample, which is rarely seen in the literature on fear of cybercrime, as well as the addition of a theoretical framework within which the results should be interpreted. Future research might utilize the high-quality data of the Special Eurobarometer Survey in order to further investigate the fear of cybercrime, e.g., to explore the differences between different EU countries.

There are many challenges associated with cybercrime, and fear of it is a major component that hinders the willingness of

individuals to use online services. Such reluctance leads many to miss out on the social and economic benefits provided by an Internet-connected world (Riek, Bohme, & Moore, 2016). The findings of the present study suggest that social and physical vulnerabilities affect fear of crime in the virtual world just as they do with traditional place-based crimes. A crucial task for future research and policymakers is to find ways to use implications from such research findings to develop interventions in order to reduce fear of cybercrime and distrust of online services.

Notes

1. European Commission. Eurobarometer 79.4: Social Climate, Development Aid, Cyber Security, Public Transport, Anti-Microbial Resistance and Space Technology, May-June 2013. ICPSR36038-v1. Cologne, Germany: GESIS/Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributors], 2015-07-08. <http://doi.org/10.3886/ICPSR36038.v1>
2. For more information about the sampling and data collection, see: European Commission (2013) Cyber Security report.
3. More information about the weighting procedure can be found at Eurobarometer Data Service at: <http://www.gesis.org/eurobarometer-data-service/survey-series/standard-special-eb/weighting-overview/> (GESIS, n.d.).

Acknowledgments

The author would like to thank the staff at the European Institute for Crime Prevention and Control for their helpful comments and support.

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