



Abertay University®

Practising Safe Sex(t): Developing a game-based mitigation to tackle the rise of technology-facilitated sexual violence.

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Abstract

Context

More people are accessing the internet than ever before, with the coronavirus pandemic exacerbating the need for people to be online. This created the perfect storm for cybercrime and technology-facilitated abuse, which risen exponentially throughout the pandemic. The mitigations in place are not suitable in educating and preventing people from becoming victims of technology-facilitated sexual violence and are ill-equipped to support victims.

Aim

The aim of this project was to build a game-based mitigation to educate players about technology-facilitated sexual violence. A literature review into technology-facilitated sexual violence and available mitigations would be performed. The mitigations would be evaluated for their accessibility and effectiveness to prevent people from becoming victims.

Method

Ren'Py visual novel engine was used to build a five-chapter visual novel game, with each chapter revolving around a technology-facilitated sexually violent crime. The game was hosted online, with a survey to collect both pre- and post-game responses. This data collected demographic information, usability scores and qualitative feedback to support quantitative responses.

Results

Forty-five participants taken part in this study. The results of the study found that the game was very effective as an educational mitigation. All participants apart from two, who already knew about technology-facilitated sexual violence learned something new. The game had a good usability score, meaning that it was easy to use.

Conclusion

The project demonstrated that a game-based mitigation against technology-facilitated sexual violence was very effective and usable by adults of all ages. The limitations of this study were the small sample size and lack of ethnic diversity. Future work aims to allow the player to create their own sprite and have game content that is more relevant to older player's ages.

Abbreviations, Symbols and Notation

TFSV – Technology-Facilitated Sexual Violence

IBSA – Image Based Sexual Abuse

USI – Unsolicited Sexual Images

SUS – System Usability Scale

N – Number of

P - Participant

1. Introduction

1.1. Background

Technology-Facilitated Sexual Violence has been on the rise as more people around the world access the internet. The pandemic exacerbated this rise to an unprecedented scale as people were locked down and required the internet to communicate with each other (Collier et.al 2020).

Technology-Facilitated Sexual Violence (TFSV) is sexual violence that has been enabled or carried out using technology – it is not dependent on technology to be perpetrated. In Scottish law, it is covered by the Sexual Offences Act 2009 and The Abusive Behaviour and Sexual Harm Act 2016.

The legal and specialist mitigations in place to prevent TFSV such as the law, police and charities are not suitable for purpose. They are suitable for protecting a victim **after** a crime has taken place, but they do not educate or prevent people from becoming victims of TFSV. Furthermore, this rise in cases of TFSV has caused a backlog for specialist support systems such as the police and charities dedicated to sexual violence, and they are unable to provide adequate and timely support for victims.

There are also mitigations in place by social media and online porn companies, where most TFSV occurs. These mitigations include policies, reporting and digital fingerprinting. However, these mitigations can be bypassed easily and have multiple flaws in the execution. (Henry et.al 2021)

These legal, specialist and online mitigations do not aid in the education of TFSV and what is constituted as sexual violence. This makes it difficult for victims to understand if they have been victimised, and where they can go to get help. Most of these mitigations are also not easily accessible until a person has become a victim.

The use of gamification has been investigated as a possible tool to prevent people from becoming victims, whilst educating them on what TFSV is and what to do if they become a victim. Gamification has been used to educate and engage people for many different topics, including cybersecurity. However, there are currently no serious games about TFSV, or sexual violence in general.

1.2. Aim of Project

1.2.1. Research Question

This project posed the research question; “How can gamification be applied to educate people about TFSV?”. There were three specifics with this research question that had to be answered. These were:

- Research Question 1: *What are the mitigations available to prevent technology-facilitated sexual violence?*
- Research Question 2: *How effective are the mitigations at educating, preventing, and protecting people against technology-facilitated sexual violence?*
- Research Question 3: *How effective is gamification to educate users about technology-facilitated sexual violence?*

1.2.2. Aim and Objectives

The aim of the project was to develop a serious game to educate adults about technology-facilitated sexual violence, to prevent and protect users from becoming victims, whilst signposting available support if players do become victims.

The objectives of the game are as follows:

- Review and evaluate the effectiveness of mitigations currently in place to prevent technology-facilitated sexual violence (TFSV).
- An accessible and user-friendly serious game will be developed to educate, prevent, and protect users against TFSV.
- To evaluate effectiveness of the game, test participants will be required to complete a pre and post survey about their knowledge and opinion on TFSV.

1.3. Structure

The structure of this dissertation will begin with chapter two, which will analyse the existing literature about TFSV, current mitigations in place for TFSV and the effectiveness of gamification as a mitigation.

Chapter three will discuss the methodology used to design and develop the game from scratch, as well as the survey design used to evaluate the game. The chapter will discuss the pre- and post-game questions and why a pre-game survey was developed.

Chapter four will display the results obtained through the survey and display the data in digestible format. The results will also display the usability and accessibility of the game, detailing the process used to obtain this data.

Chapter five will discuss the results of the game and compare the results of the pre- and post-game responses. The researcher will evaluate the effectiveness of the game as a suitable mitigation against TFSV.

Chapter six summarises the project as a whole and discusses potential future work and improvements that can be carried out if the game is used as an educational tool.

2. Literature Review

This chapter will focus on peer-reviewed papers and literature reviews, as well as legal documents regarding the law surrounding sexual offences. There are resources by specialist charities, the police and social media that will be reviewed to investigate the shortcomings of these mitigations. The resources reviewed have been used in the design and creation of the game, to understand technology-facilitated sexual violence, the effect it has on victims and the mitigations currently in place.

2.1. Technology-Facilitated Sexual Violence

2.1.1. An Overview of Technology-Facilitated Sexual Violence

With technology becoming more accessible, people across the world can access internet-based communication. Recently, due to the pandemic and subsequent lockdowns restricting meeting people in real life, more people than ever are accessing the internet and communicating online. As a result, technology-facilitated abuse and cybercrime has increased at an exponential rate. (Collier et.al 2020).

During the pandemic, people were more likely to engage in virtual sexual activity if they were not cohabiting with a partner, when compared to pre-pandemic sexual experiences. Virtual sexual activity is defined within the study carried out by Mercer et al. (2021)., as sexting and watching pornography. This meant if people could not physically have sex or engage in sexual activities, the internet was used to gain sexual satisfaction instead.

Whilst generally more people were sexting, those who were more isolated from others during the pandemic had higher sexting interactions than those who were not as isolated. Research conducted by Thomas, Binder and Matthes (2021) found privacy management when sexting was poor and relied on hiding their face in photos and videos, as well as sexting with people they know offline. They also found that women and younger people were more likely to implement privacy management techniques when compared to males and older people. A limitation of this research is the study had a significant number of female participants (n=322) when compared to the number of male participants (n=171), leading to a lack of data on male sexting interactions during the pandemic. As more people engaged in virtual sexual activities and a lack of privacy related techniques being employed when sexting, reported cases of technology-facilitated sexual violence subsequently increased.

The term technology-facilitated sexual violence (hereinafter, TFSV) is defined as sexual violence that is carried out or aided using technology. Under the Sexual Offences (Scotland) Act 2009, sexual violence is considered as rape, sexual assault by penetration, sexual assault, sexual coercion, coercing a person into being present during a sexual activity, coercing a person into looking at a sexual image, communicating indecently, sexual exposure and voyeurism (Sexual Offences (Scotland) Act 2009, 2021). Fisico and Harkins (2021) categorised these offences as 'Image-Based Sexual Abuse', 'Video Voyeurism', 'Sending Unsolicited Sexual Images' and 'The Use of Technology to Facilitate In-Person Sexual Violence'. Within these categories there are specific crimes - some of which have been given media-friendly names - such as Sextortion, Revenge Porn, Up-Skirting, Cyber Flashing. Scottish law does not have a specific TFSV law, but TFSV crimes are covered by the Sexual Offences Act 2009 and the Abusive Behaviour and Sexual Harm (Scotland) Act 2016.

2.1.2. Categories of Technology-Facilitated Sexual Violence

Image-Based Sexual Abuse (hereinafter, IBSA) is defined as non-consensual recording and/or distribution of intimate images such as nude or sexual photos and videos. This includes the threat of

distribution. The most common incident of IBSA is 'Revenge Porn' which involves the perpetrator either sharing or threatening to share sexual images or videos of the victim without their consent. This is typically done to cause distress and embarrassment to the victim (Powell et.al, 2020).

Another common form of IBSA is sextortion, which involves the distribution or threat of distribution of sexual images and/or sexual information to extort money or sexual favours from a victim (Wolak et.al, 2016). Sextortion is like Revenge Porn as sexual images are shared to cause distress, however the aim of sextortion is to use the possibility of embarrassment and distress to receive money or sexual favours.

Video Voyeurism is the recording or photographing of an individual(s) in a private situation such as getting dressed/undressed, having sex or any other action that would be considered private. Recording or photographing an individual for personal sexual pleasure is also an offence, for example recording or photographing underneath a person's clothes such as a skirt, kilt or shorts without the person's consent or knowledge. This is covered under the Voyeurism offence within the Sexual Offences (Scotland) Act 2009 (Sexual Offences (Scotland) Act 2009, 2021).

Sending Unsolicited Sexual Images (hereinafter, USI) is commonly known as 'cyber-flashing'. This is where a perpetrator will send explicit images of themselves, typically of a penis to non-consenting or unknowing victims. Due to most perpetrators sending images of their penis, it is common to hear this offence described as 'sending dick pics'. The images can be sent through social media, text messages and Bluetooth technology as well as Apple's Airdrop feature (Freeman, 2020).

The use of technology to facilitate in-person sexual violence is sexual violence carried out through the use or aid of technology. An example of this would be a perpetrator using dating apps to arrange a date or meet, with the aim of sexually assaulting or raping the victim. Dating apps and websites are typically used, but social media and websites unrelated to dating and romance can also be used to facilitate sexual violence in-person (Fisico & Harkins, 2021).

2.1.3. Effects of Technology-Facilitated Sexual Violence

The effects of TFSV on children and young adults has been widely researched and studied, however there is currently little research on the impact TFSV has on adult victims. A literature review by Fisico and Harkins (2021), identified that victims of non-consensual image sharing experienced "*anger, guilt, and depression, damaged relationships with partners, family, employers, job loss, social isolation, and even suicide.*" The review identified there is the possibility of the victim being physically harmed by the perpetrator, particularly if in-person sexual violence has occurred. Similarly, a study by Champion, Oswald, and Pedersen (2021) investigated the psychological effect TFSV has on victims, identifying a link between TFSV and the likelihood of a victim committing suicide. The study produced data which demonstrates that TFSV has a negative effect on a victim's mental health state and will to live. Both papers emphasise the harmful emotional, psychological, and physical harm victims may experience from TFSV.

The paper by Zhong, Kebbell and Webster (2020) indicates TFSV is likely to be "*directed at women by men*". The study focused on how individuals assign responsibility to a male perpetrator and female victim depending on the incident and victim's response. Overall, male perpetrators were considered more responsible for TFSV than female victims, however a third of the responsibility was assigned to female victims – particularly if they gave an '*aggressive rejection*'. The paper linked higher levels of sexual aggression and toxic disinhibition to a higher likelihood of committing TFSV. The link between toxic disinhibition and sexual aggression is also demonstrated in an international study by Powell et.al (2020) which found TFSV crimes were used to bully, blackmail and abuse victims. The study

emphasised the effects that TFSV has on victims, particularly IBSA victims as they are continually traumatised by the likelihood of their images being distributed across the internet without their consent.

A study by Powell, Scott, and Henry (2018) found there is a link between LGBT+ people and the likelihood of them becoming victimised by TFSV. Transgender people are three times as likely to be victims of TFSV compared to cisgender and straight people. TFSV crimes being perpetrated against LGBT+ people are more sexual, gender and sexuality based than TFSV crimes perpetrated against straight men and women.

2.2. Current Mitigations

2.2.1. Legal Mitigations

Victims of TFSV are typically directed to go to the police for help after an incident has occurred. The police are expected to be able to support the victim and begin legal proceedings, such as gathering evidence and bringing an offender to justice. However, the unprecedented rise in cyber-crime and the pandemic has meant the police are struggling to both support victims and protect the public from TFSV. (Collier, et.al)

Police Scotland are aware of the rise in TFSV, with 30% of all cyber offences (estimated 14,130 offences) occurring in 2020 being recorded as sexual offences. They have admitted *“policing in Scotland is blurred by the use of technology to aid, and facilitate crime”* and due to social, economic, and technological changes, technology is being used more now than ever. This has caused the public to become susceptible to cyber-crime and computer misuse. In their cyber strategy, they have suggested they will move away from *“reactive actions”* to *“proactive and preventative actions”* such as cyber education, early intervention and building digital resilience. (Police Scotland, Cyber Strategy 2020).

To proactively tackle sexual violence in Scotland, Police Scotland have launched a new sexual violence campaign – ‘Don’t Be That Guy’. The campaign is specifically aimed at adult men, which the study by Zhong et.al (2020) identified as more likely to be perpetrators of TFSV. As well as demonstrating examples of sexual violence in person, it emphasises that sending USI is an act of sexual violence. The video released by the campaign does this through a sixty-second video where small acts of sexual violence such as catcalling and wolf-whistling, gradually build to aggressive acts of sexual violence. Regarding USI, a character says, “Ever slid into a girl’s DMs, then just went ahead, and showed her it?” (Police Scotland, 2021). The campaign generated a large national conversation about sexual violence against women - both in person and online - and was heavily praised for placing the onus of sexual violence on the perpetrator, instead of the victim.

It is difficult to determine how effective current legal mitigations are in preventing TFSV occurring in Scotland. This is since there are currently no specifically recorded convictions for TFSV crimes in Scotland. The current law against sexual offending and sexually violent crimes in Scotland states a perpetrator can be punished from an imprisonment term lasting less than a year, with or without a fine to life imprisonment. The punishment is dependable on the severity of the crime; however, prosecution and conviction rates are incredibly low compared to the number of reports. For example, there were 2343 reports of Rape and Attempted Rape – only 300 of the perpetrators were prosecuted and a further 130 were convicted. (Recorded Crime in Scotland, 2020-2021, 2022), (Criminal Proceedings in Scotland, 2019-20, 2022) There is little to no evidence available that indicates these legal punishments prevent or deter perpetrators from committing TFSV crimes or reoffending.

2.2.2. Other Mitigations

As well as legal mitigations, there is specialist support through charities that victims are typically guided to after their experience. However, these charities have admitted they are struggling to cope with the demand that has occurred due to the rise in TFSV. This is evidenced in a paper by Tanczer, Parkin and Lopez-Neira (2021) which investigates how specialist charities and support are dealing with the rise in TFA. The paper discusses how support workers are struggling to help victims of online intimate partner violence and TFSV effectively. The individuals surveyed admitted there is a lack of assistance, training, and support for workers to administer suitable and adequate support for victims of TFA and TFSV. One participant highlighted that *“there’s a real sense that statutory services and ourselves are behind, we’re behind the wave here”*. This survey emphasises the fact that cases of TFSV have increased exponentially and specific charities and support are not equipped to deal with this influx. It demonstrates the need for proactive prevention of TFSV, so people do not become victims and can identify when they may be vulnerable to falling victim.

Some of the most common platforms that TFSV occurs on are Facebook, Reddit, and Pornhub – all having built-in mitigations on their platforms to prevent TFSV occurring. They have implemented mitigations such as policies, reporting abilities, AI, and digital fingerprinting. However, they are faulty and have multiple issues. Policy mitigations, such as terms of use policies have ambiguous wording and blurs the lines of what can be considered non-consensual or abusive. Reporting non-consensual images or abusive content requires the content to be viewed, then reported. The content is reviewed either by a human or AI, which will make the decision of whether the content is harmful. Digital fingerprinting is a more recent mitigation, where a unique identifier called a hash is created of harmful content when it is removed, which means if the same content is uploaded again – the hash is flagged, and the content removed immediately. However, changing the content at all changes the hash and renders the mitigation useless, unless it is reported and fingerprinted again (Henry et.al 2021).

There are currently no application-based mitigations for TFSV, apart from Rape Crisis Scotland and Scottish Women’s Rights Centre for Stalking. The app called, ‘FollowItApp’ is a mobile application created to record stalking incidents – including technology-facilitated stalking. The logs are permissible in Scottish courts as valid evidence if a victim decides to take legal action. However, to download and use the app, the user must be a woman, eighteen or over, living in Scotland and have a phone-call or other means of communication with the Scottish Women’s Rights Centre. This is not suitable for victims who are not able to safely communicate with the SWRC, as well as victims under eighteen, and those who may identify as male or non-binary who may also be experiencing incidents of stalking in Scotland.

2.3. Gamification as a Mitigation

2.3.1. Effectiveness of Gamification

Deterding et al. (2011) carried out research into gamification and developed the definition that gamification is the process of applying game mechanics to non-game contexts such as education, fitness, and information. Within their research they discuss the definition and use of serious games. Through their research, they have determined serious games are games that have been developed for a purpose other than entertainment. Serious games are built for the user to learn about a topic whilst they play, unlike typical games which are played for enjoyment.

Aparicio, Vela, Gonzalez-Sanchez, and Isla-Montes’ (2012) research suggests gamification’s effectiveness is increased by utilising intrinsic motivation. Intrinsic motivation is the theory that a person will carry out a task or activity, as it is an enjoyable or pleasurable experience to do so. The

theory has three main principles, autonomy, mastery and purpose. Allowing the person to make their own decisions within the game fulfils the autonomy need, mastery is fulfilled by the player learning how to play the game, as well as fulfilling objectives and completing levels. Gamification allows the player to fulfil a purpose in the game – such as helping a character, solving a difficult puzzle, thus fulfilling the need for purpose as part of the intrinsic motivation model. (Aparicio et.al, 2012)

Gamification being used in an educational manner has been investigated by Scholefield and Shepherd (2019), through the development of a role-playing game to educate players about password hygiene and security awareness. The research identifies that gamification is used for various cybersecurity aspects such as cyber security skills and encouraging people to learn and engage in computing and cyber security. Most participants agreed their knowledge about password security increased, that the game was enjoyable, and that gamification was an effective educational technique. However, there is no long-term research into the effectiveness of the game in terms of knowledge retention. The researcher noted that gender demographic was not included, which may have been valuable in understanding how people of different genders interact with gamification.

Research carried out by Arinta, Suyoto and Emanuel (2020) which investigated the effectiveness of gamification for flood emergency planning. The game was aimed at individuals within rural communities that are likely to be in a flooding disaster area. The game is designed to teach the player how to prepare for flooding before it occurs, how to stay safe and seek help during a flood, and what to do post-flood. The game makes use of elements such as points, levels, rewards, and progress statuses to encourage the user to play and continue engaging with the game. The study had sixty-five participants from a disaster preparedness school and twenty-one participants from people *“who had experienced and were affected by the flood disaster”*. The majority of participants agreed the game was useful, easy to use and were satisfied with the game. The game applied the same training given by a flood disaster preparation team. The game was more time-efficient by 89.77% and removed the need to train a full team for three months, who would then teach disaster preparation participants. This study demonstrates that gamification is a suitable mitigation when being used as an educational tool for serious issues.

2.4. Summary

In summary, TFSV crimes have been increasing gradually through the years and risen exponentially during the pandemic as more people gained access to the internet. TFSV has a devastating mental and emotional impact on victims and in some cases, the victim is subjected to physical harm. Unfortunately, the mitigations in place to prevent, educate and support are not suitable. This is due to lack of proactive actions, lack of training and support as well as reactive measures on social media and adult websites which are not fail-safe and can be easily bypassed.

To proactively educate people about TFSV, gamification is a suitable way to teach people about TFSV in an accessible way. A serious game would allow the user to learn about TFSV in a gamified way, utilising intrinsic motivation. Intrinsic motivation is used to encourage the player to engage with the topic, whilst satisfying the player's autonomy, mastery and purpose needs.

3. Methodology

3.1. Overview

As the studies in the literature review indicate, the mitigations in place to educate, prevent and protect people against TFSV are not suitable. This solution to this, was a serious game as a proactive educational mitigation to prevent and protect players from becoming victims.

The serious game was developed as a visual novel game, using the Ren'Py Visual Novel Engine. Visual novels are text-based stories which allow players to make decisions within the game. In the game, characters interact with the player directly and ask for advice on what they should do in their current situation. The player can choose different options, where it is suitable to do so in the story.

The literature review, specialist charity advice and victim's statements on the impact TFSV crimes had on their lives were used in the chapter development. This was done to create a more accurate storyline, with no fabrication or embellishment of a victim's experience. This also reduced bias when designing male and non-binary victims' experiences for their respective chapters.

This chapter will detail and discuss the methodology used to design and develop the game. Firstly, analysis looking into serious games and potential game formats was carried out. The chapter will cover the design process of each chapter, moving on to the development phase of the game. Finally, in the evaluation section of the chapter – the survey design will be discussed in detail.

3.2. Analysis

Before the game could be designed, the researcher had to choose the format of the serious game. There were no existing games about TFSV to compare against each other to understand what the most suitable game format would be. Therefore, each format was considered by the suitability for educating the user about TFSV and the level of learning required to begin playing. The game would need to be suitable and accessible, so adults of all abilities could play the game. As research by Aparicio, Vela, Gonzalez-Sanchez, and Isla-Montes' (2012) suggests, gamification is successful due to the utilisation of intrinsic motivation, so the game format would need to implement features to fulfil this need.

The serious game was developed as a visual novel. A visual novel is a text-based story which allows the player to make choices that change the outcome of the story. The visual novel would allow the player to be immersed in the scenario, with the ability to influence the character's decisions. This would fulfil the educational aspect and principles required for the intrinsic motivation that would encourage the player to engage with the game and learn from it. As a visual novel game, it simply requires the player to click to continue the story and click the option they would like to choose. It does not require a high level of technical ability, thus making it suitable for adults of any age and ability. Table 1 below, explains how the visual novel will fulfil the intrinsic motivation principles for gamification to be successful.

Intrinsic Motivation	How principle is fulfilled
Autonomy	<ul style="list-style-type: none">- Player can choose options which influence character's decisions- Each chapter has choices at pivotal stages, allowing for autonomy throughout game.
Mastery	<ul style="list-style-type: none">- Learning to play visual novel fulfils mastery purpose- Player can learn about TFSV crimes and prevention, which they may not have known.
Purpose	<ul style="list-style-type: none">- Player can provide advice and help for character/victim in need- Player also learns where to get help for TFSV crimes

Table 1 - Table showing how the game fulfils Intrinsic Motivation

After reviewing the suitability of the visual novel, the researcher decided it was the most suitable option for a game-based mitigation. The researcher then started designing the chapters for the visual novel.

3.3. Design

Each of the chapters in the visual novel were designed to revolve around each category of TFSV as described by Fisico and Harkins (2021). There were five chapters, 'Revenge Porn', 'Sextortion', 'Up-skirting', 'Non-Consensual Image Sending' and 'The use of technology to facilitate sexual violence'. Each chapter had a different synopsis, with different characters of different genders, for example Jackie is non-binary and is referred to as 'They' throughout the chapter. There were no character photos, allowing the player to build their own idea of who the character is – for example, what the character looks like, what the character's background is, how they know them. The characters have been deliberately created this way, so the player can relate to them and immerse themselves into the created scenario. Table two provides an overview of the chapter's synopsis, characters and sources used to build the chapter.

Crime covered in chapter	Synopsis of chapter	Character Involved	Sources used
Revenge Porn	Friend has had private images of themselves posted on social media by an ex-partner, what should she do to get the images removed? Where can she get help?	Faye (Victim) Ethan (Perpetrator) Reya (Revenge Porn Helpline Advisor)	<ul style="list-style-type: none"> - Bluett-Boyd, N., Fileborn, B., Quadara, A. and Moore, S., 2013. - Lawcom.gov.uk., 2021. - McGlynn, C., Rackley, E. & Houghton, R., 2017. - Meta. 2021 - Revengepornhelpline.org.uk. 2022. - Youtube.com. 2017 - Youtube.com. 2018
Sextortion	Friend has been victim of a sextortion scam, where they've been recorded masturbating. The extorter is now threatening to send the video to friends and family if they don't send money. Should they ignore them?	Jackie (Victim) 'Jasmine' (Perpetrator)	<ul style="list-style-type: none"> - Bluett-Boyd, N., Fileborn, B., Quadara, A. and Moore, S., 2013. - Cassidy, R., 2022. - Jorquera, N., 2021. - Nationalcrimeagency.gov.uk. 2022. - Revengepornhelpline.org.uk. 2022. - Thorn. 2017 - Wolak, J & Finkelhor, D., 2016
Upskirting	Player is on the train where they see a person with their phone underneath a young girl's skirt. The camera is facing up, but it's not clear if they're recording or taking pictures. How should the player react?	Young Woman (Victim) Person on train (Perpetrator)	<ul style="list-style-type: none"> - British Transport Police. 2022. - Cps.gov.uk. 2021. - Moss, R., 2017 - Tait, A., 2018. - Taylor & Francis. 2022 - Thompson, C., 2022

Non-Consensual Image Sending	Player is at the pub with a group of friends where they are discussing dating apps. Two of the friends admit to sending private images to people who haven't consented and two of the friends have been victims in the past. How will the player react?	Mara (Victim) Lukasz (Victim) Aliyah (Perpetrator) Cian (Perpetrator)	<ul style="list-style-type: none"> - Bluett-Boyd, N., Fileborn, B., Quadara, A. and Moore, S., 2013. - Bumble. 2022. - Freeman, V., 2020 - Gallagher, S., 2019. - Pie_Incognito, 2022. - Scottish Women's Rights Centre. 2022.
The use of technology to facilitate sexual violence	Player's 'cousin' went on a date with a girl after speaking on a dating app. Cousin's behaviour changed after, becoming more reserved and withdrawn from friend group and family. Cousin reaches out to player and asks if they can go for a chat. What advice can the player give?	Stephen (Victim) Lydia Bain (Perpetrator)	<ul style="list-style-type: none"> - Echevarria, S., 2021. - Menendez, E., 2022 - Mygov.scot. 2020 - nhs.uk. 2021. - Price, H., 2022. - Rainn.org. 2022. - SURVIVORSUK. 2022.

Table 2 - Overview of chapter synopsis and characters

Chapter content was based on studies in the literature review, as well as advice and victim statements gathered through specialist charities, social media, and news outlets. These sources can be seen in table two. The resources used ensured the chapters were as accurate as possible when discussing the victims' emotions and actions, as well as how the crime is typically carried out. This meant there was no embellishing or fabricating of the victims' experience with these crimes. The researcher felt this was more appropriate rather than assuming how victims may be feeling during and after being subjected to these crimes.

To reduce bias, the researcher did not want to assume how non-binary/gender non-conforming and male victims would deal with TFSV and how they may reach out for help. As two of the characters were non-binary and male respectively, the researcher used specialist charities such as SURVIVORSUK to understand the impact TFSV crimes have on non-binary and male victims. They also spoken to non-binary and male friends to understand why they may not be as forthcoming about sexual violence if they were victims.

When the player chosen an option within the chapter, it affected the conversation and actions the victim taken within the chapter. However, the overall outcome was the same, apart from a few differences. For example, in the revenge porn chapter, if a player decided they are not going to tell Faye about the photos, Faye would contact the player instead in a more emotional state than they would respond to the player telling them about the photos in the first instance. The overall outcome of the scenario is the same – Faye's photos are removed if the player suggested contacting the police or the revenge porn helpline. The sextortion chapter however had the ability of two different outcomes – with the player recommending contacting the police and receiving help or recommending completely ignoring the extorter, with Jackie's images being leaked. The player was taken through the process of how to remove images, like they would if this situation happened in real life. The chapters were designed to be immersive, so extra care was taken to ensure the player was not subjected to any serious distress. A decision tree for each chapter can be found in Appendix A.

Originally, each conversation was designed to be ‘face-to-face’ conversations with each character. The researcher then considered that with high levels of coronavirus cases and people shielding or avoiding contact with other people, it was more suitable for the characters to communicate through texting. In these conversations characters used less formal language, such as lack of capitalisation and grammar. They would go offline and online and send multiple messages rather than one large message. This was applied to add more authenticity to the scene and emphasise that they are not fully coherent due to the stress and emotional state they were in.

When the level design had been finalised, the development phase begun. Throughout the development phase, aspects of game design were added or adapted due to changes in the game development phase.

3.4. Development

3.4.1. Game Engine

The development phase was the largest phase within the methodology and thus had the most challenges. To begin with, the researcher originally planned to use the Unity game engine to build the visual novel. The Unity engine was chosen as it was a cross-platform engine, meaning more participants could play the game. The engine is widely used in the game-development industry, so there was a large amount of learning resources available. However, the researcher did not account for the steep learning curve involved with the Unity Engine and found it overly complicated for the visual novel. After doing research into visual novel engines, the researcher opted to use the Ren’Py visual novel engine for the development of the game instead (pcgamer. 2022.).

Ren’Py is a python based visual novel engine which is widely used by indie game developers. The Ren’Py engine allows for cross-platform in the same way as Unity, however the web application build is currently in Beta and experienced issues with Apple’s Safari and Webkit engine (GitHub. 2022.). As the researcher had used python before and was competent with the programming language, the learning curve was shallow and the engine was deemed suitable for building the visual novel with.

3.4.2. Chapter Development

To begin the development of the game, the conversation and choices for each chapter were coded. When the conversations for each chapter had been developed, the researcher explored where characters could converse with each other using text-messaging. Phone assets were found on ‘itch.io’, which is an indie game store which also has game assets built by developers. The phone assets were free to use, as indicated by the developer.

The researcher decided it may aid the worldbuilding if the characters refer to the player by name. The player was asked before they begin the story how they would like the characters to refer to them. Figure one shows the player entering their name, and figure two shows the character saying the player’s name.

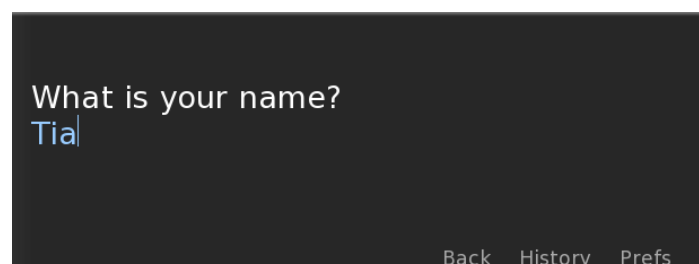


Figure 1 - Player entering their name at the start of the game

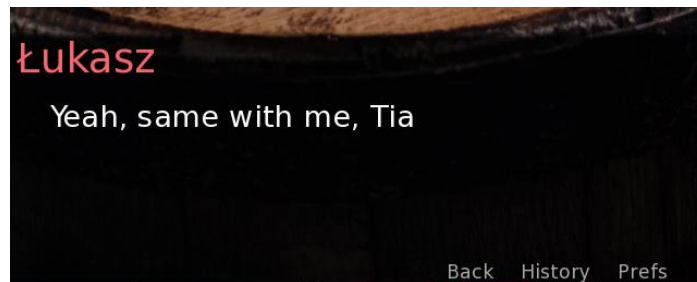


Figure 2 - Character directly referring to player by chosen name in chapter

The phone asset used looked realistic and acted like a normal phone would. The phone asset allowed for more than one message on the screen and the player could scroll through the received messages. The text box adapted to the size of message sent, which meant the content of messages was not cut off. The phone and messages can be seen in figure three. To ensure the colours of the background and font being used were suitable and accessible, the Google Material colour tool was used (Color Tool - Material Design., 2022).

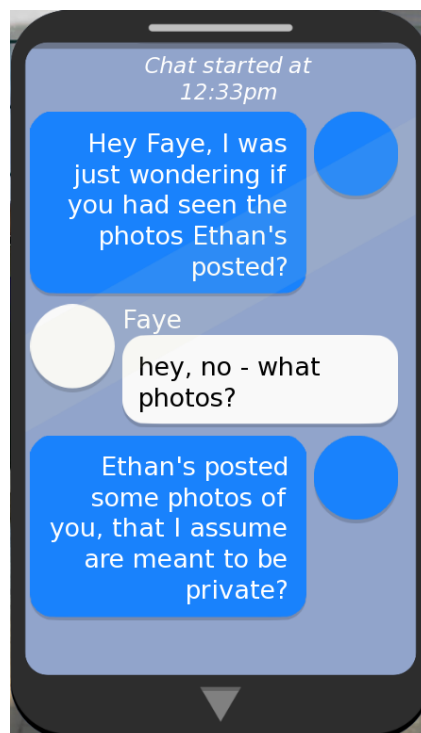


Figure 3 - Second phone asset with conversation between Player and Faye

To create a more immersive story and to aid in the world building, royalty free images were used for backgrounds. These images are of breakrooms, bedrooms, phones, and other images to aid in setting the scene for the chapter and are from a dedicated royalty-free image website, Pexels. (Pexels. 2022). There were no music or sound effects, it was investigated as a possible aid for worldbuilding, but there was no suitable royalty free music to match the atmosphere being created. The music interfered with the self-voicing assistance the game utilised, which made the game less accessible.

3.4.3. Information Page Development

Rather than break the chapter flow by having characters discuss crimes and relevant laws, the researcher used information pages which were easier to read and digest. Originally the information

page was displayed like the conversation text is, which was not suitable. Figure four shows how this looked before the background images were applied.

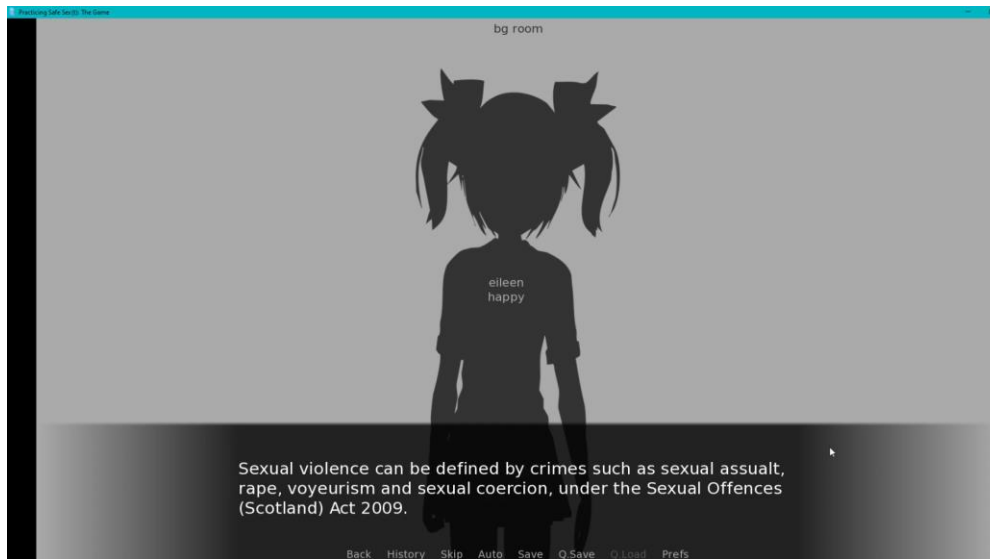


Figure 4 - Example of information being displayed as conversational text

Using Canva's 'YouTube Intro' templates, the information pages were created. The pages were exactly 1920 x 1080, which was the same resolution as the game window. They have information about how to play the game, information regarding the crimes, the law surrounding these crimes, and the support available for each. An example of the information page can be seen in figure five.

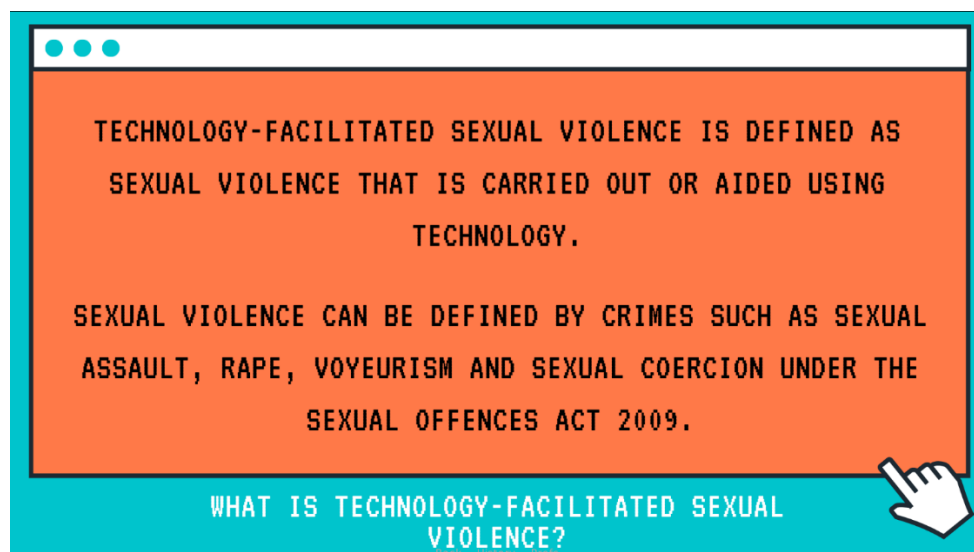


Figure 5 - Information page detailing what TFSV is.

The information pages all use the same template, so it was consistent throughout. To check the accessibility of the colours and font used, the researcher sent these pages to multiple people with colour blindness, dyslexia, and dyspraxia. The overall feedback was that the page was easy to read, and the information was clear. To avoid having too much information on one page, the information was split into multiple pages.

3.4.4. Accessibility

Accessibility was a very important aspect of the game, as everyone over the age of eighteen should be able to play the game. There were multiple features in the game that were added or enabled to make sure the game was as accessible as possible. These pages ensured the information was being delivered in a user-friendly way, whilst being accessible for those with learning difficulties.

Originally, the default highlight colour was a light grey and inherited from the main menu's highlight variable. This was difficult to read the white text explaining each option when it was highlighted. To fix this, the highlight colour was changed to the same colour of orange used in the information screen, as seen in figure six. The Material colour tool was used again, ensuring accessibility and readability.

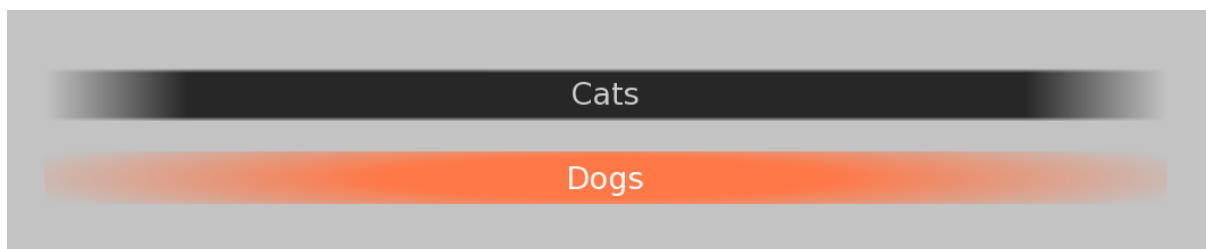


Figure 6 - Choice highlighted with orange colour

Each character had a different colour which contrasted with the dark background the text was on. This made identifying the character that was speaking easier, particularly in scenes where multiple characters were speaking – such as the '*sending unsolicited images*' chapter. The player's name was the same colour throughout the game, aiding with consistency and accessibility.

3.4.5. Game Deployment

Once the game was built, the researcher had to decide how the game should be deployed for participants to play. There were several ways to build the visual novel with Ren'Py, such as a web application, mobile application, and desktop application. The mobile application was not considered as it required the researcher to send the game to the Apple App Store and Google Play Store, which would have taken a significant amount of time to process. There were no guarantees the stores would accept the game, due to the sensitive content the game discussed.

The desktop application was considered, as the hardware requirements to install and run the application on are very minimal. However, the installation process was not suitable for participants who were not very technical minded. The installation process from itch.io, where the game is available to download required a user to download, unzip and run the application file. This was considered difficult for people who do not regularly download zipped files or are not particularly tech-literate.

Finally, the web application was considered. The Ren'Py web build was still in beta during the development and deployment phase, which meant Apple's Safari and Webkit engine was not compatible with the Ren'Py engine. However, the web-browser market share at the time of deployment was primarily Google Chrome, Safari and Firefox, with the game able to run on both Chrome and Firefox browsers successfully (Oberlo, 2022). The web application was far more accessible and easier to use than downloading the desktop application. It was faster to open and play, which meant the overall participation time in the study was much quicker than using the desktop application for the study. The web application was chosen for this reason and was deployed on the university's web servers.

3.5. Evaluation

To evaluate the effectiveness of the game as a mitigation against TFSV, a survey was designed for participants to complete alongside the game.

3.5.1. Survey Questions

The survey had twenty-six questions in total, with fourteen questions being asked before the participant played the game and twelve questions being asked after the participant played the game. Before the participant could access the survey, they had to consent to their data being used for research and confirm they were over eighteen years of age. If the participant answered no to either of these questions, they were screened out of the study.

The researcher looked into the survey questions used in the studies referred to in the literature review, particularly in both Thomas et al, and Mercer et al.'s questionnaires (2021). The wording of questions and statements were used to ensure the researcher was asking relevant and specific questions. The use of multiple choice and long-text answers were identified through the study's questionnaires and used within the researcher's survey design for the participant to give more detailed answers if necessary.

The full list of pre-game survey questions can be found in Appendix B, part a). The pre-game survey asked demographic questions, questions about their knowledge of TFSV and how likely they were to approach a family member and a friend. The full list of post-game survey questions can be found in Appendix B, part c). The post-game survey asked questions about their knowledge of TFSV after playing the game, if they were more likely to approach a family member and a friend and the overall suitability and usability of the game.

3.5.1.1. Pre-Game Survey Questions

The demographic questions used a harmonised approach which is recommended by the Office of National Statistics. This ensured every participant was represented in terms of gender, sexuality, and ethnicity (Ons.gov.uk, 2022). These questions were asked so the researcher could identify a correlation or relationship with a participant's demographic, with their understand of TFSV and how they interacted with the game.

To measure the effectiveness of the game in teaching participants about TFSV, the survey asked what their current understanding of TFSV and if they recognise any of the crimes that fall under the category of TFSV. Participants were asked how likely they would be to approach a family member and a friend if they were a victim. If they wouldn't approach a family member or friend, they were asked if they can explain their answer. When the participant completed these questions, they progressed to the game stage.

3.5.1.2. Post-Game Survey Questions

When the participant played the game, they were asked to complete the post-game phase of the survey. The participant was asked to score the usability of the game against the System Usability Scale (hereinafter, SUS). The SUS is built of ten questions pertaining to the usability of the application, with the participant choosing a reaction ranging from 'Strongly Disagree' to 'Strongly Agree'. The questions can be viewed in Appendix B, part b). The reactions have a weighting behind them to score the usability. Table three shows the weighting for each reaction.

Reaction	Weighting
Strongly Disagree	1
Slightly Disagree	2

Neither Disagree nor Agree	3
Slightly Agree	4
Strongly Agree	5

Table 3 - Reaction and weighting for each statement in the SUS

The participant was asked how they felt about the narrative of the game and if they felt it was effective as an educational tool about TFSV. They were asked if they learned about TFSV. To understand if the game was effective at opening a conversation about TFSV, participants were asked again if they were now more likely to approach a friend and family member if they became a victim after playing the game. Finally, the participant was asked if they have any general comments about the game.

Overall, at the end of the development phase, the researcher had a fully working and engaging visual novel. Once the game was deployed to the servers and had been tested for any errors, the game and survey was advertised online for participants to take part in the study.

4. Results

This section will examine the results obtained by the survey created in the methodology phase. The survey was advertised online on the researcher's Facebook, LinkedIn, Twitter pages, and Discord servers. Some participants were approached in person to complete the study at security conferences and university. The survey was open for responses for the duration of twenty days (30/03/2022-19/04/2022). Forty-five people participated in the research during this timeframe; no participants were excluded from the study. The long-text justifications for each question can be read in full within Appendix C.

4.1. Demographic Data

Participants (n = 45) were asked to select their age from the available categories, with the results showing a varied range of ages. Most participants (n = 21) were between the ages of eighteen to twenty-four, whilst the oldest participants (n = 4) were between the ages of fifty-five to sixty-four. Over half of participants (n = 28) involved in the study identified as male, with 14 participants identifying as female and 4 participants identifying as transgender/gender non-conforming. Overall, most participants were male and between the ages of eighteen to twenty-four. When asked how they would describe their ethnicity, all participants (n = 45) described their ethnicity as white. The impact of this will be explored in the Discussion section of the dissertation. The overall sexual orientation demographic was varied, with most participants (n = 31) identifying as heterosexual. The full summary of the demographic data can be examined in figure 8.

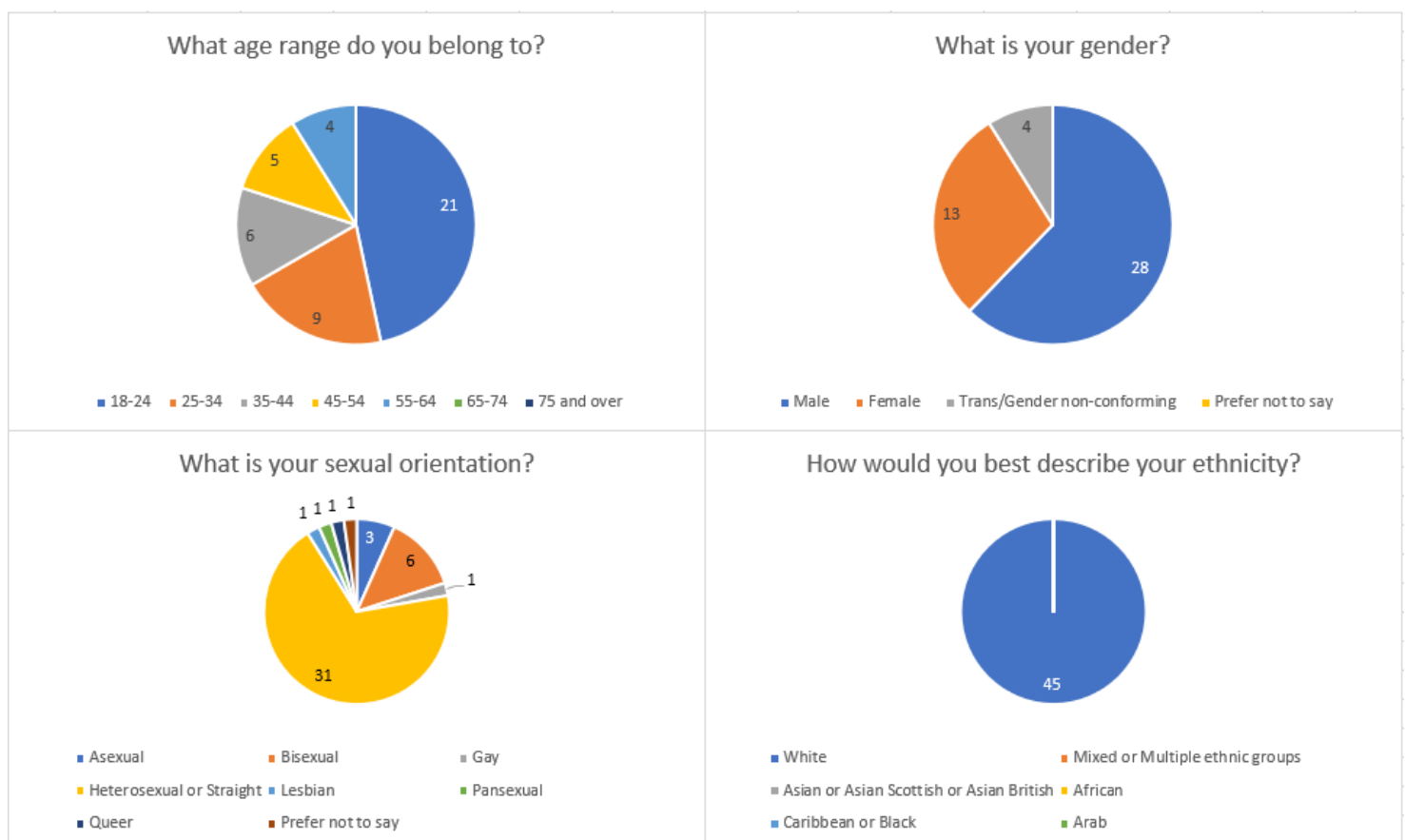


Figure 7 - Summary of demographic results, including age, gender, sexuality, and ethnicity.

4.2. TFSV Knowledge Data

Before playing the game under half of the participants (n = 21) said they knew what TFSV was, whilst 14 said 'No' and 10 answered 'Maybe'. After playing, just under 85% of participants (n = 38) said they learned about TFSV. The summary of these results can be seen in the pie charts in figure eight, below. The participants who answered 'No' and 'Maybe', explained that they already knew about TFSV. When those who answered yes or maybe were asked what their understanding of TFSV was, most of the answers referred to Revenge Porn and Sextortion.

- *"A crime which relates to sexual based violence which has also been conducted OR assisted by technology i.e Ransoming of sensitive photos/videos for money OR favours."* – P28
- *"The use of technology devices and its online services to cause distress towards an individual through harmful actions, such as: sending unwanted sexual images, blackmailing an individual with their private sexual images, stalking and releasing an individuals sexual images to the public."* – P31

Only one of the answers mentioned video voyeurism and four mentioned physical sexual violence in their answers. None of the answers directly mentioned the terms Up-Skirting or Down-Blousing.

- **Video Voyeurism:** *"Acts of sexual violence/abuse/assault committed with the aid of technology, for example using social media to send nudes or to threaten to release someone else's nudes or the taking of videos or images of someone without their consent."* – P02
- **In-Person Sexual Violence:** *"refers to a range of behaviors where digital technologies are used to facilitate both virtual and face-to-face sexually based harms."* – P04

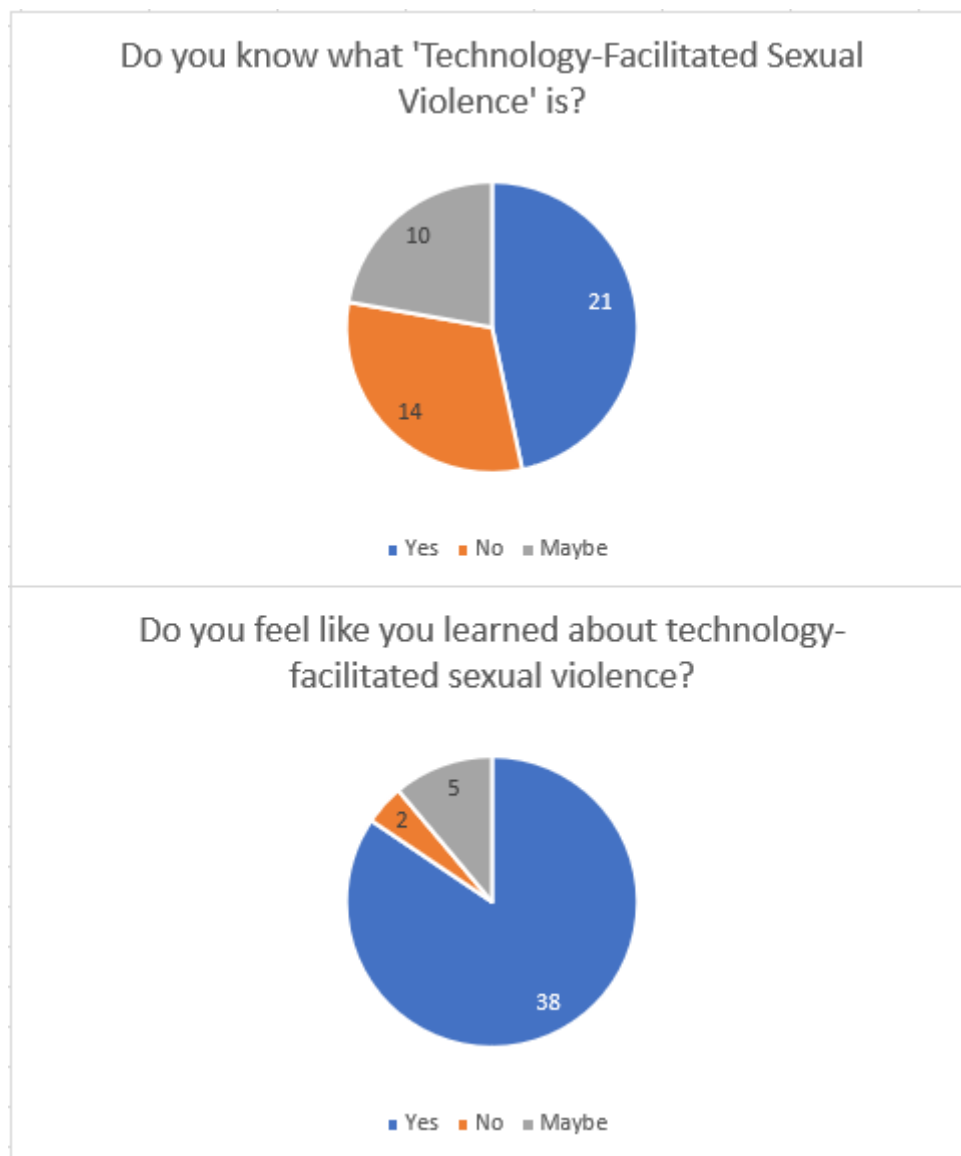


Figure 8 - Summary of TFSV knowledge before and after playing the game.

Before playing the game, participants were asked if they have heard of six TFSV crimes - which can be seen in figure nine. All but one participant ($n = 44$) had heard of or knew what revenge porn was. Video voyeurism was the least recognisable crime with only twenty-one participants having heard or know of the crime.

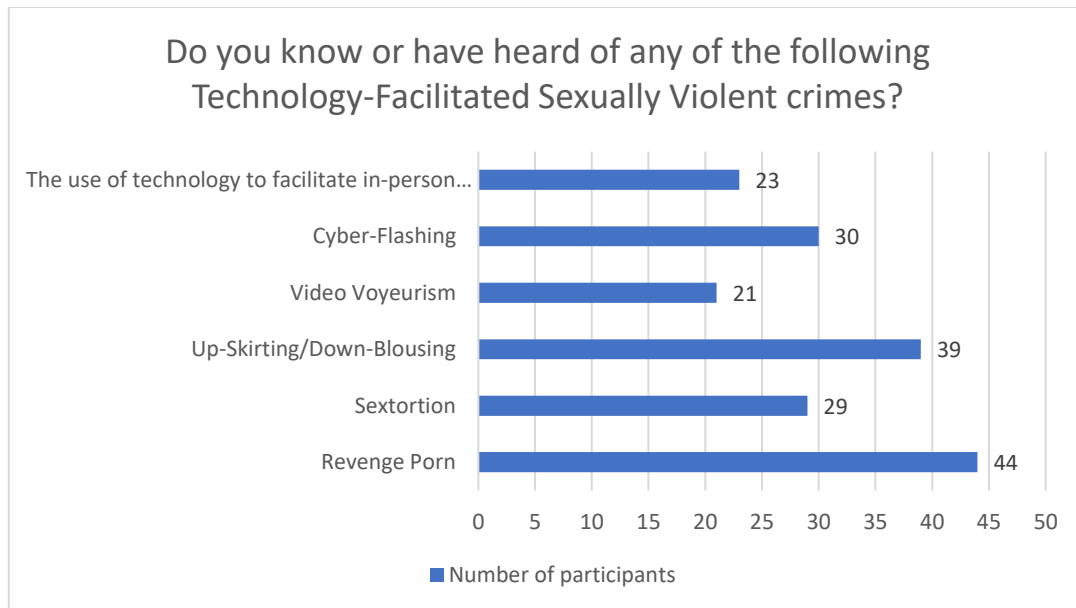


Figure 9 - Summary of participant's pre-game knowledge of TFSV crimes

After playing the game, participants were asked if they felt like they had learned about TFSV. Only two participants replied 'No' and had previously responded 'Yes' in the pre-game survey when asked if they knew what TFSV was. They both replied that they already knew about TFSV was, when asked to explain their answer.

- *"I am aware of the issue and an advocate in fighting this" – P38*
- *"There was no new information for me as I am already fairly knowledgeable on the subject. This could teach people if they did not already have this level of knowledge" – P06*

Most participants explained that they learned about the types of support available, as well as the laws and legalities surrounding TFSV. Participants also learned about TFSV crimes, including those not particularly well-known such as video voyeurism.

- *"I feel like I've learned a lot about the topic. The game did a good job of highlighting and explaining the types of crime, and suitable support and reporting centers for different scenarios." – P08*
- *"I didn't know cyber-flashing was illegal before this, I hadn't really heard the term used before either" – P43*
- *"I have a greater understanding on the best practices in speaking to others and reporting TFSV in regards to sextortion and in-person sexual violence and the parties that can be contacted. I also learned about video-voyuerism and how to handle the situations as not to escalate the situation to a point of physical violence." – P32*

4.3. Knowledge of Available Support

When asked if they know where or who they would seek advice from if they were a victim, most participants said 'No' (n = 17) or 'Maybe' (n = 15). Only thirteen participants knew where they would go to seek help. When asked again after playing the game, nearly all participants (n = 42) knew where to get help, with the other three participants saying they 'Maybe' knew where to get help. This comparison can be seen in figure ten, below.

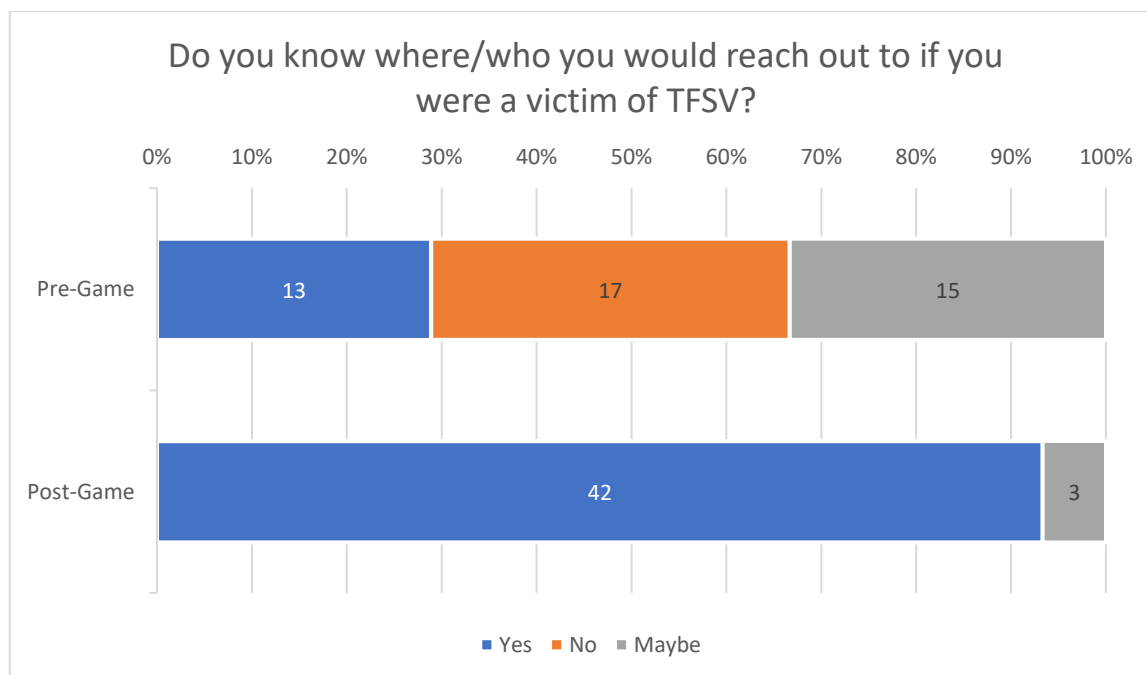


Figure 10 - Summary of where participants would seek help if they became a victim of TFSV.

When asked who they would seek help from in the pre-game survey, eighteen of the twenty-seven responses said they would go to the police, whilst twelve out of the twenty-seven said they would seek help from specialist charities. Some of the responses stated they would go to a lawyer, university, or friends.

- *“It would depend on how I felt and reacted to any of these crimes. If it would have a significant impact on my mental health I would most likely contact a helpline such as Samaritans. However, I feel that my first instinct would be to go to the police in hopes they will be able to remove my personal images from the internet and track down the criminal responsible.” – P31*

Two participants highlighted that they would not be comfortable with going to the police, with one person stating they feel they would not be taken seriously. The other participant said that going to the police would have its own problems but did not elaborate on what these problems are.

- *“At first I'd search for help online, but assuming it's a crime, I would consider reporting to the police (and yes, I know, doing so has its own problems).” – P30*
- *“I would like to believe I could turn to the police, but I do not have faith in them regarding how seriously they would take such crimes.” – P02*

4.3.1. Likelihood of Asking for Help

Participants were asked if they would approach a family member and a friend if they were to become a victim of TFSV. In the pre-game survey, seventeen participants said they would not approach a family member, whilst eighteen said they would possibly approach them and ten said they would ask a family member for help. Figure eleven shows this breakdown. Embarrassment was the main reason participants would not ask family for help or advice, fear of victim blaming was the second most common reason. Two participants referenced trauma as a reason they would not ask family for help, with one participant having had a bad experience approaching family with similar events in the past.

- *"Its a personal experience. The same as if it was non technology based and these types of things are not something I would feel safe sharing with my family (They are judgemental so when I have in the past gone through similar things I avoid talking with them)" – P06*
- *"they lack an understanding of the complexity of trauma in general and would probably cause more problems. they also have an older world view and lack understanding of technology also, so would more then likely blame the technology itself and ban it, or blame me as a victim to some extent." – P45*

In the post-game survey, the responses changed to just under half of participants (n = 19) saying they would ask a family member for help. Fourteen said they would possibly approach them and twelve said they still wouldn't approach a family member for help. Of those who said no, embarrassment was still a factor. One participant mentioned they would prefer to have a neutral person.

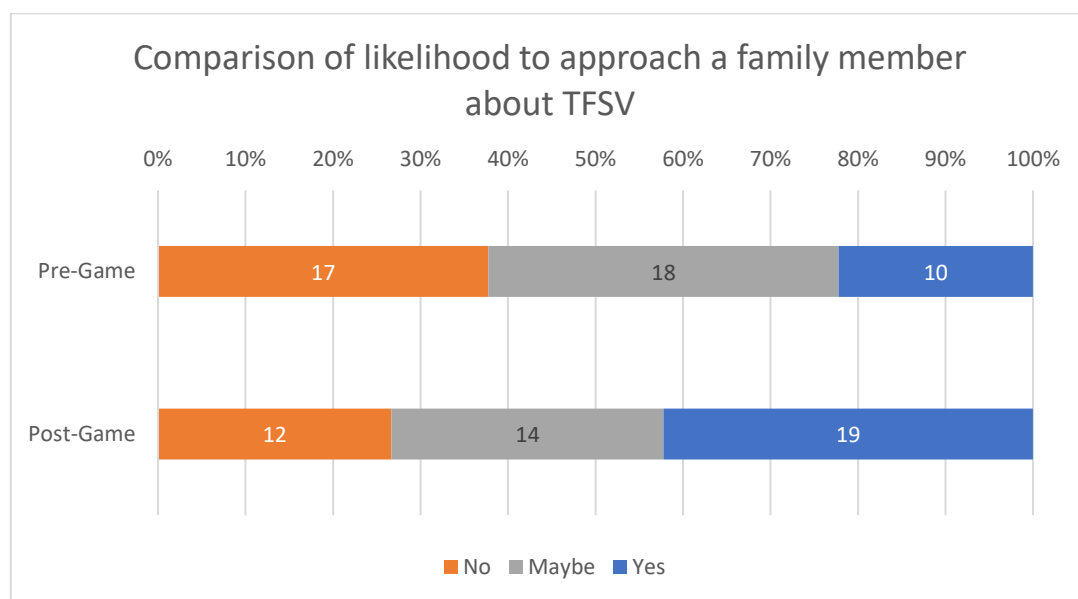


Figure 11 - Comparison of the pre- and post-game likelihood of approaching a family member about TFSV

Participants were also asked how likely they were to approach a friend if they were a victim of TFSV. Just over half of participants (n = 26) said they would ask a friend for help, whilst fourteen said 'Maybe' and five said 'No'. The breakdown for this question can be seen in figure twelve. Participants who said 'No', mentioned embarrassment would be the main reason they would not ask for help. Participants also explained they fear being bullied or judged by a friend if they asked for help.

- *"i would feel they might turn on me and bully me" – P33*
- *"Same as above answer I don't feel comfortable talking to them as they are judgemental and that's not something I need to deal with." – P06*

When compared to the post-game survey, at least 75% of participants (n = 34) said they would speak to a friend if they were a victim of TFSV whilst eight participants said 'Maybe' and three said 'No'. Like the answers for the family member question, participants would prefer to have the support of a neutral or anonymous person than ask a friend for help.

- *"If dealing with these issues, I'd prefer to use an anonymous support service" – P25*

- “My friends are judgemental and would cause issues for me so I would deal with it myself” – P06

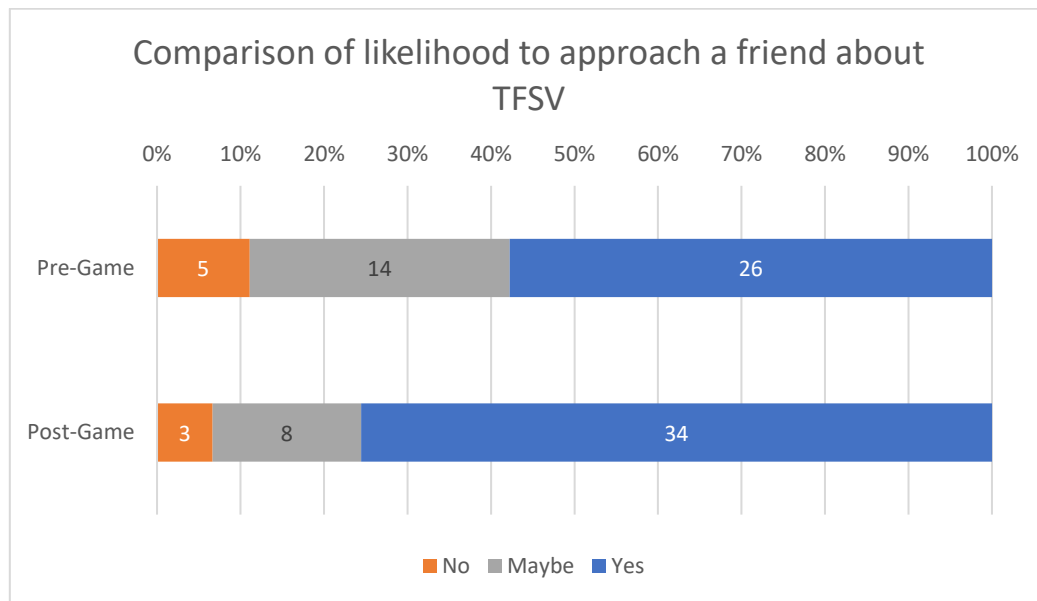


Figure 12 - Comparison of the pre- and post-game likelihood of approaching a family member about TFSV

4.4. Usability of Game

To assess the usability of the game, participants were asked to agree, disagree, or remain neutral on statements regarding the game. Below in Figure 14, the results of the SUS questions can be viewed. The statements used for the SUS question, can be referred to in Appendix B, part b), whilst the SUS Score for each individual participant can be seen in Appendix C, part b). The average SUS score was calculated at **79.7** – which is .3 under the ‘good’ threshold.

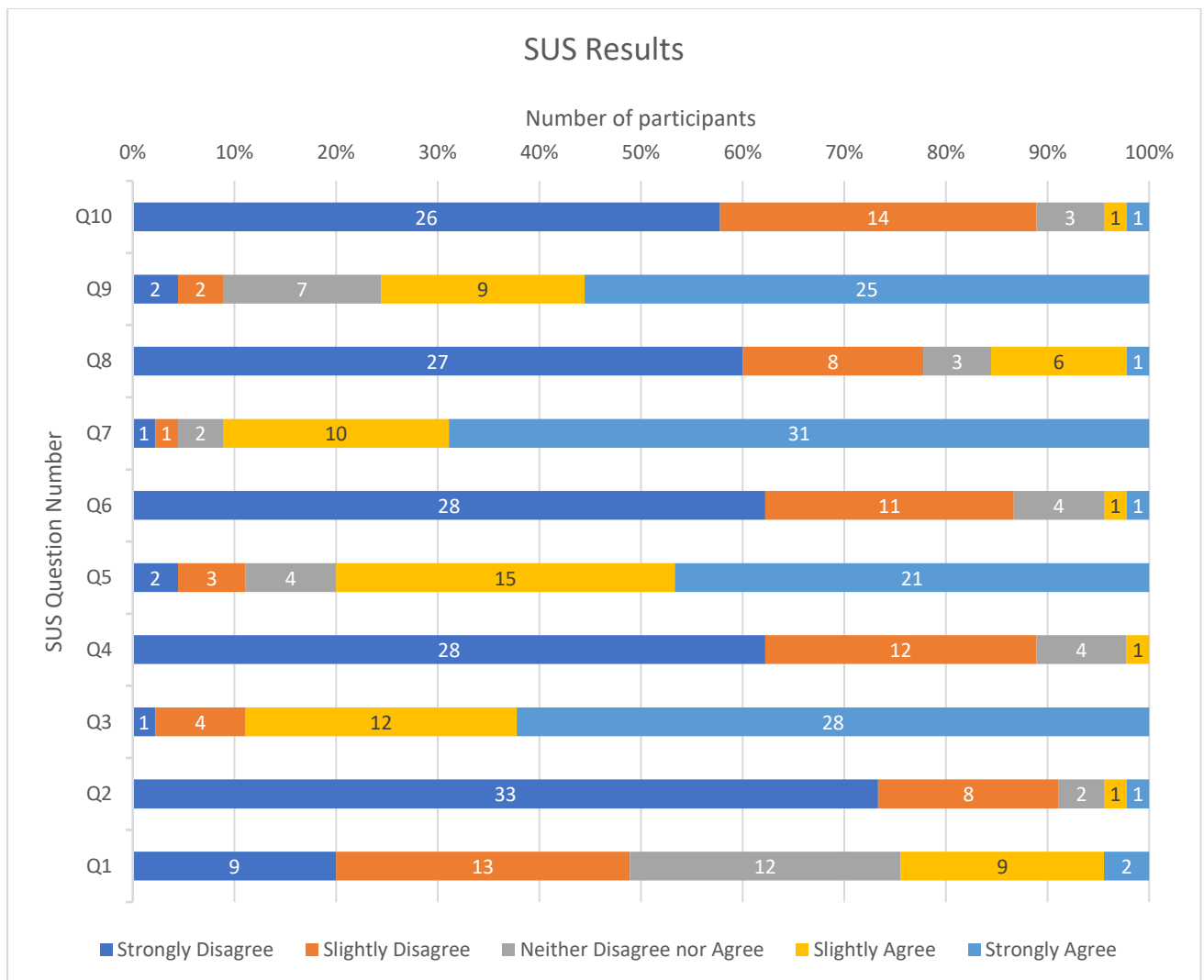


Figure 13 - Results of the SUS questions.

4.5. Suitability of Story

After playing the game, participants were asked if they felt the story of the visual novel was suitable for educating people about TFSV. A large majority of participants (n=40) said 'Yes', whilst three said 'Maybe' and two said 'No'. This breakdown can be seen in the pie chart, in figure fourteen. Participants were given the ability to justify their answer which can be viewed in appendix C, part e).

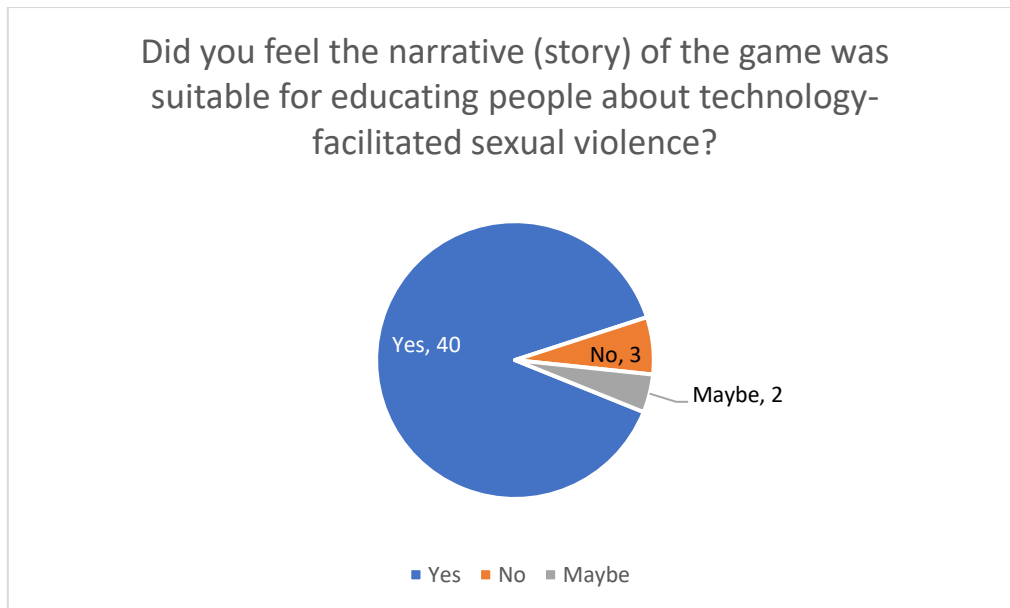


Figure 14 - Summary of participant's response to suitability of the story

Most participants noted that they felt the story was believable and easy to understand. Participants also noted that they learned more than they would have through the game, than they would have with articles and videos.

- *"I like how the interactive element means that you're more likely to pay attention to the content, whereas an article/report/block-of-text might not have the same result."* – P30
- *"It was a lot more interesting than just reading an article about it. Also made you think about how you would react if it actually happened to a someone you knew and in turn made you really think about the consequences."* – P24

The results examined from the survey prove the game has a positive impact on the TFSV knowledge of a player, with every player apart from two that already knew about TFSV learning something new. The results show gamification of serious topics and as an educational mitigation against TFSV is successful. These results will be discussed in further detail in the Discussion section.

5. Discussion

This chapter will discuss the results presented in the previous section. The overall suitability of the game as a mitigation has been evaluated, looking into how effectively it taught participants about TFSV and where to go if they unfortunately, were to become a victim. The chapter will discuss and evaluate the relationship between demographics and likelihood to reach out for help. Lastly, the game itself will be discussed, particularly the format and story of the game to see if that was a factor in the ability to educate about TFSV.

5.1. Overview

The aim of this project was to answer the research question of “How can gamification be applied to educate people about Technology-Facilitated Sexual Violence?”. The literature review identified that current mitigations are not effective and dedicated services such as the Police and specialist charities are struggling to cope with the influx of victims. It also identified men are more likely to be perpetrators of TFSV, while women are victims. Furthermore, LGBTQ+ people are three times more likely to experience TFSV than cisgender, heterosexual people.

The developed mitigation was a visual novel game – which put the participant into a direct situation where TFSV has happened or is happening. Family members, friends and a stranger are all characters who the character will interact with through chapters and scenarios depicting different categories of TFSV.

Overall, the survey results show the game was effective as a mitigation against TFSV, through education. The survey also shown the likelihood of participants of different demographic asking for help and support through family members, friends, and specialist support.

5.2. Analysis of Results

5.2.1. Demographic Analysis

As seen in section 4.1 of the Results section, nearly all demographic factors apart from non-white ethnicities were represented. The main demographic represented by the participants were eighteen-to twenty-four-year-old, white, cisgender, heterosexual males. This main demographic is similar to the target audience of the ‘Don’t Be That Guy’ campaign by Police Scotland, which is young heterosexual males (Police Scotland, 2021). However, cisgender women and LGBTQ+ people were also represented within the demographic, with the literature examined showing they are more likely to be victims than cisgender men (Powell et al, 2018; Zhong et al, 2020).

Since there were a varied range of demographics relating to age, sexuality, and gender – the impact of TFSV, where individuals believe they would seek help and how they interacted with the game could be assessed in more detail. Ethnicity could not be assessed as only white participants taken part in the study; this is discussed in more detail in the limitations section.

LGBTQ+ participants were much less likely to approach a family member compared to heterosexual participants. In the pre-game responses, only three out of fourteen LGBTQ+ participants said they would be comfortable asking family for help, after playing the game four out of fourteen LGBTQ+ participants said they would approach a family member. These participants were more likely to speak to a friend, with only one participant saying they wouldn’t reach out to a friend both pre- and post-game.

Men were also less likely to approach family members and preferred to approach friends. The reasons given for this was embarrassment, not knowing how family would react and wanting to speak to a neutral person. This is also likely since research looking into gender inclusiveness

regarding sexual violence suggests men are taught at a young age that they should not be emotional as it is a feminine trait, as well as myths that men cannot be sexually assaulted are still very common. (Turchik et.al, 2015) This is likely why male participants would not feel comfortable asking family for help, if they were to become a victim of TFSV.

The researcher ensured the support services recommended within the game were specific for different genders. This was due to different types of support available for each gender such as support offered to women will be different to the support offered for men. This has proved to be beneficial after reviewing the results, as participants would rather speak to specialist support than family members and often friends.

5.2.2. Participant's TFSV Knowledge

The results in section 4.2 of the results chapter demonstrate that participants have a basic understanding of TFSV, but this understanding revolves primarily around IBSA such as Revenge Porn and Sextortion. In-person sexual violence and video voyeurism was mentioned briefly in participants explanation of what their understanding of TFSV was.

This was further emphasised when participants were asked to select the crimes they have heard or know of from a list. Figure nine in subsection 4.2 shows the full list and corresponding results. 'Revenge Porn' and 'Up-Skirting/Down-Blousing' were the most heard of crimes, which were also given 'media-friendly' names. 'Video Voyeurism' and 'The use of technology to facilitate in-person sexual violence' were not as recognised. The media-friendly terms may have been more recognisable as they are more likely to be used in headlines and news reports, where participants may hear about these crimes.

Participants between the ages of eighteen to thirty-four were more likely to know what TFSV was, when compared to thirty-five- to sixty-four-year-old participants. This may be since people between the ages of sixteen to forty-four-year-olds are more likely to be online according to the Office for National Statistics, on a regular basis (ONS, 2021). Those between eighteen to thirty-four are also more likely to have been or become victims of TFSV, so this knowledge may be due to having experienced TFSV directly or indirectly experienced TFSV, through a peer being victimised by TFSV (Fisico and Harkins, 2021).

When participants were asked if they had learned about TFSV after playing the game, all participants apart from two who previously responded 'Yes', had learned about TFSV. The game aimed to educate players about the support available, laws and legalities surrounding TFSV and the crimes that fall under the TFSV category. The game also aimed to show the emotions victims would experience and actions they may take after being exposed to a TFSV crime. This proved beneficial in the educational aspect of the game, as it emphasised the victim impact of each crime.

- *"It provided well written examples to explain each term in detail and provided good situational experiences to help hammer home both the crime and the solutions out there to help victims of said crimes"* - P13

Overall, participant's knowledge of TFSV increased by 57.6%, with all but two participants learning about TFSV laws, crimes, and available support.

5.2.3. Where to Seek Help

The results in section 4.3 detailed the pre- and post-game survey results of where participants would reach out for help and if they would approach a family member and a friend if they were to unfortunately become a victim of TFSV. Most participants either did not know or maybe knew where

they would go for help if they were to become victims of TFSV. As seen in the results, eighteen participants said they would go to the police, whilst twelve mentioned seeking specialist charities. However, two of these responses expressed distrust and lack of faith with the police, particularly due to feeling that they would not be taken seriously.

- *"At first I'd search for help online, but assuming it's a crime, I would consider reporting to the police (and yes, I know, doing so has its own problems)." – P30*
- *"I would like to believe I could turn to the police, but I do not have faith in them regarding how seriously they would take such crimes." – P02*

This lack of faith and trust in the police to handle victim's complaints seriously may be a factor in why participants said they maybe or do not know where to seek help. A survey by the North Yorkshire Police, Fire & Crime Commissioner (2018) investigated why revenge porn victims did not report their experiences to the police. It was found that victims (n = 92) did not want to report an incident due to shame and embarrassment (n = 75), victim blaming (n = 49) and feeling as if the police would not take their matters seriously (n = 50). Victims also did not know they could go to the police about revenge porn (n = 41), with a small number not reporting due to a bad experience or dislike of the police. (n = 18). These may be likely factors for the two participants that did not want to go to the police if they were to become TFSV victims.

Participants also mentioned they would seek help online, through helplines and support groups.

- *"Local authorities, online helplines" – P39*
- *"Police, online support groups" – P35*
- *"At first I'd search for help online, but assuming it's a crime, I would consider reporting to the police (and yes, I know, doing so has its own problems)." – P30*

Most of the support helplines - both telephone and online - are only open a few days a week, for a few hours at a time. For example, the Rape Crisis live chat helpline is only open Monday – Thursday from 1400-1630 and 1800-2030, and Friday from 1400-1630. Meanwhile, emailing safeline which has specific support for male victims can take two working days for a response. These support helplines may be suitable during the day, however if the victim is working or cannot safely access these helplines, it is no help to them. However, the Revenge Porn Helpline has a chatbot available for out of hours support, which has the option to leave contact details for workers to get back in touch during work hours through different mediums, including Facebook Messenger.

When asked if they would approach a family member for advice or help about TFSV, most participants either wouldn't or would maybe consider reaching out. When asked to explain their answers, embarrassment and fear of victim blaming were some of the main reasons. Two participants also mentioned due to previous experiences of approaching family about traumatic events, they wouldn't be comfortable asking them for help.

- *"My relationship with most of my family is strained, and with those it isn't I don't feel comfortable enough to share some aspects of my life with them" – P36*
- *"they lack an understanding of the complexity of trauma in general and would probably cause more problems. they also have an older world view and lack understanding of technology also, so*

would more than likely blame the technology itself and ban it, or blame me as a victim to some extent.” – P45

This is similar to the answers given when asked if they would approach a friend, participants were particularly worried about being judged and bullied by their peers. This would likely exacerbate the already isolating and traumatic experience of TFSV, causing victim’s mental health to be affected if victims do not have a trusted person to go to for help (Fisico and Harkins, 2021; Champion. et al, 2021). However, after playing the game – nine more participants answered that they would feel comfortable speaking to family and friends if they experienced TFSV.

- *“... I found it could help people be more comfortable at approaching their friends or maybe their family when it came to something as serious as these scenarios as well.” – P26*

Many participants still said they wouldn’t be comfortable for the same reasons they mentioned before playing the game. One participant however, said they would recommend their family played the game to hopefully start an open conversation about TFSV.

- *“...if my family played this game or a similar game-based narrative story I actually think it might make the topic less touchy and make these crimes more open for discussion. I really believe this is a great way to introduce someone to these topics and educate on the right actions to take if it ever happens to yourself or someone you know.” – P31*

This point will be discussed further in the discussion, in section 5.2.4. However, it emphasises the fact that sex and sexual violence, such as TFSV needs to be less taboo in society for victims to feel comfortable enough to reach out to family and friends. These results also show the need for victims to have access to online support, where they will not be judged or blamed for what has happened to them.

Overall, participants know where to seek help after playing the serious game. However, it was highlighted that a victim may not want to go to the police to report an incident and receive help. It was noted that current specialist support is currently only available within working hours, which may cause the victim unnecessary stress on top of an already stressful experience. Victims may be less likely to ask family and friends for help of fear of embarrassment and shame, or bad experiences in the past when asking for help. This means victims would rely on specialist supports such as charities and the police.

5.2.4. Usability of Game

To assess the usability of the game, the SUS was evaluated. The SUS (system usability score) is used in the technology industry to understand how usable an online product such as a website or application is. There are ten questions, and each one is rated from ‘Strongly Disagree’ to ‘Slightly Agree’. The questions and the results for the SUS can be seen in the results section 4.4. Overall, the game was rated at **79.7**, which is 0.3 below the threshold of ‘good’ usability. The statement that a large volume of participants agreed on, was that the game was unnecessarily complex. The statement with a mixed range of responses was “I would like to play this game regularly”. No statements had a large negative response.

In terms of accessibility, the game included self-voicing which could be toggled on or off. This meant people who had visual impairments and severe dyslexia could still play the game, aiding in the accessibility of the game. The informational images used an orange and blue background with black text, this was done to bring attention to the text – whilst being easy to read from. This was tested with a dyslexic person and a colourblind person in the design phase. The comments about the game

highlighted that colours and text used in the images, may in fact – not have been easy to read from. Some participants pointed out that the font used was difficult to read and focus on, and that they preferred the Ren’Py default text.

- *“...The colour scheme of the text sections was a bit harsh when moving from in-person to informational segments. I found it hard to focus on the text quickly, but I also think this helped me to digest the information more fully.” – P32*
- *“...The information sections (all-caps blocky text on an orange background) aren't hugely accessible - I struggled to keep focus on them, and I'm sure it must be worse for someone with dyslexia or a similar condition...” – P39*

This means the educational aspect of the TFSV laws may not have been accessible for each player. This will be discussed further in the future work section of this paper.

When asked if they had comments about the game, participants mentioned the game would not support scrolling with a trackpad, attempting to scroll caused the game to skip through chapters. Some participants also attempted to play the game on a mobile device and found it was difficult to play. These issues will be discussed further in the limitations section of the Discussion.

Trackpad Issues – *“Could be the laptop I was using, however the trackpad did not support scrolling for the mobile game messages. Trying to scroll also caused the game to stop & then either jump forward/back many scenes.” – P28*

Mobile Device Issues – *“Tech:Screen size doesn't work well on Android phone. And in the phone sections, I can read the text from Faye etc, but “my” text blocks have no text - they are just solid blue.” – P12*

Overall, the game had a high level of usability for players, which aided in the game’s ability to be an effective mitigation. However, the game had some accessibility issues with the informational sections which meant it was difficult for participants to read the text on. This would have affected the ability for participants to learn the definition and laws of each crime effectively

5.2.5. Overall Suitability of Game as a Mitigation

When looking at the suitability of the game as a mitigation, multiple factors had to be evaluated. The effectiveness of the game format, the effectiveness of the educational aspect of the game and the usability and accessibility of the game.

The game format chosen was the visual novel format, as mentioned in the methodology it allowed for a more immersive game experience. This proved to be a suitable format, as multiple participants said it was immersive and that the game broke the crimes down into easy-to-understand chapters. Participants said the game was educational, informative, and interactive – and that it was preferred to reading articles or videos.

- *“I like how the interactive element means that you're more likely to pay attention to the content, whereas an article/report/block-of-text might not have the same result.” – P30*
- *“It was a lot more interesting than just reading an article about it. Also made you think about how you would react if it actually happened to a someone you knew and in turn made you really think about the consequences.” – P24*

One participant said they had learned more than they would have if they watched a video, and the emotions invoked by the chapter design “...made the game feel real. That these events were happening right before me.” (P31). This was the aim of using the visual novel and having the player as the main character, which was an effective choice for the game as an educational tool.

As seen in the results and analysis of the participant’s TFSV knowledge, everyone involved in the study learned about TFSV apart from two people who already knew what TFSV was. This was a very promising finding and proved the game was effective as an educational tool. The game aimed to teach people about engaging in sex online and how they could attempt to prevent themselves from becoming victims of these crimes. This involved advice such as covering identifying features in nude photos and videos, this means if the images were leaked it is difficult for the victim to be identified and victimised further. The information page demonstrating this can be seen in figure fifteen, below.

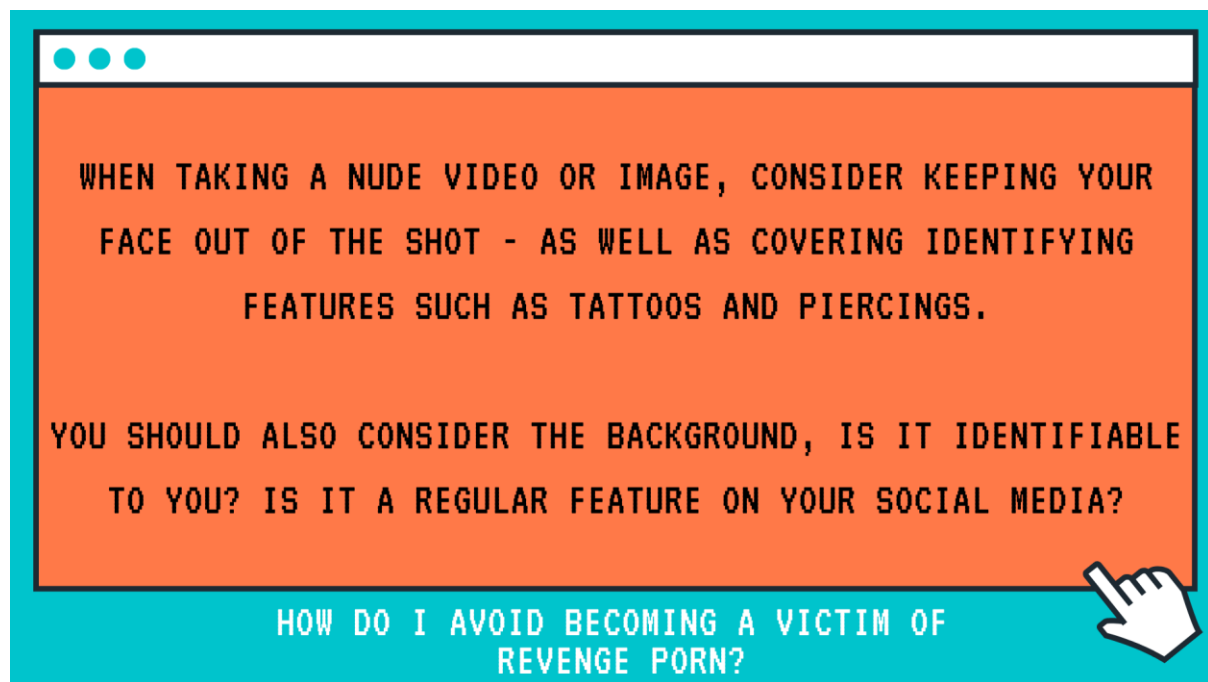


Figure 15 - Information page telling player how to send nude content safely

The researcher aimed to make sure players were not made to feel they were to blame if they become victimised by TFSV crimes, this was repeated when discussing preventative measures as seen in figure sixteen. The game taught people about the emotions a victim may experience and actions they may take, this was to help players understand what victims may be going through – especially if peers or players themselves unfortunately become victims.

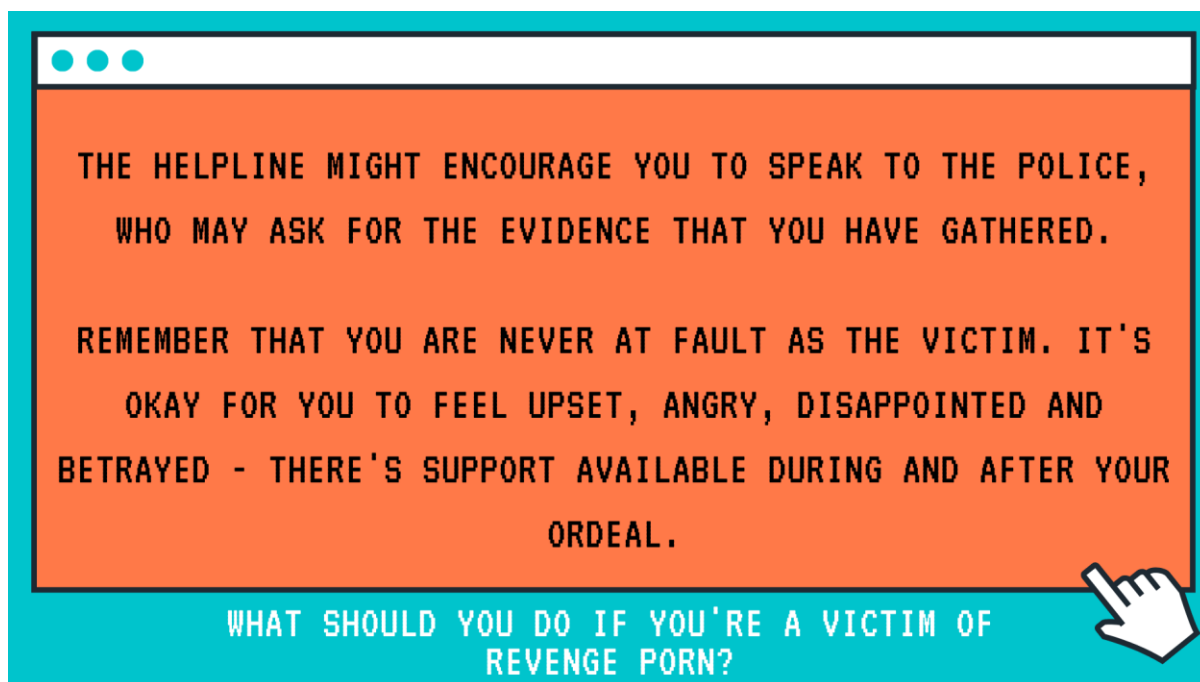


Figure 16 - Information page telling player what to do if they become a victim of Revenge Porn

These measures aided in the suitability of the game as an educational mitigation to prevent players from becoming victims, taught them where to get help if they need it and aided in generating an open conversation about sexual violence both online and in-person. The game had usability issues; however, they can be easily fixed if the game was to be applied as a preventative mitigation.

5.3. Limitations

There are limitations with the survey design. In terms of demographic questions, a participant had highlighted that the transgender options in the demographic section of the survey were not suitable and did not allow transwomen and transmen to select an option that represented their gender. This was a major oversight by the researcher, and in hindsight it may have been more appropriate to include a separate question after asking what gender participants identify with, such as “Do you identify as your assigned gender at birth?” or “Do you consider yourself to be transgender?”.

Furthermore, due to the lack of non-white participants, it is difficult to determine if a person’s ethnicity influences their likelihood of asking family and friends for help regarding TFSV crimes, as well as the effectiveness of the game as an educational mitigation for non-white people. There is also little data on how someone’s ethnicity affects their experience of TFSV, which would have been beneficial to investigate. This may have been solved with obtaining a larger sample size, with the study being advertised in more places such as the university’s newsletter and portal.

With the survey design, the researcher identified that they did not ask where participants would go to get help after playing the game. Therefore, the researcher could not see if participants would prefer to go to specialist charities, police, or peers. This meant they could not compare this to the pre-game results of where they would go if they needed help – another oversight that was realised when digesting results. It is also difficult to understand where people learned about TFSV originally, was it through participants own experience as a victim or have they seen it in media and the news? This should have been asked in the survey to understand this better.

Another limitation of the survey design was that the media friendly terms and formal terms were used in the same question. A better way of asking participants if they had heard of any of these

crimes was by asking the formal terms for TFSV crimes first, then asking about the media friendly terms. For example, would a participant have heard of 'Image Based Sexual Abuse' or 'Revenge Porn'. This may have given a better understanding of how people learn about TFSV, and if media friendly terms are easier to understand when compared to formal terms.

5.4. Issues Encountered

There were issues with the web browser version of the game. Some participants using MacOS, and Google Chrome were able to play the game, however after four days of the study starting it was highlighted that Google Chrome was no longer working and returned an error. Firefox on MacOS worked and participants were asked to download and use Firefox if they were using a MacOS system to play the game. Some participants did not have enough storage to download another web browser, meaning they could not continue the study.

6. Conclusion and Future Work

6.1. Conclusion

The aim of this research project was to develop an educational mitigation to prevent and protect players against TFSV. A visual novel was created with five chapters, each chapter telling the story of a victim of a different TFSV crime. The game was successful in educating a wide range of participants about TFSV, whilst generating an open discussion about TFSV. The story was engaging and included a wide range of characters from different backgrounds and genders to ensure each player was represented within the game. Players were able to see a character like themselves, overcoming their experience of TFSV and seeking help – further emphasising that talking about TFSV is healthy and can help if they do become victims.

The results shown that participants would prefer to speak to friends and specialist support than family, which emphasises the need for these specialist charities and the police. However, it was highlighted that people may have issues going to the police for help about TFSV. This may be due to prior experiences with the police, fear of victim blaming and fear they will not be taken seriously. This puts more pressure on specialist support to be able to help victims who do not feel comfortable speaking to family, friends, or the police. Most of the specialist charities are only open during work hours, online chatlines are only open for a fraction of the day too. This means victims may not be able to access this specialist support when it is needed.

To ensure victims are supported out with specialist support such as charities, an open conversation about sexual violence needs to happen. This can be done through destigmatisation of the topic through education, which the game has proved is possible. Only then will most victims be able to feel comfortable enough to seek help from friends and family, without fear of victim blaming and embarrassment.

To conclude, the project has been incredibly successful, answering the three research questions that were posed; *“What are the mitigations available to prevent technology-facilitated sexual violence?”*, *“How effective are the mitigations at educating, preventing, and protecting people against technology-facilitated sexual violence?”* and *“How effective is gamification to educate users about technology-facilitated sexual violence?”*. This project found the mitigations available through the police, charities and social media were not effective in educating, preventing, or protecting people against TFSV. The project also found that gamification was a suitable mitigation to educate players about TFSV, in turn potentially preventing and protecting them from becoming TFSV victims.

6.2. Future Work

If given more time, the researcher would have liked to have tailored the game to specific age ranges. This would have meant the chapters would be more relatable for an older audience. The researcher is aware the chapters are more suited to a younger age range, this is due to the researcher’s own age. Research would have to be carried out to investigate how older audiences communicate online, including their likelihood to become victims of TFSV.

The colour scheme used for the informational pages would also be changed to a more suitable colour. Multiple participants noted that the orange and blue background text was difficult to read, paired with the black pixel text. This should be replaced with an easier to read font, and dyslexia friendly colours for the background.

To make the game more immersive, the researcher had investigated the possibility of players being able to create their own sprite or character. This sprite would be used so they could be represented

visually in the game. This would have aided in the story and world building, thus aiding the player to become more immersed and engaged with the game.

Furthermore, the survey design would have included questions such as where participants would go for help after playing the game, if they think social media mitigations go far enough to protect and prevent against TFSV and if participants were able to identify formal and media terms of TFSV. This was mentioned in the limitations of the discussion and would have provided invaluable data relating to the project.

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Appendices

Appendix A – Decision Trees

a) Revenge Porn Chapter Decision Tree

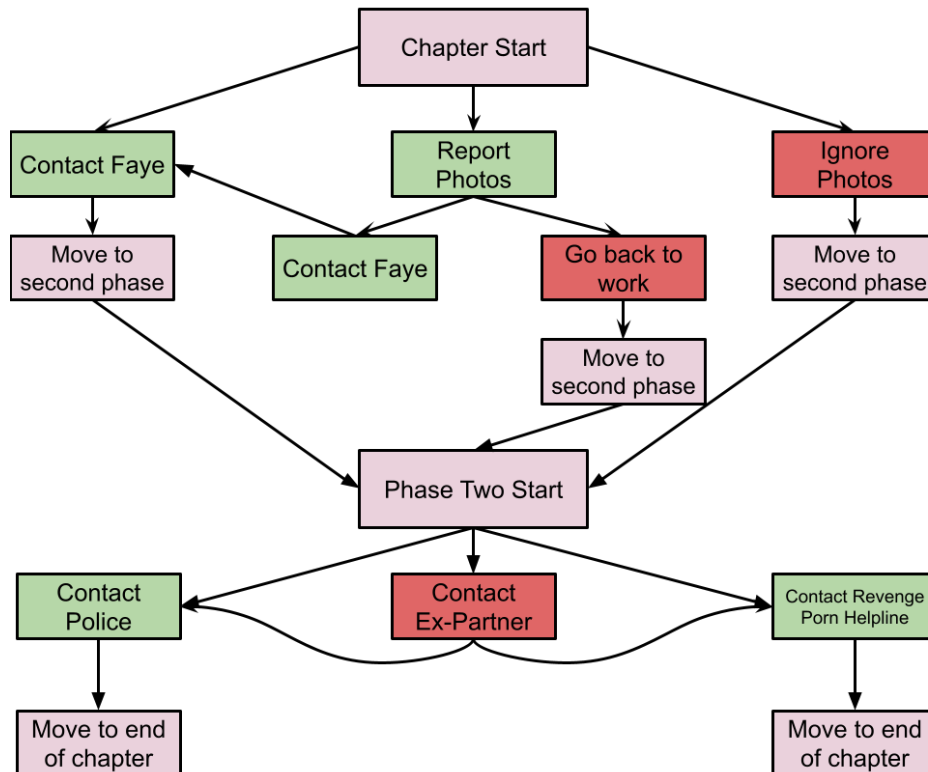


Figure 17 - Decision tree of choices available in Revenge Porn chapter.

b) Sextortion Chapter Decision Tree

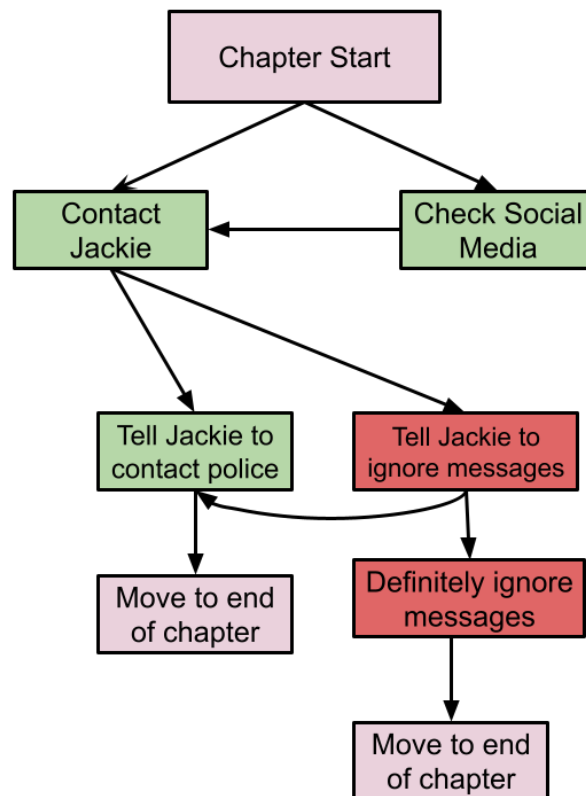


Figure 18 - Decision tree of choices available in Sextortion chapter.

c) Upskirting Chapter Decision Tree

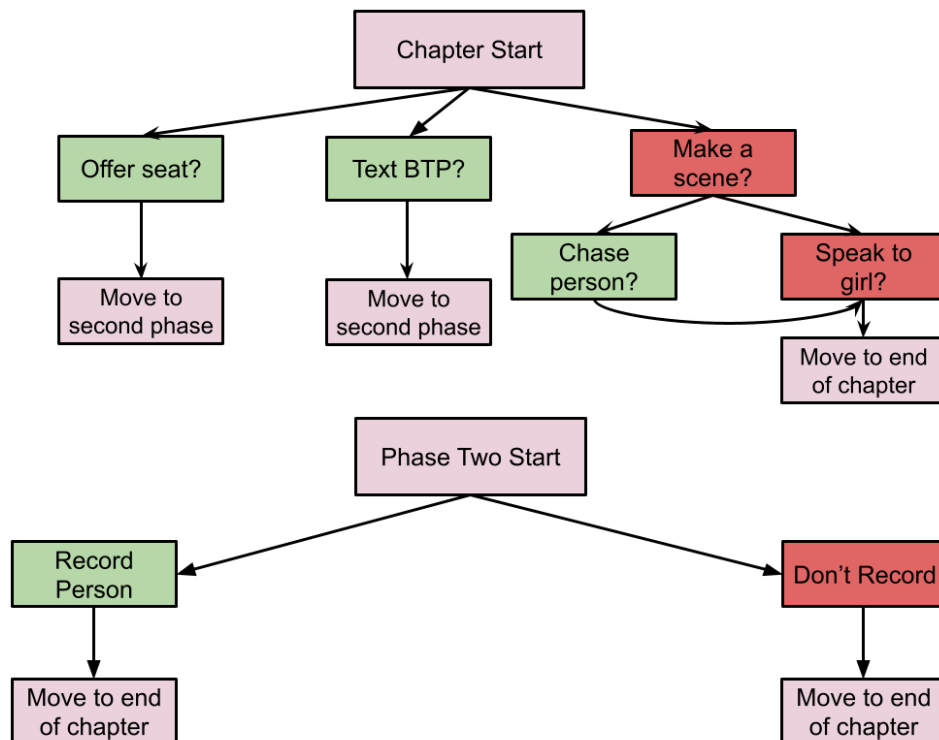


Figure 19 - Decision tree of choices available in Upskirting chapter.

d) Unsolicited Image Sending Chapter Decision Tree

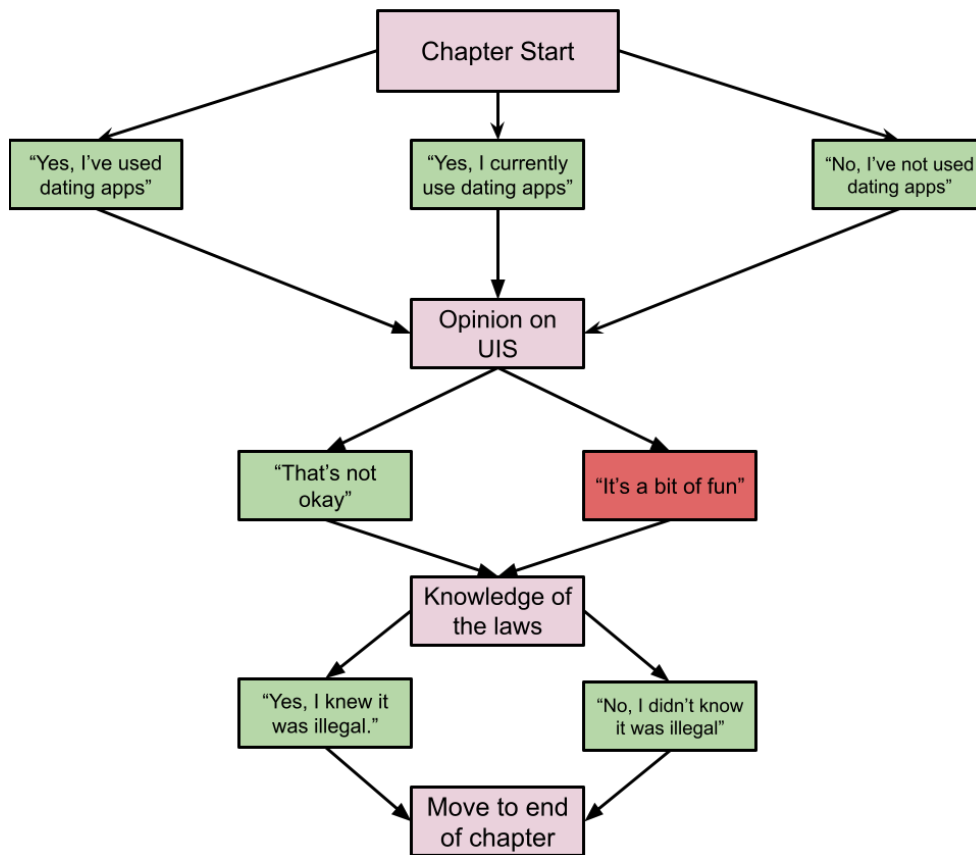


Figure 20 - Decision tree of choices available in Unsolicited Image Sending chapter.

e) In-Person Sexual Violence Chapter Decision Tree

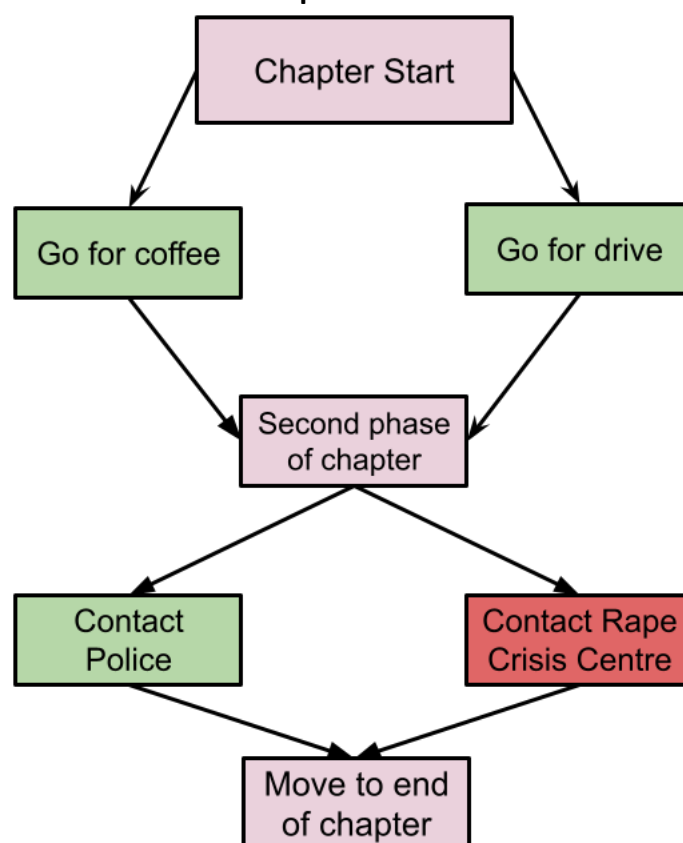


Figure 21 - Decision tree of choices available in In-Person Sexual Violence chapter.

Appendix B – Survey Questions

a) Pre-Game Survey Questions

Question Number	Question	Answer Options (if applicable)	Optional? (Y/N)
Q1	What age range do you belong to?	'18-24', '25-34', '35-44', '45-54', '55-64', '65-74' or '75 and over'	N
Q2	What is your gender?	'Male', 'Female', 'Trans/Gender Non-Conforming' or 'Prefer not to say'	N
Q3	What is your sexual orientation?	'Asexual', 'Bisexual', 'Gay', 'Heterosexual or Straight', 'Lesbian', 'Pansexual', 'Queer' or 'Prefer not to say'	N
Q4	How would you best describe your ethnicity?	'White', 'Mixed or Multiple ethnic groups', 'Asian or Asian Scottish or Asian British', 'African', 'Caribbean or Black' or 'Arab'	N
Q5	Where in the UK do you currently reside?	'Scotland', 'Wales', 'Northern Ireland' or 'England'	N
Q6	Do you know what 'Technology-Facilitated Sexual Violence' is?	'Yes', 'No' or 'Maybe'	N

Q7	If you answered yes or maybe, what is your understanding of Technology Facilitated Sexual Violence (TFSV)?	(Long-answer text)	Y
Q8	Do you know or have heard of any of the following Technology-Facilitated Sexually Violent crimes?	'Revenge Porn', 'Sextortion', 'Up-Skirting/Down-Blousing', 'Video Voyeurism', 'Cyber-Flashing', 'The use of technology to facilitate in-person sexual violence.'	N
Q9	Would you know where to seek help or advice if you were to become a victim of these crimes?	'Yes', 'No' or 'Maybe'	N
Q10	If you answered yes or maybe, where would you seek help/advice?	(Long-answer text)	Y
Q11	Would you feel comfortable approaching a family member for help or advice if you were a victim of these crimes?	'Yes', 'No' or 'Maybe'	N
Q12	If you answered no, can you explain why?	(Long-answer text)	Y
Q13	Would you feel comfortable approaching a friend for help or advice if you were a victim of these crimes?	'Yes', 'No' or 'Maybe'	N
Q14	If you answered no, can you explain why?	(Long-answer text)	Y

Table 4 - Pre-game questions, answer options and whether question is optional.

b) SUS Survey Questions

SUS Statements	Responses Available
"I think that I would like to play this game frequently."	<ul style="list-style-type: none"> - Strongly Disagree - Slightly Disagree - Neither Disagree nor Agree - Slightly Agree - Strongly Agree
"I found this game unnecessarily complex."	
"I thought this game was easy to use."	
"I think that I would need assistance to be able to play this game."	
"I found the various functions in this game were well integrated."	
"I thought there was too much inconsistency in this game."	
"I would imagine that most people would learn to play this game very quickly."	
"I found this game very cumbersome/awkward to play."	
"I felt very confident playing this game."	
"I needed to learn a lot of things before I could get going with the game."	

Table 5 - SUS Questions, with available responses.

c) Post-Game Survey Questions

Question Number	Question	Answer Options (if applicable)	Optional? (Y/N)
Q1	Refer to Appendix B – Part b)	Refer to Appendix B – Part b)	N
Q2	Did you feel like the narrative (story) of the game was suitable for educating people about technology-facilitated sexual violence?	'Yes', 'No' or 'Maybe'	N
Q3	If possible, can you explain your answer?	(Long-answer text)	Y
Q4	Do you feel like you learned about technology-facilitated sexual violence?	'Yes', 'No' or 'Maybe'	N
Q5	If possible, can you explain your answer?	(Long-answer text)	Y
Q6	Would you feel comfortable approaching a family member if you were a victim of these crimes now?	'Yes', 'No' or 'Maybe'	N
Q7	If you answered No, can you explain why?	(Long-answer text)	Y
Q8	Would you feel comfortable approaching a friend if you were a victim of these crimes now?	'Yes', 'No' or 'Maybe'	N
Q9	If you answered No, can you explain why?	(Long-answer text)	Y
Q10	Do you know where/who you would reach out to for help and advice after playing the game?	'Yes', 'No' or 'Maybe'	N
Q11	Would you feel comfortable asking for help if you were a victim of these crimes?	'Yes', 'No' or 'Maybe'	N
Q12	Do you have any comments about the game?	(Long-answer text)	Y

Table 6 - Post-game questions, answer options and whether question is optional.

Appendix C – Long-Text Survey Responses

a) Participant's Understanding Of TFSV (Pre-Game)

Participant Number	If you answered yes or maybe, what is your understanding of Technology-Facilitated Sexual Violence?
P02	<i>Acts of sexual violence/abuse/assault committed with the aid of technology, for example using social media to send nudes or to threaten to release someone else's nudes or the taking of videos or images of someone without their consent.</i>
P04	<i>efers to a range of behaviors where digital technologies are used to facilitate both virtual and face-to-face sexually based harms.</i>
P06	<i>TFSV covers any Sexual violence that requires technology to commit i.e. Unsolicited nudes, non consensual sharing of others nudes.</i>
P09	<i>Sexual Violence carried out via available technology eg revenge porn, sextortion etc</i>
P12	<i>Sexual violence perpetrated online, or using technology to track, blackmail or control the victim</i>
P13	<i>Using sexually explicit material presented in online presence to facilitate harm upon others mentally and/or physically</i>
P18	<i>the use of technology in forms of sexual abuse</i>
P20	<i>Using technology to participate or instigate sexual violence to or on someone non consenting</i>
P21	<i>Misogynistic, sexist or otherwise malicious behaviour undertaken with technology such as text messages, VoIP services, forums etc. This can include sending insults, threats, sharing other parties personal information, online stlaking etc.</i>
P22	<i>I would have known very little about this until i heard a presentation by Tia who opened my eyes to this</i>
P23	<i>the use of technology to attack someone with sexual content, either with unprovoked sexual content, or using sexual content of the victim to manipulate them</i>
P25	<i>Broad spectrum, including: nonconsensual distribution or creation, or unsolicited sending of sexually explicit material. Abuse of IoT including connected sex toys to physically or psychologically abuse a person. Harassment over DMs or calls. And blackmail such as threatening to distribute existing explicit material to - for example - friends, family and colleagues if further material is not provided. etc</i>
P27	<i>Using technology such as texting, tracking smart phones and social media posts.</i>
P28	<i>A crime which relates to sexual based violence which has also been conducted OR assited by technology i.e Ransoming of senstive photos/videos for money OR favours.</i>
P30	<i>Guessing... sharing intimate/private photos or stories about someone you know without their consent, could be with their knowledge, or bribing, or to "enjoy" a feeling of control/embarrassment/shame... while I suspect that would happen with someone they know, it might also include finding/stalk someone they don't (e.g. dating apps or social media to find someone they can abuse?)</i>
P31	<i>The use of technology devices and its online services to cause distress towards an individual through harmful actions, such as: sending unwanted sexual images, blackmailing an individual with their private sexual images, stalking and releasing an individuals sexual images to the public.</i>
P32	<i>Sexual violence that technology plays a role in either virtual or physical space.</i>
P34	<i>sexual violence through technology</i>
P35	<i>Using technology/computers to commit or assist with commission of sexual offences and harassment</i>
P36	<i>sexual assault (including inappropriate contact etc.) done through the medium of technology</i>
P37	<i>Revenge porn, unwanted sexual content, etc</i>
P41	<i>Sexual violence and malicious acts based on sexual leverage that are enabled by tech</i>
P42	<i>the use of technology to preform,enable or 'enhance' sexually exploitative acts</i>
P43	<i>Things like revenge porn where technology is used but the crime is also of a sexual nature</i>
P44	<i>Revenge porn, disclosing exposed imagery of another without consent.</i>

P45	<i>any form of sexual violence, harassment or abuse that is perpetrated via digital means/with the use of technology.</i>
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Table 7 – Participant's understanding of TFSV (pre-game)

b) Where Participant Would Seek Help/Advice (Pre-Game)

Participant Number	If you answered yes or maybe, where would you seek help/advice?
P2	<i>I would like to believe I could turn to the police, but I do not have faith in them regarding how seriously they would take such crimes.</i>
P3	<i>the police</i>
P4	<i>police , victim support, lawyer</i>
P6	<i>Police</i>
P8	<i>Police</i>
P10	<i>Police</i>
P12	<i>I'd check online</i>
P13	<i>Police or other helpline governing bodies</i>
P18	<i>organisations based around support</i>
P19	<i>Police</i>
P21	<i>The police</i>
P22	<i>Reporting to Police as well as specialist support groups</i>
P23	<i>if possible, to the police, or university, however I do not really know.</i>
P25	<i>Government and NHS websites and charities. Friends or family members if comfortable with this. School or University if relevant</i>
P26	<i>Police, helpline</i>
P27	<i>The police in most cases.</i>
P28	<i>Police, Helplines & online crisis sites.</i>
P30	<i>At first I'd search for help online, but assuming it's a crime, I would consider reporting to the police (and yes, I know, doing so has its own problems).</i>
P31	<i>It would depend on how I felt and reacted to any of these crimes. If it would have a significant impact on my mental health I would most likely contact a helpline such as Samaritans. However, I feel that my first instinct would be to go to the police in hopes they will be able to remove my personal images from the internet and track down the criminal responsible.</i>
P34	<i>police</i>
P35	<i>Police, online support groups</i>
P37	<i>Police, online charities</i>
P38	<i>The Police</i>
P39	<i>Local authorities, online helplines</i>
P41	<i>revengeporn helpline, a friend</i>
P42	<i>ceop, safeline, sarsas</i>
P45	<i>hotlines dedicated to assisting victims of any sexual crime</i>

Table 8 – Where participant would seek help or advice (pre-game)

c) Why Participant May Not Approach a Family Member (Pre-Game)

Participant Number	If you answered no, can you explain why?
P01	<i>Just not close</i>
P02	<i>I would feel embarrassed to speak to family members about these things.</i>
P04	<i>I am the it literate person they come to for help</i>
P05	<i>It's embarrassing</i>
P06	<i>Its a personal experience. The same as if it was non technology based and these types of things are not something I would feel safe sharing with my family (They are judgemental so when I have in the past gone through similar things I avoid talking with them)</i>
P12	<i>I don't think they would cope. My parents certainly wouldn't</i>
P16	<i>I'd prefer to keep that part of my life private, no matter how much it would help me to reach out.</i>
P25	<i>Not close to family</i>
P31	<i>This topic has never been brought up within my family. Maybe that's because it's seen as a touchy subject and my family avoided talking about it. Due to this I would feel extremely uncomfortable bringing it up for the first time really. My family aren't on that level of openness sadly.</i>
P33	<i>i would feel embaresed to tell anyone in the family</i>
P34	<i>would prefer a nutral person involved</i>
P35	<i>Embarrassment, judgement</i>
P36	<i>My relationship with most of my family is strained, and with those it isn't I don't feel comfortable enough to share some aspects of my life with them</i>
P40	<i>Because it feels like somehow it's your fault when you're a victim of things like this</i>
P41	<i>I don't think they would understand or be able to help</i>
P45	<i>they lack an understanding of the complexity of trauma in general and would probably cause more problems. they also have an older world view and lack understanding of technology also, so would more then likely blame the technology itself and ban it, or blame me as a victim to some extent.</i>

Table 9 – Why participant may not approach a family member (pre-game)

d) Why Participant May Not Approach a Friend (Pre-Game)

Participant Number	If you answered no, can you explain why?	Previous Answer
P02	<i>I would feel embarrassed to speak to friends about these things.</i>	
P06	<i>Same as above answer I don't feel comfortable talking to them as they are judgemental and that's not something I need to deal with.</i>	<i>“Its a personal experience. The same as if it was non technology based and these types of things are not something I would feel safe sharing with my family (They are</i>

		<i>judgemental so when I have in the past gone through similar things I avoid talking with them)"</i>
P16	<i>Same answer as above</i>	<i>"I'd prefer to keep that part of my life private, no matter how much it would help me to reach out. "</i>
P25	<i>Would not want to burden them</i>	
P31	<i>Not sure why, but I would feel comfortable approaching a friend over family. I think it's because we would be the same age and they would understand and provide the right help without making me feel embarrassed or shaming me for whatever crime had been committed against me. (Participant answered yes)</i>	
P33	<i>i would feel they might turn on me and bully me</i>	

Table 10 - Why participant may not approach a friend (pre-game)

e) Why Participant May or May Not Have Felt Like the Narrative (Story) Of The Game Was Suitable For Educating People About Technology-Facilitated Sexual Violence? (Post-Game)

Participant Number	If you answered no, can you explain why?
P02	<i>The presenting of instances through possible real life examples was a good way of explaining how these things can happen to anyone and the text after explaining what each situation was explained the examples well.</i>
P05	<i>I think there was a lot of information, but not sure I'll remember it all</i>
P06	<i>The narrative gives you something to focus on to help better your understanding taking you through scenarios that explain things better than say some legal text</i>
P09	<i>it was very well referenced to the laws that applied to each chapter</i>
P11	<i>it followed a logical plot and believable storyline</i>
P12	<i>Narrative was simple and logically ordered</i>
P13	<i>I think it was informative and well documented with working relational examples</i>
P14	<i>informative thorough and in detail on advise to seek help</i>
P15	<i>It is very clear and tells You exactly what You need to know about everything</i>
P16	<i>Outside of a couple choices, I was heavily railroaded into taking the choices that the creator obviously wants me to take. Having some reasonable sounding but wrong choices would help educate people better on how to deal with these situations</i>
P18	<i>its easy to play and has simple to understand language making it accesiable for many groups</i>
P21	<i>It covered the scenarios in a believable way and wasn't too intense.</i>
P22	<i>Good story lines that covered the all of the different subjects</i>

P23	<i>the game explores many very real situations, each one telling a strong narrative, and an important message with it.</i>
P24	<i>It was a lot more interesting than just reading an article about it. Also made you think about how you would react if it actually happened to a someone you knew and in turn made you really think about the consequences.</i>
P25	<i>The first person / visual novel format helped to approach the scenarios as if it was myself. The format of introducing a concept, playing through an example case and providing information to explain the choices made and support available helps give a complete understanding of the topics to an audience, regardless of existing experience.</i>
P26	<i>The information before each chapter described technology-facilitated sexual violence perfectly and the visual novel aspect showed what each scenario could look like for a person and how they could take action and ask for help when they need it. I found it could help people be more comfortable at approaching their friends or maybe their family when it came to something as serious as these scenarios as well.</i>
P27	<i>Useful information for links to help contacts</i>
P28	<i>It uses close to real life scenarios, which helps convey the crimes facing people currently & will continue to face.</i>
P30	<i>I like how the interactive element means that you're more likely to pay attention to the content, whereas an article/report/block-of-text might not have the same result.</i>
P31	<i>Yes I really liked the idea of using a narrative based approach to educate on technology-facilitated sexual violence. I believe through a game, a person can fully immerse themselves in the situation and get a real feel for what it is like going through such a crime.</i> <i>It helps you to know how you would react if you or someone you know were in any of the situations depicted in the game. Who you would go to for help and advise someone where to go for help.</i>
P32	<i>I feel that the scenarios and information are really well laid out, however sometimes the conversation felt too robotic. I understand that the way that the communication is done is to make the scenario stand out, but I feel that some informal language could be used in the in-person segments. The text conversation was very similar to how I communicate with others therefore making me more invested in the narrative.</i>
P35	<i>Everyone loves a game!</i>
P38	<i>Good stroy lines</i>
P39	<i>I don't think the fact it was a game contributed significantly to the impact - a simple information pack would have communicated the same information in a more concise and accessible way</i>
P41	<i>I think the scenarios were really good. The colour0coded names were good. Tho more background imaging would of made it a little easier to follow rather than jsut names</i>
P42	<i>it went through explaining a lot of angles on each type of crime explaining them simply but not being condescending, lots of reassurance about it not being your fault and happening to males etc. making it much more effective</i>
P43	<i>The stories were well thought out and the fact you are directly addressed and involved makes you feel connected to the characters and so you can empathise with what they are feeling</i>
P44	<i>The narrative followed realistic examples of technology-assisted sexual violence scenarios, and offered some guidance on helping to deal with this circumstances. Though not in all cases do things go as smoothly as the scenarios presented.</i>

Table 11 – Why participant may or may not have felt like the narrative (story) of the game was suitable for educating people about technology-facilitated sexual violence? (post-game)

f) Why Participant May or May Not Have Learned About Technology-Facilitated Sexual Violence. (Post-Game)

Participant Number	If you answered no, can you explain why?
P02	<i>I feel I already knew quite a lot about this topic already</i>
P05	<i>There was definitely some things I didn't know</i>
P06	<i>There was no new information for me as I am already fairly knowledgeable on the subject. This could teach people if they did not already have this level of knowledge</i>
P08	<i>I feel like I've learned a lot about the topic. The game did a good job of highlighting and explaining the types of crime, and suitable support and reporting centers for different scenarios.</i>
P11	<i>some things i had heard of but not others very educational</i>
P13	<i>It provided well written examples to explain each term in detail and provided good situational experiences to help hammer home both the crime and the solutions out there to help victims of said crimes</i>
P15	<i>Explained the different types of technology that can be used as ways of sexually abusing people</i>
P16	<i>If I knew nothing about technology based sexual harassment then I would have learned alot about it, however I knew a decent amount before going in.</i>
P18	<i>i learned more in depth of the topic and was able to see more about definitions of the law</i>
P21	<i>learned a lot about the resources that are available to victims.</i>
P22	<i>yes, covered lots of different subjects</i>
P23	<i>I feel like I have learnt a lot about what counts as a crime, and how to deal with the situation.</i>
P24	<i>I had a brief awareness of some of these aspects but this game really showed the many ways it can happen to people.</i>
P25	<i>I felt like I already had a strong understanding of the topic but still learned additional resources for support and the specific sentences for perpetrators.</i>
P26	<i>Understanding the different aspects of it that I didn't know before, the many different helplines out there for people and how it can help you deal with it mentally.</i>
P27	<i>Although I was aware of all of the issues covered in this game; I wasn't sure about all of the web links and help lines that were available.</i>
P28	<i>Yes - it covers a wide ranger of scenarios, which initially I was aware of, but to the full extent based on the content provided.</i>
P30	<i>Noting the specific laws, while I won't remember those details, shows that they exist, and if I ever did need to refer to them, I'd search for the details.</i>
P31	<i>I say maybe just because I knew quite a lot about the crimes discussed in the game beforehand. However, I did learn a lot about who to contact if these crimes were to happen to myself or someone I know. I didn't know about Survivors UK or the Rape Crisis helpline before playing the game. Now I know who to go to for myself, or advise others where to go (as options were given for other genders etc). It was also nice to learn that the Police would actually take action and help the victim in these crimes, that they have a process to tackle such crimes when they happen, and there are laws in place to convict the criminal/offender.</i>
P32	<i>I have a greater understanding on the best practices in speaking to others and reporting TFSV in regards to sextortion and in-person sexual violence and the parties that can be contacted. I also learned about video-voyuerism and how to handle the situations as not to escalate the situation to a point of physical violence.</i>

P35	<i>The examples helped my learning</i>
P37	<i>Put the types of violence into context</i>
P38	<i>I am aware of the issue and an advocate in fighting this</i>
P39	<i>I learned a couple of new terms and legal technicalities</i>
P41	<i>I learnt a bit more about the laws that surrounded the issues. And more examples of it happening</i>
P43	<i>I didn't know cyber-flashing was illegal before this, I hadn't really heard the term used before either</i>
P44	<i>The game taught us various forms of technology-assisted sexual violence and how to navigate them.</i>

Table 12 – Why participant may or may not have learned about technology-facilitated sexual violence. (post-game)

g) Why Participant May Not Approach a Family Member (Post-Game)

Participant Number	If you answered no, can you explain why?	Pre-Game Answer
P02	<i>I would still feel embarrassed</i>	<i>I would feel embarrassed to speak to family members about these things.</i>
P05	<i>I still feel uncomfortable</i>	<i>It's embarrassing</i>
P06	<i>My family is judgemental and would cause issues for me so I would deal with it myself</i>	<i>Its a personal experience. The same as if it was non technology based and these types of things are not something I would feel safe sharing with my family (They are judgemental so when I have in the past gone through similar things I avoid talking with them)</i>
P12	<i>It is not something my family would cope with</i>	<i>I don't think they would cope. My parents certainly wouldn't</i>
P16	<i>My answer from before has not changed, I would still rather keep that part of me private, even at the cost of myself.</i>	<i>I'd prefer to keep that part of my life private, no matter how much it would help me to reach out.</i>
P25	<i>still no closer to my family</i>	<i>Not close to family</i>
P30	<i>I think this one depends a lot on the circumstances.</i>	
P31	<i>I still wouldn't. As mentioned previously, it's not something my family talks about so I would still feel uncomfortable. Although, if my family played this game or a similar game-based narrative story I actually think it might make the topic less touchy and make these crimes more open for discussion. I really believe this is a great way to introduce someone to these topics and educate on the right actions to take if it ever happens to yourself or someone you know.</i>	<i>This topic has never been brought up within my family. Maybe that's because it's seen as a touchy subject and my family avoided talking about it. Due to this I would feel extremely uncomfortable bringing it up for the first time really. My family aren't on that level of openness sadly.</i>
P34	<i>Would prefer a neutral person</i>	<i>Would prefer a neutral person involved</i>

P40	<i>Because it's not something I'm comfortable with</i>	<i>Because it feels like somehow it's your fault when you're a victim of things like this</i>
P42	<i>atho hearing reassurance about it not being the victims fault and it happening to men too, there is still issues with necessarily beveling that or accepting that it may be wrong, also a worry that they wount see it in a positive way</i>	
P45	<i>for the same reasons listed prior</i>	

Table 13 – Why participant may not approach a family member (post-game)

h) Why Participant May Not Approach a Friend (Post-Game)

Participant Number	If you answered No, can you explain?	Pre-Game Answer
P02	<i>There are maybe some friends I feel I could approach</i>	<i>I would feel embarrassed to speak to friends about these things.</i>
P06	<i>My friends are judgemental and would cause issues for me so I would deal with it myself</i>	<i>Same as above answer I don't feel comfortable talking to them as they are judgemental and that's not something I need to deal with.</i>
P16	<i>Same answer as above ("My answer from before has not changed, I would still rather keep that part of me private, even at the cost of myself.")</i>	<i>Same answer as above ("I'd prefer to keep that part of my life private, no matter how much it would help me to reach out.")</i>
P25	<i>If dealing with these issues, I'd prefer to use an anonymous support service</i>	<i>Would not want to burden them</i>

Table 14 – Why participant may not approach a friend (post-game)

i) Participant's Thoughts About the Game

Participant Number	Do you have any comments about the game?
P06	<i>The story aspects help explain concepts in an easy to understand way and give you context that legal text does not. The game also ran well no lag or issues</i>
P12	<i>Tech:Screen size doesn't work well on Android phone. And in the phone sections, I can read the text from Faye etc, but "my" text blocks have no text - they are just solid blue. Overall: I think it's good - images and structure work well</i>
P13	<i>Very well designed, informative and definitely an comfortably easy consumption of what can be perceived as a difficult subject matter to learn and understand</i>
P15	<i>Showed that this can happen to anyone not just Women.</i>
P16	<i>It may have been my download, but the dialog in the phone interface that was from my character would not show up.</i>
P18	<i>it was really interesting, and educational. an easily accessible form of educating!!</i>
P21	<i>Using my own name was a bit jarring!</i>
P22	<i>I really good way of teaching others about this type of offending</i>
P24	<i>Really informative and interactive.</i>
P26	<i>It was very well informative and could understand the points the different chapters were trying to convey in the game. Definitely have this app published on app store!</i>
P27	<i>This would be a very helpful game and would instruct anyone affected by these types of crimes and would provide information on who to contact in the first instance. It</i>

	<i>would also be useful for people that are not aware of these crimes to be more informed regarding the issues.</i>
P28	<i>Could be the laptop I was using, however the trackpad did not support scrolling for the mobile game messages. Trying to scroll also caused the game to stop & then either jump forward/back many scenes.</i>
P29	<i>On one of the pages there was some small size text I could see. Began with 'You [something]'</i>
P30	<i>From a geeky point of view, I probably wouldn't use WASM, it's a lot of data to download (slow), seems to be a bit buggy, and it's not a normal in browser experience (e.g. couldn't see an obvious way to go back, keyboard controls are a bit weird, I didn't test but I suspect a screen reader user might struggle with this, even with the voice version)... for a proof of concept it's fine, but I would probably keep to normal web tech (e.g. HTML/CSS/JS).</i>
P31	<p><i>I enjoyed playing through the game. Was very easy to get started and follow. The information about the crimes and where to get help were presented very well and let me take it in easily. I think now that I'm filling out the final part of the survey it's helped me retain the information discussed in the game. I'm not sure if I watched an hour video I would be able to remember it like I am now. The interactivity played a big role in this. Kept me engaged.</i></p> <p><i>The game immersed me in the events that were occurring to my friends and strangers. The chapters instilled fear, concern and anger in me. These emotions helped make the game feel real. That these events were happening right before me. Topics like these shouldn't hold back and I think you did a great job with the game presenting them.</i></p>
P32	<i>Some of the content had weird scaling, however I feel this was down to me playing the game in a resolution greater than 1080p. The colour scheme of the text sections was a bit harsh when moving from in-person to informational segments. I found it hard to focus on the text quickly, but I also think this helped me to digest the information more fully.</i>
P34	<i>it was well thought out and well presented</i>
P39	<i>Some minor feedback - the "what can you do to prevent" section read a little as though people were being blamed for not taking these actions, despite the "you are not to blame" statements elsewhere in the text. The information sections (all-caps blocky text on an orange background) aren't hugely accessible - I struggled to keep focus on them, and I'm sure it must be worse for someone with dyslexia or a similar condition. I'd advise a more readable font, not using all-caps, perhaps something similar to the Renpy font used elsewhere. I'd appreciate more acknowledgement of justified reasons to not contact the police - a previous negative history, racial profiling and brutality, etc, and include non-police resources for all sections, not just the final one. Finally, "trans" isn't a separate gender category, and should only be used that way when talking about trans-specific resources - a transgender woman shouldn't have to choose between "woman" and "trans" since both are perfectly valid categories for her. Marking whether specific shelters, especially "mens" and "womens" shelters, are open to trans people of that gender, would be more useful.</i>
P41	<i>I liked the design tho i felt the words were sometimes in weird font. I really enjoyed it tho</i>
P42	<i>great game overall adding the option to toggle on the voice command earlier would have been nice but good game overall</i>

P43	<i>Very immersive and educational game, think it could really help people learn about technology-facilitated sexual violence and how they can help others/what to do if they ever need help. This should 100% be in schools!</i>
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Table 15 -What participants thought about the game

Appendix E - Likelihood Comparison

Approach a family member			Approach a friend		
Participant Number	Pre-Game	Post-Game		Pre-Game	Post-Game
P01	No	No		Yes	Yes
P02	No	No		No	Maybe
P03	Maybe	Maybe		Maybe	Maybe
P04	No	Yes		Yes	Yes
P05	No	No		Maybe	Yes
P06	No	No		No	No
P07	Maybe	Yes		Maybe	Yes
P08	Yes	Yes		Yes	Yes
P09	Maybe	Yes		Yes	Yes
P10	Yes	Yes		Yes	Yes
P11	Maybe	Maybe		Maybe	Yes
P12	No	No		Maybe	Maybe
P13	Maybe	Maybe		Yes	Yes
P14	Yes	Maybe		Yes	Yes
P15	No	Yes		Yes	Yes
P16	No	No		No	No
P17	Yes	Yes		Yes	Yes
P18	Maybe	Maybe		Yes	Yes
P19	Maybe	Yes		Yes	Yes
P20	Maybe	Yes		Yes	Yes
P21	Maybe	Maybe		Yes	Maybe
P22	Yes	Yes		Yes	Yes
P23	Maybe	Maybe		Maybe	Yes
P24	Yes	Yes		Maybe	Yes
P25	No	No		No	No
P26	Maybe	Yes		Maybe	Yes
P27	Maybe	Maybe		Maybe	Maybe
P28	Maybe	Yes		Maybe	Yes
P29	Maybe	Maybe		Yes	Yes
P30	Maybe	Maybe		Maybe	Yes
P31	No	No		Yes	Yes
P32	Yes	Yes		Yes	Yes
P33	No	Yes		No	Maybe
P34	No	No		Yes	Yes
P35	No	Maybe		Yes	Yes

P36	No	No		Yes	Yes
P37	Maybe	Maybe		Yes	Yes
P38	Yes	Yes		Yes	Yes
P39	Yes	Yes		Maybe	Maybe
P40	No	No		Yes	Yes
P41	No	Maybe		Yes	Yes
P42	Maybe	Maybe		Maybe	Maybe
P43	Yes	Yes		Maybe	Yes
P44	Maybe	Yes		Yes	Yes
P45	No	No		Yes	Yes

Table 16 - Likelihood of approaching family and friends before and after playing the game.

Appendix F – GDPR Data Management Sign Off Form



**Abertay
University**

GDPR Research Data Management Data Sign Off Form

For undergraduate or postgraduate student projects supervised by an Abertay staff member.

This form **MUST** be included in the student's thesis/dissertation. Note that failure to do this will mean that the student's project cannot be assessed/examined.

Part 1: Supervisors to Complete

By signing this form, you are confirming that you have checked and verified your student's data according to the criteria stated below (e.g., raw data, completed questionnaires, superlab/Eprime output, transcriptions etc.)

Student Name:	Tia Cotton		
Student Number:	1602119		
Lead Supervisor Name:	Lynsay Shepherd		
Lead Supervisor Signature			
Project title:	Practising Safe Sex(t): Developing a game-based mitigation to tackle the rise of technology-facilitated sexual violence.		
Study route:	PhD <input type="checkbox"/>	MbR <input type="checkbox"/>	MPhil <input type="checkbox"/>
	Undergraduate <input checked="" type="checkbox"/>	PhD by Publication <input type="checkbox"/>	

Part 2: Student to Complete

	Initial here to confirm 'Yes'
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I confirm that I have handed over all manual records from my research project (e.g., consent forms, transcripts) to my supervisor for archiving/storage	TC
I confirm that I have handed over all digital records from my research project (e.g., recordings, data files) to my supervisor for archiving/storage	TC
I confirm that I no longer hold any digital records from my research project on any device other than the university network and the only data that I may retain is a copy of an anonymised data file(s) from my research	TC
I understand that, for undergraduate projects, my supervisor may delete manual/digital records of data if there is no foreseeable use for that data (with the exception of consent forms, which should be retained for 10 years)	TC

Student signature : TCotton

Date: 16/05/2022