Factors Influencing Victim's VOM Participation in the Context of Cybercrimes

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Abstract

Research into the factors influencing cybercrime victims' willingness to participate in Victim-Offender Mediation (VOM) is lacking. Based on literature findings, perceived seriousness mediated by moral wrongfulness, self-efficacy mediated through the need for agency, and self-blame were hypothesised to influence VOM participation through various mechanisms. Due to the unique challenges posed by cybercrimes, participants in this research were asked about their preferred form of VOM, including offline methods such as face-to-face meetings and written letters, compared to the Computer-Based Communication (CBC) methods of video calls and email messages. It was expected that individuals high in perceived seriousness and moral wrongfulness would be more likely to participate in VOM, while those low in self-efficacy and high in need for agency would be less inclined. Participants high in self-blame were anticipated to be more inclined to participate in VOM. Participants were randomly assigned to one of two groups involving a cybercrime with either low or high financial loss experienced by the victim to achieve variability in the scores of perceived seriousness. Participants imagined themselves as victims of cyber fraud on an online marketplace and answered questions regarding the independent variables assessed in this study. They then indicated their likelihood of participating in VOM and their preferred form of participation. Contrary to expectations, perceived seriousness, moral wrongfulness, self-efficacy, and self-blame were not related to VOM participation willingness. Only the need for agency positively influenced victims' willingness to participate in VOM. Participants expressed willingness to engage in alternative forms of VOM, such as CBC video calls and CBC email messages. This study provides insights into the mechanisms by which the need for agency influences VOM participation, aiding organisations in encouraging more victims to participate in VOM after a cybercrime. Moreover, starting points for further research into factors influencing victim's VOM participation are set. This participation might benefit victims, offenders, and society, thereby making VOM highly valuable.

Introduction

As technology usage continues to rise, so does the prevalence of cybercrimes (Gangwar & Narang, 2022). In this research, cybercrimes refer to illicit activities conducted through computers or interconnected networks. These activities encompass various forms, including unauthorised access to information, identity misappropriation and cyber fraud (Zhang et al., 2011). Victims of cybercrimes endure similar consequences to victims of offline crimes, such as financial and psychological impacts (Borwell et al., 2021a). In the context of cybercrimes, these impacts can be intensified due to the social environment that often exacerbates victims' feelings of guilt and shame, as they are frequently held accountable for the incidents. Additionally, the resulting lack of social support intensifies feelings of loneliness and insecurity (Cross, 2015). These negative consequences resulting from the experience of a cybercrime underline the importance of research targeting victims of cybercrimes and their needs. Hereby, research on victims of offline crimes has demonstrated their need for information about their case and legal procedures, as well as vindication, which includes assurance that the offenders acknowledge their actions (Zehr, 2015). According to Wemmers (2002), victims also seek emotional support, including acknowledgement of the emotional impact of the crime and opportunities to discuss their feelings. Moreover, victims express a desire to participate in legal processes following a cybercrime incident (Wemmers, 2002).

In the context of offline crimes, these needs can be addressed through the practice of restorative justice (Wemmers, 2002). Zehr (2015) defines restorative justice as an alternative framework to the current criminal justice system. Compared to the current criminal justice system, restorative justice does not include punishment of the offender, aiming to teach them a lesson. Zehr (2015) states it aims to restore the victim's and the offender's needs instead, holding the offender accountable for repairing the harm they have done, and involve individuals who are directly involved in an offence including victims, offenders, and the community. He suggests this restoration can be achieved with a variety of innovative programs sharing the common modality of a dialogue between the victim and the offender. In these programs, offenders are expected to acknowledge the needs of the victim and take active responsibility for their behaviour (Zehr, 2015). For a successful outcome, the wrongdoing must be recognised, equity reinstated, and future plans such as prevention measures need to be taken into account, ensuring the prevention of future issues (Morris & Maxwell, 2001). Victim-Offender Mediation (VOM) is one example of a restorative justice program, that allows victims to actively participate in influencing the outcome of their case. Firstly, the

mediator will meet separately with the offender and the victim to establish rapport and gather insights (Choi & Severson, 2009). Afterwards, a mediation encounter can be scheduled. The session can either be a direct face-to-face meeting or indirect, by communication through the mediators themselves or through written letters (Wemmers & Cyr, 2006). During VOM sessions, victims and offenders engage in a voluntary dialogue facilitated by a mediator. During the dialogue, the victim has the opportunity to ask questions and express their perspective to the offender (Umbreit, 1998). Through VOM, offenders are encouraged to take responsibility for their actions, while victims are provided with an avenue to address their emotional, informational, and participation needs by actively participating in the process and discussing their feelings (Zehr, 2015).

As cybercrime rates continue to rise, the imperative of assisting individuals who become victims of such crimes through practices such as VOM becomes paramount (Gangwar & Narang, 2022). While certain aspects, such as victim's needs, remain consistent across online and offline crimes, notable differences exist, such as victim-blaming (Notté et al., 2021). However, much of the existing research on crimes and victims primarily focuses on offline crimes, making research into cybercrimes highly relevant (Borwell et al., 2021a). Notably, VOM has proven to be a successful strategy in addressing the needs of victims of offline crimes and helping them cope with the aftermath of the crime (Hansen & Umbreit, 2018). Nascimento et al. (2022) describe that within the process of VOM, victims are exposed to a traumatic stimulus in a controlled environment. This meeting with the offender in a safe setting can lead to less experience of distress, fear, or anxiety. Furthermore, victims show less anger towards the offender as well as less self-blame after VOM participation (Nascimento et al., 2022). Yet, within the context of cybercrimes, research has predominantly centred on victim-reporting behaviour and seeking support, thus neglecting further steps such as VOM (De Kimpe et al., 2020), although VOM might be able to offer this support. Understanding why victims choose to participate in restorative justice programs such as VOM holds significant importance in assisting victims to cope with their experiences, needs and negative emotions. Therefore, this research aims to investigate factors that influence cybercrime victim's willingness to participate in VOM. Thereby, the impact of perceived seriousness of the crime, self-blame and self-efficacy on the willingness of cybercrime victims to participate in mediation is investigated, while also exploring the mediating mechanisms involved in this process.

Factors Influencing Participation in VOM

The first step towards victim participation in VOM is reporting the crime incident and seeking support from others. Studies have shown that victims of cybercrimes are less likely to report the incident to the police than victims of traditional crimes as they prefer to deal with the incident themselves (Curtis & Oxburgh, 2022). Concrete factors leading to VOM participation in the context of offline crimes have been examined by Hansen and Umbreit (2018). These predictors include the judgement of whether the crime is serious enough to invest time in VOM (Hansen & Umbreit, 2018). According to De Kimpe et al. (2020), when the victim's perceived severity of the offline crime is high, their need for support is evaluated higher than the perceived costs of forwarding the incident to the police or others. Conversely, when individuals do not perceive the crime to be serious, they are less likely to report the crime and thus participate in VOM (De Kimpe et al., 2020). Based on similar consequences of offline and online crimes (Borwell et al., 2021a), the above-mentioned findings might apply to online crimes as well. This leads to the following hypothesis:

H1a: Individuals with lower levels of perceived seriousness of the cybercrime are less likely to participate in VOM.

This possible relationship between perceived seriousness and participation in VOM can be explored further. Hereby, Adrianessen et al. (2018) suggest that rankings of perceived seriousness are related to rankings of moral wrongfulness. Thereby, they define moral wrongfulness as being determined by the extent to which the crime violates moral norms. Similarly, Herzog and Einat (2012) also identified a relationship between the perceived seriousness and moral wrongfulness of a crime, suggesting that both factors may influence the victim's willingness to participate in VOM by increasing their likelihood of reporting the incident to the police (De Kimpe et al. 2020). Warr (1989) elaborates on this relationship, proposing that when individuals assess the perceived seriousness of a crime, they tend to focus on its primary aspect, such as its moral wrongfulness, which in turn influences their moral evaluation of the crime. Therefore, a higher perceived seriousness might lead to greater perceived moral wrongfulness of the crime, which in turn leads to a higher willingness to participate in VOM. Therefore, the aforementioned information leads to the following hypothesis:

H1b: The relation between the perceived seriousness of the cybercrime and willingness to participate in VOM (H1a) is mediated by moral wrongfulness.

Besides the perceived seriousness of the crime, research indicates that one of the most prevalent reasons victims choose not to participate in VOM after offline crimes is their belief that they can handle the experience independently (De Kimpe et al., 2020). This belief can be linked to the concept of self-efficacy, which describes an individual's perceived ability to effectively carry out a specific task (Bong & Clark, 1999). Self-efficacy has been shown to influence behaviour, with higher levels predicting better performance in tasks of everyday life (Bandura, 1990). In the context of traumatic experiences, individuals aim to restore a sense of inner harmony despite the experience of the trauma. Achieving this equilibrium requires high self-efficacy, which is essential for effectively coping with and overcoming such experiences (Benight et al., 2015). Therefore, individuals who have a strong sense of self-efficacy and feel capable of managing trauma effectively, are less inclined to seek help, as they believe they can confront their experiences effectively on their own (Gehm, 1998). Consequently, these individuals are assumed to be less inclined to participate in VOM as well (De Kimpe et al., 2020). In light of the information provided above, the following hypothesis is proposed:

H2a: Individuals with lower levels of self-efficacy are more likely to participate in VOM.

The concept of self-efficacy has often been associated with the concept of agency, which Abele and Wojciszke (2013) explain influences how people think about themselves. Thereby, agency contributes to a positive evaluation of self-identity, which individuals strive to maintain. Agency includes traits such as strength, competence, and power (Abele & Wojciszke, 2013). In turn, self-efficacy affects feelings, thoughts, and behaviour and is thereby interconnected with agency. Individuals with high self-efficacy tend to have a higher agency, as they believe they can successfully accomplish tasks, thus becoming active agents in their lives. Contrarily, a low sense of self-efficacy can diminish an individual's belief in their abilities, thereby making them less likely to take proactive steps to assert their agency (Bandura, 1990).

Victims have been identified as showing a need for agency after the occurrence of a crime, since victims often experience a loss of control in their lives and consequently, feel a threat to their agency (Shnabel & Nadler, 2015). Based on research by Shnabel and Nadler (2015), it is assumed that participating in VOM might help victims regain a sense of control by allowing them to communicate with the offender. When perpetrators acknowledge they are morally indebted to the victim, it might restore a sense of power to the victim. They however state that if the conflict remains unresolved and the victim's need for agency is not met, they

may harbour feelings of revenge. Conversely, this victim empowerment suggests that successful mediation can contribute to a positive self-identity for the victim (Shnabel & Nadler, 2015). In conclusion, individuals with low self-efficacy and thereby a higher need for agency seek to restore their sense of strength, which can be achieved through the opportunity to participate in VOM. This suggests that the agency is not only involved in the active dialogue during VOM but also influences the decision-making process regarding participation in VOM. Therefore, low levels of self-efficacy might lead to a higher need for agency which in turn might makes victims more likely to participate in VOM as they aim to feel more powerful. Drawing from the preceding information, the following hypothesis is posited:

H2b: The relation between self-efficacy and willingness to participate in VOM (H2a) is mediated by the need for agency.

The last factor that will be considered concerning the willingness to participate in VOM is self-blame, a common consequence experienced by victims of cybercrimes (Curtis & Oxburgh, 2022). Self-blame is often used by individuals to cope with the aftermath of a crime, primarily acting as a motivating factor to seek help, as self-blame leads victims to the belief they can prevent future incidents (Cross et al., 2016; Tennen et al., 1986). As a result, individuals who feel a sense of control over the incident may be more likely to seek support from their social networks, mainly family and friends who can advise victims to report the incident to the police (De Kimpe et al., 2020). This might give victims the chance to participate in VOM as research indicates that VOM can reduce self-blame in victims, which stems from open communication with the offender taking responsibility for the incident (Nascimento et al., 2022). Thereby, self-blame can help victims regain a sense of control over their lives (Frieze et al., 1987). Although not specifically studied in the context of VOM, this suggests that those who engage in self-blame might view participation in VOM as an important step following their initial search for social support. Thus, the following hypothesis is advanced:

H3: Individuals with higher levels of self-blame are more likely to participate in VOM.

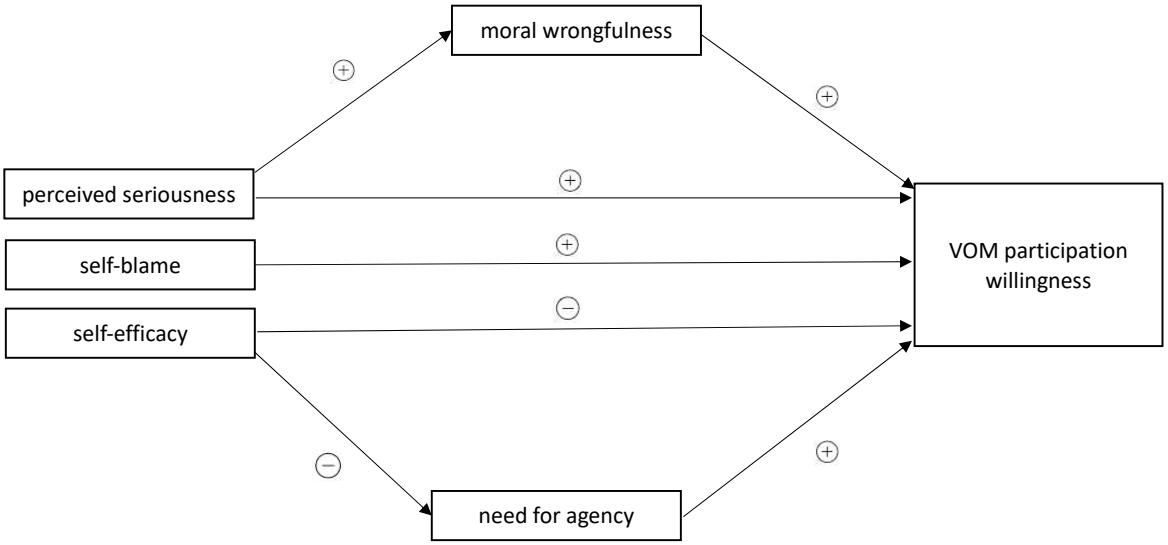
Current Research

The present research will make use of imaginary victims who read cyber fraud scenarios and consequently get offered the opportunity to participate in VOM. These scenarios will be used to measure the aforementioned hypotheses regarding various factors that might influence cybercrime victims' willingness to participate in VOM. The specific

assumptions about how these factors might affect VOM participation willingness are illustrated in Figure 1.

Figure 1

Visual Representation of the Predicted Factors Influencing the Willingness to Participate in VOM



Methods

Design

The study employed a between-subjects experimental design that aimed to investigate the impact of the independent variables perceived seriousness of the crime, self-blame, and self-efficacy on the dependent variable VOM participation willingness, while also exploring the mediating effects of moral wrongfulness and the need for agency. The study was an online study illustrating cyber fraud in which participants were asked to imagine themselves buying an item from a seller on an online marketplace, which then never arrives. The crime scenario condition included a manipulation of the variable measuring the perceived seriousness of the crime. Thereby, participants were randomly assigned to one of the two conditions involving either the purchase of a used model of the latest version of a smartphone or a phone case. The aim was to achieve a variety of scores in the variable of perceived seriousness between the two groups based on the amount of financial loss experienced by the victim.

Participants

The study comprised a convenience sample of individuals over the age of 18 who gave informed consent to use their data. In total, 154 individuals participated in the study from

which 18 participants had to be removed due to the exclusion criteria of being under the age of 18 ($N = 2$), not giving consent to use their data ($N = 2$), incorrectly answering a control question regarding the crime scenario ($N = 2$) or providing incomplete answers to variables measured with the survey ($N = 12$). Therefore, in total 136 respondents were included in the study. Of these participants, 66 aged 18 to 62 ($M = 30.92$, $SD = 12.88$) were in the smartphone condition. 70 respondents were in the phone case condition which included participants aged 18 to 68 ($M = 31.14$, $SD = 14.42$). Further demographic characteristics of the participants are displayed in Table 1.

Table 1

Demographic Characteristics of Participants

Baseline Characteristic	Smartphone Group		Phone Case Group		Total	
	N	%	*N*	%	*N*	%
Gender						
Female	47	71.21	50	71.43	97	71.32
Male	19	28.79	19	27.14	38	27.94
Third-Gender	0	0	1	1.43	1	0.74
Nationality						
German	51	77.27	57	81.43	108	79.41
Dutch	6	9.09	2	2.86	8	5.88
Other	9	13.64	11	15.71	20	14.71

Other Nationalities of the smartphone condition included Brasilian, Canadian, Belgian, Polish, Filipino, Swiss, Latvian, Australian, and Portuguese (all $N = 1$). Participants in the phone case condition were from other nationalities including Brasilian ($N = 3$), British ($N = 2$), and Canadian, Irish, Swedish, Lebanese, American, and French (all $N = 1$).

Next to the demographics, the realism of the scenario as perceived by the participants was assessed to ensure the validity of the crime scenario used in this study. This scale included five items rated on a 7-point Likert scale. The total mean score of the realism scale

in the phone condition was $M = 5.53$. In the phone case scenario, it was slightly higher ($M = 5.70$).

To further ensure the validity of the results, participants' previous experiences were assessed. A percentage of 24.26% ($N = 33$), reported having been victims of cybercrime themselves. The most common cybercrime mentioned by the participants was purchase fraud on marketplaces. Other cybercrimes included credit card or online banking fraud. Moreover, half of the participants (50%, $N = 68$) indicated that they knew someone who had fallen victim to cybercrime. These cybercrimes also included purchase fraud, credit card and online banking fraud, identity theft and romance scam for money. A small percentage of participants, constituting 1.47% ($N = 2$), admitted to having been involved in cybercrime as offenders involving video game fraud and phishing. Additionally, a minority of participants (3.68%, $N = 5$) reported knowing individuals who had engaged in cybercrime. These cybercrimes included password cracking. Furthermore, it was found that before participating in this study, 13.97% ($N = 19$), were already familiar with Victim-Offender Mediation, mostly through their studies.

Materials

Self-Efficacy

The General Self-Efficacy Scale (GSE) by Schwarzer and Jerusalem (1995) was utilised to measure self-efficacy. This scale comprised 10 items rated on a 4-point Likert scale. For consistency with the self-blame scale, this research expanded the scale to a 5-point Likert scale, ranging from "Not at all true" (0) to "Completely true" (4). Example statements include “If someone opposes me, I can find the means and ways to get what I want.” and “If I am in trouble, I can usually think of a solution.” The total mean score of the scale was computed, with higher scores indicating greater levels of self-efficacy. The GSE is a validated scale with a Cronbach’s α of .85 (Kusurkar, 2013).

Perceived Seriousness

Drawing from the study by (Adriaenssen et al., 2019), who measured the perceived seriousness of a crime, five items were designed to measure the perceived seriousness of the cybercrime. Participants rated these items on a 7-point Likert scale, ranging from 1 (Not serious at all) to 7 (Very serious). For perceived seriousness, participants responded to questions such as “How serious do you consider the cybercrime to be to your financial well-being?” or “How serious do you consider the cybercrime to be to your emotional well-being?”. The total mean scores for all items were found, with higher scores indicating higher

levels of perceived seriousness. A confirmatory factor analysis using the minres method with an oblimin rotation was performed with one factor. Factor 1 had an eigenvalue of 2.41 explaining 36% of the variance. The factor analysis included a total of five items assessing the participant's level of perceived seriousness from which none were deleted due to low factor loadings (FL's < .30). All items demonstrated high factor loadings (FL's > .30), leading to a Cronbach's α of .72. Based on the root mean square of the residuals of 0.07 and the off-diagonal value of 0.96, the one-factor model seems to be a good fit for the data.

Moral Wrongfulness

Five items assessing the moral wrongfulness of the crime were created based on the research of Zebel et al. (2017). These items included questions like "Do you believe the cybercrime goes against commonly accepted moral principles?" or "Does the cybercrime offend your sense of morality?". Participants rated these items on a 7-point Likert scale, ranging from 1 (Not at all) to 7 (Very much). The total mean scores were found, with higher scores indicating elevated levels of moral wrongfulness. A confirmatory factor analysis using the minres method with an oblimin rotation was performed with one factor. Factor 1 had an eigenvalue of 1.74 explaining 35% of the variance. The factor analysis included a total of five items assessing the participant's level of moral wrongfulness from which none were deleted due to low factor loadings (FL's < .30). All items demonstrated high factor loadings (FL's > .30), resulting in a Cronbach's α of .57. Based on the root mean square of the residuals of 0.05 and the off-diagonal value of 0.98, the one-factor model seems to be a good fit for the data.

Need for Agency

The need for agency was explored by adapting and extending items from Shnabel and Nadler (2008), which originally measured participants' need for power, to fit the context of a cybercrime scenario. This adaptation resulted in nine items rated on a 7-point Likert scale, ranging from 1 (Not particularly) to 7 (Very much). The items included statements like "I would like to influence the outcome of the crime case and its procedure" or "I would like to have control over the interaction between myself and the offender". Total mean scores were taken, with higher scores indicating a greater need for agency. A confirmatory factor analysis using the minres method with an oblimin rotation was performed with one factor. Factor 1 had an eigenvalue of 4.61 explaining 51% of the variance. The factor analysis included a total of nine items assessing the participant's need for agency from which none were deleted due to low factor loadings (FL's < .30). All items demonstrated high factor loadings (FL's > .30),

resulting in a Cronbach's α of .88. Based on the root mean square of the residuals of 0.09 and the off-diagonal value of 0.97, the one-factor model seems to be a good fit for the data.

Self-Blame

The factor of self-blame was assessed using eleven items adapted from Harry et al. (2018) to fit the context of a cybercrime scenario. The scale consisted of two sub-scales measuring self-blame of behaviour and self-blame of personality comprising a total of 11 items. Participants were asked to respond to questions such as "To what extent do you think your past behaviours contributed to you becoming a victim of the cybercrime?" or "To what extent do you blame your personality for becoming a victim of the cybercrime?" using a 5-point Likert scale ranging from 0 (Not at all) to 4 (Completely). Participants' mean scores were analysed, with higher scores indicating greater self-blame for the cybercrime incident. A confirmatory factor analysis using the minres method with an oblimin rotation was performed with two factors. Factor 1 including six items assessing the participant's level of behavioural self-blame had an eigenvalue of 3.47 explaining 32% of the variance. Factor 2 including five items assessing the participant's level of self-blame regarding their personality had an eigenvalue of 2.96 explaining 27% of the variance. The factor analysis included a total of 11 items from which none were deleted due to low factor loadings (FL's < .30). All items demonstrated high factor loadings (FL's > .30), resulting in a Cronbach's α of .91. Based on the root mean square of the residuals of 0.04 and the off-diagonal value of 0.99, the two-factor model seems to be a good fit for the data. [1]

VOM Participation Willingness

Participants' willingness to participate in VOM was measured using the item "I am willing to participate in Victim-Offender Mediation," which participants rated on an 11-point Likert scale ranging from 0 (Not at all likely) to 10 (Extremely likely). The total mean scores for both groups were taken, with higher scores indicating a greater willingness to participate in VOM. Furthermore, alternative methods of VOM participation were considered based on research of Bonensteffen et al. (2022) who suggest that computer-based communication (CBC) offers a promising solution as an alternative to face-to-face meetings or other indirect forms of VOM, such as written correspondence. Accordingly, this study examined which type of communication victims prefer between a face-to-face meeting, written letters, CBC messages via e-mail or CBC video calls.

[1] It was tested if analysing each subscale separately would produce different results, but no significant differences were found.

Scenarios

To assess participants' perceived seriousness and their perceived moral wrongfulness of the crime, two distinct cybercrime scenarios were created as decision-making research in a criminal context usually includes hypothetical scenarios as a research method (Van Gelder et al., 2019). Participants answered questions about these two variables based on the scenario they envisioned themselves as the victim in, which described online fraud. This scenario was selected for its simplicity for participants to imagine, as purchase fraud is the most common type of cybercrime (Statistics Netherlands, 2023). This statistic is confirmed by the experiences shared by respondents in this study, who most frequently fell victim to purchase fraud and noted that the same scenario occurred to them in real life, only involving different items. In this study, each scenario entailed varying degrees of financial loss for the victim to capture differences in the perceived seriousness of the crime. In one scenario, participants were purchasing the latest version of a new smartphone, while in the other, they were purchasing a phone case. The orders never arrived, making them victims of cyber fraud. Participants were randomly assigned to one of the two groups without knowing that there were different groups. This manipulation, involving different financial implications, aimed to capture variance in the perceived seriousness of the crimes, ensuring participants had different scores on the variable of perceived seriousness.

The method used to assess the dependent variable, VOM participation willingness, involved presenting participants with a mediation scenario. Participants were asked to imagine themselves as crime victims receiving a letter from a victim-support organisation inviting them to participate in VOM with their offender. This scenario formed the basis for measuring the victims' willingness to participate in VOM.

Procedure

The research involved conducting an online survey distributed via various social media platforms such as WhatsApp, Facebook, and Instagram, utilising a link from the Qualtrics platform. Additionally, participants had the option to access the survey through the online SONA system. The study, titled "Victim’s VOM participation," incentivised participants on the SONA platform with 0.25 SONA points for their participation. Upon accessing the survey through either the link or the SONA system, participants were directed to the informed consent form, which outlined the study's purpose, procedures, anticipated risks, data confidentiality, voluntary participation, researcher contact information, and participant consent. Once consent was granted, participants could proceed with the survey.

Initially, the independent variable self-efficacy was assessed by evaluating agreement with specific statements. Participants were then presented with one of two crime scenarios involving the purchase of either the latest version of a new smartphone or a phone case from a marketplace platform. In both scenarios, the purchased item failed to arrive, leading the victim to report a cybercrime incident to the police. After reading the scenario, participants answered a control question regarding the item they purchased on the marketplace. Subsequently, the independent variables perceived seriousness, moral wrongfulness, need for agency, and self-blame were assessed through various statements.

Following this, participants were presented with a scenario explaining the opportunity to engage in Victim-Offender Mediation (VOM) with their crime offender. The imaginary victims were then asked about the likelihood of their participation in VOM and educated about different forms of VOM before expressing their preference. Lastly, participants responded to control questions regarding their prior experiences with cybercrimes and VOM, along with providing background information on demographic variables such as gender, age, and nationality. The questionnaire concluded with a debriefing, explaining the study's aim, which investigated factors influencing victims' willingness to participate in VOM. Additionally, participants were informed of the manipulation involved in the crime scenario conditions.

Data Analysis

The collected data were analysed using the statistical software R (see Appendix). Firstly, the data were prepared by applying exclusion criteria of being under the age of 18, incorrectly answering the control question, and handling missing values. Participants meeting the exclusion criteria or having missing values on any variables were removed from the dataset. Next, descriptive statistics were calculated, including means and standard deviations of the demographic variables, perceived realism of the scenario and previous experiences of the participants to provide an overview of the dataset.

Before testing the hypotheses, four parametric assumptions including linearity, normality, homogeneity of variance and independence of observations were checked to ensure the validity of the results. The normality assumption was tested using the Shapiro-Wilk test, which showed that the assumption of normality of residuals was violated for the linear models of the variables self-efficacy ($W = 0.94$, $p < 0.01$), moral wrongfulness ($W = 0.95$, $p < 0.01$), perceived seriousness ($W = 0.96$, $p < 0.01$), and self-blame ($W = 0.96$, $p < 0.01$). Homogeneity of variance was assessed using the Breusch-Pagan test, which detected

heteroscedasticity in the model incorporating self-efficacy ($BP = 5.60$, $p = 0.02$), indicating that the variance of the residuals was not constant across all levels of the independent variable. Due to the large sample size, parametric tests were chosen for the analyses.

H1a and H1b were assessed using a mediation analysis, with the perceived seriousness of the cybercrime as the independent variable, willingness to participate in VOM as the dependent variable, and moral wrongfulness as the mediator. This analysis explored the indirect effects of perceived seriousness on VOM participation willingness through moral wrongfulness. Subsequently, H2a and H2b were investigated using mediation analysis, with self-efficacy as the independent variable, willingness to participate in VOM as the dependent variable, and the need for agency as the mediator. This analysis aimed to understand the relationships between the three variables. Lastly, H3 was examined using linear regression analysis, with participation in VOM as the dependent variable and self-blame as the independent variable to determine the direct effect of self-blame on the willingness to participate in VOM.

Results

Descriptive Statistics

The total mean scores of the independent and dependent variables were computed separately for all participants either belonging to the smartphone condition group or the phone case condition group and for both groups together (see Table 2).

Table 2

Total Mean Scores for Study Variables

	Smartphone Group		Phone Case Group		Total	
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*
Self-Efficacy	3.62	0.69	3.68	0.57	3.65	0.63
Perceived Seriousness	3.96	1.06	3.16	1.08	3.55	1.14
Moral Wrongfulness	5.94	1.25	5.71	1.23	5.82	1.24
Need for Agency	4.69	1.56	4.85	1.31	4.78	1.43
Self-Blame	2.44	0.76	2.31	0.79	2.38	0.77
VOM Participation Willingness	4.65	3.34	5.29	2.68	4.98	3.02

Participants in the smartphone group and the phone case group exhibited differences regarding their mean scores in several variables. The participant's willingness to participate in VOM was higher in the phone case group.

Correlations

A correlation matrix including all variables was computed to identify relationships between the variables (see Table 3).

Table 3

Correlations for Study Variables

Variable	Self-Efficacy	Perceived Seriousness	Moral Wrongfulness	Need for Agency	Self-Blame	VOM Participation Willingness
Self-efficacy	-					
Perceived Seriousness	-0.23 *	-				
Moral Wrongfulness	-0.14	0.25 *	-			
Need for agency	0.07	0.36 *	-0.04			
Self-blame	-0.10	0.22 *	-0.12	-0.04	-	
VOM Participation Willingness	-0.03	0.16	0.03	0.37 *	0.12	-

*$p < .05$.

The correlation matrix revealed several significant relationships between the variables. Firstly, self-efficacy was found to have a significant negative correlation with perceived seriousness. Perceived seriousness additionally demonstrated significant positive relationships with moral wrongfulness, need for agency and self-blame. The need for agency was positively correlated with VOM participation willingness.

Hypothesis Testing

Perceived Seriousness and Moral Wrongfulness

To test Hypothesis 1a, and Hypothesis 1b a mediation analysis was conducted. This analysis aimed to examine the indirect effect of the perceived seriousness of the cybercrime on the willingness to participate in VOM, mediated by moral wrongfulness. The results revealed a marginally significant total effect between the perceived seriousness of the cybercrime and willingness to participate in VOM ($B = 0.43$, $p = 0.06$). However, due to the criterion of $p > 0.05$, H1a, suggesting a relationship between perceived seriousness and willingness to participate in VOM was rejected.

Path a, including perceived seriousness on moral wrongfulness ($B = 0.27$, $p < 0.01$) was significant, while path b, moral wrongfulness on willingness to participate in VOM ($B = -0.01$, $p = 0.95$), was not significant. When moral wrongfulness entered the relationship between perceived seriousness and willingness to participate in VOM, the direct effect ($B = 0.43$, $p = 0.07$) was not significant. The indirect effect was not significant either ($B = -0.00$, $p = 0.95$). Therefore, it was concluded that there was no significant mediation effect of moral wrongfulness on the relationship between the perceived seriousness of the cybercrime and willingness to participate in VOM and H1b was rejected.

Self-Efficacy and Need for Agency

Hypothesis 2a and hypothesis 2b were examined using mediation analysis which explored the relationship between self-efficacy, the need for agency, and the willingness to participate in VOM. The results showed that there was no significant total effect between self-efficacy and willingness to participate in VOM ($B = -0.15$, $p = 0.72$). Therefore, H2a which states that lower levels of self-efficacy are associated with a higher likelihood of participation in VOM must be rejected.

Path a, including self-efficacy on the need for agency was not significant ($B = 0.15$, $p = 0.43$), and path b, displaying the need for agency on willingness to participate in VOM, was significant ($B = 0.78$, $p < 0.01$). Finally, when the need for agency entered the relationship between self-efficacy and willingness to participate in VOM, the direct effect ($B = -0.27$, $p = 0.49$) was not significant. In addition, the test for the indirect effect showed an estimate of $B = 0.12$ ($p = 0.44$), therefore, it was concluded that there was no significant mediation effect of the need for agency on the relationship between self-efficacy and willingness to participate in VOM and H2b was rejected. Nevertheless, a significant effect of the need for agency on VOM participation willingness was found.

Self-Blame

Hypothesis 3 investigated the relationship between self-blame and participation in VOM with linear regression analysis. The analysis revealed no significant relationship between self-blame and VOM participation willingness (F (1,134) = 2.04, p = 0.16), with an adjusted R-squared value of 0.01. This shows that self-blame explains approximately 1% of the variance in VOM participation willingness. Moreover, the regression coefficient for self-blame was B = 0.48, SE = 0.34. Therefore, for each additional unit of self-blame, there is an increase of 0.48 units in VOM participation willingness. However, this positive relationship between self-blame and perceived seriousness was not found to be statistically significant (t (134) = 1.43, p = .16). Consequently, there is insufficient evidence to conclude a significant association between self-blame and participation in VOM. Therefore, H3 was rejected.

Other Results

Next to the hypotheses, it was tested whether there was a significant difference in the variable means between the smartphone and the phone case group regarding the variable VOM participation willingness as the two conditions could lead to different scores on the dependent variable. A t-test was used to compare the mean scores of the phone case group and the smartphone group. There was no significant difference between the mean scores found (t (134) = -1.22, p = 0.23). Furthermore, participants were asked about their willingness to engage in various forms of Victim-Offender Mediation. Among the participants, 42.65% (N = 58) expressed a preference for participating in face-to-face meetings, followed by 22.06% (N = 30) who indicated a willingness to engage in CBC video calls. Additionally, 21.32% (N = 29) expressed a preference for CBC messages via email, while 13.97% (N = 19) indicated a willingness to participate through written letters.

Discussion

The present study was the first to investigate the impact of the perceived seriousness of the crime, self-efficacy and self-blame as well as the mediating factors of moral wrongfulness and the need for agency on the willingness of cybercrime victims to participate in Victim-Offender Mediation (VOM). Results of this study suggest that the factors of perceived seriousness, moral wrongfulness, self-efficacy and self-blame do not influence whether victims of cybercrimes are willing to participate in VOM. Only individuals displaying a higher need for agency seem to be more likely to participate in VOM.

Perceived Seriousness and Moral Wrongfulness

The relationship between the perceived seriousness of the crime and VOM participation

willingness is not statistically significant as the results revealed only a marginally significant total effect. Therefore, contrary to expectations, not enough evidence was found to state that perceived seriousness influences cybercrime victims' willingness to participate in VOM, although there seems to be a trend. This finding contradicts existing literature, which suggests that individuals' perceived seriousness of the crime impacts their decision to participate in VOM (Hansen & Umbreit, 2018). Participants in this study were assigned to one of two groups involving differences in experienced financial loss due to the cybercrime. Thereby, differences in scores measuring the perceived seriousness of the crime were expected. This expectation was confirmed as the mean scores of the perceived seriousness scale showed that participants who faced higher financial losses perceived the crime as more serious compared to those who faced lower financial losses. Despite this, the cybercrime was seen by participants as neutrally serious, indicating that the perceived seriousness of the crime was not high. Therefore, one possible explanation for the discrepancy between the findings of this study and the literature is that the crimes in this study were not perceived as serious enough to significantly influence VOM participation willingness. This aligns with research by Niemeyer and Shichor (1996), who found that the most common reason for victims not to participate in VOM was that the crime was not important enough to engage them in VOM participation. Hamby et al. (2018) note that there is insufficient research on the impact of financially motivated cybercrimes. The scenario of this study depicting cyber fraud may be perceived as less serious than other types of cybercrimes, such as online harassment, which has been extensively studied (Borwell et al., 2021b). Further research comparing the perceived seriousness of different types of cybercrimes and their relationship with willingness to participate in VOM could provide insights into whether the observed relationship is more than marginally significant for other types of cybercrimes.

As the perceived seriousness of the crime does not relate to VOM participation willingness, moral wrongfulness cannot mediate this relationship as previously expected based on literature by Warr (1989). Moral wrongfulness alone showed no direct relationship to VOM participation willingness, indicating it cannot explain whether cybercrime victims choose to participate in VOM. Interestingly, perceived seriousness did show a significant positive relationship with moral wrongfulness. Therefore, individuals who perceive the crime as more serious are also likely to judge it as morally wrong. This is supported by research from Adrianessen et al. (2018) suggesting that when assessing perceived seriousness, individuals accordingly rank the moral wrongfulness of the crime. However, this increased sense of moral wrongfulness does not translate into a higher willingness to participate in

VOM. Contrary to scores of perceived seriousness, the mean scores of moral wrongfulness in both groups were high. This finding suggests that while cybercrime victims may recognise the moral wrongfulness of a serious crime, this recognition alone is insufficient to drive their participation in restorative justice processes like VOM. Hereby, Hansen and Umbreit (2018) stated that other factors influencing whether victims will invest time in VOM include factors such as fear. Fear may be more influential in the decision-making process than perceived seriousness and the moral wrongfulness of the cybercrime. According to protection motivation theory, fear appeals act as motivating factors for engaging in protective behaviours (Plotnikoff & Trinh, 2010). In the context of cybercrime, when the perceived seriousness is high, an individual's fear appraisal may also be high, leading to a greater motivation to engage in help-seeking behaviour, potentially resulting in VOM participation. Thereby, the fear appraisal might be more influential than the moral wrongfulness of the crime. This assumption could be tested in further research to gain deeper insight into potential factors and underlying mechanisms influencing victims' participation in VOM.

Self-Efficacy and Need for Agency

Based on the literature, it was assumed that self-efficacy would be related to the willingness to participate in VOM (Gehm, 1998). Contrary to the expectation of finding a negative relationship, no relationship was found. Therefore, one cannot infer an individual's willingness to participate in VOM based on their self-efficacy level. Literature suggests that self-efficacy acts as a motivating factor to perform certain behaviours (Williams & Rhodes, 2014). Thus, individuals with low self-efficacy might lack the motivation to engage in proactive behaviours, such as participating in VOM. Although individuals with low self-efficacy tend to rely more on help from others due to their perceived inability to manage situations independently (Garrey et al., 2022), this reliance may not extend to taking the step of participating in mediation. Furthermore, the protection motivation theory incorporates the concept of response efficacy, which could be more influential in predicting VOM participation than self-efficacy. In this context, individuals evaluate whether the expected outcome of a protective behaviour is sufficient to address the perceived threat. When the expected response efficacy is high, individuals are more likely to engage in the corresponding behaviour. In the context of the present study, if individuals believe that VOM might help them deal with the crime, they might be more inclined to participate. Therefore, future research could explore whether the protection motivation theory can be applied to understand victims' participation in VOM.

As the study did not find a significant relationship between self-efficacy and VOM participation, the need for agency cannot mediate this non-existent relationship, contrary to previous assumptions (Abele & Wojciszke, 2013). Furthermore, no relationship between self-efficacy and the need for agency was observed, possibly because self-efficacy was measured using the General Self-Efficacy Scale, which reflects everyday challenges, while the need for agency was specifically measured in the context of cybercrimes. This discrepancy might indicate that individuals respond differently to everyday obstacles compared to distinct situations like cybercrime. Theories suggest that people might behave differently than usual in distinct situations (Jager, 2003). Thus, in the context of a cybercrime, individuals might act in a different manner, leading to the difference in significance levels of self-efficacy and agency measured with general or context-specific scales. Further research using self-efficacy scales tailored to cybercrimes could provide more insight into the relationship between self-efficacy, the need for agency, and VOM participation. This assumption is supported by the finding that the need for agency, measured in the context of the cybercrime, significantly relates to VOM participation willingness. Therefore, a high need for agency predicted greater participation in VOM, consistent with previous assumptions made based on research by Shnabel and Nadler (2015), who suggest that individuals seek agency after a crime to regain a sense of power.

Self-Blame

Besides self-efficacy and agency, self-blame was thought to influence the willingness to participate in VOM by motivating victims to seek help, as self-blame leads them to believe that they can prevent such an incident from happening in the future (Cross et al., 2016; Tennen et al., 1986). However, similarly to self-efficacy, this study found no effect of self-blame on the victim's willingness to participate in VOM, indicating that self-blame cannot predict VOM participation. The mean scores of the self-blame scale used in this study indicate that similarly to perceived seriousness, self-blame scores were not very high for participants. This might indicate that the scenario was not leading individuals to blame themselves for the crime, resulting in no relationship between self-blame and VOM participation. Moreover, according to the literature, self-blame encourages individuals to talk about their experiences, helping them cope with adverse events (Lickel et al., 2014). This assumption relies heavily on the presence of a social support system, which might influence the effect of self-blame on VOM participation (De Kimpe et al., 2020). When individuals do not have a social support system they can rely on, they might be less inclined to participate in VOM as nobody is encouraging them to do so. On the other hand, if individuals do have a close support system, they might not always encourage them to report the incident to the

police, or individuals might not feel the need to engage in dialogue with the mediator or offender during VOM. Therefore, the influence of social support systems might be studied in further research to determine their effect on self-blame and thereby connection to VOM participation.

VOM Participation Willingness

Similarly to self-blame and perceived seriousness scores, the overall participation willingness score of imaginary victims within this study was low as well. Additionally, there was no significant difference in these scores found between the smartphone and the phone case group. Since perceived seriousness did not affect the willingness to participate in VOM, manipulating this variable by incorporating the smartphone and the phone case group was unlikely to change VOM participation scores. Therefore, if perceived seriousness does not influence VOM participation, implementing a manipulation will not affect this relationship which explains the non-significant difference between the two groups of this study. Next to the indifference in scores between groups, the low participation willingness could be explained with the help of research by Wyrick and Constanzo (1999) who found that the time that passed between the occurrence of the crime and VOM influences whether victims will participate in VOM. They state that for crimes involving property loss, the more time that passes, the less likely victims are to participate. For personal crimes, it is the opposite. They explain this difference by the fact that victims of property loss aim to regain their loss and VOM immediately after the crime could help recover this loss. As time passes, the loss becomes more accepted and less important. In contrast, victims of personal violence are not focused on regaining property but rather on understanding the motives of the offender. They need to cope with the aftermath immediately after the crime, but over time, they might feel ready to meet the offender. As this research describes post-sentencing VOM which implies that a few weeks have passed since the crime occurred, imaginary victims in this study experiencing property loss may be less inclined to participate in VOM than if they would have experienced personal crimes. Therefore, future research should consider the variable of time elapsed since the crime occurred. This could provide further insight into the victim's willingness to participate in VOM.

Limitations

Several limitations should be acknowledged when interpreting the results of this study. Firstly, the sample comprised a convenience sample, which entails several limitations impacting the generalisability of the results. Most of the participants were female Germans

who were willing to invest time in completing the survey and answering personal questions, leading to a selection bias (Emerson, 2021). This results in a lack of diversity among participants and a self-selection bias, where participants may have different character traits than those who did not participate. Therefore, the results of the study may reflect the characteristics of this target group, not the whole population. Future research could increase the sample size and diversity using stratified sampling methods to enhance the external validity of the study (Sharma, 2017). Thereby, background variables that might offer alternative explanations for research findings should be considered.

Although most scales used in this study show good internal consistency, indicating that they measure the same underlying construct, the scale measuring moral wrongfulness shows low internal consistency (Tavakol & Dennick, 2011). This low internal consistency might stem from the small number of five items, but it could also indicate that the scale is not reliable. Therefore, a low internal consistency could impact the reliability of the findings, leading to incorrect interpretations. Improving internal consistency can thereby increase the reliability of the results, leading to more accurate interpretations. The five items of the scale are based on a study by Zebel et al. (2017), and the definition of moral wrongfulness. Future research could include more items and rewrite existing ones to test if the internal consistency improves. Furthermore, Warr (1989) suggested that perceived seriousness consists of the two dimensions of moral wrongfulness and harmfulness of the crime. Although this study found distinct factor loadings on two identified factors, research by Warr (1989) might indicate that perceived seriousness and moral wrongfulness are not different constructs but belong to the same construct. This could also be investigated further by future research.

Implications and Future Research

In addition to its limitations, the study has notable strengths. Although victim participation in VOM has been proven successful in many ways, research on the subject of cybercrimes is recent, and so far, no research has been done regarding the willingness of victims of cybercrimes to participate in VOM. Therefore, no data regarding this topic is available, which makes research into this topic highly relevant and this study provides a starting point for this research. One explicit strength of this study is the scenario used in this study that instructed participants to imagine a cybercrime. The scenario in this study depicts one form of cybercrime, namely cyber fraud. This cyber fraud scenario can be considered a strong point of this study as this type of cybercrime is the most common cybercrime, which makes it easily imaginable for the participants (Statistics Netherlands, 2023). Moreover, based on five

questions about the perceived realism of the scenario, participants evaluated it as realistic. Furthermore, it allows for the inclusion of a manipulation regarding financial loss experienced by the participants, leading to variability in this variable. Nevertheless, there are many different types of cybercrimes, such as phishing, cyberstalking, or identity theft which could be worth investigating in further research (Gordon & Ford, 2006). Each crime entails different consequences in terms of financial loss or emotional damage (Leukfeldt & Malsch, 2019). Wyrick and Constanzo (1999) propose that a factor influencing a victim's VOM participation is the type of offence. Hereby, in crimes where property loss or damage occurs, compensation is the favoured option over mediation. As cyberfraud involves property loss, this might indicate lower participation willingness compared to other cybercrimes involving for example personal violence because violent crimes lead to more psychological distress, leading to a higher willingness of VOM participation to combat the distress.

Furthermore, although the most common type of cybercrimes was chosen for this study, it may affect the generalisability of the results to other types of cybercrimes, as participants' responses might differ depending on the crime. Therefore, future research could include various cybercrime scenarios in the study to examine differences between cybercrimes. By exploring these differences, the study's findings could be more broadly applicable and informative. In addition to displaying only one form of cybercrime, the scenario also describes post-sentencing VOM. Therefore, the process of sentencing is finished when VOM takes place (Schleswig-Holstein Association for Social Responsibility in Criminal Justice, 2015). This means that the offender has already been punished, which might give the victim assurance that the offender participates in VOM not to avoid punishment but to accept responsibility for the crime. In contrast, participating in pre-sentencing VOM might help the offender to receive a lighter punishment, but it may also give the victim more freedom to influence the outcome of the sentence, potentially affecting the victim's need for agency as they feel they have a say in the process. Future research should explore the effects of different timings of mediation on the victim's sense of agency.

Another strength of the study is the inclusion of various variables tested in relation to VOM participation willingness. In addition to the variables studied in this research, other potential confounding variables should be investigated in future research. One such variable is previous experiences. Many participants reported previous experiences with being a victim or offender of a crime or being familiar with VOM in general. These experiences could influence the relationship between the independent and dependent variables, as past experiences guide present behaviour (Albarracín & Wyer, 2000). Participants familiar with VOM might be more

or less inclined to participate, depending on their perceptions of its effectiveness. For example, individuals may exhibit learned helplessness (Maier & Seligman, 1976). This term describes when individuals feel they have no control over an outcome and may not attempt to change the situation in the future, even if opportunities exist. In this study, individuals who previously felt helpless during a cybercrime might be less inclined to participate in VOM after the cybercrime described in this study. Therefore, participants' previous experiences should be considered in further research. To avoid previous experiences interfering with the results, future research could separate individuals with and without such experiences and test for differences in VOM participation willingness. This approach would provide clearer insights into the impact of different factors on VOM participation willingness.

Apart from exploring how previous experiences influence victims' willingness to participate in VOM, this study uncovered several unexpected relationships among the independent variables of this research. Interestingly, perceived seriousness was positively correlated with both the need for agency and self-blame, while showing a negative correlation with self-efficacy. Nevertheless, it must be considered that these correlations do not imply causation, as there might be underlying factors influencing these associations. Although this study only found a marginally significant impact of perceived seriousness on VOM participation willingness, further investigation into how this factor influences victims' decisions, possibly through other mediating factors, could enhance VOM research in the context of cybercrimes. The correlation findings suggest that manipulating perceived seriousness could potentially have affected other study variables as well, by creating variety in the scores of these variables. Further research is needed to explore how variations in perceived seriousness influence other variables and impact victims' decisions to participate in VOM.

Lastly, cybercrimes, compared to offline crimes, present obstacles such as the physical distance between victim and offender and the often-unknown identity of the offender (Borwell et al., 2021b). Even if the offender is found and identified, they might be located in a country without laws on cybercrimes, or the state does not agree to send them overseas for a restorative justice program (Robalo & Rahim, 2023). These obstacles are taken into account within this study by considering alternative methods of VOM, such as computer-based communication (CBC) (Borwell et al., 2021b). Bonensteffen et al. (2022) define CBC as communication through computer-mediated channels, such as messages or video calls. This approach overcomes concerns related to direct confrontation with the offender in face-to-face meetings, as well as perceived distance and potential miscommunication of emotions in VOM

conducted through written correspondence (Bonensteffen et al., 2022). Therefore, in this study, participants were asked about their preferred form of VOM. Approximately half preferred offline VOM, mostly through face-to-face meetings and some through written letters. The other half preferred CBC, with video calls being the most favoured, followed by email messages. These preferences highlight participants' willingness to engage in online forms of VOM, which can be especially useful when the offender is located in another continent. Thereby, this research provides a starting point and encouragement for future research trying to overcome obstacles specific to VOM in the context of cybercrimes. Future research should further investigate the preferred form of VOM for different types of cybercrimes to expand the applicability of VOM. Additionally, it could explore whether victims would be willing to engage in mediation with another offender who committed a similar crime if the actual offender is unknown, by which the victim and the offender could profit from the benefits of VOM even when the real offender of their crime cannot be present (Van Ness et al., 2022). This could be done through victim-offender panels where VOM can be conducted either offline or online (Robalo & Rahim, 2023). Consequently, this research could facilitate broader implementation of VOM, thereby benefiting victims and offenders through the positive effects of VOM.

Conclusion

The increasing incidence of cybercrimes underlines the significance of research aimed at assisting victims after the occurrence of such crimes. Thereby, the practice of VOM addresses the victim's needs and aids in their recovery from such crimes. This study found that a high need for agency leads to a higher participation willingness in VOM. Conversely, the factors self-blame, self-efficacy, moral wrongfulness and perceived seriousness were not found to be related to VOM participation. Furthermore, starting points for further research have been set. Thereby, the results of this study can primarily be used in the academic field for further research as factors that might influence the willingness to participate in VOM have been identified. Additionally, possible alternatives to offline VOM have been discussed, and this study has shown that these alternatives are accepted by individuals. These implications can be utilised in the practical field by organisations aiming to increase victim participation in VOM, benefiting both the victim and the offender. By possibly decreasing reoffending rates and helping victims cope with the aftermath of the crime, this research is of importance to society (Dijk et al., 2019; Nascimento et al., 2022). Brett et al. (1991) emphasise that one of the biggest obstacles for mediators is encouraging victims to participate in VOM. They state that if administrators understand the factors influencing victim participation in VOM, they can

enhance their efforts to increase participation rates. The implications of this research clearly provide a step toward identifying these factors.

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Appendix

R Script

```
##prepare dataset##
rawdata <- Bachelors_thesis_April_25_2024_11_56
mydata <- rawdata[-c(1:2), ]
mydata <- mydata[, -c(1:17)]
library(dplyr)
#informed consent filter NO
mydata <- filter(mydata, Informedconsent != 2)
mydata <- mutate(mydata, `control phone` = ifelse(is.na(`control phone`), 2, `control phone`))
#control questions filter wrong
my_data <- mydata[-c(100), ]
my_data <- mutate(my_data, `control phone` = ifelse(!is.na(`control phone`) & `control
phone` != 2, 1, `control phone`))
my.data <- my_data[-c(45), ]
#realistic questions
my.data1 <- my.data[, -c(13:17)]
my.data2 <- my.data1[, -c(13:18)]
my.data3 <- my.data2[, -c(47, 49, 51, 53, 55, 59)]
#filter NA for variables
my.data4 <- my.data3[complete.cases(my.data3[, c(46:50)]), ]
my.data5 <- my.data4[complete.cases(my.data4[, c(46:50)]), ]
#filter age
my.data5 <- my.data4[-c(54, 95, 118), ]
my.data5 <- my.data5[-c(144), ]
#filter NA
my.data5 <- na.omit(my.data5)
#create dataset for realistic scenario questions phone
realistic_phone_dataset <- select(my.data, 13:17)
realistic.phon.dataset <- na.omit(realistic_phone_dataset)
#create dataset for realistic scenario questions case
realistic_case_dataset <- select(my.data5, 19:23)
realistic.case.dataset <- na.omit(realistic_case_dataset)
##descriptive statistics##
```

```
#age
responses_phone <- my.data5[my.data5$`control phone` == 1, ]
responses_case <- my.data5[my.data5$`control phone` == 2, ]
summary(as.numeric(responses_phone$age))
mean(as.numeric(responses_phone$age))
sd(as.numeric(responses_phone$age))
summary(as.numeric(responses_case$age))
mean(as.numeric(responses_case$age))
sd(as.numeric(responses_case$age))
#gender
table(as.numeric(responses_phone$gender))
table(as.numeric(responses_case$gender))
#nationality
table(as.numeric(responses_phone$nationality))
table(as.numeric(responses_case$nationality))
#scenario
table(as.numeric(my.data5$`control phone`))
#mediation form
table(as.numeric(my.data5$`Q2 participation`))
##cronbachs alpha##
#self-efficacy
self_efficacy <- my.data5[, c('Q1 self-efficacy_2', 'Q1 self-efficacy_4', 'Q1 self-efficacy_5',
'Q1 self-efficacy_6', 'Q1 self-efficacy_7', 'Q1 self-efficacy_8', 'Q1 self-efficacy_9', 'Q1 self-
efficacy_10')]
str(self_efficacy)
self_efficacy <- apply(self_efficacy, 2, as.numeric)
chronbachs_alpha <- alpha(self_efficacy)
print(chronbachs_alpha)
#cronbachs alpha perceived seriousness
perceived_seriousness <- my.data5[, c('Q1 ps', 'Q2 ps', 'Q3 ps', 'Q4 ps', 'Q5 ps')]
str(perceived_seriousness)
perceived_seriousness <- apply(perceived_seriousness, 2, as.numeric)
chronbachs_alpha2 <- alpha(perceived_seriousness)
print(chronbachs_alpha2)
```

```
#cronbachs alpha moral wrongfulness
moral_wrongfulness <- my.data5[, c('Q1 mw', 'Q2 mw', 'Q3 mw','Q4 mw','Q5 mw')]
str(moral_wrongfulness)
moral_wrongfulness <- apply(moral_wrongfulness, 2, as.numeric)
chronbachs_alpha3 <- alpha(moral_wrongfulness)
print(chronbachs_alpha3)
#cronbachs alpha agency
agency <- my.data5[, c('Q1 Agency', 'Q2 Agency', 'Q3 Agency', 'Q4 Agency', 'Q5 Agency',
'Q6 Agency', 'Q7 Agency', 'Q8 Agency', 'Q9 Agency')]
str(agency)
agency <- apply(agency, 2, as.numeric)
chronbachs_alpha4 <- alpha(agency)
print(chronbachs_alpha4)
#cronbachs alpha self-blame
self_blame <- my.data5[, c('Q1 Self-blame_1', 'Q1 Self-blame_2', 'Q1 Self-blame_3', 'Q1
Self-blame_4', 'Q1 Self-blame_5', 'Q1 Self-blame_6', 'Q1 Self-blame_7', 'Q1 Self-blame_8',
'Q1 Self-blame_9', 'Q1 Self-blame_10', 'Q1 Self-blame_11')]
str(self_blame)
self_blame <- apply(self_blame, 2, as.numeric)
chronbachs_alpha5 <- alpha(self_blame)
print(chronbachs_alpha5)
#participation willingness variable
participation_willingness <- my.data5[, c('Q1 participation')]
##confirmatory factor analysis##
install.packages("RedaS")
install.packages("GPArotation")
library(RedaS)
library(GPArotation)
#self-efficacy
patterns <- c('Q1 self-efficacy_2', 'Q1 self-efficacy_4', 'Q1 self-efficacy_5', 'Q1 self-
efficacy_6', 'Q1 self-efficacy_7', 'Q1 self-efficacy_8', 'Q1 self-efficacy_9', 'Q1 self-
efficacy_10')
selected_variables <- grep(paste(patterns, collapse = '|'), names(my.data5), value = TRUE)
variablesse1 <- my.data5[, selected_variables]
```

```
variablesse1 <- as.data.frame(lapply(variablesse1, as.numeric))
non_numericse <- sapply(variables, function(x) any(!is.na(x) & !is.numeric(x)))
print(names(variablesse1)[non_numericse])
variablesse1 <- variablesse1[, !non_numericse]
correlation_matrixse <- cor(variablesse1)
print(correlation_matrixse)
cortest.bartlett(correlation_matrixse, n = 136)
eigen_values <- eigen(correlation_matrixse)$values
print(eigen_values)
factor_analysisse <- fa(r = correlation_matrixse, nfactors = 1, rotate = "oblimin")
print(factor_analysisse, digits = 2)
fa.diagram(factor_analysisse)
#perceived seriousness
patternsps <- c('Q[1-5] ps')
selected_variablesps <- grep(paste(patternsps, collapse = '|'), names(my.data5), value =
TRUE)
variablesps <- my.data5[, selected_variablesps]
variablesps <- as.data.frame(lapply(variablesps, as.numeric))
non_numericps <- sapply(variables, function(x) any(!is.na(x) & !is.numeric(x)))
print(names(variablesps)[non_numericps])
variablesps <- variablesps[, !non_numericps]
correlation_matrixps <- cor(variablesps)
cortest.bartlett(correlation_matrixps, n = 136)
eigen_values <- eigen(correlation_matrixps)$values
print(eigen_values)
factor_analysisps <- fa(r = correlation_matrixps, nfactors = 1, rotate = "oblimin")
print(factor_analysisps, digits = 2)
fa.diagram(factor_analysisps)
#moralwrongfulness
patternsmw <- c('Q1 mw', 'Q2 mw', 'Q3 mw','Q4 mw','Q5 mw')
selected_variablesmw <- grep(paste(patternsmw, collapse = '|'), names(my.data5), value =
TRUE)
variablesmw <- my.data5[, selected_variablesmw]
```

```
variablesmw <- as.data.frame(lapply(variablesmw, as.numeric))
non_numericmw <- sapply(variables, function(x) any(!is.na(x) & !is.numeric(x)))
print(names(variablesmw)[non_numericmw])
variablesmw <- variablesmw[, !non_numericmw]
correlation_matrixmw <- cor(variablesmw)
cortest.bartlett(correlation_matrixmw, n = 136)
eigen_values <- eigen(correlation_matrixmw)$values
print(eigen_values)
factor_analysismw <- fa(r = correlation_matrixmw, nfactors = 1, rotate = "oblimin")
print(factor_analysismw, digits = 2)
fa.diagram(factor_analysismw)
#factoranalysis psmw combined
combined_variables <- cbind(variablesps, variablesmw)
non_numeric_combined <- sapply(combined_variables, function(x) any(!is.na(x) &
!is.numeric(x)))
print(names(combined_variables)[non_numeric_combined])
combined_variables <- combined_variables[, !non_numeric_combined]
correlation_matrix_combined <- cor(combined_variables)
eigen_values_combined <- eigen(correlation_matrix_combined)$values
print(eigen_values_combined)
factor_analysis_combined <- fa(r = correlation_matrix_combined, nfactors = 1, rotate =
"oblimin")
print(factor_analysis_combined, digits = 2)
cronbach_alpha <- alpha(combined_variables)
print(cronbach_alpha)
#agency
patternsa <- c('Q1 Agency', 'Q2 Agency', 'Q3 Agency', 'Q4 Agency', 'Q5 Agency', 'Q6
Agency', 'Q7 Agency', 'Q8 Agency', 'Q9 Agency')
selected_variablesa <- grep(paste(patternsa, collapse = '|'), names(my.data5), value = TRUE)
variablesa <- my.data5[, selected_variablesa]
variablesa <- as.data.frame(lapply(variablesa, as.numeric))
non_numerica <- sapply(variables, function(x) any(!is.na(x) & !is.numeric(x)))
print(names(variablesa)[non_numerica])
```

```
variablesa<- variablesa[, !non_numerica]
correlation_matrixa <- cor(variablesa)
cortest.bartlett(correlation_matrixa, n = 136)
eigen_values <- eigen(correlation_matrixa)$values
print(eigen_values)
factor_analysisa <- fa(r = correlation_matrixa, nfactors = 1, rotate = "oblimin")
print(factor_analysisa, digits = 2)
fa.diagram(factor_analysisa)
#self-blame
patternssb <- c('Q1 Self-blame_1', 'Q1 Self-blame_2', 'Q1 Self-blame_3', 'Q1 Self-blame_4',
'Q1 Self-blame_5', 'Q1 Self-blame_6', 'Q1 Self-blame_7', 'Q1 Self-blame_8', 'Q1 Self-
blame_9', 'Q1 Self-blame_10', 'Q1 Self-blame_11')
print(patternssb)
selected_variablessb <- grep(paste(patternssb, collapse = '|'), names(my.data5), value =
TRUE)
variablessb <- my.data5[, selected_variablessb]
variablessb <- as.data.frame(lapply(variablessb, as.numeric))
non_numericsb <- sapply(variablessb, function(x) any(!is.na(x) & !is.numeric(x)))
print(names(variablessb)[non_numericsb])
variablessb <- variablessb[, !non_numericsb]
correlation_matrixsb <- cor(variablessb)
cortest.bartlett(correlation_matrixsb, n = 136)
eigen_values <- eigen(correlation_matrixsb)$values
print(eigen_values)
factor_analysissb <- fa(r = correlation_matrixsb, nfactors = 2, rotate = "oblimin")
print(factor_analysissb, digits = 2)
fa.diagram(factor_analysissb)
##mean scores##
#perceived seriousness
responses_phone <- my.data5[my.data5$`control phone` == 1, ]
responses_case <- my.data5[my.data5$`control phone` == 2, ]
mean_1 <- rowMeans(responses_phone[c('Q1 ps', 'Q2 ps', 'Q3 ps', 'Q4 ps', 'Q5 ps')], na.rm =
TRUE)
```

```
mean_2 <- rowMeans(responses_case[c('Q1 ps', 'Q2 ps', 'Q3 ps', 'Q4 ps', 'Q5 ps')], na.rm =
TRUE)
overall_mean1 <- mean(mean_1, na.rm = TRUE)
print(overall_mean1)
overall_mean2 <- mean(mean_2, na.rm = TRUE)
print(overall_mean2)
sd(mean_1)
sd(mean_2)
mean_t1 <- rowMeans(my.data5[c('Q1 ps', 'Q2 ps', 'Q3 ps', 'Q4 ps', 'Q5 ps')], na.rm = TRUE)
overall_meant1 <- mean(mean_t1, na.rm = TRUE)
print(overall_meant1)
sd(mean_t1)
my.data5$`Q1 ps` <- as.numeric(as.character(my.data5$`Q1 ps`))
my.data5$`Q2 ps` <- as.numeric(as.character(my.data5$`Q2 ps`))
my.data5$`Q3 ps` <- as.numeric(as.character(my.data5$`Q3 ps`))
my.data5$`Q4 ps` <- as.numeric(as.character(my.data5$`Q4 ps`))
my.data5$`Q5 ps` <- as.numeric(as.character(my.data5$`Q5 ps`))
#self-efficacy
my.data5$`Q1 self-efficacy_2` <- as.numeric(as.character(my.data5$`Q1 self-efficacy_2`))
my.data5$`Q1 self-efficacy_4` <- as.numeric(as.character(my.data5$`Q1 self-efficacy_4`))
my.data5$`Q1 self-efficacy_5` <- as.numeric(as.character(my.data5$`Q1 self-efficacy_5`))
my.data5$`Q1 self-efficacy_6` <- as.numeric(as.character(my.data5$`Q1 self-efficacy_6`))
my.data5$`Q1 self-efficacy_7` <- as.numeric(as.character(my.data5$`Q1 self-efficacy_7`))
my.data5$`Q1 self-efficacy_8` <- as.numeric(as.character(my.data5$`Q1 self-efficacy_8`))
my.data5$`Q1 self-efficacy_9` <- as.numeric(as.character(my.data5$`Q1 self-efficacy_9`))
my.data5$`Q1 self-efficacy_10` <- as.numeric(as.character(my.data5$`Q1 self-efficacy_10`))
responses_phone <- my.data5[my.data5$`control phone` == 1, ]
responses_case <- my.data5[my.data5$`control phone` == 2, ]
mean_1 <- rowMeans(responses_phone[c('Q1 self-efficacy_2', 'Q1 self-efficacy_4',
                                     'Q1 self-efficacy_5', 'Q1 self-efficacy_6',
                                     'Q1 self-efficacy_7', 'Q1 self-efficacy_8',
                                     'Q1 self-efficacy_9', 'Q1 self-efficacy_10')], na.rm = TRUE)
mean_2 <- rowMeans(responses_case[c('Q1 self-efficacy_2', 'Q1 self-efficacy_4',
                                    'Q1 self-efficacy_5', 'Q1 self-efficacy_6',
```

```
                    'Q1 self-efficacy_7', 'Q1 self-efficacy_8',
                    'Q1 self-efficacy_9', 'Q1 self-efficacy_10')], na.rm = TRUE)
overall_mean1 <- mean(mean_1, na.rm = TRUE)
print(overall_mean1)
overall_mean2 <- mean(mean_2, na.rm = TRUE)
print(overall_mean2)
sd(mean_1)
sd(mean_2)
mean_t2 <- rowMeans(my.data5[c('Q1 self-efficacy_2', 'Q1 self-efficacy_4',
                    'Q1 self-efficacy_5', 'Q1 self-efficacy_6',
                    'Q1 self-efficacy_7', 'Q1 self-efficacy_8',
                    'Q1 self-efficacy_9', 'Q1 self-efficacy_10')], na.rm = TRUE)
overall_meant2 <- mean(mean_t2, na.rm = TRUE)
print(overall_meant2)
sd(mean_t2)
#moral wrongfulness
my.data5$`Q1 mw` <- as.numeric(as.character(my.data5$`Q1 mw`))
my.data5$`Q2 mw` <- as.numeric(as.character(my.data5$`Q2 mw`))
my.data5$`Q3 mw` <- as.numeric(as.character(my.data5$`Q3 mw`))
my.data5$`Q4 mw` <- as.numeric(as.character(my.data5$`Q4 mw`))
my.data5$`Q5 mw` <- as.numeric(as.character(my.data5$`Q5 mw`))
responses_phone <- my.data5[my.data5$`control phone` == 1, ]
responses_case <- my.data5[my.data5$`control phone` == 2, ]
mean_1 <- rowMeans(responses_phone[c('Q1 mw', 'Q2 mw', 'Q3 mw', 'Q4 mw', 'Q5 mw')],
na.rm = TRUE)
mean_2 <- rowMeans(responses_case[c('Q1 mw', 'Q2 mw', 'Q3 mw', 'Q4 mw', 'Q5 mw')],
na.rm = TRUE)
overall_mean1 <- mean(mean_1, na.rm = TRUE)
print(overall_mean1)
overall_mean2 <- mean(mean_2, na.rm = TRUE)
print(overall_mean2)
sd(mean_1)
sd(mean_2)
```

```
mean_t3 <- rowMeans(my.data5[c('Q1 mw', 'Q2 mw', 'Q3 mw', 'Q4 mw', 'Q5 mw')], na.rm =
TRUE)
overall_meant3 <- mean(mean_t3, na.rm = TRUE)
print(overall_meant3)
sd(mean_t3)
#agency
my.data5$`Q1 Agency` <- as.numeric(as.character(my.data5$`Q1 Agency`))
my.data5$`Q2 Agency` <- as.numeric(as.character(my.data5$`Q2 Agency`))
my.data5$`Q3 Agency` <- as.numeric(as.character(my.data5$`Q3 Agency`))
my.data5$`Q4 Agency` <- as.numeric(as.character(my.data5$`Q4 Agency`))
my.data5$`Q5 Agency` <- as.numeric(as.character(my.data5$`Q5 Agency`))
my.data5$`Q6 Agency` <- as.numeric(as.character(my.data5$`Q6 Agency`))
my.data5$`Q7 Agency` <- as.numeric(as.character(my.data5$`Q7 Agency`))
my.data5$`Q8 Agency` <- as.numeric(as.character(my.data5$`Q8 Agency`))
my.data5$`Q9 Agency` <- as.numeric(as.character(my.data5$`Q9 Agency`))
responses_phone <- my.data5[my.data5$`control phone` == 1, ]
responses_case <- my.data5[my.data5$`control phone` == 2, ]
mean_1 <- rowMeans(responses_phone[c('Q1 Agency', 'Q2 Agency', 'Q3 Agency', 'Q4
Agency', 'Q5 Agency', 'Q6 Agency', 'Q7 Agency', 'Q8 Agency', 'Q9 Agency')], na.rm =
TRUE)
mean_2 <- rowMeans(responses_case[c('Q1 Agency', 'Q2 Agency', 'Q3 Agency', 'Q4
Agency', 'Q5 Agency', 'Q6 Agency', 'Q7 Agency', 'Q8 Agency', 'Q9 Agency')], na.rm =
TRUE)
overall_mean1 <- mean(mean_1, na.rm = TRUE)
print(overall_mean1)
overall_mean2 <- mean(mean_2, na.rm = TRUE)
print(overall_mean2)
sd(mean_1)
sd(mean_2)
mean_t4 <- rowMeans(my.data5[c('Q1 Agency', 'Q2 Agency', 'Q3 Agency', 'Q4 Agency', 'Q5
Agency', 'Q6 Agency', 'Q7 Agency', 'Q8 Agency', 'Q9 Agency')], na.rm = TRUE)
overall_meant4 <- mean(mean_t4, na.rm = TRUE)
print(overall_meant4)
sd(mean_t4)
```

```
#self-blame
my.data5$`Q1 Self-blame_1` <- as.numeric(as.character(my.data5$`Q1 Self-blame_1`))
my.data5$`Q1 Self-blame_2` <- as.numeric(as.character(my.data5$`Q1 Self-blame_2`))
my.data5$`Q1 Self-blame_3` <- as.numeric(as.character(my.data5$`Q1 Self-blame_3`))
my.data5$`Q1 Self-blame_4` <- as.numeric(as.character(my.data5$`Q1 Self-blame_4`))
my.data5$`Q1 Self-blame_5` <- as.numeric(as.character(my.data5$`Q1 Self-blame_5`))
my.data5$`Q1 Self-blame_6` <- as.numeric(as.character(my.data5$`Q1 Self-blame_6`))
my.data5$`Q1 Self-blame_7` <- as.numeric(as.character(my.data5$`Q1 Self-blame_7`))
my.data5$`Q1 Self-blame_8` <- as.numeric(as.character(my.data5$`Q1 Self-blame_8`))
my.data5$`Q1 Self-blame_9` <- as.numeric(as.character(my.data5$`Q1 Self-blame_9`))
my.data5$`Q1 Self-blame_10` <- as.numeric(as.character(my.data5$`Q1 Self-blame_10`))
my.data5$`Q1 Self-blame_11` <- as.numeric(as.character(my.data5$`Q1 Self-blame_11`))
responses_phone <- my.data5[my.data5$`control phone` == 1, ]
responses_case <- my.data5[my.data5$`control phone` == 2, ]
mean_1 <- rowMeans(responses_phone[c('Q1 Self-blame_1', 'Q1 Self-blame_2', 'Q1 Self-
blame_3', 'Q1 Self-blame_4', 'Q1 Self-blame_5', 'Q1 Self-blame_6', 'Q1 Self-blame_7', 'Q1
Self-blame_8', 'Q1 Self-blame_9', 'Q1 Self-blame_10', 'Q1 Self-blame_11')], na.rm = TRUE)
mean_2 <- rowMeans(responses_case[c('Q1 Self-blame_1', 'Q1 Self-blame_2', 'Q1 Self-
blame_3', 'Q1 Self-blame_4', 'Q1 Self-blame_5', 'Q1 Self-blame_6', 'Q1 Self-blame_7', 'Q1
Self-blame_8', 'Q1 Self-blame_9', 'Q1 Self-blame_10', 'Q1 Self-blame_11')], na.rm = TRUE)
mean_1 <- rowMums(responses_phone[c('Q1 Self-blame_1', 'Q1 Self-blame_2', 'Q1 Self-
blame_3', 'Q1 Self-blame_4', 'Q1 Self-blame_5', 'Q1 Self-blame_6', 'Q1 Self-blame_7', 'Q1
Self-blame_8', 'Q1 Self-blame_9', 'Q1 Self-blame_10', 'Q1 Self-blame_11')], na.rm = TRUE)
mean_2 <- rowMeans(responses_case[c('Q1 Self-blame_1', 'Q1 Self-blame_2', 'Q1 Self-
blame_3', 'Q1 Self-blame_4', 'Q1 Self-blame_5', 'Q1 Self-blame_6', 'Q1 Self-blame_7', 'Q1
Self-blame_8', 'Q1 Self-blame_9', 'Q1 Self-blame_10', 'Q1 Self-blame_11')], na.rm = TRUE)
mean1 <- mean_1 / 11
mean(mean1)
sd(mean_1)
overall_mean1 <- mean(mean_1, na.rm = TRUE)
print(overall_mean1)
overall_sd1 <- sd(overall_mean1, na.rm = TRUE)
print(overall_sd1)
```

```
overall_mean2 <- mean(mean_2, na.rm = TRUE)
print(overall_mean2)
sd(mean_1)
sd(mean_2)
mean_t5 <- rowMeans(my.data5[c('Q1 Self-blame_1', 'Q1 Self-blame_2', 'Q1 Self-blame_3',
'Q1 Self-blame_4', 'Q1 Self-blame_5', 'Q1 Self-blame_6', 'Q1 Self-blame_7', 'Q1 Self-
blame_8', 'Q1 Self-blame_9', 'Q1 Self-blame_10', 'Q1 Self-blame_11')], na.rm = TRUE)
overall_meant5 <- mean(mean_t5, na.rm = TRUE)
print(overall_meant5)
sd(mean_t5)
#VOM participation
my.data5$`Q1 participation` <- as.numeric(as.character(my.data5$`Q1 participation`))
responses_phone <- my.data5[my.data5$`control phone` == 1, ]
responses_case <- my.data5[my.data5$`control phone` == 2, ]
mean_1p <- rowMeans(responses_phone[c('Q1 participation')], na.rm = TRUE)
mean_2p <- rowMeans(responses_case[c('Q1 participation')], na.rm = TRUE)
overall_mean1 <- mean(mean_1, na.rm = TRUE)
print(overall_mean1)
overall_mean2 <- mean(mean_2, na.rm = TRUE)
print(overall_mean2)
sd(mean_1)
sd(mean_2)
mean_t6 <- rowMeans(my.data5[c('Q1 participation')], na.rm = TRUE)
overall_meant6 <- mean(mean_t6, na.rm = TRUE)
print(overall_meant6)
sd(mean_t6)
#check difference
t_test_result <- t.test(mean_1p, mean_2p)
print(t_test_result)
##check assumptions##
#create linear models
modelse <- lm(combined_participation ~ combined_selfefficacy, data = my.data5)
modelmw <- lm(combined_participation ~ combined_moralwrongfulness, data = my.data5)
```

```
modelps <- lm(combined_participation ~ combined_perceivedseriousness, data = my.data5)
modela <- lm(combined_participation ~ combined_agency, data = my.data5)
modelsb <- lm(combined_participation ~ combined_selfblame, data = my.data5)
#normality
#shapiro test
residualsse <- residuals(modelse)
shapiro.test(residualsse) #0.001 not normal
residualsmw <- residuals(modelmw)
shapiro.test(residualsmw) #0.000005 not normal
residualsps <- residuals(modelps)
shapiro.test(residualsps) #not normal
residualsa <- residuals(modela)
shapiro.test(residualsa) # 0.17 normal
residualssb <- residuals(modelsb)
shapiro.test(residualssb) #not normal#transform dv
transformedp <- log(combined_participation)
#histograms
hist(residuals(modelse), main = "Histogram of Residuals", probability = TRUE)
curve(dnorm(x, mean = mean(residuals(modelse)), sd = sd(residuals(modelse))),
    + col = "darkblue", lwd = 2, add = TRUE)
hist(residuals(modelmw), main = "Histogram of Residuals", probability = TRUE)
curve(dnorm(x, mean = mean(residuals(modelps)), sd = sd(residuals(modelmw))),
    + col = "darkblue", lwd = 2, add = TRUE)
hist(residuals(modelps), main = "Histogram of Residuals", probability = TRUE)
curve(dnorm(x, mean = mean(residuals(modelps)), sd = sd(residuals(modelps))),
    + col = "darkblue", lwd = 2, add = TRUE)
hist(residuals(modela), main = "Histogram of Residuals", probability = TRUE)
curve(dnorm(x, mean = mean(residuals(modela)), sd = sd(residuals(modela))),
    + col = "darkblue", lwd = 2, add = TRUE)
hist(residuals(modelsb), main = "Histogram of Residuals", probability = TRUE)
curve(dnorm(x, mean = mean(residuals(modelsb)), sd = sd(residuals(modelsb))),
    + col = "darkblue", lwd = 2, add = TRUE)
hist(residuals(modelp), main = "Histogram of Residuals", probability = TRUE)
curve(dnorm(x, mean = mean(residuals(modelp)), sd = sd(residuals(modelp))),
```

```
    + col = "darkblue", lwd = 2, add = TRUE)
#linearity
plot(combined_selfefficacy, combined_participation,
    main = "Scatterplot for Linearity",
    xlab = "combined_selfefficacy", ylab = "combined_participation")
fit <- lm(combined_participation ~ combined_selfefficacy)
abline(fit, col = "red")
plot(combined_moralwrongfulness, combined_participation,
    main = "Scatterplot for Linearity",
    xlab = "combined_moralwrongfulness", ylab = "combined_participation")
fit <- lm(combined_participation ~ combined_moralwrongfulness)
abline(fit, col = "red")
plot(combined_perceivedseriousness, combined_participation,
    main = "Scatterplot for Linearity",
    xlab = "combined_perceivedseriousness", ylab = "combined_participation")
fit <- lm(combined_participation ~ combined_perceivedseriousness)
abline(fit, col = "red")
plot(combined_agency, combined_participation,
    main = "Scatterplot for Linearity",
    xlab = "combined_agency", ylab = "combined_participation")
fit <- lm(combined_participation ~ combined_agency)
abline(fit, col = "red")
plot(combined_selfblame, combined_participation,
    main = "Scatterplot for Linearity",
    xlab = "combined_selfblame", ylab = "combined_participation")
fit <- lm(combined_participation ~ combined_selfefficacy)
abline(fit, col = "red")
#homogeneity of variance
install.packages("lmtest")
library(lmtest)
residuals <- residuals(modelse)
bp_test <- bptest(modelse)
print(bp_test) #0.2 violated
residuals <- residuals(modelmw)
```

```
bp_test <- bptest(modelmw)
print(bp_test) #0.1 not violated
residuals <- residuals(modelps)
bp_test <- bptest(modelps)
print(bp_test) #0.5 not violated
residuals <- residuals(modela)
bp_test <- bptest(modela)
print(bp_test) #0.9 not violated
residuals <- residuals(modelsb)
bp_test <- bptest(modelsb)
print(bp_test) #0.9 not violated
#independence of observations
install.packages("car")
library(car)
dw_test <- durbinWatsonTest(modelse)
print(dw_test) #1.89 not violated
dw_test <- durbinWatsonTest(modelmw)
print(dw_test) #1.89 not violated
dw_test <- durbinWatsonTest(modelps)
print(dw_test) #1.95 not violated
dw_test <- durbinWatsonTest(modela)
print(dw_test) #1.94 not violated
dw_test <- durbinWatsonTest(modelsb)
print(dw_test) #1.90 not violated
#mean scores both groups
#perceived seriousness smartphone
my.data5[, c('Q1 ps', 'Q2 ps', 'Q3 ps', 'Q4 ps', 'Q5 ps')] <- lapply(my.data5[, c('Q1 ps', 'Q2 ps',
'Q3 ps', 'Q4 ps', 'Q5 ps')], as.numeric)
mean_ps <- rowMeans(my.data5[, c('Q1 ps', 'Q2 ps', 'Q3 ps', 'Q4 ps', 'Q5 ps')], na.rm =
TRUE)
#participation
my.data5[, c('Q1 participation')] <- lapply(my.data5[, c('Q1 participation')], as.numeric)
mean_p <- rowMeans(my.data5[, c('Q1 participation')], na.rm = TRUE)
#self-efficacy
```

```
my.data5[, c('Q1 self-efficacy_2', 'Q1 self-efficacy_4',
        'Q1 self-efficacy_5', 'Q1 self-efficacy_6',
        'Q1 self-efficacy_7', 'Q1 self-efficacy_8',
        'Q1 self-efficacy_9', 'Q1 self-efficacy_10')] <- lapply(my.data5[, c('Q1 self-
efficacy_2', 'Q1 self-efficacy_4',
                                                    'Q1 self-efficacy_5', 'Q1 self-efficacy_6',
                                                    'Q1 self-efficacy_7', 'Q1 self-efficacy_8',
                                                    'Q1 self-efficacy_9', 'Q1 self-
efficacy_10')], as.numeric)
mean_se <- rowMeans(my.data5[, c('Q1 self-efficacy_2', 'Q1 self-efficacy_4',
                        'Q1 self-efficacy_5', 'Q1 self-efficacy_6',
                        'Q1 self-efficacy_7', 'Q1 self-efficacy_8',
                        'Q1 self-efficacy_9', 'Q1 self-efficacy_10')], na.rm = TRUE)
#agency
my.data5[, c('Q1 Agency', 'Q2 Agency', 'Q3 Agency', 'Q4 Agency', 'Q5 Agency', 'Q6 Agency',
'Q7 Agency', 'Q8 Agency', 'Q9 Agency')] <- lapply(my.data5[, c('Q1 Agency', 'Q2 Agency',
'Q3 Agency', 'Q4 Agency', 'Q5 Agency', 'Q6 Agency', 'Q7 Agency', 'Q8 Agency', 'Q9
Agency')], as.numeric)
mean_a <- rowMeans(my.data5[, c('Q1 Agency', 'Q2 Agency', 'Q3 Agency', 'Q4 Agency', 'Q5
Agency', 'Q6 Agency', 'Q7 Agency', 'Q8 Agency', 'Q9 Agency')], na.rm = TRUE)
#moral wrongfulness
my.data5[, c('Q1 mw', 'Q2 mw', 'Q3 mw', 'Q4 mw', 'Q5 mw')] <- lapply(my.data5[, c('Q1 mw',
'Q2 mw', 'Q3 mw', 'Q4 mw', 'Q5 mw')], as.numeric)
mean_mw <- rowMeans(my.data5[, c('Q1 mw', 'Q2 mw', 'Q3 mw', 'Q4 mw', 'Q5 mw')], na.rm
= TRUE)
#self-blame
my.data5[, c('Q1 Self-blame_1', 'Q1 Self-blame_2', 'Q1 Self-blame_3', 'Q1 Self-blame_4', 'Q1
Self-blame_5', 'Q1 Self-blame_6', 'Q1 Self-blame_7', 'Q1 Self-blame_8', 'Q1 Self-blame_9',
'Q1 Self-blame_10', 'Q1 Self-blame_11')] <- lapply(my.data5[, c('Q1 Self-blame_1', 'Q1 Self-
blame_2', 'Q1 Self-blame_3', 'Q1 Self-blame_4', 'Q1 Self-blame_5', 'Q1 Self-blame_6', 'Q1
Self-blame_7', 'Q1 Self-blame_8', 'Q1 Self-blame_9', 'Q1 Self-blame_10', 'Q1 Self-
blame_11')], as.numeric)
```

```
mean_sb <- rowMeans(my.data5[, c('Q1 Self-blame_1', 'Q1 Self-blame_2', 'Q1 Self-blame_3', 'Q1 Self-blame_4', 'Q1 Self-blame_5', 'Q1 Self-blame_6', 'Q1 Self-blame_7', 'Q1 Self-blame_8', 'Q1 Self-blame_9', 'Q1 Self-blame_10', 'Q1 Self-blame_11')], na.rm = TRUE)
#correlation matrix
mean_scores <- data.frame(mean_se, mean_ps, mean_p, mean_a, mean_mw, mean_sb)
correlation_matrix <- cor(mean_scores, use = "pairwise.complete.obs")
print(correlation_matrix)
#significance
calc_p_values <- function(correlation_matrix, n) {
  t_stat <- abs(correlation_matrix) * sqrt((n - 2) / (1 - correlation_matrix^2))
  p_values <- 2 * pt(t_stat, df = n - 2, lower.tail = FALSE)
  p_values
}
mean_score_matrix <- as.matrix(mean_scores[, c('mean_se', 'mean_ps', 'mean_mw', 'mean_a', 'mean_sb')])
correlation_matrix <- cor(mean_score_matrix, use = "complete.obs")
n <- nrow(mean_score_matrix)
p_values <- calc_p_values(correlation_matrix, n)
format_correlation <- function(correlation_matrix, p_values, alpha_levels, sig_levels) {
  alpha_levels <- c(alpha_levels, 1)
  sig_levels <- c(sig_levels, "")
  sig_cor_matrix <- matrix("", nrow = nrow(correlation_matrix), ncol = ncol(correlation_matrix))
  for (i in 1:nrow(correlation_matrix)) {
    for (j in 1:ncol(correlation_matrix)) {
      if (i != j) {
        p_value <- p_values[i, j]
        sig_label <- ""
        if (!is.na(p_value)) {
          for (k in 1:length(alpha_levels)) {
            if (p_value <= alpha_levels[k]) {
              sig_label <- sig_levels[k]
              break
            }
```

```
        }
       }
       sig_cor_matrix[i, j] <- paste0(format(correlation_matrix[i, j], digits = 2), sig_label)
      } else {
       sig_cor_matrix[i, j] <- format(correlation_matrix[i, j], digits = 2)
      }
    }
  }
  colnames(sig_cor_matrix) <- colnames(correlation_matrix)
  rownames(sig_cor_matrix) <- rownames(correlation_matrix)
  sig_cor_matrix
}
alpha_levels <- c(0.05, 0.01, 0.001)
sig_levels <- c("***", "**", "*")
formatted_cor_matrix <- format_correlation(correlation_matrix, p_values, alpha_levels,
sig_levels)
print(formatted_cor_matrix)
#H1a regression
modelH1a <- lm(mean_p ~ mean_ps, data = mean_scores)
summary(modelH1a)
#H1b mediation analysis
mediation_model <- ' mean_mw ~ a * mean_ps
mean_p ~ c * mean_ps + b * mean_mw
#Indirect effect (a * b)
indirect := a * b
#Total effect (c + indirect)
total := c + indirect
'# Estimate the mediation model
mediation_results <- sem(mediation_model, data = mean_scores)
# Summarise the results
summary(mediation_results, standardized = TRUE, fit.measures = TRUE)
#H1c crime scenario seriousness
#perceived seriousness different conditions
responses_phone <- my.data5[my.data5$`control phone` == 1, ]
```

```
responses_case <- my.data5[my.data5$`control phone` == 2, ]
mean_1 <- rowMeans(responses_phone[c('Q1 ps', 'Q2 ps', 'Q3 ps', 'Q4 ps', 'Q5 ps')], na.rm =
TRUE)
mean_2 <- rowMeans(responses_case[c('Q1 ps', 'Q2 ps', 'Q3 ps', 'Q4 ps', 'Q5 ps')], na.rm =
TRUE)
overall_mean1 <- mean(mean_1, na.rm = TRUE)
print(overall_mean1)
overall_mean2 <- mean(mean_2, na.rm = TRUE)
print(overall_mean2)
wilcox_test_result <- wilcox.test(mean_1, mean_2)
print(wilcox_test_result)
#H2 regression
install.packages("mgcv")
library(mgcv)
# Fit a GAM model
gam_model <- gam(mean_p ~ s(mean_se), data = mean_scores)
# Summarize the model
summary(gam_model)
#H3 mediation analysis
  mediation_model <- ' mean_a ~ a * mean_se
mean_p ~ c * mean_se + b * mean_a
#Indirect effect (a * b)
indirect := a * b
#Total effect (c + indirect)
total := c + indirect
'
# Estimate the mediation model
mediation_results <- sem(mediation_model, data = mean_scores)
# Summarize the results
summary(mediation_results, standardized = TRUE, fit.measures = TRUE)
#H4 correlation
modelH4 <- lm(mean_p ~ mean_sb, data = mean_scores)
summary(modelH4)
```

```
#differences in self-blame
#self-blame
mean_sbb <- rowMeans(my.data5[c('Q1 Self-blame_1', 'Q1 Self-blame_2', 'Q1 Self-blame_3',
'Q1 Self-blame_4', 'Q1 Self-blame_5', 'Q1 Self-blame_6', 'Q1 Self-blame_7', 'Q1 Self-
blame_8', 'Q1 Self-blame_9', 'Q1 Self-blame_10', 'Q1 Self-blame_11')], na.rm = TRUE)
overall_meansbb <- mean(mean_sbb, na.rm = TRUE)
print(overall_meansbb)
modelH4b <- lm(mean_p ~ mean_sbb, data = mean_scores)
summary(modelH4b)
#relistic scenario
realistic.phon.dataset$`Q2 realistic` <- as.numeric(as.character(realistic.phon.dataset$`Q2
realistic`))
realistic.phon.dataset$`Q1 realistic` <- as.numeric(as.character(realistic.phon.dataset$`Q1
realistic`))
realistic.phon.dataset$`Q2 realistic` <- as.numeric(as.character(realistic.phon.dataset$`Q2
realistic`))
realistic.phon.dataset$`Q3 realistic` <- as.numeric(as.character(realistic.phon.dataset$`Q3
realistic`))
realistic.phon.dataset$`Q4 realistic` <- as.numeric(as.character(realistic.phon.dataset$`Q4
realistic`))
realistic.phon.dataset$`Q5 realistic` <- as.numeric(as.character(realistic.phon.dataset$`Q5
realistic`))
realistic.phon.dataset$'Q2 realistic_reversed' <- 8 - realistic.phon.dataset$'Q2 realistic'
realistic.phon.dataset$mean_score <- rowMeans(realistic.phon.dataset[, c("Q1 realistic", "Q2
realistic_reversed", "Q3 realistic", "Q4 realistic", "Q5 realistic")], na.rm = TRUE)
print(realistic.phon.dataset)
realistic.phon.dataset$mean_score <- rowMeans(realistic.phon.dataset[, c("Q1 realistic", "Q3
realistic", "Q4 realistic", "Q5 realistic", "Q2 realistic_reversed")], na.rm = TRUE)
total_mean <- mean(realistic.phon.dataset$mean_score, na.rm = TRUE)
print(total_mean)
realistic.case.dataset$`Q1.2 realistic` <- as.numeric(as.character(realistic.case.dataset$`Q1.2
realistic`))
realistic.case.dataset$`Q2.2 realistic` <- as.numeric(as.character(realistic.case.dataset$`Q2.2
realistic`))
```

```
realistic.case.dataset$`Q3.2 realistic` <- as.numeric(as.character(realistic.case.dataset$`Q3.2 realistic`))
realistic.case.dataset$`Q4.2 realistic` <- as.numeric(as.character(realistic.case.dataset$`Q4.2 realistic`))
realistic.case.dataset$`Q5.2 realistic` <- as.numeric(as.character(realistic.case.dataset$`Q5.2 realistic`))
realistic.case.dataset$'Q2.2 realistic_reversed' <- 8 - realistic.case.dataset$'Q2.2 realistic'
realistic.case.dataset$mean_score <- rowMeans(realistic.case.dataset[, c("Q1.2 realistic", "Q2.2 realistic_reversed", "Q3.2 realistic", "Q4.2 realistic", "Q5.2 realistic")], na.rm = TRUE)
print(realistic.case.dataset)
realistic.case.dataset$mean_score <- rowMeans(realistic.case.dataset[, c("Q1.2 realistic", "Q3.2 realistic", "Q4.2 realistic", "Q5.2 realistic", "Q2.2 realistic_reversed")], na.rm = TRUE)
total_mean <- mean(realistic.case.dataset$mean_score, na.rm = TRUE)
print(total_mean)
#previous experiences
table(as.numeric(my.data5$'Q1 experiences'))
table(as.numeric(my.data5$'Q2 experiences'))
table(as.numeric(my.data5$'Q3 experiences'))
table(as.numeric(my.data5$'Q4 experiences'))
table(as.numeric(my.data5$'Q5 experiences'))
```