“Cybercrime risk perception and preventive awareness among Vietnamese university students: The roles of social media, legal awareness, media influence, and education”

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ARTICLE INFO	Thanh Thao Phung (2026). Cybercrime risk perception and preventive awareness among Vietnamese university students: The roles of social media, legal awareness, media influence, and education. *Knowledge and Performance Management*, *10*(3), 50-66. doi:10.21511/kpm.10(3).2026.04
DOI	http://dx.doi.org/10.21511/kpm.10(3).2026.04
RELEASED ON	Thursday, 16 July 2026
RECEIVED ON	Friday, 28 November 2025
ACCEPTED ON	Tuesday, 16 June 2026

JOURNAL	"Knowledge and Performance Management"
ISSN PRINT	2543-5507
ISSN ONLINE	2616-3829
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	Sp. z o.o. Kozmenko Science Publishing

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
37	3	13

BUSINESS PERSPECTIVES

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CYBERCRIME RISK PERCEPTION AND PREVENTIVE AWARENESS AMONG VIETNAMESE UNIVERSITY STUDENTS: THE ROLES OF SOCIAL MEDIA, LEGAL AWARENESS, MEDIA INFLUENCE, AND EDUCATION

Type of the article: Research Article

Received on: 28th of November, 2025
Accepted on: 16th of June, 2026
Published on: 16th of July, 2026

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Abstract

Cybercrime is an increasingly visible digital safety concern for young adults in Vietnam, particularly for university students who rely heavily on social media for communication, learning, and risk-related information. This cross-sectional study examines the associations between social media use, legal awareness of cybercrime, media influence and misinformation exposure, family-school education, personal safety anxiety, and cybercrime risk perception and preventive awareness. Data were collected from 746 adult respondents in Vietnam, almost all of them were undergraduate students aged 18-24, and analyzed using EFA, CFA, CB-SEM, and bootstrap resampling. The results indicate that personal safety anxiety is the strongest correlate of cybercrime risk perception and preventive awareness. Family-school education, legal awareness, media influence and misinformation exposure, and social media use are also positively associated with both anxiety and the outcome construct. Indirect associations through personal safety anxiety were observed for all four antecedents, with the strongest indirect association involving family-school education. The findings should be interpreted as associational rather than causal because the data are cross-sectional and self-reported. The study contributes to socio-legal and communication research by showing how informational, legal, educational, and emotional factors jointly relate to cybercrime-related awareness among Vietnamese university students.

Keywords cybercrime, cybercrime risk perception, preventive awareness, legal awareness, personal safety anxiety, social media use

JEL Classification K42, D83, D91

INTRODUCTION

The expansion of digital platforms has transformed communication, learning, entertainment, and social interaction. At the same time, it has created a more complex cybercrime environment in which fraud, identity misuse, privacy violations, online deception, and platform-enabled harassment can affect individuals and institutions. Cybercrime is therefore not only a technical or legal problem but also a socio-behavioral issue because individuals' perceptions of cyber threats influence how they interpret risk, seek information, and adopt preventive behaviors (Martin, 2025).

Globally, cyber insecurity has been recognized as a major contemporary risk because digital threats can produce financial loss, privacy harm, organizational disruption, and declining trust in institutions (WEF, 2024). The FBI Internet Crime Report recorded 880,418 complaints and losses exceeding USD 12.5 billion in 2023, illustrating the

Conflict of interest statement:
Author(s) reported no conflict of interest

http://dx.doi.org/10.21511/kpm.10(3).2026.04

scale of cyber-enabled harm (Federal Bureau of Investigation, Internet Crime Complaint Center, 2024). Vietnam reflects these global concerns. Official Vietnamese sources reported approximately 1,500 online fraud cases prosecuted in 2023 and substantial financial losses, while later national reports indicated a high number of attacks targeting Vietnamese organizations and enterprises (Ministry of Information and Communications, 2024). These figures point to an environment in which cybercrime is increasingly visible in public discussion and everyday digital life.

According to the Digital 2024: Vietnam report, Vietnam had 78 million Internet users and 72.7 million social media users as of January 2024 (DataReportal, 2024). For students, platforms such as Facebook, TikTok, Zalo, and Instagram are not only channels for entertainment and interaction but also sources of information about risk, crime, law, and public warnings. As a result, cybercrime risk perception and preventive awareness may be shaped by both direct knowledge and mediated exposure to cyber incidents, victim stories, official warnings, and misinformation.

Cybercrime risk perception and preventive awareness matter because perceived risk, recognition of harmful behaviors, and awareness of response options can be associated with vigilance, protective intention, reporting behavior, and willingness to adopt safer digital practices. Existing studies suggest that cybersecurity knowledge and awareness are associated with safer online intentions and behaviors (Lee & Chua, 2023), while attitudes toward cybersecurity can shape preventive responses to threats such as phishing and social engineering (Kuraku et al., 2023). However, much of the existing literature has examined isolated predictors, such as cybersecurity knowledge, media exposure, social media use, or education, rather than testing these factors simultaneously within an integrated model.

A further limitation concerns the psychological pathway through which these factors may be related to cybercrime-related perceptions and awareness. Personal safety anxiety may reflect the emotional salience of information exposure, legal awareness, media influence, and educational messages. In this sense, anxiety is not treated here as an undesirable outcome alone. When accompanied by coping resources and actionable guidance, it may become a form of informed vigilance. Yet the indirect role of personal safety anxiety in cybercrime risk perception and preventive awareness among Vietnamese university students remains underexplored.

Against this background, the scientific problem addressed in this article is how cybercrime risk perception and preventive awareness are formed among Vietnamese university students in a digitally intensive environment where media exposure, legal awareness, misinformation, and educational guidance operate simultaneously. The empirical scope of the article is deliberately limited to a predominantly undergraduate student sample aged 18-24. Therefore, the findings are not generalized to all Vietnamese youth, older adults, or non-student populations. The study proposes and tests an integrated model in which social media use, legal awareness of cybercrime, media influence and misinformation exposure, and family-school education are associated with cybercrime risk perception and preventive awareness directly and indirectly through personal safety anxiety.

1. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

This literature review is organized around three connected streams of previous research. The first stream concerns information exposure and media effects, including social media use, agenda-setting, media dependency, and misinformation. The second stream concerns knowledge and socialization, including legal awareness and family-school education. The third stream concerns psychological risk appraisal, especially personal safety anxiety and cybercrime risk perception and preventive awareness. This structure allows

previous scientific achievements to be reviewed as a coherent basis for the conceptual model rather than as separate descriptions of isolated variables.

The theoretical framework is integrated rather than additive. Social media use and media influence define the information environment in which cybercrime-related cues become salient; legal awareness provides the cognitive-legal lens through which students interpret these cues; family-school education represents socialization and guidance that make risk norms and preventive practices available; and personal safety anxiety captures the affective appraisal through which informational, legal, and educational inputs become subjectively meaningful. Reinforcing spirals, risk information processing, agenda-setting, media dependency, the Theory of Planned Behavior, Social Learning Theory, Protection Motivation Theory, and the Extended Parallel Process Model are therefore used as complementary perspectives within a single socio-behavioral model: exposure and socialization shape knowledge and salience, while threat appraisal links these antecedents to cybercrime-related perception and awareness.

Social media use has become a central context in which young adult students encounter cybercrime-related information. Drawing on the reinforcing-spirals perspective and risk information processing approaches, repeated exposure to risk messages can be associated with issue salience, perceived information insufficiency, and systematic attention to threat-related content (Griffin et al., 1999; Slater, 2007). In digital environments, users may encounter official warnings, media reports, peer narratives, victim accounts, and sensational or misleading posts. Such exposure may make cybercrime appear more common, severe, and personally relevant, particularly among young users who rely on social platforms for information and social interaction.

Legal awareness of cybercrime refers to knowledge of prohibited online behaviors, legal consequences, rights, reporting channels, and available remedies. From the perspective of the Theory of Planned Behavior, knowledge can strengthen perceived behavioral control by clarifying what behaviors are risky, prohibited, or reportable (Ajzen, 1991). However, legal awareness may also be associated with stronger threat recognition. When individuals better understand the legal seriousness of online fraud, impersonation, data misuse, harassment, and misinformation, they may perceive cybercrime as more salient and may report stronger security-related concerns.

Media influence and misinformation exposure are also important in the formation of cybercrime risk perception and preventive awareness. Agenda-setting theory suggests that repeated media attention can be associated with the salience of particular issues in public consciousness (McCombs & Shaw, 1972), while media dependency theory proposes that media effects may be stronger when audiences rely on media for orientation in uncertain environments (Ball-Rokeach & DeFleur, 1976). Cybercrime is often communicated through incidents, warnings, losses, and victim narratives. Accurate information may support awareness, whereas sensationalized or misleading information may be associated with fear amplification and distorted perceptions of prevalence and vulnerability (Hendriks, 2019; Ravichandran & Arulchelvan, 2017).

Family and school education provide another important source of cyber-safety socialization. Social Learning Theory emphasizes that norms and behaviors are acquired through modeling, guidance, and repeated interaction with significant others (Bandura, 1977). In the cyber-safety context, families and schools can teach students how to recognize suspicious links, protect personal data, verify information, report harmful behavior, and respond to online incidents. Preventive education may therefore be associated with greater recognition of cybercrime and stronger perceived salience of digital risks, while also providing coping resources. For youth who receive more frequent warnings and guidance from family and school, cybercrime risk perception, preventive awareness, and personal safety anxiety may be higher because risks become more visible and personally relevant, but such anxiety can still represent informed vigilance when accompanied by practical prevention skills (Lapuh Bele et al., 2014; Mavric et al., 2024).

Personal safety anxiety is a security-related emotional response involving worry, unease, or vigi-

http://dx.doi.org/10.21511/kpm.10(3).2026.04

lance about potential threats in digital environments. Protection Motivation Theory and the Extended Parallel Process Model both emphasize that perceived threat and efficacy jointly shape protective responses (Rogers, 1975; Witte, 1992). Security anxiety has also been linked to risk appraisal and threat-avoidance behavior when individuals perceive threats as serious and personally relevant (Wang et al., 2023). In the present model, personal safety anxiety is treated as a theoretically proposed psychological pathway linking information exposure, legal awareness, media influence, and education with cybercrime risk perception and preventive awareness.

Cybercrime risk perception and preventive awareness refer to an individual's cognitive and affective evaluation of the seriousness, likelihood, and consequences of illegal or harmful behaviors in digital environments, together with awareness of basic preventive and response options. Previous research indicates that cybercrime seriousness and risk perception are influenced by knowledge, beliefs, emotional reactions, and social context (Fissel & Lee, 2023; Lee & Lim, 2019; Slovic, 2010). For young adult students who are highly active online, this construct may be shaped not only by personal experience but also by social media content, legal knowledge, educational guidance, and anxiety about personal safety.

Taken together, previous research suggests that cybercrime risk perception and preventive awareness are shaped by the interaction of informational exposure, legal cognition, educational resources, and emotional appraisal. Nevertheless, prior studies have rarely tested these elements simultaneously within one integrated model, especially in the context of Vietnamese university students. This study therefore addresses a specific empirical gap by examining whether personal safety anxiety represents an indirect pathway linking social media use, legal awareness, media influence and misinformation exposure, and family-school education with cybercrime risk perception and preventive awareness.

The purpose of this study is to examine the direct associations of social media use, legal awareness of cybercrime, media influence and misinformation exposure, and family-school education with cybercrime risk perception and preventive awareness, and to test the indirect role of personal safety anxiety in these relationships. The hypotheses are formulated as follows:

H1a: Social media use is positively associated with cybercrime risk perception and preventive awareness.

H1b: Legal awareness of cybercrime is positively associated with cybercrime risk perception and preventive awareness.

H1c: Media influence and misinformation exposure are positively associated with cybercrime risk perception and preventive awareness.

H1d: Family and school education is positively associated with cybercrime risk perception and preventive awareness.

H2a: Social media use is positively associated with personal safety anxiety.

H2b: Legal awareness of cybercrime is positively associated with personal safety anxiety.

H2c: Media influence and misinformation exposure are positively associated with personal safety anxiety.

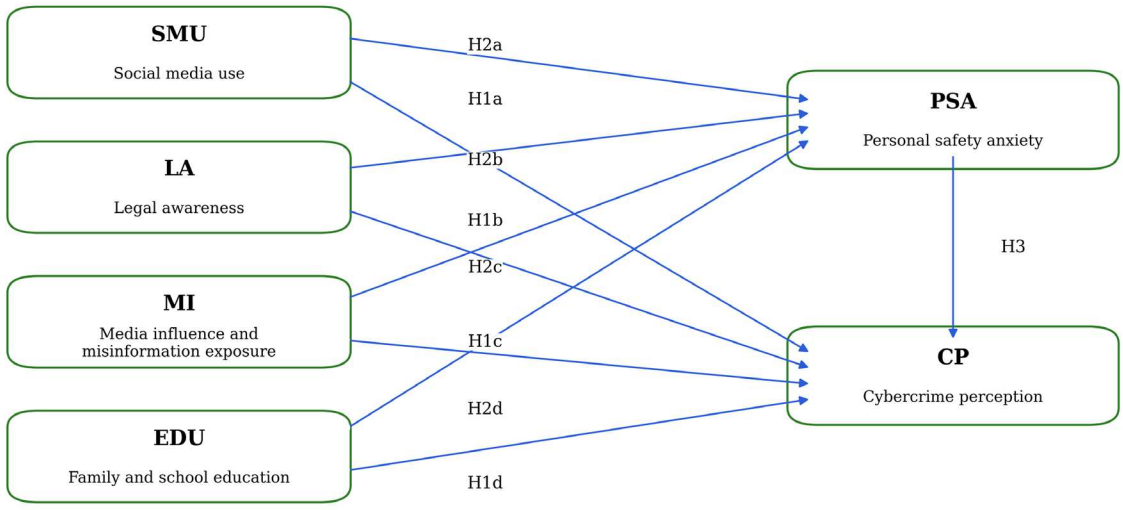
H2d: Family and school education is positively associated with personal safety anxiety.

H3: Personal safety anxiety is positively associated with cybercrime risk perception and preventive awareness.

H4a: Personal safety anxiety is specified as an indirect pathway between social media use and cybercrime risk perception and preventive awareness.

H4b: Personal safety anxiety is specified as an indirect pathway between legal awareness of cybercrime and cybercrime risk perception and preventive awareness.

H4c: Personal safety anxiety is specified as an indirect pathway between media influence and misinformation exposure and cybercrime risk perception and preventive awareness.



Note: Indirect pathways: *H4a:* SMU → PSA → CP; *H4b:* LA → PSA → CP; *H4c:* MI → PSA → CP; *H4d:* EDU → PSA → CP.

Figure 1. Conceptual model and hypothesized direct and indirect pathways

H4d: Personal safety anxiety is specified as an indirect pathway between family and school education and cybercrime risk perception and preventive awareness.

2. METHODOLOGY

This section reports the study design, sampling approach, respondent profile, instrument development, ethical procedures, and data analysis strategy.

2.1. Research design and study context

This study employed a cross-sectional survey design to test an integrated socio-behavioral model of cybercrime risk perception and preventive awareness among Vietnamese university students and young adult digital platform users. Covariance-based structural equation modeling (CB-SEM) was selected because the study aimed to evaluate overall model fit and estimate theoretically specified relationships among latent constructs within a confirmatory framework (MacCallum et al., 1996; Jobst et al., 2023). Social media use, legal awareness of cybercrime, media influence and misinformation exposure, and family-school education were specified as exogenous variables. Personal safety anxiety was specified as an indirect pathway, and cybercrime risk perception and preventive awareness were specified as the final endogenous constructs.

2.2. Respondents, sampling, and data collection

The target population comprised Vietnamese university students and young adult digital platform users who used services such as Facebook, TikTok, Zalo, and Instagram. Data were collected through an anonymous structured online questionnaire in Vietnam from May 2025 to August 2025. The questionnaire was distributed through university-related networks and social media channels. The questionnaire introduction stated that the research was conducted by a student research team from Hanoi Procuratorate University and that respondents' information would be kept anonymous. This sampling strategy was appropriate for accessing digitally active university students, but it also means that the sample should not be treated as representative of all Vietnamese youth.

Participation was voluntary, and respondents were informed that the data would be used only for academic research purposes. After data screening, 746 valid responses were retained. Incomplete, duplicate, or invalid responses were excluded before analysis. The achieved sample size was considered adequate for CB-SEM because sample size

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requirements depend on model complexity, factor loadings, parameter estimates, and expected effect sizes rather than only on fixed rules of thumb (Bastardoz & Antonakis, 2014; Wolf et al., 2013). Recent SEM guidance recommends model-specific power and precision considerations, including analytic and simulation-based approaches (Jobst et al., 2023; Wang & Rhemtulla, 2020).

Table 1. Respondent characteristics (N = 746)

Characteristic	Category	n (%)
Gender	Female	443 (59.4)
	Male	300 (40.2)
	Other	3 (0.4)
Age group	18-24	742 (99.5)
	25-30	3 (0.4)
	Over 30	1 (0.1)
Education level	Lower secondary school	2 (0.3)
	Upper secondary school	19 (2.5)
	Undergraduate	724 (97.1)
	Postgraduate	1 (0.1)
Occupation	Student	740 (99.2)
	Office staff	2 (0.3)
	Civil servant/public employee	3 (0.4)
	Freelancer	1 (0.1)

The sample was therefore highly concentrated among undergraduate students aged 18-24. During data screening, age information was checked, and all respondents were confirmed to be 18 years of age or older; 742 respondents were classified in the 18-24 age group. This composition is relevant to the research objective because the study focuses on young adult students who are active in digital and social media environments. At the same time, the dominance of students is a major boundary condition, and generalizations beyond digitally connected Vietnamese university students should be made cautiously.

Table 2. Frequently used social media platforms

Platform	Number of users (n)	Percentage of cases (%)
Facebook	671	89.9
TikTok	589	79.0
Zalo	501	67.2
Instagram	463	62.1
Others	259	34.7

The platform-use profile confirms that the respondents were embedded in major social media ecosystems. This is important for the study because the proposed model assumes that cybercrime-related information, warnings, misinformation, and peer narratives are encountered primarily through digital and social media channels.

2.3. Instrument development and questionnaire structure

The questionnaire included demographic questions, social media platform-use items, and multi-item measures for the six latent constructs. The demographic section recorded gender, age group, education level, occupation, and frequently used social media platforms. All construct items were measured on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire contained six construct blocks: social media use (SMU, five items), legal awareness of cybercrime (LA, five items), media influence and misinformation exposure (MI, five items), family-school education (EDU, five items), personal safety anxiety (PSA, five items before refinement), and cybercrime risk perception and preventive awareness (CP, five items). The label of CP was revised to make clear that the items include perceived seriousness and recognition as well as prevention and response awareness; the construct is therefore not treated as a pure perception-only measure.

The item wording was developed from the conceptual definitions of the constructs and adapted to the Vietnamese university-student setting. Items were included because they directly correspond to the proposed model and capture the hypothesized social, legal, media, educational, emotional, and perceptual components of cybercrime-related awareness. The questionnaire was written in Vietnamese, reviewed for clarity and contextual appropriateness, and pilot-refined before the main survey to reduce ambiguity and ensure that response options were understandable for the target respondents. These steps are consistent with established recommendations for instrument development and scale adaptation (Boateng et al., 2018; Efstathiou, 2019; Koenig & Zaben, 2021).

The initial questionnaire contained 30 observed variables across six latent constructs. During exploratory factor analysis, item PSA3 was removed because its factor loading was below 0.50. The fi-

Table 3. Measurement structure of the questionnaire

Construct	Code	Measurement focus
Social media use	SMU	Daily use, exposure to cybercrime information, time spent on social media, information-safety search, and perceived influence of social media
Legal awareness of cybercrime	LA	Knowledge of cybercrime behaviors, legal rules, reporting channels, prior legal learning, and distinction between legal and illegal online conduct
Media influence and misinformation exposure	MI	Exposure to news, media-induced concern, difficulty distinguishing real and fake information, insecurity caused by social media, and influence of misinformation
Family and school education	EDU	Family reminders, school programs, learning to protect personal data, perceived need for school education, and risk-sharing by relatives
Personal safety anxiety	PSA	Worry about sharing personal data, fear of online fraud, privacy concern, insecurity about unknown links/files, and caution before posting. PSA3 was removed after EFA refinement
Cybercrime risk perception and preventive awareness	CP	Recognition of cybercrime forms, prevention knowledge, perceived seriousness, verification before sharing, and response knowledge

nal measurement model, therefore, retained 29 observed variables. The full questionnaire is provided in Appendix A so that readers can evaluate the wording, coverage, and construct alignment of the survey instrument.

Several procedural remedies were used to reduce common method bias. The survey was anonymous, participation was voluntary, there were no right or wrong answers, and respondents were informed that the data would be analyzed only in aggregate form. The questionnaire separated the predictor, mediator, and outcome blocks, used neutral wording, and avoided evaluative labels that might encourage socially desirable responses. Nevertheless, because all variables were measured using the same self-report instrument at one point in time, common method bias cannot be fully excluded. This limitation is explicitly acknowledged in the Discussion and should be addressed in future studies through longitudinal designs, multi-source data, marker variables, or temporal separation.

2.4. Ethical considerations and data-use statement

The study involved adult human participants and followed ethical principles for anonymous social-science survey research. All respondents confirmed that they were at least 18 years old before completing the questionnaire. Participation was voluntary and based on informed consent. The introductory text of the questionnaire explained the academic purpose of the study, the voluntary nature of participation, the approximate scope of the questions, and the anonymous treatment of responses. Proceeding to the questionnaire was treated as consent to participate, and respondents could stop at any point before submitting the form. No names, contact details, identity numbers, student codes, IP addresses, precise locations, or other directly identifying information were collected. The dataset was stored securely, accessed only by the research team, and analyzed only in aggregate form. Because the study involved only anonymous self-report responses from adults, posed no more than minimal risk, and did not involve deception, intervention, clinical procedures, minors, or personally identifiable sensitive data, it was treated as exempt from full institutional ethics review under the applicable practice for low-risk anonymous social-science surveys.

The dataset analyzed in this article was collected specifically for the present study and has not been used as the empirical basis for any other published or submitted article. This statement is included to address the editorial concern that the same survey results should not be reused across publications without transparent disclosure.

2.5. Data analysis strategy

Data screening and preparation were conducted before model estimation. The analysis proceeded in two stages. First, the measurement model was evaluated through reliability testing, exploratory factor analysis, confirmatory factor analysis, convergent validity assessment, and discriminant validity assessment. Internal consistency was examined using Cronbach's alpha and composite reliability, while convergent validity was assessed through average variance extracted. EFA was conducted using Principal Axis Factoring with Promax rotation. In the first EFA run, 30 observed

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variables were extracted into six factors, but item PSA3 was removed because its loading was below 0.50. The refined EFA retained 29 observed variables across six factors. CFA was then used to assess the measurement model on the same retained dataset. This approach is reported transparently, but it should be interpreted as within-sample validation rather than cross-validation. Discriminant validity was evaluated by comparing the square root of AVE with inter-construct correlations, consistent with SEM reporting guidance (Cheung & Wang, 2017; Cheung et al., 2024).

Second, the structural model was estimated using CB-SEM to test the hypothesized structural paths from SMU, LA, MI, and EDU to PSA and CP, as well as the path from PSA to CP. Indirect paths from the four antecedents to cybercrime risk perception and preventive awareness through personal safety anxiety were assessed using bootstrap resampling with 1,000 draws. Bootstrap inference was used because indirect effects often have non-normal sampling distributions (Tofighi, 2020). Because the data are cross-sectional, mediation results are interpreted as evidence consistent with the proposed indirect-pathway model rather than proof of causal ordering (Cole & Maxwell, 2003; Maxwell et al., 2011; Reichardt, 2011).

3. RESULTS

This section presents the empirical findings in the sequence required for SEM-based research: descriptive evidence, reliability analysis, factor analysis, model validity, structural paths, mediation effects, gender invariance, reliability, and descriptive statistics.

The descriptive statistics indicate that item means were generally above the midpoint of the five-point scale, suggesting relatively high agreement across most measures. Media influence items were particularly high, with MI3 reaching a mean of 4.19. Legal awareness items also showed moderate-to-high mean values. Cronbach's alpha values ranged from 0.828 to 0.883, indicating acceptable to good internal consistency for all initial construct scales.

Table 5. Internal consistency of measurement scales

Scale	Cronbach's alpha
SMU	0.849
LA	0.828
MI	0.856
EDU	0.852
PSA	0.883
CP	0.862

3.1. Exploratory and confirmatory factor analysis

Exploratory factor analysis supported the dataset's adequacy for factor extraction. In the first run, the KMO value was 0.900, and Bartlett's test of sphericity was significant (chi-square = 11,162.974, df = 435, $p < 0.001$). The first extraction explained 56.010% of the variance. However, item PSA3 did not meet the loading criterion and was removed. The second EFA run produced a KMO value of 0.892, a significant Bartlett's test (chi-square = 10,557.774, df = 406, $p < 0.001$), a minimum retained eigenvalue of 1.068, and a cumulative variance explained of 56.040%. All retained factor loadings exceeded 0.50. Complete standardized CFA factor loadings for retained items are reported in Appendix B.

The CFA results indicated acceptable model fit: chi-square/df = 2.941, TLI = 0.924, CFI = 0.932, GFI = 0.913, and RMSEA = 0.051. Convergent validity was supported because composite reliability values were at least 0.833 and AVE values were at least 0.503. Discriminant validity was also sup-

Table 4. Descriptive statistics of selected observed variables

Observed variable	N	Minimum	Maximum	Mean	Standard deviation
SMU1	746	1	5	3.77	0.728
SMU2	746	1	5	3.84	0.722
SMU3	746	1	5	3.79	0.775
SMU4	746	1	5	3.80	0.740
SMU5	746	1	5	3.84	0.731
LA1-LA5	746	1	5	3.82-3.89	0.74-0.78
MI1-MI3	746	1	5	Up to 4.19	0.78-0.80

Source: AMOS output.

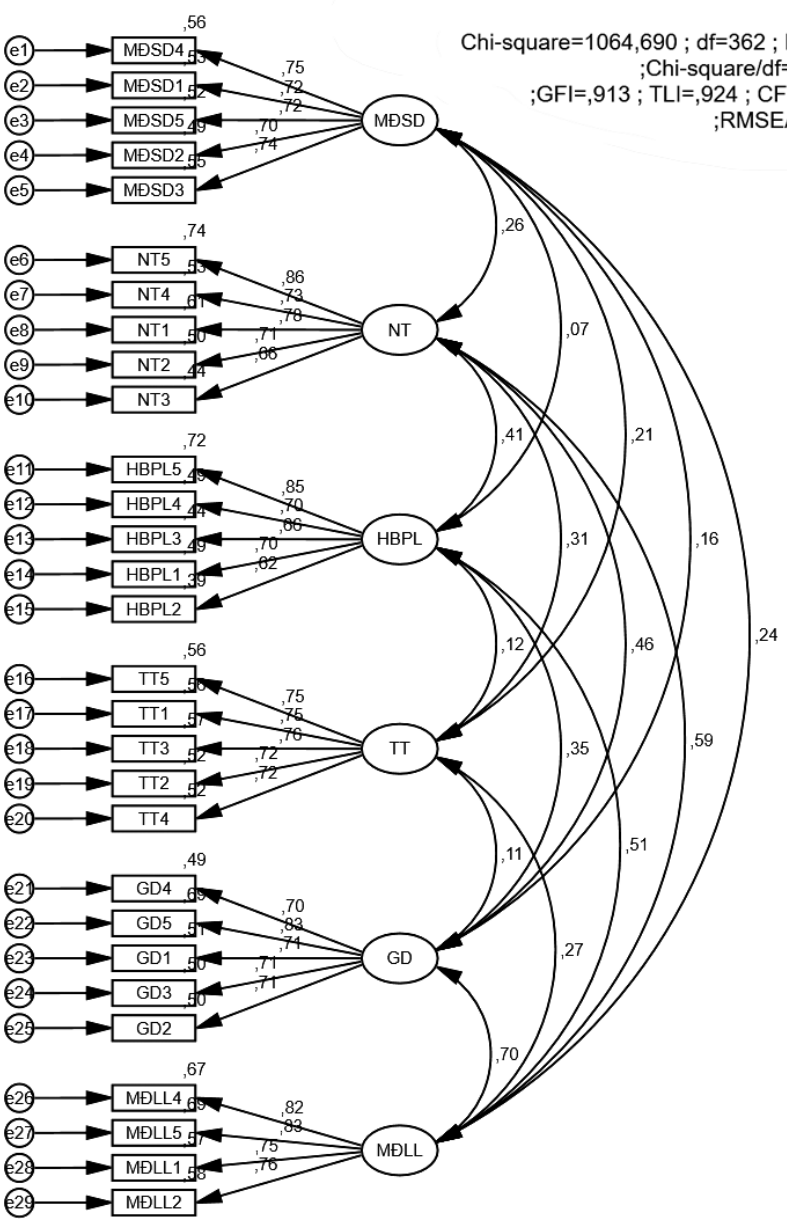

Figure 2. Standardized confirmatory factor analysis results

Table 6. Exploratory factor analysis results

Index	Value
First-run KMO	0.900
First-run Bartlett's test	chi-square = 11,162.974, df = 435, p < 0.001
First-run variance explained	56.010%
Item removed after first run	PSA3 because loading < 0.50
Final KMO after refinement	0.892
Final Bartlett's test	chi-square = 10,557.774, df = 406, p < 0.001
Final variance explained	56.040%
Minimum retained eigenvalue	1.068
Retained observed variables	29
Factor-loading criterion	All retained loadings > 0.50

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ported in the reported matrix excerpt because the square roots of AVE were higher than the corresponding inter-construct correlations.

Table 7. CFA model fit and convergent validity

Indicator / Construct	Value 1	Value 2	Value 3
chi-square/df	2.941		
TLI	0.924		
CFI	0.932		
GFI	0.913		
RMSEA	0.051		
EDU	CR = 0.854	AVE = 0.540	MSV = 0.491
SMU	CR = 0.850	AVE = 0.531	MSV = 0.067
CP	CR = 0.865	AVE = 0.564	MSV = 0.343
LA	CR = 0.833	AVE = 0.503	MSV = 0.264
MI	CR = 0.857	AVE = 0.545	MSV = 0.094
PSA	CR = 0.871	AVE = 0.628	MSV = 0.491

Table 8. Discriminant validity matrix (reported coefficients)

Construct	EDU	SMU	CP	LA	MI	PSA
EDU	0.735					
SMU	0.157	0.728				
CP	0.461	0.259	0.751			
LA	0.347	0.072	0.407	0.709		
MI	0.105	0.206	0.307	0.121	0.738	
PSA	0.701	0.243	0.586	0.514	0.269	0.793

3.2. Structural model and hypothesis testing

The SEM results supported all hypothesized structural associations. For personal safety anxiety, family-school education showed the largest positive association (beta = 0.568, p = 0.002), followed by legal awareness (beta = 0.291, p = 0.002), media influence and misinformation exposure (beta = 0.153, p = 0.002), and social media use (beta = 0.102, p = 0.006). These results indicate that educational guidance, legal cognition, media exposure, and social media use were positively associated with personal safety anxiety in the present sample.

For cybercrime risk perception and preventive awareness, personal safety anxiety was the strongest direct correlate (beta = 0.343, p = 0.001). Media influence and misinformation exposure (beta = 0.160, p = 0.004), legal awareness (beta = 0.157, p = 0.005), family-school education (beta = 0.132, p = 0.018), and social media use (beta = 0.111, p = 0.008) also showed significant positive associations. The model explained 61.3% of the variance in personal safety anxiety and 40.4% of the variance in cybercrime risk perception and preventive awareness.

Figure 3 presents the estimated AMOS structural model with standardized path coefficients for the hypothesized structural associations.

3.3. Mediation analysis and gender invariance

The bootstrap analysis with 1,000 resamples supported the indirect-pathway interpretation of personal safety anxiety. All indirect associations from social media use, legal awareness, media influence and misinformation exposure, and family-school education to cybercrime risk perception and preventive awareness through personal safety anxiety were statistically significant (p = 0.001-0.002). The largest standardized indirect association was observed for family-school education (0.123), followed by legal awareness (0.061), media influence

Table 9. Structural paths and explained variance

Dependent variable	Path	Standardized coefficient	p-value	Result
PSA	SMU → PSA	0.102	0.006	Supported
PSA	LA → PSA	0.291	0.002	Supported
PSA	MI → PSA	0.153	0.002	Supported
PSA	EDU → PSA	0.568	0.002	Supported
PSA	R-squared	0.613		
CP	SMU → CP	0.111	0.008	Supported
CP	LA → CP	0.157	0.005	Supported
CP	MI → CP	0.160	0.004	Supported
CP	EDU → CP	0.132	0.018	Supported
CP	PSA → CP	0.343	0.001	Supported
CP	R-squared	0.404		

Source: AMOS output.

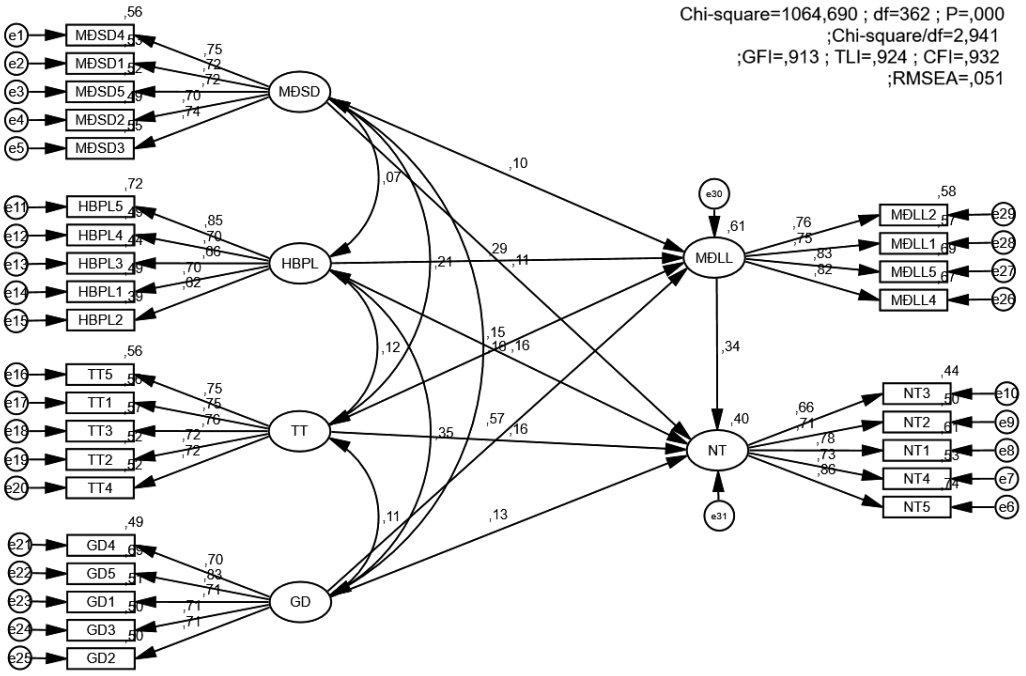

Figure 3. Structural equation model results from AMOS

Table 10. Indirect associations through personal safety anxiety

Indirect path	Standardized indirect association	p-value	Result
SMU → PSA → CP	0.015	0.002	Supported
LA → PSA → CP	0.061	0.001	Supported
MI → PSA → CP	0.026	0.001	Supported
EDU → PSA → CP	0.123	0.001	Supported

and misinformation exposure (0.026), and social media use (0.015). These results should be interpreted as cross-sectional indirect associations, not as evidence that the antecedent variables temporally caused later changes in anxiety or cybercrime-related awareness.

As an exploratory multi-group robustness check, a chi-square difference test comparing constrained and unconstrained gender models showed no statistically significant difference (Delta chi-square = 9.424, Delta df = 9, p = 0.399). This result suggests that the estimated structural associations did not differ significantly by gender in the current male-female subsample. However, this should not be interpreted as a full gender invariance conclusion because configural, metric, scalar, and residual measurement invariance were not tested in a complete stepwise sequence, and the 'other' gender category was too small for separate analysis.

Table 11. Multi-group analysis by gender

Model	Chi-square	df
Invariant model	1516.164	733
Non-invariant model	1506.740	724
Difference	9.424	9
p-value	0.399	

4. DISCUSSION

This study examined how social media use, legal awareness, media influence and misinformation exposure, and family-school education are associated with cybercrime risk perception and preventive awareness among Vietnamese university

http://dx.doi.org/10.21511/kpm.10(3).2026.04

students, with personal safety anxiety specified as a theoretically proposed indirect pathway. The findings support an integrated account in which cybercrime-related perceptions and awareness are linked to the joint operation of informational exposure, legal cognition, educational socialization, and emotional risk appraisal.

The strongest direct correlate of cybercrime risk perception and preventive awareness was personal safety anxiety. This result is consistent with Protection Motivation Theory and the Extended Parallel Process Model, both of which argue that perceived threat and emotional arousal can intensify risk appraisal when a threat is considered serious and personally relevant (Rogers, 1975; Witte, 1992). It also extends research on security anxiety by showing that anxiety may operate not only as an outcome of cyber-threat exposure but also as a proximal psychological correlate of cybercrime-related perception and awareness (Wang et al., 2023). In the Vietnamese university-student context, this suggests that cybercrime-related awareness is not purely cognitive but is closely connected to affective vigilance about personal safety.

The positive association of family-school education with both personal safety anxiety and cybercrime risk perception and preventive awareness is particularly important. Rather than concluding that education directly increases anxiety, the results suggest that students who report more family reminders, school-based guidance, and discussion about online risks also report higher vigilance and stronger cybercrime-related awareness. Education may make fraud, privacy invasion, suspicious links, and harmful online behavior more visible and personally relevant. This interpretation is consistent with social learning and preventive education perspectives, but it also indicates that education should not rely only on warnings; it should pair risk salience with clear response efficacy and self-efficacy guidance.

Legal awareness was positively associated with both personal safety anxiety and cybercrime risk perception and preventive awareness. This finding may appear counterintuitive if legal awareness is expected only to strengthen perceived control. However, it is consistent with the idea that legal knowledge can make violations more recognizable and consequences more concrete. In other words, legally informed students may be more capable of identifying online behaviors as cybercrime and therefore more likely to perceive such risks as serious. This extends the Theory of Planned Behavior perspective by suggesting that knowledge and perceived control may coexist with heightened threat recognition (Ajzen, 1991).

Media influence and misinformation exposure were also positively associated with both anxiety and cybercrime risk perception and preventive awareness. This result is consistent with agenda-setting and media-dependency perspectives, which suggest that repeated exposure to media narratives can be associated with issue salience and public risk judgments (Ball-Rokeach & DeFleur, 1976; McCombs & Shaw, 1972). The finding is especially relevant in a high-platform-use student sample, where cybercrime-related warnings, victim stories, sensational posts, and misinformation may circulate rapidly. Compared with legal awareness and education, however, the associations involving media influence were moderate, suggesting that media exposure matters but should not be interpreted independently of cognitive and educational resources.

Social media use showed statistically significant but comparatively smaller direct and indirect associations. This indicates that platform use alone may not be sufficient to explain cybercrime risk perception and preventive awareness. What users encounter on these platforms, whether they can evaluate information critically, and whether they have legal and educational resources may be more consequential than frequency of use alone. This finding refines previous assumptions about social media exposure by suggesting that the quality and interpretation of exposure are central to risk perception.

The indirect-association results make a distinct contribution to the literature, but they should be read cautiously. All four antecedents were indirectly associated with cybercrime risk perception and preventive awareness through personal safety anxiety, suggesting that anxiety is a plausible psychological pathway linking social, legal, media-related, and educational variables to cybercrime-related perceptions. Because the data are cross-sectional, however, this pattern should not be described as proof that inputs are translated into risk perception over time. Longitudinal or experimental studies are needed to confirm the temporal ordering implied by the model.

Practically, the findings suggest that cybercrime-prevention programs for university students should integrate legal literacy, platform-specific safety education, misinformation recognition, and efficacy-oriented communication. Because education and legal awareness are positively associated with anxiety as well as perception and awareness, preventive interventions should be designed to transform concern into controlled vigilance. Programs should therefore explain what constitutes cybercrime, how to identify suspicious messages or links, how to protect personal information, how to verify content before sharing, how to document evidence, and where to report incidents.

Several limitations should be acknowledged. First, the sample was highly concentrated among undergraduate students aged 18-24, even though all respondents were adults, which limits generalizability to older, non-student, rural, working, or less digitally connected populations. Second, although the survey was anonymous and suitable for examining associations, the cross-sectional design cannot establish temporal causality or definitive mediation. Third, the study relied on self-reported questionnaire data, which may be affected by social desirability and common method bias. Fourth, EFA and CFA were conducted on the same sample; therefore, the measurement results should be understood as within-sample evidence rather than independent cross-validation. Fifth, item PSA3 was removed after EFA refinement, indicating that future studies should further refine the measurement of personal safety anxiety. Sixth, the gender analysis was exploratory and did not constitute a full stepwise measurement-invariance test. Future research should use longitudinal or experimental designs, include more diverse youth groups, use independent calibration and validation samples, and examine additional predictors such as prior victimization, cybersecurity self-efficacy, institutional trust, peer influence, and actual protective behavior.

CONCLUSION

This study aimed to explain cybercrime risk perception and preventive awareness among Vietnamese university students by testing the associations involving social media use, legal awareness of cybercrime, media influence and misinformation exposure, family-school education, and personal safety anxiety.

The results show that personal safety anxiety is the strongest direct correlate of cybercrime risk perception and preventive awareness. Family-school education, legal awareness, media influence and misinformation exposure, and social media use are all significantly associated with personal safety anxiety and the CP construct, while all four antecedents also show significant indirect associations through anxiety. The model explains 61.3% of the variance in personal safety anxiety and 40.4% of the variance in the CP construct, indicating meaningful explanatory power for the proposed integrated framework.

These findings indicate that cybercrime-related perceptions and awareness among university students are associated with the combined influence of media exposure, legal understanding, educational guidance, and emotional appraisal. The study therefore suggests that cybercrime prevention should not only inform students about online threats but also provide practical, efficacy-oriented guidance that converts anxiety into informed vigilance. Legal literacy, digital safety education, misinformation recognition, and family-school communication should be coordinated to strengthen students' capacity to recognize, avoid, and report cybercrime risks.

AUTHOR CONTRIBUTIONS

Conceptualization: Thanh Thao Phung.
Data curation: Thanh Thao Phung.
Formal analysis: Thanh Thao Phung.
Funding acquisition: Thanh Thao Phung.
Investigation: Thanh Thao Phung.
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http://dx.doi.org/10.21511/kpm.10(3).2026.04

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http://dx.doi.org/10.21511/kpm.10(3).2026.04

APPENDIX A. Questionnaire structure

The questionnaire below was adapted from the Vietnamese survey instrument used in the study. Items were measured on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Item PSA3 was included in the initial questionnaire but removed after EFA refinement because its factor loading was below 0.50.

Table A1. Questionnaire items used in the survey

Construct	Code	Item wording
Social media use	SMU1	I use social media every day for entertainment or communication.
Social media use	SMU2	I frequently encounter information about cybercrime on social media.
Social media use	SMU3	I spend more time on social media than on other platforms.
Social media use	SMU4	I use social media to search for information-safety content.
Social media use	SMU5	I believe social media affects how I understand cybercrime.
Legal awareness of cybercrime	LA1	I know which behaviors are considered cybercrime under Vietnamese law.
Legal awareness of cybercrime	LA2	I understand basic legal regulations related to personal information protection.
Legal awareness of cybercrime	LA3	I know how to report illegal behavior online.
Legal awareness of cybercrime	LA4	I have studied or read legal materials about cyber safety.
Legal awareness of cybercrime	LA5	I can distinguish legal from illegal behavior in cyberspace.
Media influence and misinformation exposure	MI1	I often read news about cybercrime from newspapers or television.
Media influence and misinformation exposure	MI2	Media information makes me more concerned about online risks.
Media influence and misinformation exposure	MI3	I find it difficult to distinguish real and fake information online.
Media influence and misinformation exposure	MI4	Social media often makes me feel insecure about cyber safety.
Media influence and misinformation exposure	MI5	Misinformation in the media affects how I evaluate cybercrime.
Family and school education	EDU1	My family has reminded me to be careful when using the Internet.
Family and school education	EDU2	My school has organized programs related to cyber safety.
Family and school education	EDU3	I have learned how to protect personal information online.
Family and school education	EDU4	I think cybercrime education is necessary in schools.
Family and school education	EDU5	Relatives have shared with me the risks that may occur online.
Personal safety anxiety	PSA1	I often worry when sharing personal information online.
Personal safety anxiety	PSA2	I am afraid of being deceived when using online services.
Personal safety anxiety	PSA3	I feel that I can easily be tracked or lose privacy when using the Internet. Removed after EFA refinement.
Personal safety anxiety	PSA4	I feel unsafe when receiving links or files from strangers.
Personal safety anxiety	PSA5	I often think carefully before posting something on social media.
Cybercrime risk perception and preventive awareness	CP1	I can recognize common forms of cybercrime.
Cybercrime risk perception and preventive awareness	CP2	I clearly understand measures to prevent cybercrime.
Cybercrime risk perception and preventive awareness	CP3	I am aware of the seriousness of violations online.
Cybercrime risk perception and preventive awareness	CP4	I always verify information before sharing it online.
Cybercrime risk perception and preventive awareness	CP5	I know how to respond when detecting cybercrime behavior.

APPENDIX B. Standardized CFA factor loadings

Table B1. Standardized CFA loadings

Construct	Item	Standardized loading
SMU	SMU1	0.72
SMU	SMU2	0.70
SMU	SMU3	0.74
SMU	SMU4	0.75
SMU	SMU5	0.72
LA	LA1	0.70
LA	LA2	0.62
LA	LA3	0.66
LA	LA4	0.70
LA	LA5	0.85
MI	MI1	0.75
MI	MI2	0.72
MI	MI3	0.76
MI	MI4	0.72
MI	MI5	0.75
EDU	EDU1	0.74
EDU	EDU2	0.71
EDU	EDU3	0.71
EDU	EDU4	0.70
EDU	EDU5	0.83
PSA	PSA1	0.75
PSA	PSA2	0.76
PSA	PSA4	0.82
PSA	PSA5	0.83
CP	CP1	0.78
CP	CP2	0.71
CP	CP3	0.66
CP	CP4	0.73
CP	CP5	0.86

Note: The table reports standardized CFA loadings for the retained observed variables based on the AMOS output. PSA3 was removed during EFA refinement and is therefore not included in the final CFA model.

http://dx.doi.org/10.21511/kpm.10(3).2026.04