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Abstract. Despite extensive research in addressing technical aspects of cybercrime, there is a significant gap in understanding how psychological factors impact scam compliance in differing contexts. This review evaluates studies from diverse disciplines, including psychology, criminology, and behavioral science, to identify key personality, cognitive, emotional and social factors that influence victimization. Covering a broad spectrum of fraudulent activities—including investment fraud, relationship scams, mass marketing fraud and phishing—the review aims to provide an overview of recent empirical research focusing specifically on data collected from actual scam victims. The review applied the PRISMA-P methodology to systematically search and screen literature from multiple databases to identify 18 empirical studies. Findings revealed that personality traits such impulsivity and trust, cognitive factors such as authority bias, and other emotional and social risk factors are recurrent themes found to influence scam compliance. However, there is considerable variability in research methodologies, scam contexts, and reporting of results. This variability underscores the need for more detailed, context-specific investigations into different scam types as the psychological factors that influence scam compliance differs by scam type and context. The review concludes with recommendations for future research, emphasizing the importance of examining specific scam contexts and improving study designs to better understand scam compliance.

Keywords. scam compliance, deception, persuasion, personality, cognition, cyberpsychology

1. Introduction

Cybercrimes impact millions of people across the world each year. According to Cybersecurity Ventures, the global annual cost of cybercrime is predicted to reach $9.5 trillion USD in 2024 [1]. Scams and crimes of deception are a subset of cybercrimes where the individual concerned has been deceived, and having been deceived, is compliant to the demands of the scammer. There has been considerable recent research on cybercrimes, scams and related threats across many disciplines including computer science, psychology, criminology, organisational science, and accounting. Many papers have oriented their work on the technical and cybersecurity aspects of cybercrime [2], but more recently researchers have ventured into considering the role of the victim in these crimes to shed some light on what may influence an individual's susceptibility to believing and acting on scam stimuli.

Scams and deception crimes are attacks on a person's cognition. Cognition is the mental process of acquiring knowledge and understanding through thought, experience and senses which has evolved over many thousands of years [3]. It is both a conscious and sub-conscious process by which knowledge is accumulated and engaged to allow us to perceive, recognise, conceive and reason [4]. Cognition is influenced by personality

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traits (stable cognitive and behavioural patterns consistent in various contexts), emotional factors (which vary from moment to moment) and social factors (which vary across the lifespan). It includes our ability to process information, whether visual or auditory, and allows us at a high level to tap into four processing components: perception, working memory, decision making, and action [5]. Each of these components is influenced by short-term and long-term cognitive factors, such as workload, stress, personality, and vigilance. Further, each of these components and their influences is a significant area of research in its own right. For example, personality research, has occupied some interest by many researchers within the fraud context [6]. More recently, researchers have found support for behavioural predispositions as being statistically significant vulnerabilities for specific scam contexts, such as high scores on measures of impulsiveness and trust propensity attributes as compliance predictors in relationship scams [7]. Understanding scam victims' personality, cognition profiles, and their emotional and social context, can help us understand what influences a person to believe deceptive communication from a scammer, leading to scam compliance [8].

There have been a small number of reviews into cybercrime and scam victimization trends, however many have focused on age as the key risk factor [9,10], or on specific scam types [11]. In 2019, Norris et al. [12] undertook a systematic review of psychologically-based literature related to online fraud vulnerabilities and found that despite a growing body of research, a limited number of studies able to identify specific psychological factors and processes associated with increased susceptibility to victimisation. Most empirical studies they identified focused on the 'phishing' context, using simulations with student or employee participants, who were often pre-warned about the nature of these tests of scam compliance. Forewarnings and pre-existing awareness have been shown to alter an individual's behaviour in simulated experiments [13,14], so this is an inherent weakness when investigating crimes of deception. In contrast, studies into other scam contexts such as relationship scams have focused on comparing the psychological profiles of actual scam victims to non-victims [11].

This mini review therefore aims to summarise scientific research findings across a range of disciplines and scam types that have examined the psychological influences on scam compliance and susceptibility, focusing on studies involving real victims of crimes of deception. This provides a timely and concise overview of the current evidence regarding the psychological factors that have been identified from actual victims as playing a role in cybercrime victimization and identify any gaps in the literature.

2. Method

2.1 Search Strategy

This mini review was performed using the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) approach [15]. The goal was to identify the scientific studies over the last decade that empirically explore psychological influences of scam susceptibility from a victim perspective. Given the cross-disciplinary nature of the subject, the databases searched covered multiple disciplines, including computer science, psychology, law, criminology, medicine and health scientific databases (PsycINFO, Scopus, Web of Science, ProQuest, Science Direct, Wiley Online Library, Sage, PubMed, ProQuest Dissertations & Theses Global, ACM Digital Library, Informit Online, IEEE Xplore, and EBSCOhost).

Searches were conducted in December 2023 and included only peer-reviewed English-language scientific papers, conference proceedings, book chapters, books, and academic theses, published between 2013 and 2023 inclusive. This period was selected because it has witnessed the greatest escalation of reported scam impacts on the community [16]. The search syntax rules varied slightly across databases based on their functionality, but in each case studies were identified for screening if the title, abstract or key words were found to include the term scam* (including scams, scamming, scammer) or social engineer* (including social engineering and social engineers), and either behav* (including behaviour, behaviours, and behavioural along with US spelling equivalents), persua* (including persuasion, persuasive or persuade), or psycholog* (including psychology and psychological).

2.2 Screening Process

Figure 1 shows the initial search syntax across the thirteen databases yielded 4,690 papers. Google Scholar was also searched separately, resulting in a further 14 papers for screening. After removing duplicates, 2,808 were screened at the title and abstract level reducing the number of eligible papers to 2,116. A further detailed examination at full-text level to apply the requirement to only include empirical research involving actual victims resulted in a total of 18 research papers included in the review.

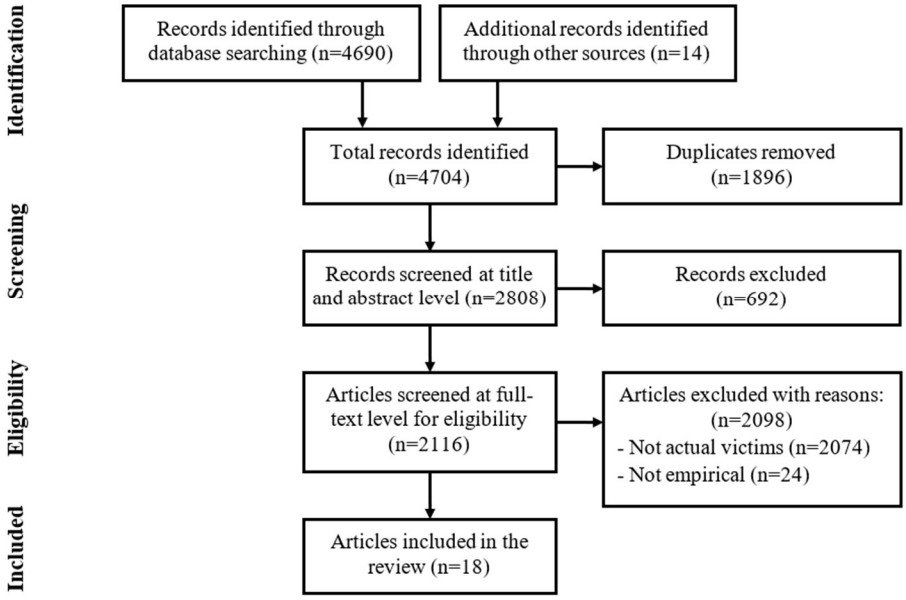

Figure 1. PRISMA flow diagram

3. Results

3.1 Study Characteristics

One-third of the included papers were from the United States (n=6) and one-third were from the United Kingdom (n=6), however one each of these included participants from other countries. The remaining six papers were from Canada, Australia, China, Japan, Malaysia, and the Netherlands. There was a relatively steady volume of studies published over the time period (between one and three each year), despite the rapid acceleration of victimisation over that period. The exception was 2021 when no studies were published (possibly due to COVID-19 interruptions), but this was made up for in 2022 with four studies published in this year. Scientific studies published in psychology (39%) and criminology (33%) disciplines accounted for most of the eligible publications, followed by medicine and health (17%) and consumer research (11%). There were no eligible papers from computer science, despite the inclusion of computer science databases in the search strategy.

3.2 Study Participants and Design

Most studies (n=13) used quantitative surveys to compare scam victims with non-victims. The remaining studies used qualitative methods: victim interviews (n=5) and content analysis of victim narratives posted online (n=1). Participant demographics varied widely across the studies. Several studies focused on older adults (n=6), while studies with larger samples sizes drew upon random samples that aimed to be representative of the broader population. Other populations of interest with young people aged 18-25, eBay and dating site users, and individuals with acquired brain injury. Some studies did not collect or disclose details on their participants, other than stating that they were victims of cybercrime.

3.2 Study Findings

Table 1 shows the characteristics of the included studies and the psychological factors that were found to significantly influence scam compliance. Two-thirds of the studies identified personality factors (n=12), with impulsivity and trust the most common. Almost as many studies identified emotional factors (n=11), including emotional instability, depression or financial desperation. Cognitive factors (e.g. cognitive ability, authority bias) and social factors (e.g. loneliness) were identified in 6 studies each. A variety of scam types were studied, however half of studies either combined results for multiple different scam types (n=5) or did not disclose the scam type (n=4). Of the studies that focused on a single scam type, relationship scams (n=4) were the most common.

Table 1. Summary of study findings regarding psychological factors influencing scam compliance

Authors and location	Scam Type	Design	Participants	Personality factors	Cognitive factors	Emotional factors	Social factors
Whitty 2018 (UK) [17]	Relationship	Survey of victims (n=200) vs non-victims (n=9,466)	Random sample	Impulsivity, addictive disposition, lower kindness, trustworthiness			
Whitty 2019 (UK) [8]	Various	Survey of victims (n=1,057) vs non-victims (n=10,723)	Random sample	Impulsivity (urgency, sensation seeking), addictive disposition			
Whitty, 2020 (UK) [18]	Various (reported separately)	Survey of victims (n=1,057) vs non-victims (n=10,723)	Random sample	Impulsivity, neuroticism, internal locus of control		Emotional instability	
Modic 2022 (UK) [19]	Online auction fraud	Study 1: Survey of victims (n=327) vs non-victims (n=2,374) Study 2: Survey of victims n=81)	eBay users	Impulsivity, modesty, creativity, gentleness		Scarcity	
Wen et al. 2022 (China) [20]	Various	Interviews with scam victims (n=17)	18–25 years	Impulsivity, trust	Poor risk perception	Emotional instability, motivated by high value monetary gain	
Fischer et al. 2013 (US) [21]	Not disclosed	Survey of victims (n=26) vs non-victims (n=77)	Not disclosed	Trust		Motivated by high value monetary gain	
Ueno et al. 2022 (Japan) [22]	Various	Survey of victims (n=56) vs non-victims (n=99)	60+ years	Over-confidence			
Olivier et al. 2015 (UK) [23]	Mass marketing fraud	Interviews with victims (n=3)	60+ years	Trust		Emotional vulnerability	Loneliness
Gould et al. 2023 (Australia) [24]	Relationship	Interviews with scam victims (n=7) and close others (n=6)	Individuals with acquired brain injury	Trust	Lower cognitive ability		Social isolation, loneliness
Wilson et al. 2023 (Malaysia) [25]	Various	Interviews with victims and non-victims	Not disclosed	Trust, greed		Financially desperation	
DeLiema et al. 2020 (US) [26]	Investment	Survey of victims (n=214) vs non-victims (n=813)	Investors (M=70 years)	Risk-taking, greed/materialism		Motivated by high value monetary gain	
Judges et al. 2017 (Canada) [27]	Not disclosed	Survey of victims (n=51) vs non-victims (n=100)	60-90 years without cognitive impairment	Lower conscientiousness, lower honesty-humility	Lower cognitive ability		
DeLiema 2015 (US) [28]	Not disclosed	Survey of victims (n=460) vs non-victims (n=11,524)	50+ years, not living in nursing home		Higher cognitive ability	Stressful life event	Widowed (not loneliness)
Wang et al. 2022 (US) [29]	Relationship	Content analysis of online narratives by victims	Not disclosed		Authority bias, reciprocity bias	Emotional instability	Social isolation
DeLiema et al. 2023 (US) [30]	Various	Survey of victims (n=307) vs non-victims (n=1,040)	Scam reporters		Authority bias	Financially desperation	Loneliness
Lichtenberg et al. 2013 (US) [31]	Not disclosed	Survey of victims (n=220) vs non-victims (n=4,240)	50+ years			Depression	Loneliness
Buchanan et al. 2014 (UK) [32]	Relationship	Study 1: Survey of victims (n=137) vs non-victims (n=716) Study 2: Survey of scam victims (n=325) vs non-victims (n=42)	Study 1: Dating site users Study 2: Relationship scam Support website			Idealization of romantic partners	
Jansen et al 2016 (Netherlands) [33]	Phishing/malware	Interviews with victims (n=30)	Reported to police	Nil (everyone is susceptible)			

4. Discussion

4.1 Personality Factors

Impulsivity was the most commonly identified personality risk factor for scam victimization, and was a significant predictor in four of the five large scale quantitative studies [8,17,18,19]. The exception was DeLiema (2015) [28] focused on people aged over 50 years, which is not surprising given that impulsivity is found to decrease with age [34]. Among the qualitative interviews with victims, being high in trust was the most identified factor, and was commonly self-reported by victims to explain why they believed the scammer's deception.

While the lack of delineation between results for different scam types in many studies made it difficult to determine trends in specific contexts, most of the other personality factors identified appear to be related to increased risk-taking (e.g., addictive disposition, over-confidence, high internal locus of control, greed, and lower consciousness), with some of these found to be directly related to scams that exploit the victim's desire for financial gain such as investment or mass-marketing scams.

4.2 Cognitive Factors

Only one-third of included studied identified cognitive factors that influence scam compliance. Authority bias, where individuals comply with a scammer's deception due to how 'official' a demand for compliance seems, was a significant predictor of victimization in DeLiema's 2023 study [30], especially in threat-based scams. Authority bias was also a factor identified in Wang et al.'s study of narratives by relationship scam victims [29], in that scammers would produce 'official' looking documents to legitimize their financial requests. Reciprocity bias was also identified, with scammers creating scenarios where victims would feel a strong inclination to return favours.

There were contradictory results regarding the influence of overall cognitive ability. Lower cognitive ability was identified as a predictor of scam compliance in Judges et al.'s study [27] of individuals aged 60-90 years (but without cognitive impairment), and in Gould et al.'s [24] interviews with individuals with acquired brain injury. However, DeLiema's large scale study [28] of individuals aged over 50 (but not living in nursing homes) found that scam victimization was associated with *higher* cognitive ability. The author suggested this may be explained by the victims in their study being younger and more educated than the non-victims, or that victims who are older and/or with lower cognitive ability may be less likely to report their victimization. The only study that focused on young people found that scam victims identified poor risk perception as a cognitive factor in their scam compliance [20].

4.3 Emotional Factors

Emotional instability emerged as a recurrent theme across various scam types, which some authors suggested made individuals more reactive to the visceral cues used by scammers. Other emotional factors identified were driven by external pressures, such as financial desperation and stressful life events, which can cloud judgment and increase scam compliance. Depression and emotional vulnerability were found to be significant factors influencing scam victimization in older individuals [23,31].

There were also emotional factors specific to particular scam contexts, such as the desire of scarcity in falling for online auction scams [19], the idealization of romantic partners in relationship scams [32] and feeling motivated by lure of a high-value monetary gain in mass marketing and investment scams [20,21,26]. Overall, emotional factors appear to play a critical role in diminishing an individual's capacity to critically evaluate scam-related information.

4.4 Social Factors

All social factors identified in the included studies related to aspects of social isolation. DeLiema [28] found that compared to married respondents, those who are widowed were more likely to be victimised, despite loneliness not being a statistically significant factor. However, loneliness was frequently identified as a contributing factor in other studies, particularly among older victims [23,31] and individuals with acquired brain injuries [24]. In addition to lacking social support networks that could otherwise help them avoid scams, interviews revealed that for some older people, the ritual of

interacting with and dispatching money to scammers can be exciting for the victim and provide them with rare social interaction [23].

4.5 Study Quality

Methodologically, most quantitative studies statistically compared victims to non-victims, which allowed for researchers to elucidate scam compliance sensitivities. However, studies inconsistently defined the period and number of prior scam events, and the time elapsed between scam engagement and research participation. The latter is particularly critical for interview studies, as longer gaps can lead to memory distortion or rationalization by victims, thereby affecting the reliability of the data collected. Studies with shorter intervals between scam engagement and research participation are likely to capture more accurate reasons and aspects of scam compliance.

Studies also inconsistently characterized the specific scam context. Many studies either combined results from different scam types or did not disclose the specific scam type. This lack of specificity is problematic, as scam compliance can vary greatly among scam types. The Australian Competition & Consumer Commission (ACCC) [16] notes that compliance with phishing scams can occur within minutes, whereas compliance with relationship and investment scams often unfolds over weeks, months, or even years [35]. This distinction is crucial, yet it was often overlooked, leading to a generalized understanding that may not accurately reflect the nuanced reality of different scam types.

Finally, there was a stark difference between the contexts examined in the studies and commonly reported scam scenarios. For instance, nearly 90% of investment fraud cases reported to the ACCC [16] involve cryptocurrency, with victims typically starting with a small investment that escalates as scammers show fake returns over time. This scenario, however, was not captured in the studies reviewed, indicating a knowledge gap that needs to be addressed through more context-specific research.

4.6 Conclusion

This mini review provides a concise overview of the current empirical evidence of the psychological factors contributing to scam compliance, revealing insights from studies of actual victims. The recurring identification of personality traits such as impulsivity, and cognitive biases like authority bias, illustrates how deeply ingrained psychological patterns can predispose individuals to fall victim to scams. The emotional and social factors identified—ranging from emotional instability and financial desperation to social isolation—further emphasize the vulnerability of certain populations, particularly older adults and those experiencing significant life stressors.

Three main implications for future research emerge from this review. First, future research should focus on examining specific scam types, rather than aggregating results across diverse scams. Understanding the unique psychological, cognitive, emotional, and social factors at play in different types of scams will provide more actionable insights for prevention and intervention strategies tailored to not only different scams, but different psychological profiles. Given the varying influence of factors like impulsivity, trust, and cognitive ability across different age groups and scam contexts, future studies should consider age-specific vulnerabilities and how these interact with different scam types.

Second, there is a need for more consistent and rigorous methodological approaches, particularly in terms of defining the time between scam engagement and participation in research. Reducing this gap will help ensure that data collected reflects the immediate reasons for scam compliance, rather than rationalizations formed over time.

Finally, researchers should strive to align their studies more closely with the evolving landscape of scam tactics, such as the growing prevalence of cryptocurrency scams. By keeping pace with these developments, research can remain relevant and provide timely insights that can inform policy and protective measures.

In conclusion, while the existing body of research offers valuable insights into the psychological factors influencing scam compliance, addressing the gaps identified in this review and refining study designs will be crucial for advancing a more nuanced understanding of the diverse factors contributing to scam victimization in different contexts, and developing more effective interventions.

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