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Does perceived social networking site security arise from actual and perceived physical safety?

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ABSTRACT

Despite widespread concerns with social networking site (SNS) security, little research has determined why some are more concerned about SNS security than others. The present research proposes that people may derive their sense of security in SNSs from how safe they are and feel in their physical environment. Specifically, this research examined the relationships between participants' (N = 1262; 47.9% women) perceived neighborhood safety, perceived SNS security, and physical environments as defined by their neighborhood zip code. Findings showed that safety in one's physical environment predicted their perception of physical safety, which in turn predicted their perception of SNS security. These relations held even when holding annual household income constant. Together, these findings suggest that perception of safety in offline and online contexts may be closely intertwined. This research highlights the importance of considering features of the physical environment to understand individual differences in the perception of SNS security.

1. Introduction

Throughout history, humans have been faced with external threats to safety (e.g., warfare, disease, other predators). In recent decades, however, safety has increasingly incorporated an additional context beyond the historically physical milieu: Social networking sites (SNSs). The present paper concerns the relationship between actual and perceived levels of safety in the physical environment and perceptions of security while on SNSs—a dynamically evolving context in which people spend multiple hours each day (Bayer et al., 2020; Chaffey, 2020). Concerns with threats to security on SNSs are warranted. Scams on SNSs may lead to financial losses in millions of dollars (Fletcher, 2020) while the leaking of personal information on SNSs (e.g., a person's location) may contribute to the ease and prevalence of cyberstalking that threatens physical safety (Nobles et al., 2014). Reports of identity theft further show that the criminal use of SNSs to obtain personal information for subsequent identity theft has increased in recent years (Douglas, 2020). Collectively, although threats to SNS security do not appear to closely approximate threats in the physical environment, they may pose as much danger to human lives.

Despite widespread concerns with SNS security, previous research reported variations in how secure people perceive SNSs to be (e.g., Ha & Pan, 2018; Hansen et al., 2018), suggesting that some are more concerned than others. Previous studies (e.g., Hajli & Lin, 2016; Rifon et al., 2005; Salleh et al., 2012; Shin, 2010) have examined predictors of these individual differences. These studies focused solely on the context within SNSs—an understandable focus given that SNSs present a unique context of online profiles, networks, and streams of user-generated content; they are also largely uninhibited from the physical dimensions of space and time (Bayer et al., 2020; boyd, 2007; Burgess et al., 2017; Ellison & boyd, 2013; McFarland & Ployhart, 2015).

In light of the stark differences between the physical and online contexts, it may seem reasonable to assume that physical environments present threats that do not necessarily translate into the disembodied context of SNSs. However, people frequently switch between SNS contexts and the everyday physical environment—offline experience in these physical environments may then inform (i.e., carry over to) perceptions of security in SNSs. Therefore, the major aim of this research is to go beyond the focus on SNS contexts by testing whether perceived SNS security is derived in part from one's physical environment and their perceptions of it. Specifically, we propose a test of whether safety in the physical environment will predict perception of physical safety, which in turn will predict perceived SNS security. In the following, we review the literature on perceived SNS security. Then, we discuss

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perspectives lending support for our proposal that perceived SNS security is informed by actual and perceived safety in physical contexts. We further discuss how factors in an individual's background may affect these relationships.

1.1. Background literature

1.1.1. Perceived social networking site security

When considering the safety of the online world, it is common to use the term "security," which entails protection against deliberate and planned acts of threat (Idsø & Jakobsen, 2000; Pearsall & Hanks, 2001). Although research on SNS security has received considerable attention, relatively little is known about social perceptions of SNS security. SNS security is often operationalized through actual indicators of online threats (e.g., the prevalence of phishing and spam attacks) rather than perceptions of it. There is, therefore, a need to empirically study perceptions of SNS security and the factors that may underlie it.

The present research focused on perceptions of security regarding the structural features of SNSs, such as the measures of the site to protect personal information. This contrasts with the focus on social dynamics by some studies on this topic (e.g., the integrity of other users; Krasnova et al., 2010). We acknowledge the importance of these social dynamics. We chose to focus on the structural features of SNSs for two reasons. First, social dynamic aspects of security perception in SNSs may change across social situations and interaction partners in SNSs. For example, one's level of trust towards one online group may be different than another. Perception of structural features on the other hand is more likely to stay consistent across different social situations on SNSs, as these features are independent of social interaction. Second, structural features serve as a digital "gatekeeper" by which all threats on SNSs must surpass. A cybercriminal's ability to determine a victim's location, for instance, is to a large degree constrained by the access allowed by the SNS itself. Accordingly, we considered the structural features of SNSs as the starting point of people's perceptions of security in this context.

Prior research focusing on the structural features of SNS security found a generally high concern of SNS security in the past decade (Zhang & Gupta, 2018). However, not all people are equally concerned with SNS security features. In studies on this topic, participants responded to items such as "I am concerned with the security of sensitive information when I use the smartphone-based SNS" (e.g., Gao et al., 2018, p. 189) on 5-point Likert response scales indicating "strongly disagree" on the lowest endpoint and "strongly agree" on the highest endpoint. In three example studies, participants within one standard deviation of mean responses indicated response ranges of 3.35–4.55 (Gao et al., 2018), 1.94 to 3.76 (Ha & Pan, 2018), and 2.50 to 4.72 (Chen & Chen, 2015), suggesting that although many participants agreed that they are concerned or strongly concerned for SNS security (i.e., scores above the midpoint of three), other participants reported lower or little concern for SNS security. That is, some are more concerned with SNS security than others. Further research on risky behaviors such as self-disclosure of personal information on SNSs demonstrates behavioral neglect by some individuals but not others (e.g., Chen & Chen, 2015).

An important question for this area of research is then: why are some people concerned with SNS security while others are not? A few studies suggested potential predictors of individual differences in perceived SNS security within the context of SNSs. These studies specifically examined subjective indicators such as confidence in one's ability to use SNS, sense of information control and perceived privacy, or reported website exposure to explain individual differences in perceived SNS security (Hajli & Lin, 2016; Rifon et al., 2005; Salleh et al., 2012; Shin, 2010). While this literature highlights predictors of perceived SNS security, little research has examined predictors in the individual's physical environment.

1.1.2. Perceived SNS security with actual vs. perceived physical environment safety

As people constantly switch from SNSs to everyday physical environments or vice versa, we consider whether safety in one's neighborhood may be a predictor of perceived SNS security. Information about crime rates based on neighborhood zip code is readily available (e.g., Move, Inc., 2017). Nevertheless, little research has examined the relationship between neighborhood safety and perceived SNS security. This comes as no surprise—one might not expect an empirical test to reveal a relationship where the level of physical safety determined by burglary or physical violence rates would predict SNS perception (i.e., in a context where such acts are impossible). The relationship between safety in the physical environment and perception of SNS security may not be straightforward. Actual safety in physical environments may predict perceived SNS security only when individuals' perception of their physical environment matches the actual condition. Psychological research has long demonstrated that the "objective" reality may not always translate into the "subjective" perception (Fiske et al., 2010). Little research has addressed this exact question of whether actual safety of the physical environment will predict perceived safety of the physical environment.

How well do people detect their safety in their environment? Evolutionary theory holds that fundamental challenges to safety in the physical environment result in perception to address those challenges (Bugental, 2000; Kenrick et al., 2003). Analogous to biological defenses in the human body against pathogens, the "behavioral immune system" could detect the presence of the invisible pathogen (Schaller & Park, 2011). Multiple studies lend support for this perspective. Properties in one's physical neighborhood such as gate presence, lighting levels, and neighborhood cohesion have been shown to predict perceptions of safety in physical contexts (see Abdullah et al., 2014; Boomsma & Steg, 2014; Kim & Seidel, 2012). Accordingly, we expected that actual physical safety determined by neighborhood zip code would significantly predict perceived physical safety.

What factors predict perceived SNS security? Previous research in human-computer interaction suggests that aesthetic factors such as visual design and website quality can inform security perceptions in online contexts (Grabner-Kräuter & Kaluscha, 2003; Ou & Sia, 2009; Yu & Singh, 2002). Users may perceive security concerns when a website's visual design is cluttered, difficult to navigate, or wrought with grammatical or spelling errors (Banks, 2014; Fogg, 2003, pp. 722–723; Neff, 2003; Sillence et al., 2004, pp. 663–670). In a sense, a subjective feeling of "problems" may be predictive of how people perceive security in SNS environments. Most threats online are invisible. There is no equivalent of gunshots or a shattering car window to immediately alert SNS users when, analogously, their location is revealed, or information leaked. Given the lack of relevant cues in SNSs, users' perceived SNS security may then result from what is available: physical safety cues people can draw from their own experience. This possibility resonates well with previous findings of generalized perception from physical to SNS contexts with attachment style and perception of imagined others (see Bodford et al., 2017; Marwick & boyd, 2011; Ranzini & Hoek, 2017). Given this support, we expected that physical safety perception will predict perceived SNS security.

1.1.3. Background factors: socioeconomic status and past victimization

In the present study, we additionally considered two factors in an individual's background that may affect the relationships between actual and perceived physical safety, or between perceived physical safety and perceived SNS security we proposed. We first considered that socioeconomic status (SES) may be an alternative explanation for the relationship between actual and perceived physical safety. Individuals with high SES likely occupy resource-rich communities able to provide resources for a safe physical environment (e.g., wealthier communities may have a higher police presence), while also having the income to invest in physical protection (e.g., house alarms or gates) that may lead

to higher perceived physical safety. Indeed, evidence shows that individuals with higher SES fear less for their physical safety (Austin et al., 2002; Meyer et al., 2014; Simsek et al., 2014), tend to live in physically safer places (Leventhal & Brooks-Gunn, 2000), and exhibit a higher sense of control over physical threats (Feldman & Steptoe, 2004). In this possibility, SES drives both actual and perceived physical safety.

Despite inconsistent previous findings involving SES and perceived SNS security, it is possible that SES may explain the relationship between perceived physical safety and perceived SNS security as well. One work found a negative relation between SES and perceived risk of theft while online (Reisig et al., 2009); however, more recently, another study found no significant correlation between household income and perceived online threat susceptibility (Tsai et al., 2016). Despite conflicting evidence and assessment of perceived security in online domains, which include but are not limited to SNSs, we hesitated to rule out the possibility that SES positively predicts perceived SNS security in addition to perceived physical safety. Thus, we examined whether the relationships between actual physical safety and perceived physical safety, and between perceived physical safety and perceived SNS security holds above and beyond SES.

We considered past victimization as a second background factor revealing a different strength of the relationship between perceived physical safety and perceived SNS security. Past research demonstrated past victims of offline and online crimes tend to feel less safe in the context the crime was committed (Connor-Smith et al., 2010; Foster & Hagedorn, 2014; Garofalo, 1979; Näsi et al., 2017; Virtanen, 2017; Wolff & Shi, 2009). On one hand, it is possible that such experiences exemplified by these studies might lead to more generalization between perceived physical safety and perceived SNS security. For example, a victim of a burglary in the physical world may experience heightened fear of identity theft or credit card fraud while using SNSs. However, we may just as readily imagine victims of crime in one context indicating less association: Someone who has been robbed at gunpoint while walking home might have low perceived physical safety (e.g., running errands at night, going to unfamiliar places alone), all the while maintaining or even increasing their level of perceived SNS security—a milieu in which physical attacks are impossible. Similarly, past victims of SNS crime—identity fraud, cyberstalking—might turn to the physical, disconnected world, if their perceived physical safety remains largely independent of their perceived SNS security. In case of either possibility, we explored whether past victimization may moderate the relationship between perceived physical safety and perceived SNS security.

1.2. Research questions

To recapitulate, the present study addressed four research questions:

RQ1. Does actual physical safety predict perceived physical safety and perceived SNS security?

RQ2. Does perceived physical safety predict perceived SNS security?

RQ3. Does actual physical safety indirectly predict perceived SNS security through perceived physical safety?

RQ4. Do the relationships between actual and perceived physical safety, and between perceived physical safety and perceived SNS security, depend on factors in an individual's background?

1.3. Hypotheses

Our expectations were expressed in the following hypotheses for RQ1 and RQ2:

H1a. actual physical safety will positively, directly predict perceived physical safety.

H1b. actual physical safety will not directly predict perceived SNS security.

H2. perceived physical safety will positively predict perceived SNS security.

We did not have an explicit hypothesis for RQ3. That is, we explored the indirect relation between actual physical safety and perceived SNS security that is suggested by the hypothesized relationships.

We did not have explicit hypotheses for RQ4. That is, we explored whether actual physical safety will positively predict perceived physical safety and whether perceived physical safety will positively predict perceived SNS security after controlling for socioeconomic status. We further explored whether past victimization moderates the relationship between perceived physical safety and perceived SNS security.

1.4. Sample choice

Below we present a study in which a large sample of undergraduate students completed measures of actual and perceive physical safety, perceived SNS security, past victimization, and demographic information. We provide two reasons for undergraduate students as a starting sample for the present line of research. First, prior research shows that undergraduate students spend a considerable amount of time on SNSs (Bolton et al., 2013). If undergraduate students rely on perceptions of physical safety to inform their perceived SNS security, this finding will lay the ground for future research to replicate it in other populations that may not be as familiar with SNSs. Second, prior research suggests that undergraduate students comprise a sample that is relatively homogeneous in terms of age, education level, and experience in using SNSs (Kim, 2019; Peterson, 2001); thus, this sample minimizes the potential confounding effects of sociocultural factors.

2. Method

2.1. Participants

One-thousand two-hundred sixty-two undergraduate students enrolled in an introductory psychology course at a large, public institution took part in the study and received course credit for participation. Of this sample, 47.9 percent were female with a mean age of 19.43 (SD = 2.77); 56.5 percent identified as White, 15.8 percent as Latina/Latino, 8.9 percent as East Asian, 4.4 percent as Black/African American, 3.6 percent as Asian American, 2.5 percent as South Asian, 2.1 percent as Southeast Asian, 1.6 percent as Middle Eastern, 0.7 percent as Arab/Arab American, 0.6 percent as Native American, and 3.3 percent listed another ethnicity; 82.6 percent reported that they hailed from at least a middle-class background.

2.2. Materials

2.2.1. Actual physical safety

To measure actual physical safety of participants' physical environments, we asked participants to report the zip code of their permanent home at the end of the survey. Trained research assistants coded each zip code for two measures of actual physical safety (personal crime risk and property crime risk), which are released by the FBI across local police departments and municipalities, and standardized by Move, Inc. (2017). Personal crime risk represented the combined risks of rape, murder, assault, and robbery; property crime risk reflected the combined risks of burglary, larceny, and motor vehicle theft. Scores were based on seven years' worth of demographic and geographic analyses of zip code-specific crime.

After data entry, these personal and property crime index scores were randomly spot-checked for accuracy and reverse-coded to indicate personal and property safety, rather than crime risk, by computing ((max+1)–x) for each value where x indicates the raw score, subtracted from one point more than the maximum possible value. To compute actual physical safety scores, we then took the average of the personal and property safety scores so that the various types of crime were given equal weight (e.g., murder was not weighted more or less heavily than vehicle theft). For comparison, an actual physical safety score of 477 reflected the average of the U.S. national personal and property crime

risk, whereas actual physical safety scores of 527 and 377 respectively indicated half and twice the level of crime risk compared to this U.S. national average. We report the descriptive statistics of actual physical safety for our sample in Table 1 along with the following variables.

2.2.2. Perceived physical safety

We gauged perceived physical safety through Austin, Furr, and Spine's (2002) four-item index of "perception of safety in one's neighborhood." Participants thought of their permanent home (i.e., the home corresponding to their provided zip code) while indicating the degree on a 7-point scale to which they agreed or disagreed with the four items (e.g., People in my neighborhood can leave their personal property outside and unattended without fearing that it will be damaged or stolen). We formed a single averaged composite across these four items ($\alpha = 0.78$).

2.2.3. Perceived SNS security

We assessed perceived SNS security in two steps. First, we asked participants to report which SNSs they used or visited at least once a month out of Facebook, Google+, Instagram, LinkedIn, and Snapchat.[1] Second, on the next screen, we displayed six items based on Flavián and Guinalíu's (2006) index of perceived website security to assess perceived SNS security. Participants indicated the extent that they agreed or disagreed with the item on a 7-point Likert scale. For each statement, which we altered to refer to "these websites" (i.e., in plural form), we asked participants to answer based on the website(s) they had previously selected. An example item was I feel secure using these websites. We formed a single composite variable averaging across all six items ($\alpha = 0.89$).

2.2.4. Past victimization

We used an index by Thompson et al. (1992) to assess property victimization (e.g., Have you or a household member ever been a victim of theft or burglary (either when you were at home or away from home?) and personal victimization (e.g., Have you or a household member ever been a victim of assault/battery, robbery, or murder?). Responses to these two binary items were summed so that a score of 1 indicated that the participant (or a household member) had never been a victim of either crime; 2 indicated victimization of at least one type of crime; and 3 indicated victimization of both types of crime. We further adapted these items to pertain to online victimization, in which theft/burglary was adapted to Have you … victim of identity theft? and assault/battery was adapted to Have you … victim of cyberbullying or cyberstalking? Frequencies of responses to these items are displayed in Table 2.

2.2.5. Socioeconomic status

We asked participants In terms of income, how would you describe you and your family's socio-economic status? to determine SES. They responded on a five-point scale (1 = working class to 5 = upper class).

Table 1
Descriptive statistics for variables of interest.

Variable	Mean	SD	N
Actual physical safety (mean of personal, and property safety)	468.21	65.59	1196
Perceived physical safety	4.58	1.35	1262
Perceived SNS security	3.98	1.21	1251
Socioeconomic status	3.24	0.95	1257

[1] We specified a timeframe of one month to control for situations including, for example, Google+'s 2.5 billion-user platform on which more than 90 percent of users have never posted a single piece of content. We chose these SNSs based on popularity (Moreau, 2016), excluding social media—rather than social networking—sites (e.g., YouTube, Pinterest).

Table 2
Frequencies of past physical and online victimization.

Frequency of victimization	Neither	One	Both
Past physical victimization	57.1%, n = 719	33.4%, n = 421	9.5%, n = 120
Past online victimization	69.1%, n = 871	25.5%, n = 321	5.4%, n = 68

2.3. Procedure

All measures in the study were programmed and presented to participants online via Qualtrics survey software (see Appendix A). Participants first completed measures of perceived physical safety, past victimization, and perceived SNS security, followed by demographics.

3. Results

3.1. RQ1: does actual physical safety predict perceived physical safety and perceived SNS security?

We assessed the correlations between actual and perceived physical safety, and between actual physical safety and perceived SNS security. Actual physical safety positively predicted perceived physical safety ($r[1194] = 0.18$, $p < .001$). As such, we found support for H1a. Further, actual physical safety did not predict perceived SNS security ($r[1184] = 0.00$, $p = .91$), supporting H1b. Correlations are reported in Table 3, which depicts a bivariate correlation matrix of our key variables of interest.

3.2. RQ2: does perceived physical safety predict perceived SNS security?

We assessed the correlation between perceived physical safety and perceived SNS security. Perceived physical safety positively predicted perceived SNS security, $r(1249) = 0.13$, $p < .001$, supporting H2: that physical safety and SNS security are related at the perceptual level. Of secondary interest is the website, or websites, participants considered when responding to the perceived SNS security scale. Most participants reported that they used Snapchat, Facebook, and Instagram at least once a month (83.9%, 81.9%, and 81.7%, respectively), with fewer using Google+ (35.5%) and LinkedIn (20.8%). As such, responses to the measure of perceived SNS security are more likely to pertain to perceptions when using Snapchat, Facebook, and Instagram; indeed, the majority (65.4%) of all participants used all three major services. Only 6.3 percent of participants used all five in a typical month.

3.3. RQ3: does actual physical safety indirectly predict perceived SNS security through perceived physical safety?

Although actual physical safety predicted perceived physical safety, and perceived physical safety predicted perceived SNS security, we did not observe a direct relationship between actual physical safety and perceived SNS security. Thus, we conducted a mediation analysis of perceived physical safety on the relationship between actual physical safety and perceived SNS security; path coefficients and the total and direct effects of actual physical safety on perceived SNS security are

Table 3
Correlation matrix of variables of interest.

	1.	2.	3.	4.	5.	6.
1. Actual physical safety	–	–	–	–	–	–
2. Perceived physical safety	.18***	–	–	–	–	–
3. Perceived SNS security	.00	.13***	–	–	–	–
4. Physical victimization	-.05†	-.21***	-.10***	–	–	–
5. Online victimization	-.01	-.09**	-.08**	.22***	–	–
6. Socioeconomic status	.15***	.25***	.04	-.16***	-.02	–

Note: †$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$; $1186 \leq n \leq 1260$.

depicted in the mediation model in Fig. 1. The mediation analysis yielded a significant mediation effect (Sobel $z = 3.60$, $p < .001$) with significant paths from predictor to mediator and mediator to outcome; however, no direct relationship appeared between actual physical safety and perceived SNS security. Thus, we found evidence that actual physical safety indirectly predicts perceived SNS security through perceived physical safety.

3.4. RQ4: do the relationships between actual and perceived physical safety, and between perceived physical safety and perceived SNS security, depend on factors in an individual's background?

3.4.1. Socioeconomic status

We assessed whether the relationships between actual and perceived physical safety and between perceived physical safety and perceived SNS security held controlling for SES. Both relationships held: Actual physical safety predicted perceived physical safety controlling for SES, $r(1188) = 0.14$, $p < .001$; perceived physical safety predicted perceived SNS security, holding SES constant, $r(1242) = 0.12$, $p < .001$. Thus, we found support for H1a and H2 over and above SES.

3.4.2. Past victimization

It is noteworthy that past victimization experiences (in both online and physical settings) negatively predicted perceived physical safety and perceived SNS security ($-0.21 \leq r[1247–1258] \leq -0.08$, $0.001 \leq p \leq .01$). Thus, we explored whether past victimization in both cases moderated the perceptual relationship. There was no significant moderation effect of past online victimization on the relationship between perceived physical safety and perceived SNS security ($b_{interaction} = -.04$, $p = .34$; $R^2 = 0.02$, $F(3,1245) = 9.24$, $p < .001$). However, we observed a significant interaction of past physical victimization ($b_{interaction} = 0.08$, $p < .05$; $R^2 = 0.03$, $F(3,1245) = 11.21$, $p < .001$), whereby the relationship between perceived physical safety and perceived SNS security differed across those who had never been victimized ($b_{not\ victim} = .06$, $p = .13$)[2], victims of one type of crime ($b_{victim1} = 0.11$, $p < .01$), and of both property and personal crime ($b_{victim2} = 0.25$, $p < .01$). This moderation model, displayed in Fig. 2, suggests a stronger relationship between perceived physical safety and perceived SNS security for victims of physical crime compared to non-victims.

4. Discussion

4.1. Summary of findings

The present study examined whether individual differences in perceived SNS security are derived from safety features in the physical environment. Findings revealed that actual physical safety—as measured by zip code neighborhood crime data—positively predicted perceptions of physical safety, which in turn, predicted perceptions of SNS security. Both relations held even when holding annual household income constant, providing evidence against SES as an alternative explanation for these results. Further, as no direct relation between actual physical safety and perceptions of SNS security appeared, we explored and found evidence of an indirect relationship made available by perceptions of physical safety.

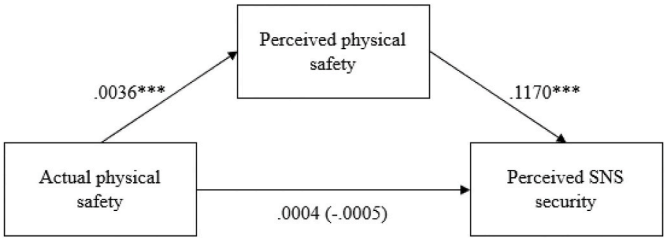

Fig. 1. Indirect effect of actual physical safety on perceived SNS security through perceived physical safety.

Moreover, the present research explored whether past victimization in both physical and online contexts altered the strength of this positive relationship between perceptions of physical safety and SNS security. Findings suggested that past victims of burglary, robbery, and similar physical crimes who also perceive that they live in unsafe environments have more concerns about SNS security compared to non-victims. This may suggest that past victims of physical crimes may generalize perceived threat into any potentially related context in case of attack regarding personal or property safety.

4.2. Implications

The present findings inform the burgeoning literature aimed to understand individual differences in perceived SNS security. Consistent with prior research (e.g., Ha & Pan, 2018; Hansen et al., 2018), the present findings showed that some people are more concerned about SNS security than others because of the safety of their immediate physical environment. These findings further extended prior work on predictors of perceived SNS security within the context of SNSs (e.g., Hajli & Lin, 2016; Rifon et al., 2005; Salleh et al., 2012; Shin, 2010) by demonstrating the potential role of the actual level of safety in the physical environment on perceived SNS security. An interesting direction for future work will be to identify other factors outside of the SNS environment that predict perceptions of SNS security.

Furthermore, the present findings have implications for the decades of past research in cyberpsychology and human-computer interaction that support a strong distinction between the online and offline worlds in self-presentation, interpersonal perception, and control over the time and pace of interaction with external stimuli (Bodford et al., 2017; McFarland & Ployhart, 2015; McKenna & Bargh, 2000). Not surprisingly, human attitudes and behaviors have been shown to differ substantially between the two spheres. In the offline world, we are bound to physical forms and geographic situations that remain relatively stagnant. But online, especially on SNSs, a person can assume whatever identities they wish without consideration of temporal or spatial bounds. As such, empirical work has conceptualized cyberspace as a separate dimension—a layer of interaction that can be added to the physical world. However, the present findings suggest that these two worlds may not be as distinct as one might expect. Perceived safety and security between offline and SNS contexts may generalize across one another—exemplifying a partial collapse between offline and SNS perceptual boundaries. As such, the present work informs previous research conceptualizing offline and SNS psychology as distinct. Just as SNSs may add a layer of interaction on top of offline context, this layer may be just as easily be removed from it in the case of safety and security perception. An interesting direction for future research will be to systematically identify other psychological domains that may generalize across offline and SNS contexts and identify factors that explain such generalizations.

The present findings further suggest that for past victims of physical crime, these two contexts seem to collapse even further. In social domains where self-presentation, interpersonal perception, and mediated communication are concerned, people may take the physically removed nature of the digital world for granted by seeking ways to hide in the shadows of this new medium. But in the domain of fear, the present findings suggest that there is nowhere to hide—that threats in physical contexts may bleed into SNSs. These findings beg the question of the exact nature of the consequences of this perceived collapsing between

[2] The subscripts accompanying our b coefficients indicate whether the participant has been a victim of one type of physical crime (victim1), both in the scale (victim2), or neither (not victim).

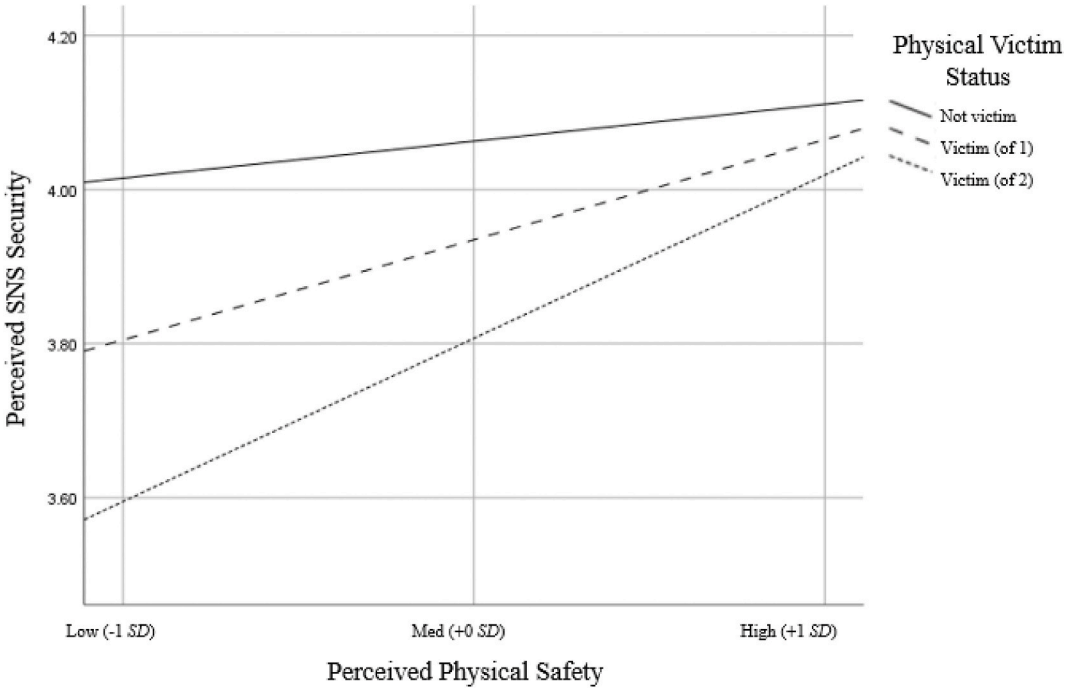

Fig. 2. Moderation of past physical victimization status of the relation between perceived physical safety and perceived SNS security.

the two worlds. If this generalization of threat is an adaptive strategy, one might hope to see an increase in online safety precautions, wariness of novel sites or contacts, and withholding of personal information when cues of physical danger are salient. Whether people's behavior on SNSs indeed shows this will be an interesting direction for future research.

Of further importance is whether a person's extent of SNS engagement—e.g., time spent on or resources invested in SNS—heightens or reduces this generalization of threat, and to what end. Trends in social media use over time show that people are spending less time offline (e.g., socializing with other face-to-face) while spending more time on digital contexts like SNSs (Nielsen, 2016; Twenge & Spitzberg, 2020). As people, especially younger generations, invest more time and energy into SNSs, which may be accompanied by unknown and ever-advancing dangers, awareness of cybercrime and safety practices should recognize that boundaries between physical and SNS contexts may have become less distinct. It would be imprudent to assume that basic human instincts cannot, and should not, change to meet the new environments in which people occupy: Our sense of safety and security that has historically stemmed from the creation of barriers between self and danger must now incorporate new methods of self-protection against still-evolving threats that can occur anywhere, at any time.

Consistent with the idea that fundamental challenges to physical safety in individuals' environments result in perception to address those challenges (see, Bugental, 2000; Kenrick et al., 2003), the present findings also established a link between actual and perceived safety in the physical environment using actual crime data and participants' reported perceptions of safety. Analogously, are perceptions of SNS security linked to actual rates of SNS security (e.g., rates of cybercrime) as well? Cues informing users of safety concerns in online contexts are rare (West, 2008), so people likely cannot easily perceive actual levels of security on SNS from the online interface alone. It will be informative for future research to test whether the actual level of cybercrime in SNS environments predicts perceived SNS security.

4.3. Conclusions

While previous research examined predictors of individual differences in people's perceptions of SNS security within the context of SNSs, the present research extended beyond SNS contexts by considering their offline origins in the physical environment. The present findings suggest that actual and perceived physical safety are offline origins of perceived SNS security. These findings suggest that the perceptual boundary between physical safety and SNS security may be more generalizable than one might expect. Furthermore, this research highlights the importance of considering features of the physical environment to understand individual differences in perceived SNS security.

4.3.1. Limitations

While this research expands social psychological understanding of individual differences in perceived SNS security, limitations and further questions remain. First, our sample comprised a relatively homogeneous group in the United States: predominately young, middle-class college students currently living in a western university environment. We therefore bring the external validity of our sample into question along two key spectrums: Age and level of access to SNSs. Whether older generations derive their perceptions of SNS security from safety from the physical environment is unknown, particularly given less time spent online and comfort with SNSs compared to younger users (Bolton et al., 2013; Jiang et al., 2016; Thomas, 2011). Whether our findings generalize to societies with lower infrastructure for technology is unknown as well. Our empirical investigation assumes that everyday offline experience is permeated with heavy SNS use. This argument may break down in countries where most households lack computer or smartphone access, where SNS security concerns are not only rare but impossible, or where SNS identities are only half-formed, used for recreation rather than necessity. Future research considering a wider array of users on these two spectrums may test, for instance, whether the relationship between perceptions of physical safety and SNS security may be weaker in older generations, individuals from rural communities, or citizens of countries lacking in cyberinfrastructure due to different cultural norms regarding and access to SNSs.

A further limitation is the correlational design of the present study. Based on the findings, we were unable to conclude that actual physical safety determines perceptions of physical safety or that these perceptions determine concerns with SNS security. Future research may wish to test whether threat manipulations administered to simulate threat in

physical contexts (e.g., using threat scenarios; see White et al., 2013a; 2013b) result in downstream lower perceived SNS security as a result of lower perceived physical safety. It's also possible that if safety and security perception generalize across offline and SNS contexts, then perception of SNS security has a return effect on perceptions of physical safety, especially for heavy SNS users. Future research could thus alternatively simulate SNS threats to physical safety and observe if such threats raise concerns with physical safety as a result of perceptions of SNS security, indicating a potential cyclical relationship between these offline and SNS perceptions.

Finally, although we examined the relationships between actual and perceived physical safety and perceived SNS security, we know little of the impact of time on these relationships. A two-part study examining lingering expected decreases in perceptions of safety and security in offline and SNS contexts days—or even weeks—after exposure to physical or SNS threats would add to our understanding of the temporal conditions of these relationships. Given the ubiquity of SNS threats to physical safety (see Ahmad, 2019; De Groot, 2019; Zhang & Gupta, 2018), a large-scale longitudinal study could capture ongoing changes in perceptions of safety and security between physical and SNS contexts after knowledge of crime-related events in mainstream news or participants' immediate communities. Alternatively, researchers could use this study design and model these relationships before and after (a portion of) participants report personal experiences of an offline or online crime-related event. The products of understanding the temporal influence on these relationships would inform future intervention research concerned with negative outcomes resulting from lower perceived SNS security (e.g., facing the dilemma of disconnecting from SNSs or participating in a context with potential security risk; see Gao et al., 2018).

Author note

We have no conflicts of interests to disclose.

Credit contributions

Jessica E. Bodford: Conceptualization; Methodology; Investigation; Data curation; Formal analysis; Writing – original draft. Cameron J. Bunker: Data curation; Formal analysis; Writing – review & editing. Virginia S. Y. Kwan: Conceptualization; Methodology; Writing – review & editing.

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Appendix A. Survey materials

A.1. Perceived physical safety

The questions below ask about the neighborhood where your permanent home is located. Please indicate how much you agree or disagree with each statement.

	Strongly disagree	Disagree	Somewhat disagree	disagree Neither agree nor	Somewhat agree	Agree	agree Strongly
In the neighborhood where I live, people really do not need to lock their doors when they leave their homes for a short period of time.							
People who live in my neighborhood have to worry about someone breaking into their home to steal things.							
People in my neighborhood can walk around at night without fear of being attacked or bothered by strangers.							
People in my neighborhood can leave their personal property outside and unattended without fearing that it will be damaged or stolen.							

A.2. Past victimization

Have you or a household member ever been a victim of theft or burglary (either when you were at home or away from home)?
μYes❍ No.
Have you or a household member ever been a victim of assault/battery, robbery, or murder?
μYes❍ No.
Have you or a household member ever been the victim of identity theft?
μYes❍ No.
Have you or a household member ever been the victim of cyberbullying or cyberstalking?
μYes❍ No.

A.3. Perceived SNS security

Which of the following websites do you use or visit at least once a month? (Select all that apply.)
❑ Facebook ❑ Google+ ❑ Instagram ❑ LinkedIn ❑ Snapchat.
Thinking only of the websites you indicated above, please indicate how much you agree or disagree with each of the following statements.
If you only used one of the above websites, please answer these questions with only that website in mind.

	Strongly disagree	Disagree	Somewhat disagree	disagree Neither agree nor	Somewhat agree	Agree	Strongly agree
These websites have enough security measures to protect my personal information.							
When I post information on these websites, I am sure that it will not be intercepted or obtained by unauthorized third parties.							
I am confident that the private information I provide these websites will be secured.							
I think these websites are very concerned about the security of any transactions.							
I feel secure using these websites.							
I feel safe when I provide personal information to these websites.							

A.4. Demographics

What is your sex?
❍ Male ❍ Female ❍ Other: _____
What is your age?
_____
Which best describes your race or ethnicity?
μWhite/Caucasian ❍ Black/African-American ❍ Hispanic/Latino ❍ Native American.
❍ East Asian (e.g., China, Japan) ❍ South Asian (e.g., India) ❍ Southeast Asian (e.g., Indonesia) ❍ Asian-American ❍ Middle Eastern ❍ Arab/Arab-American ❍ Other: _____
In terms of income, how would you describe your family's socio-economic status?
μUpper class ❍ Upper-middle class ❍ Middle class ❍ Lower-middle class ❍ Working class.
μOther: _____
What is the 5-digit zip code of your permanent home?
_____.

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