Escape: Exploring Agency as a Fear-Inducing Mechanic in Video Games

by

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ABSTRACT

Horror games and movies share many similarities when it comes to how they elicit fear. However, a major difference between the two is the aspect of agency found prominently in games, but little, if at all, in movies. Agency is the capacity to act upon something. Previous work suggests that media with more agency have a greater propensity for eliciting fear than media without. However, this work relied solely on watch (i.e., low agency) versus play (i.e., high agency) comparisons. In this work, an agency manipulation with three separate agency conditions (low-agency watch, medium-agency directed play, and high-agency undirected play) is used in a horror video game. Results of the study show no measured difference in fear, agency, or other metrics where differences were expected. Correlational analyses revealed positive correlations between several factors, but not fear and agency. Potential reasons for the lack of differences are discussed, including the need for the study design to be conducted remotely instead of in a controlled laboratory setup due to the ongoing COVID-19 pandemic. This work brings into question the role of agency and fear in uncontrolled and possibly more ecologically valid scenarios.

DEDICATION

To Djordje Lepir, a dearest friend, in the hope that he reciprocates and names a satellite after me someday.

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I had not initially intended to go on to graduate school. By chance, I would end up taking a summer course from Dr. Patricia Evans to complete my psychology degree. Not only was she extremely helpful in my success of a not so easy course, but a simple

comment made in passing would go on to push me towards graduate studies. I applied after the deadline and was missing two courses. Dr. Evans helped get me organized in about a week and I started school shortly thereafter. I would not have been able to do so without her help.

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Table of Contents

List of Tables

List of Figures

Chapter 1 Introduction

It is fascinating that horror media, which are intended to cause fear, are viewed by so many as an enjoyable form of entertainment. Whether they come in the form of books or haunted houses, movies or video games, it is clear that many people find these experiences to be not only scary, but also fun and exciting. For horror game developers, understanding why people seek out and enjoy scary experiences, and how to create the best scary experiences are particularly important questions. This raises the question: why are people putting themselves through scary experiences and how can scary experiences be designed? In order to understand why people enjoy subjecting themselves to scary stimuli, it is important to have a basic understanding of what fear is.

There is no universally agreed upon definition of fear, and there is some disagreement about whether the experience of fear is biological, psychological, behavioural, socio-cultural, or a combination thereof in origin [3]. The difficulty in providing a definition arises from the complexity of fear, and the points of view from the various fields when describing fear as a construct [3]. For example, a biological view of fear could focus on the nervous responses experienced by people who are afraid. Common markers would include an increased heart rate, rapid breathing, pupillary dilation, and sweating (e.g., [32-35]). Conversely, a behavioural perspective attempts to measure things like avoidance behaviour and startles [31, 33, 35]. In the end, some researchers choose to simply ask participants if they experienced fear in the form of Likert scale questions and let them implicitly decide what that means (e.g., [12, 34]).

If you have ever been on a rollercoaster, you can easily recall the mixture of excitement and nervousness that occurs before and during the ride. The sympathetic nervous system is to thank for this. It is the body's excitatory response system. When this system activates, blood vessels constrict, heart rate and breathing rate increase, and your pupils dilate [35]. Notice that these are some of the same effects described above when talking about how to define fear. In fact, they are the same thing. When you are being chased by someone with a chainsaw the biological processes that occur are not dissimilar to those that occur when you are getting ready to go on a rollercoaster. Though you might expect there to be slight differences between the two situations, biologically speaking, the core principle is that the body reacts in a similar fashion to both scenarios. Why then is one considered scary while the other is fun and exciting? An important difference between the two is your perception of it. Understanding how our perception of a situation changes how we feel about it (scared vs. excited), provides a basis from which to understand how horror can be enjoyable. Similarly, it can also explain why some people find rollercoasters thrilling, while others find them terrifying.

Note that other more complex models do exist and explain, in greater detail, the specific phenomenon of fear and enjoyment. For example, Lin et al. employ models that rely on several factors, including "horror self-efficacy" (your self-assessed ability to cope with the horror media), as a means of explaining enjoyment in horror experiences [1]. This horror self-efficacy model is not unlike the evolutionary perspective suggested by Kjeldgaard-Christiansen & Clasen wherein players are challenged to overcome their fears, which acts as a motivating force to play in the first place [21].

Interestingly, fear is not the only negative-valence emotion that players enjoy experiencing. It seems that various negative emotions (e.g., sadness), when used to create emotionally moving experiences, can evoke enjoyment [20]. However, specific negative emotions might only attract certain types of players. For example, enjoyment of frightening games seems to be an attribute more commonly found in players with high sensation and high arousal seeking scores [1,18]. Similarly, high sensation-seeking also predicts enjoyment of horror movies [36].

How scary a person finds a stimulus or an experience is results from a multitude of factors. Understanding the specific common sources of what makes something scary is not only important to developers of horror games, but to developers of other game genres. For example, an action game that is not intended to be frightening could be quite scary if the player feels tension and is about to die in an intense battle and lose progress. This could be a good thing or a bad thing, depending on the desired experience. For this reason, a good understanding of the mechanisms behind the elicitation of fear is beneficial to both the game designer and the player.

Films have well-established practices around fear elicitation. Video games and movies share many similarities, and many concepts that apply to horror movies are likely equally applicable to video games. Often, horror movies will be dark, with ominous sounds, smooth and slow camera movements that are followed by quick turnarounds with a monster jumping out, etc. [36]. While it is safe to assume that these same techniques would lend themselves well to creating a frightening game experience, there is, however, one major difference between movies and games: the aspect of interactive play. Players

actively participate in the development of the story. This active participation is one of the factors that can give rise to agency, by requiring player input for the progression of the game experience. Conversely, movie watchers may be attentive and actively watching/listening, but they are not involved in the development of the movie. The interactive component is not there.

A previous study has looked at differences in fear between watchers and players, with players scoring significantly higher on physiological indicators of fear than watchers [12]. The limitation of their approach is that the results simply tell us that between a game and a movie, the game would be expected to be more frightening. However, it does not inform about the specific effects that agency has on fear, only that in the presence of more agency, indicators or fear are expected to be greater. Nevertheless, these results follow conventional wisdom. Movies allow for a certain degree of dissociation from the characters. That is to say that as a viewer, you can create a sort of mental separation between what is happening to them and yourself because you as a watcher have no part in the experience of the characters [38]. This is not as easy to do with video games. In games, your decisions as a player directly affect the outcomes for the characters. The successes of the characters can be directly attributed to you, but you are also responsible for anything bad that might happen to these characters [38].

To gain a more complete understanding of how agency affects fear, a comparison of different degrees of agency is required. This would work to either support the simple notion that an increase in agency results in more fear, or could perhaps reveal a more complex relationship between fear and agency. For example, there might exist something

similar to an activation energy [40], where some amount of agency is required before it will affect fear, but anything less will have no effect, and anything more might very well contribute little to the experience. Alternatively, changes in agency might induce fear as players have their control temporarily reduced or taken away. Further still, a combination of these two interactions could be the best predictor of fear levels.

To elaborate, consider the possibility that dynamic changes in agency can be used to induce more fear. There is already evidence of lack of agency evoking other negative emotions such as sadness or anger [20]. Therefore, it stands to reason that negative emotions such as fear might also be strengthened by reductions to agency. Using the example of trying to run away from an enemy but being slowed down due to some game mechanic, it is easy to see how this threat to agency could create a more frightening scenario than the alternative, which allows the player to simply run away. Note that in this case, however, the added challenge to the game likely also plays a part in how scary it is perceived to be.

It is important to recognize that manipulating agency in the form of altering the game's challenge would also affect a player's state of "flow" [16, 37], which is the balance between challenge and player skill. The issue with using this kind of a manipulation in this study is that although flow and agency are not entirely conceptually dissimilar, they react differently to changes in game difficulty [16]. For this reason, manipulating game events to be more or less challenging could introduce unwanted effects. Additionally, unless the difficulty manipulation is applied uniformly throughout the experience, the effect might only manifest as an instance of greater fear, but otherwise

be insignificant when it comes to fear of the overall experience. This is not to say that using difficulty manipulations would not be beneficial. Quite the opposite is true. A better understanding of how challenge, flow, and agency work to affect specific instances in a game would be helpful in designing better scares. Nevertheless, the focus of this experiment will be on the overall fear experienced by players as this will represent a first known attempt to measure the effect of variable agency levels on fear in a video game. Therefore, an agency manipulation that relies on a change in game difficulty would be inappropriate. Instead, agency will be manipulated in a fashion that is applied globally, is intended to minimally alter challenge and not change the mechanics of the game.

Another important concept in the study of fear is the idea of presence. This is discussed in greater detail later (see Chapter 2.2. Presence), but in simple terms, it is a feeling of being inside a virtual world. It makes sense that the more real a virtual world seems, the more one feels as though they are a part of that virtual world, the easier it would be for that world to induce fear. Additionally, presence and agency seem to be related [11], further justifying its consideration within this work.

Because of the previous focus on *zero – near zero vs. some* comparisons, it is difficult to predict how fear will be affected by the manipulation. As such, the following will be used as a main working hypothesis: h_1 there will exist differences in the amount of fear experienced by players because of their level of agency. Additionally, the following hypotheses are made with respect to other measures from the study, based on previous work: h_2 players will experience more fear than watchers [12], h_3 players will have a greater sense of presence than watchers [11].

To summarize, scary media can be enjoyable, and these can be experienced as film at the cinema, stories in books, or on a television as video games. The interactive play component of video games gives rise to a sense of agency. Study of the interaction between agency and fear in the context of video games is somewhat new. Use of player vs. watcher study designs makes it difficult to draw conclusions about the specific effect of agency on fear. In other words, it is not yet understood how the amount of agency affects the experience of fear and a better understanding of this is the goal of this work.

Chapter 2 Related Work

2.1. Fear, Anxiety, & Embodiment

While a basic understanding of fear is useful for explaining why scary games might be attractive to certain people, it is equally important to understand anxiety. Though there is some disagreement with respect to how exactly to define anxiety [17], it is traditionally defined as a state of fearfulness or uneasiness that is unwarranted. In other words, it is like being afraid when there is nothing to be afraid of. This differs from fear, in which there is a real, tangible threat.

A logical question to ask then is, "Does the player experience fear or anxiety because of events happening in the game?" Because a game is virtual and nothing can actually hurt the player, it might initially seem as though players experience anxiety because they are not actually threatened, yet they are still scared. One of the issues with this is that it does not account for *embodiment*.

Embodiment is the idea that some external object is treated as part of one's own body [2, 28]. An object is given a kind of self-personification. This can be anything from a weapon, a tool, a game controller, or even a player character. In this sense, players may view the player character as an extension of themselves and any threat acting upon the player character is also treated as a threat to the players.

Considering this notion of embodiment, it might be best to think of a horror game as providing instances of anxiety and fear, rather than just one or the other. The suspenseful moments leading up to a jump scare (an unexpected stimulus meant to

frighten players, such as an enemy appearing suddenly and grabbing the player) would cause players to be anxious whereas an attack from an enemy would cause fear. For the purposes of this study, however, experiencing fear vs. anxiety is not as important as is if the player is scared. For this reason, fear in the context of this study is defined simply as the state of being scared. Additionally, this definition will encompass the concept of anxiety.

Embodiment is also an interesting concept to consider here because it is somewhat similar to presence, i.e., the experience of being there (e.g., [22-24]); see below. There is a relationship between presence and fear [4, 6, 7]. Likewise, there is a relationship between embodiment and presence [2]. It should be noted that this same study also found evidence for skill-based embodiment. Players with more skill embody the player character to a greater degree than players with lower skill [2]. This could indicate a relationship between flow and embodiment, as player skill would naturally influence the game's challenge.

2.2. Presence

Presence is used to describe a feeling of being there [22-24]. In the context of video games, this means feeling as though one is genuinely inside the game world. It is studied both in games research [22,23] and in therapy research [4,6,7,24]. Specifically, it is of interest to researchers who study virtual reality exposure therapy (or VRET). Often, VRET will involve patients using head-mounted displays (HMDs) to enter a virtual world where they will be exposed to anxiety-inducing stimuli such as spiders or heights. This is

not unlike something that could be found in a video game and, as such, research focusing on VRET can be quite insightful on the interactions happening in a game.

There is some debate as to a causal link between presence and fear [4,7], but some studies support presence as an important factor in the elicitation of fear. For example, simple questionnaire data from VRET patients show that increases in presence are related to increases in anxiety levels in individuals with specific phobias [6].

Additionally, comparing phobic and non-phobic participants on measures of anxiety and presence during exposure to frightening stimuli, phobic participants exhibited a greater likelihood of experiencing both anxiety and presence prior to exposure and reported higher levels of both after exposure [7]. Three possible explanations are given for why this effect is observed, including an anxiety-on-presence effect, presence-on-anxiety effect, and reciprocal interaction [7]. This clearly shows that a correlation between presence and fear exists, but how one affects the other is difficult to explain.

By repeatedly exposing phobic participants to fear-inducing stimuli in virtual reality and measuring both presence and fear, it was found that presence levels from the first trial correlated with fear levels in the second. This was not the case for fear levels in the first trial and presence levels in the second. However, in subsequent trials, both measures correlated with each other in both directions [4]. The authors suggest that presence may be causally related to the initial experience of fear, but that beyond this, the causal effect is reciprocal [4]. This explanation largely corroborates and builds upon the purely reciprocal relation hypothesised by Robillard et al. [7].

While these effects are not guaranteed to translate to general audiences, they do show that when individuals are exposed to specific stimuli that frighten them, the more presence they feel (that is, the more they feel like the experience is real), the more frightened they are. Intuitively, this makes sense. Additionally, the reason this effect might not have been observed in non-phobic individuals could be because these individuals were simply not afraid of examples of previously used phobia-inducing stimuli; heights, spiders, and enclosed spaces [7].

As previously described, intuitively, it is expected that changes in game difficulty – and by consequence, flow – could be used to induce changes in fear. Previous work has established strong correlations among presence, flow, and enjoyment [22]. Interestingly, this study also found that playing games against human opponents resulted in greater scores on each of these than when playing against computer opponents [22]. This could serve as an interesting mechanic to try to induce more fear by using a human antagonist, and therefore induce more presence, rather than using a computer one. Horror-themed games such as Dead by Daylight (Behaviour Interactive, 2019) and Deceit (Baseline, 2017) already employ these types of techniques. Boyle, Connolly, Hainey, & Boyle [25] provide a rather comprehensive review of research related either directly to or indirectly to the experiences of flow and presence as they pertain to engagement in games.

Another method of giving players a stronger sense of presence is using advanced game technology [23]. More advanced graphical capabilities could therefore serve the dual purpose of increasing presence in players and allowing for a more frightening

experience (whether directly or indirectly). Imagine both feeling more present in the game world and being attacked by a more realistic looking monster.

A break in presence (BIP) occurs when players suddenly lose their sense of presence while inside a virtual world [4]. This could be caused by any number of things either internally or externally, such as a knock on the door drawing your gaze away from the screen or a sensory glitch causing you to be hyperaware of the virtual nature of the world. With respect to BIPs originating from technical difficulties, not all problems are made equal. In particular, low frame rate and reversed controls had significantly higher impacts on presence in a combat game than in a navigation-based game [26]. This suggests that different technical issues might be more or less severe depending on the type of game played.

2.3. Immersiveness

Often used imprecisely [38], the term immersiveness used in this paper describes how well a system can stimulate the senses. This considers both the number of senses that can be stimulated, as well as the quality of the sensory information provided by the system. A modern HMD is an example of a high immersion system. It stimulates a wide range of sensory modalities such as sight, sound, touch, and balance, and does so with relatively good fidelity. Conversely, an older, low-resolution computer monitor without speakers would be a very low-immersion system. It only delivers comparatively poor visual information to the user. The HMD offers a higher quality sensory experience. It therefore makes sense that an HMD would have a greater propensity for inducing not only fear, but various other emotions rather than the old monitor alone.

In fact, pitting three systems of varying immersiveness against each other on their abilities to elicit emotional responses, Rosenthal, Zielinski, & Brady (2014) found that the two higher-immersion systems evoked greater emotional arousal than did the lowest-immersion system [9]. A noteworthy finding was that HMDs were best at evoking negative affect whereas the more immersive Cave Audio Visual Experience Automatic Virtual Environment (CAVE) [46] system was the best at evoking positive affect. This suggests that immersiveness alone, while a good predictor of arousal, might not be sufficient to predict specific emotional responses. In other words, if fear is the desired emotion, an HMD might be the better choice despite being less immersive than a CAVE.

Nevertheless, higher-immersion systems are generally found to elicit more fear than lower-immersion systems [9,10]. Specifically, manipulating immersiveness with the use of wind as an additional source of stimulation yields greater fear scores in height-anxious participants undergoing VRET for acrophobia (fear of heights) [10]. This was not observed in non-height-anxious participants, but the authors note that this may have been due to the non-height-anxious participants not being scared of the simulation to begin with. This suggests that the effect of immersiveness on fear may be dependent on the initial susceptibility to fear for a given stimulus.

2.4. Agency

Firstly, note that in some instances, the terms interactivity and autonomy are used to describe agency [11,12,19,28]. Agency is a key aspect that differentiates games from movies. Where movies represent a passive experience, games require action on the part

of the player. While both experiences may be similar in many respects, the interactivity inherent in games gives rise to several interesting effects.

For example, a perspective manipulation can be used to induce a greater sense of presence. Specifically, using first-person perspective generates a greater sense of presence than third-person perspective [11]. This was observed for both watchers and players of a video game. More importantly, players experienced more presence than watchers [11]. In other words, those with agency felt more presence than those without. If agency results in a greater sense of presence and presence promotes fear, it would be expected that agency itself could be a predictor of fear.

This very effect was observed when comparing players and watchers of a horror game. Physiological markers of fear (heart rate, breathing rate, skin conductance) all suggest that players experience significantly more fear than watchers [12]. In one study [28], the same watcher vs. player paradigm is used, but no difference was observed between players and watchers on fear. Note that this study relied solely on questionnaire data and does not necessarily conflict with the other.

What remains unclear from these, however, is whether agency is the factor affecting fear, whether presence is the important factor, or if there are other variables at play. What is required to help better understand the relationship between fear and agency is study focused on an agency manipulation within play conditions; i.e., variable levels of agency need to be compared, such as high-agency play and low-agency play. Previous work has not yet established the nature of this relationship.

There are numerous methods that can be used to manipulate agency in a game. Agency Informing Techniques (AIT) are a means by which players can be made aware of their capabilities within a game. These were identified and classified by Day and Zhu to create a model of AITs that work specifically on perceived agency [13]. Where theoretical agency is concerned with an actual measure of the impact a player can have on a game environment, perceived agency is the degree of agency a player feels they have, irrespective of the former [14].

In two studies [14,15], Thue et al. worked on a system that was able to dynamically choose between outcomes based on player decisions. Each player was given the same number of choices to make, with several possible outcomes. By actively choosing desirable outcomes, the system was able to significantly increase perceived agency while theoretical agency remained constant. This ability to manipulate perceived agency without sacrificing theoretical agency is particularly noteworthy.

To highlight this idea of one type of agency not always being congruent with the other, consider a game such as Sid Meir's Civilization V (Firaxis Games, 2010), a complex strategy game where the player manages an empire in various intricate ways. In Civilization V, players are equipped with a wide array of choices to make, and these choices will alter the future of their empire in some way or another. However, the impact of a decision made early on might not become clear for a hundred turns. Deciding to invest into science one turn earlier or later will change how your civilization functions by some amount. This game offers the player a tremendous amount of control over very precise details. Theoretical agency is very high. Conversely, because players are unlikely

to recognize the impact of their decisions immediately, that is to say the outcome is not always obvious, the ability to unlock a new technology on turn 149 instead of 150 because of a decision made on turn 10 is unlikely to elicit a great sense of perceived agency.

Chapter 3 System Design

Escape is a short, first person perspective, horror-themed, escape-room-style game that was built for use in this study with the Unity game engine [47]. See Figure 3.**1**, Figure 3.**2**, and Figure 3.**3** for examples of what the game looked like. Unity is a professional-grade, free-to-use tool for game and 3D development that provides a work environment that can facilitate developing research tools such as video games. The game itself is linear, with players completing a series of simple tasks, including a few easy puzzles such as flipping paintings upright to unlock a door. Throughout the game, players travel back and forth between two main rooms with various objects appearing and disappearing as they perform actions. The players are stalked by mannequins whose heads track them as they move around. About midway through, they also encounter a zombie-type creature and forcibly fall prey to it in the end.

To help ensure that the game had a high chance of being experienced as scary, the game design was influenced by a paper called *Nothing to Fear* [18]. In this work, the authors compiled a list of various things that people designated as being most frightening. A list of the major themes from that list that were incorporated into the game is provided in Table 3.1.

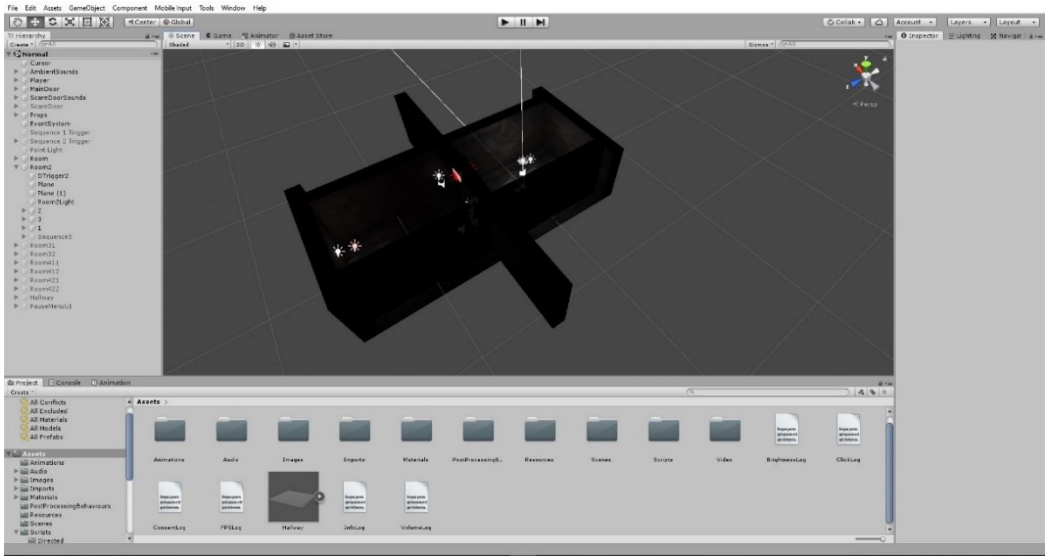

Figure 3.1. Screen capture of the unity game engine showing both main rooms that the players travel between.

Table 3.1. Nothing to Fear (2015), forced choice (fc) and open ended (oe) stimuli implemented as major themes in Escape.

Stimulus	Rank	Description/Implementation
Darkness	1 (fc), 4 (oe)	The game was dark and required players to rely on a flashlight for certain sections.
Zombies	3 (fc), 5 (oe)	A zombie creature was used to scare the player
Unknown	4 (fc), 9 (oe)	Implemented in several ways including, for example, ambiguous sounds, and unknown consequences of opening doors after a door-based jump scare
Interactivity	1 (oe)	Inherent in the play conditions but not in the watch condition
Surprise	2 (oe)	Several jump scares are encountered in the playthrough
Audio	3 (oe)	Sound effects such as whispers or dissonant chords meant to put the player in a state of uneasiness
Blood	9 (fc)	Players are required to get a keycode written in blood from a wall. The zombie creature is bloody
Music	10 (oe)	A soundtrack from the Entity horror audio package on Unity is used as the main track

The main soundtrack was taken from the Entity horror audio package on the Unity Asset Store,[1] with several other sound effects such as whispers or creaking doors taken from free audio sampling websites. Some participants specifically stated that the sounds in the game contributed to their experience of fear.

The atmosphere of the game is generally dark and grey, but bright enough to see. However, this changes briefly around the halfway point when one of the rooms becomes pitch black and the players are forced to rely on a flashlight to navigate finding answers to a puzzle. This is intended to reduce players' awareness of their surroundings and create tension as they are unaware of what might be lurking around. Shortly thereafter, a jump scare is used to introduce the zombie.

Surprise in the game came mostly in the form of jump scares. Conversely, the element of the unknown was present largely as a result of the absence of surprise. Players are initially introduced to the zombie upon opening a door and having the creature loudly slam it shut in their face, shown in Figure 3.**2**. What follows is a task that requires the participant to open a series of doors, not knowing whether or not the zombie might be behind one of them. This is meant to induce fear of the unknown.

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[1] Entity on the Unity Asset Store (last accessed April 2, 2021): https://assetstore.unity.com/packages/audio/ambient/entity-129293?_ga=2.205374224.1462812814.1617390754-191583680.1609702099

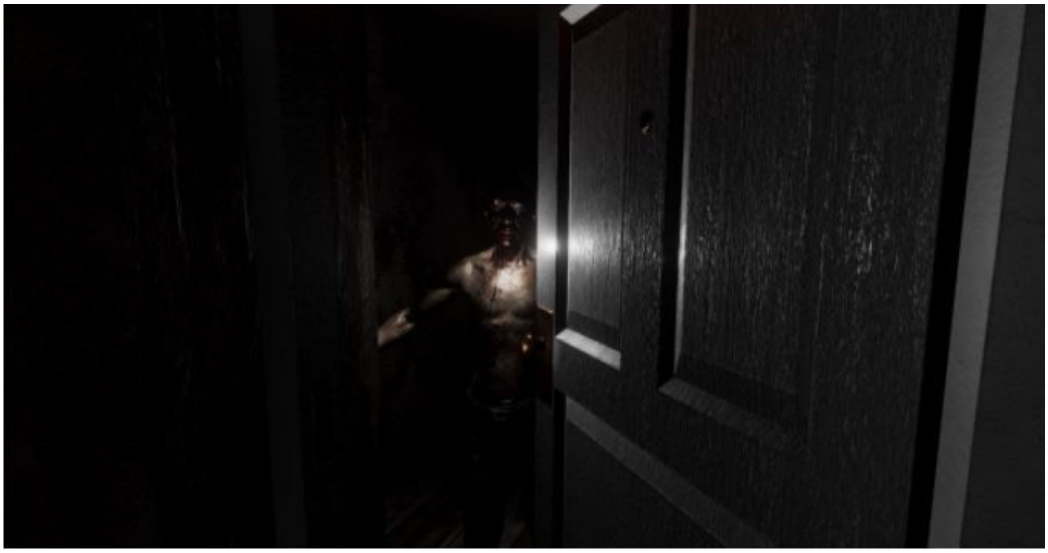

Figure 3.2. The jump scare that first introduces players to the zombie.

It should be noted that cut-scenes (sections of a game where a clip is played, similar to a film, and interactive play is momentarily stopped) were specifically not used in the game even though these are often used as effective methods of creating scary sequences. This decision was made because cut-scenes, unlike many other mechanics, temporarily remove all theoretical agency from the player. Contrast this with having the player's character, for example, twist an ankle and move more slowly; this results in the player's control being threatened, but not entirely removed.

Overall, we believe the game design to have been scary based on the anecdotal reports of participants in our study. We described these in Section 5.2. Participant Reactions. The game's scariness is also addressed briefly in the Discussion chapter (see Chapter 6.2. Lack of Difference in Experienced Fear) as there was a need to reconcile a disagreement between our data, which indicated that players reported being scared only a little, and our belief that the game was in fact quite scary.

Figure 3.3. Escape game main menu.

Chapter 4 A Study of the Effect of Agency on Fear in a Horror-Themed Video Game

To better understand the effect of agency on the experience of fear in video games, this study was designed to elicit different levels of agency in a single game. This builds upon the methods used by previous studies [12,28] that only compare watchers and players, but do not intrinsically measure the effect of the amount of agency players had on their experience of fear.

The study used a between-subject design of 80 participants who completed the study using their personal computers, with agency as the independent variable (with normal play, directed play, and watch conditions; listed from highest agency to lowest agency). Experienced fear, agency, and other relevant play experience questions were measured using questionnaire instruments and compared across conditions. Below we elaborate on the study design.

4.1. Participants

80 participants (69 males, 9 females, 2 prefer not to say) were recruited by word of mouth, via email (e.g., to students in Computer Science at the University of New Brunswick), from various online forums such as reddit or using survey exchange websites such as Survey Tandem. Participants' ages ranged from 18 to 73 years (M= 24.99, SD = 9.56).

During the initial recruitment phase, participants were not directly compensated for taking part in this study. Rather, they were given the chance to win one of two $50 (CAD) Amazon gift cards. To try and improve recruitment, a second group of participants were offered a guaranteed $10 (CAD) Amazon gift card as a token for their time, instead of being entered into the draw for the $50 gift cards. Participation was entirely voluntary, and this study received ethics approval from the UNB Research Ethics Board REB #2020-020.

4.2. Materials

A horror-themed escape room computer game, Escape, was built in Unity (see Chapter 3). Participation was done remotely on the participants' machines. Individual computer specifications were logged in case there were any performance issues with particular hardware setups. The game included the two different interactive versions (normal play and directed play) and a passive version (watching of a playthrough recording). Conditions were logged in an online database and the game assigned players round-robin to one of the three conditions when the game was started.

The normal and directed versions of the game differed in only one way. The directed version contained instructions on the next step to complete during the game and these were *always* visible during play. The normal version contained no such instructions by default. Rather, the normal version included *a hint system that only aided players should they choose to use them*, to help ensure they would be able to complete the game. These hints were disabled in the directed version as they were replaced by the guiding instructions.

The playthrough recording was created by taking the average time needed to complete each section of the game in the directed version (collected through piloting and play testing). A representative playthrough of the game was created by the author, based on these timings. The timings were taken from the directed version specifically, as it was believed that this version would contain fewer instances of confusion from the players and would therefore not require a future watcher to sit through video sections with little to no progress.

4.3. Procedure

This study would ideally be conducted in a controlled laboratory setup, where elements of the environment and experimental setup would be controlled and consistent across participants. However, due to the COVID-19 pandemic, the study was designed to be conducted remotely.

To participate, participants were required to download one of two versions of Escape depending on their operating system (Mac, Windows). Upon launching the game, they were presented with a consent form that they were required to go through prior to being shown the main menu. Due to the nature of remote testing and an inability to control exact play conditions, participants were simply instructed to play while alone and do their best to minimize distractions from external sources.

Controls for the play conditions were in the form of traditional WASD character movement (W-move forward; A-step left; S-step back; D-step right) and mouse movements to look around. The left mouse button was used to interact with various objects in the game world and the right mouse button could be used to toggle a flashlight

once it had been obtained. At several stages in the game, a password had to be typed in using the keyboard.

Play began after a series of screens instructing participants on controls, lighting settings and how to access the hints. For those in the watcher condition, the main menu simply brought them to the video, which started when participants pressed play. Upon completion of the game or video, participants were given a link to the questionnaires and asked to complete them in their web browser.

4.4. Analysis

Fear and agency are the two main factors in this study. These are measured using standardized questionnaires that are described below. A multivariate analysis of variance (MANOVA) containing both these dependent variables is used to assess differences between groups. Fear is further analyzed using a Kruskal Wallis test and agency using an analysis of variance (ANOVA). Additional ANOVA tests are used for other data obtained from the questionnaires. The questionnaires consisted of 105 questions. The questionnaire solicited ratings for presence, enjoyment, effort, pressure, positive and negative affect, and surprise. Additionally, demographic information such as handedness or experience with escape rooms was gathered. This information is presented below (see 4.6. Group Descriptive Statistics) in Table 4.1, Table 4.2, Table 4.3, Table 4.4, Table 4.5, Table 4.6, and Table 4.7.

Most of these questions were based on standardized questionnaires, including the PENS (Player Experience of Need Satisfaction) [42], IMI (Intrinsic Motivation Inventory) [43], IPQ (I-Group Presence Questionnaire) [44], and PANAS-X (Positive and

Negative Affect Schedule – Expanded Form) [41]. Fear was measured using the fear subscale of the PANAS-X and agency was measured using the autonomy scale of the PENS. While this resulted in a large number of questions, it is typical of other work in game player experience. Finally, analysis of covariance (ANCOVA) tests are used to account for a possible effect of secondary variables in our testing groups' conditions, as well as differences between participants on fear and agency scores.

4.5. Hypotheses

To guide our analysis, we make the following three hypotheses, as previously described:

- h_1: there will exist differences in the amount of fear experienced by players because of their level of agency.
- h_2: players will experience more fear than watchers (following [12]).
- h_3: players will have a greater sense of presence than watchers (following [11]).

4.6. Group Descriptive Statistics

Table 4.1. Pre-experiment questionnaire responses to agreement with statements regarding horror movie and game enjoyment (7-point scale).

	I enjoy horror movies			I enjoy horror video-games		
	Directed	**Normal**	**Watchers**	**Directed**	**Normal**	**Watchers**
Count	35	32	13	35	32	13
Mean	5.057	4.469	5.231	4.343	4.531	4.231
Std. Deviation	1.909	2.214	1.739	1.731	2.000	1.878
Minimum	1.000	1.000	1.000	1.000	1.000	1.000
Maximum	7.000	7.000	7.000	7.000	7.000	7.000

Table 4.2. Pre-experiment questionnaire responses to agreement with statements regarding enjoyment of frights and puzzles.

	I enjoy being scared			I enjoy puzzles		
	Directed	**Normal**	**Watchers**	**Directed**	**Normal**	**Watchers**
Count	35	32	13	35	32	13
Mean	4.371	4.125	4.308	6.200	5.938	5.538
Std. Deviation	1.848	2.044	1.548	0.677	1.318	1.561
Minimum	1.000	1.000	2.000	5.000	3.000	2.000
Maximum	7.000	7.000	7.000	7.000	7.000	7.000

Table 4.3. Pre-experiment questionnaire, frequency of reported escape room experience.

Condition	**Have you ever done an escape room?**	**Frequency**	**Percent**
Directed	Yes	23	65.7
	No	12	34.3
Normal	Yes	20	62.5
	No	12	37.5
Watchers	Yes	7	53.8
	No	6	46.2

Table 4.4. Pre-experiment questionnaire self report of completion of the experiment: alone vs. not alone.

Condition	**Were you alone while completing the experiment?**	**Frequency**	**Percent**
Directed	Alone	34	97.1
	Not alone	1	2.9
Normal	Alone	30	93.8
	Not alone	2	6.3
Watchers	Alone	12	92.3
	Not alone	1	7.7

Table 4.5. Pre-experiment questionnaire self report of completion of the experiment: headphones use vs. speaker use.

Condition	Are you using headphones or speakers?	Frequency	Percent
Directed	Headphones	25	71.4
	Speakers	10	28.6
Normal	Headphones	22	68.8
	Speakers	10	31.3
Watchers	Headphones	7	53.8
	Speakers	6	46.2

Table 4.6. Pre-experiment questionnaire self report of time spent playing video games per week.

Condition	Average time spent playing video games per week (minutes)	Frequency	Percent
Directed	0	0	0.0
	<30	4	11.5
	30-120	7	20.0
	120-420	16	45.7
	>420	8	22.9
Normal	0	2	6.3
	<30	0	0.0
	30-120	4	12.5
	120-420	8	25.0
	>420	18	56.3
Watchers	0	1	7.7
	<30	1	7.7
	30-120	3	23.1
	120-420	2	15.4
	>420	6	46.2

Table 4.7. Pre-experiment questionnaire handedness frequencies.

Condition2	Dominant Hand	Frequency
Normal	Right	31
	Left	0
	Ambidextrous	1
Directed	Right	27
	Left	7
	Ambidextrous	1
Watcher	Right	11
	Left	1
	Ambidextrous	1

Chapter 5 Results

5.1. Main Results

The test assumptions for the MANOVA were checked. The Shapiro-Wilk Test for Multivariate Normality was significant ($F = 0.960, p = 0.013$), indicating that the assumption of normality was violated. As such, individual tests for fear and agency scores were performed.

The collected data demonstrated the expected trends: average fear scores were higher for players than watchers ($M_{Normal} = 2.2$, $SD = 0.8$; $M_{Directed} = 2.2$, SD = 1.1; $M_{Watcher} = 2.0$, $SD = 0.7$); see Figure 5.1. The Levene's Test for Equality of Variances was significant, $F_{2,77} = 3.883$, $p = 0.025$; therefore, the assumption of normality was violated. The subsequent Kruskal-Wallis test revealed that these values were not significant, $H(2) = 0.343$, $p = 0.842$.

Despite following a similar experimental design to previous work exploring agency in games (e.g., [12, 28]), we observe agency was rated roughly equivalently for the two play conditions, and the watch condition was rated lower for agency ($M_{Normal} = 3.5$, $SD = 1.5$; $M_{Directed} = 3.5$, $SD = 1.3$; $M_{Watcher} = 3.0$, $SD = 1.7$); see Figure 5.2. However, the results were not significant, $F_{2,77} = 0.722$, $p = 0.489$; $\eta^2 = 0.018$. Note that test assumptions were checked for this and all subsequent tests; none were significant.

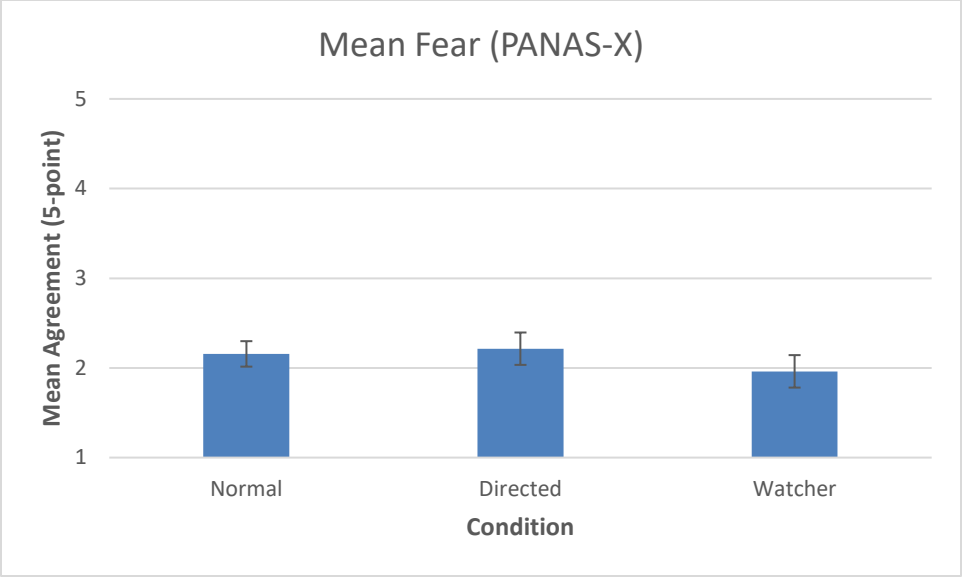

Figure 5.1. Average PANAS-X fear scores by condition.

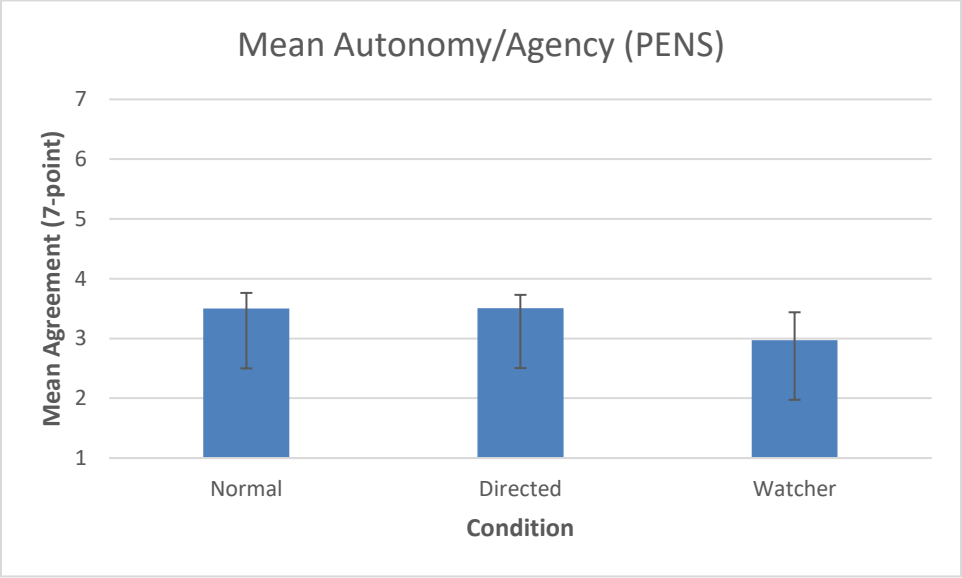

Figure 5.2. Average PENS autonomy (agency) scores by condition.

Following these results, we therefore fail to reject the null hypothesis for both h_1 and h_2. As a result of identifying no differences between conditions in terms of experienced fear or agency, we further explored our data using ANCOVAs to test for

possible unevenness of distribution of participants related to potential covariates, including: enjoyment of horror games, video game experience, horror media consumption, average time spent playing video game, gender, handedness, use of headphones vs. speakers, completion of the experiment while alone, completion of the experiment in a single sitting, reported enjoyment of being scared, previous experience with escape rooms, and enjoyment of puzzles. The ANCOVAs (all $p > 0.05$) revealed no significant difference between factors on any scale after accounting for any differences due to all measured covariates, and are not reported, since they were not a focus of our analysis.

Presence was measured using both the PENS and I-Group Presence questionnaires. Based on previous research, presence was expected to be highest in the player conditions and lowest for watchers [11]. This was not the case in this study. The presence-specific IPQ revealed no difference between watchers ($M = 3.4$, $SD = 0.8$), players in the directed version ($M = 3.9$, $SD = 0.8$) and players in the normal version ($M = 3.7$, $SD = 0.8$), $F_{2,77} = 1.680$, $p = 0.193$; $\eta^2 = 0.042$. Similarly, the PENS presence subscale results were not significant: watchers (M = 2.6, SD = 1.3), directed ($M = 3.0$, $SD = 1.4$), normal ($M = 3.1$, $SD = 1.3$), $F_{2,77} = 0.551$, $p = 0.579$; $\eta^2 = 0.014$. Again, however, the data trend in the expected direction.

Another scale where a difference was expected is on the effort/importance portion of the IMI. Neither watchers ($M = 0.7$, $SD = 1.6$) nor players ($M_{Directed} = 1.1$, $SD = 1.4$; $M_{Normal} = 1.5$, $SD = 1.4$) differed significantly here, $F_{2,77} = 1.622$, $p = 0.204$; $\eta^2 = 0.040$. Additional analysis of this scale, splitting groups further by compensation type, revealed

no significant difference. Again, these are not reported as they were not the focus of our main analysis.

A Pearson correlation test was conducted to examine the relationship between the above factors; namely, fear, PENS autonomy (agency), IPQ presence, PENS presence, as well as interest/enjoyment. Fear and agency were not significantly correlated, $r(78) = 0.198$, $p = 0.079$. All other factors were positively correlated with one another. A complete list of correlations is presented in Table 5.1.

Table 5.1. Pearson Correlations for Fear, Autonomy (Agency), IPQ Presence and PENS Presence scores.

		n	Pearson's r	p
Fear	- Autonomy	80	0.198	0.079
Fear	- IPQ_Presence	80	0.529***	< .001
Fear	- PENS_Presence	80	0.604***	< .001
Fear	- Interest/Enjoyment	80	0.228*	0.042
Autonomy	- IPQ_Presence	80	0.533***	< .001
Autonomy	- PENS_Presence	80	0.546***	< .001
Autonomy	- Interest/Enjoyment	80	0.472***	< .001
IPQ_Presence	- PENS_Presence	80	0.778***	< .001
IPQ_Presence	- Interest/Enjoyment	80	0.459***	< .001
PENS_Presence	- Interest/Enjoyment	80	0.456***	< .001

* p < .05, ** p < .01, *** p < .001

When grouped into two conditions, players and watchers, there was no significant difference between groups on the interest/enjoyment scale of the IMI ($M_{Players} = 2.5$, $SD = 1.4$; $M_{Watchers} = 1.7$, $SD = 1.5$; $F_{1,78} = 3.841$, $p = 0.054$; $\eta^2 = 0.047$; see Figure 5.3). Two studies report conflicting results with respect to differences between players and watchers on the scale of enjoyment, with one reporting greater enjoyment for players [12], and the

other reporting no difference [28]. Although no difference was found in this study, these results do not provide strong support one way or the other.

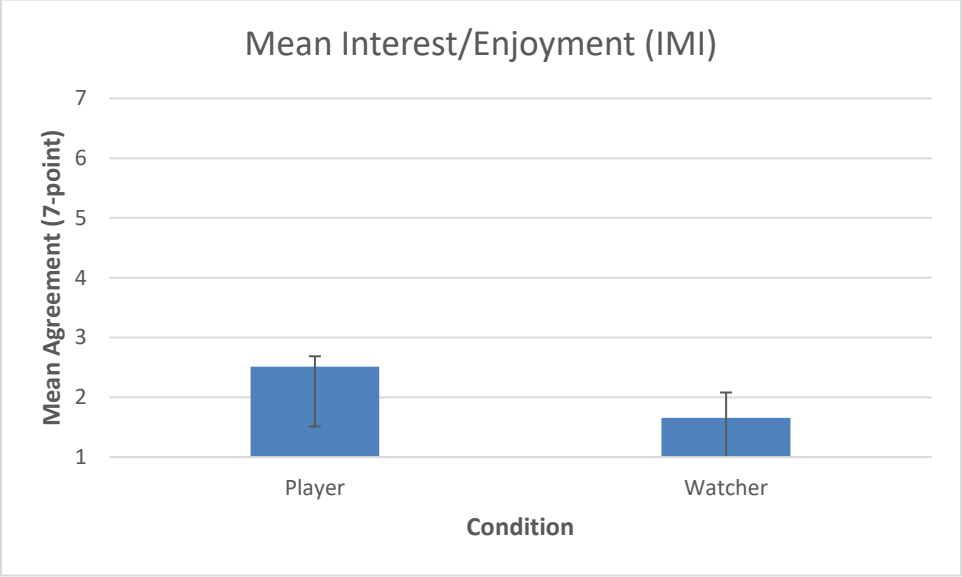

Figure 5.3. Average IMI Interest/Enjoyment scores for players and watchers.

5.2. Participant Reactions

Overall, scariness is believed to have been achieved in the game, with at least three known instances of participants quitting halfway through due to being too afraid to continue, and one participant having quit after completing only the first action in the game, opening a door. The participant indicated that they were already too frightened to continue. Additionally, at least two more prospective participants refused to participate based solely on the audio and look of the main menu. As noted before, this belief that scariness was achieved is sustained in spite of the PANAS-X scores and is discussed below (see Chapter 6.2. Lack of Difference in Experienced Fear)

Sound was described by several participants as the best-designed aspect of the game. This is encouraging because sound appears to be an important factor in the immersiveness of a game, the experience of flow, and negative affect scores [27].

One participant reported regularly looking behind them after nearly all actions. They began this behaviour early on after noticing that things changed when they looked away. The participant commented that this behaviour became more frequent after the first jump scare with the zombie.

A comment was made about the lack of a narrative element within the game. The participant suggested that including a narrative element could make the game better. It was also suggested that a single sound effect used in the game seemed out of place, but that ambient noises were otherwise effective at keeping them engaged.

Chapter 6 Discussion

The goal of this study was to provide a more nuanced understanding of the effect agency might have on the experience of fear in video games. While previous research has suggested that agency can affect fear [12], the study that resulted in this finding was comprised of a simple watcher vs. player paradigm. In this work, we sought to extend previous research by incorporating two player conditions that we believed would differ in experienced agency, comparing them against a watcher condition. Although there is a weak positive correlation between fear and agency, it is not statistically significant. The data obtained in this study seem to suggest that the relationship between agency and fear may be more complex than previously thought. Interestingly, some differences that were expected between players and watchers, such as presence and agency, did not manifest.

One of the most notable limitations of this study is its reliance on questionnaire data alone. Previous work obtained significant differences for fear only from physiological data, not questionnaire data [12]. Reliance on questionnaire data alone did not identify differences in another study [28]. They used a 3-item scale [29] to measure fear. We attempted to mitigate this limitation by trying the 6-item scale from the PANAS-X in place of simple Likert-like scale questions [12] or the previously mentioned 3-item scale [28,29]. The hope was that this instrument would be sensitive enough to measure differences between groups. Unfortunately, this seems to have been ineffective. The PANAS and PANAS-X questionnaires were originally designed to be used over multiple sessions to measure things such as anxiety in people with high anxiety and

determine if they were getting better or worse over time. Therefore, the PANAS-X may not have been an optimal choice for single session measurements.

6.1. Lack of Difference in Measured Agency Between Conditions

An interesting finding is that agency scores did not differ between players and watchers. Intuitively, it is hard to speculate about this result because watchers had no autonomy with respect to the progression of the playthrough. In other words, they had no part in the progression of the story. Conversely, players had at least some autonomy; players were the driving force in the continuation of the game. To put it differently and to elaborate further on why this finding is puzzling, not only was the theoretical agency necessarily higher for players, but the perceived agency should have been too. This should have manifested as a difference between the two groups.

It is possible that the questionnaire data used were simply not sensitive enough; however, it was expected that questions from the PENS pertaining to, for example, freedom of choice and having interesting options, would have scored zero or near zero with watchers and somewhere above this for players. From a purely speculative standpoint, it may be that some of the watchers answered these questions in the spirit of the ‘player’ they had just watched. They may have thought that the player had interesting options, and therefore the game really does offer interesting options, though not necessarily to them. If this is so, it could explain why no difference was measured. However, determining this would have required us to interview the watchers and this was not done. A solution could be to use a more robust, agency-specific questionnaire. However, no such questionnaire, designed for use in a study on video games, was found

and developing such a questionnaire was beyond the scope of this work. Further, the results from the PENS autonomy portion alone were expected to be sufficient given its common use in research in game/player experience.

Another important consideration would be the use of an alternative model to the perceived vs. theoretical one to better represent agency, thereby allowing for more specific measurements of its constituent parts. Cole & Gillies (2021) propose a new model framing agency as a four-category construct. These include actual, interpretive, fictional, and mechanical. Actual contrasts with interpretive and is a measure of the real effect of a player's actions on the game. Interpretive is the agency that is a function of the player's own cognitive evaluation of the experience. Fictional contrasts with mechanical and references the game world and story. Mechanical is a measure of the actions a player can or cannot perform [30]. These in turn give rise to four new terms, actual mechanical agency, actual fictional agency, interpretive mechanical agency, and interpretive fictional agency [30]. The immediate problem here is that new tools would have to be developed to accurately and reliably measure these.

Related to agency is presence (the feeling of being inside a virtual environment). We also found a lack of difference in presence scores between players and watchers. This finding is in direct conflict with previous work [11], and requires further investigation. In that study, players reported significantly more presence than watchers. Our study relied on both a presence-specific questionnaire, the IPQ, and the presence portion of the PENS questionnaire. Even though measured agency scores did not differ between groups, it is nevertheless the case that players had more agency than watchers, irrespective of their

perception of it. Therefore, the environment was set up in such a way that a presence effect should have manifested if one exists. However, there were also medium positive correlations between presence and agency ($r_{IPQ} = 0.533$, $r_{PENS} = 0.546$, $p < .01$ for both), and if the agency scores from this study are accurate, then these correlations bring into question what is actually being compared in several of these studies [11,12,28]. To elaborate, each of these use a player vs. watcher paradigm and do not make any attempt to measure agency. Rather, they claim that the watcher group has low agency, and the player group has high agency. While this is technically true, agency scores from this study suggest that they may be observing differences mostly due to perceived agency, not theoretical agency.

6.2. Lack of Difference in Experienced Fear

The results show the predicted trend with respect to fear. That is, they show that players scored higher on fear than watchers, and those in the directed condition scored highest overall. These, however, were not significant. The effect might be smaller than expected and require a larger sample size in order to detect. This study used a sample size within the range of those used by other studies for this type of research [12,28]. More likely, the lack of difference is due in part to the chosen measurement tool, as discussed previously.

Another factor that almost certainly had an impact on the results is the remote nature of this study. In the lab, physiological data could have been gathered and behavioural cues could have been observed, on top of relying on questionnaire data. The combination of all of these would have provided us with a much stronger basis for our

analysis. Additionally, the data are quite variable, with large standard deviations relative to the means for many of the scores. While it is difficult to say what exactly caused this, it is probably the case that conducting the experiment in a controlled lab setting would have reduced the variability of our data to some extent.

A single playthrough recording was used for all participants in the watcher condition. This was done by necessity. Ideally, each player would have been paired with a watcher, thus providing a range of watch experiences. The use of a single playthrough might have introduced some unexpected effects. To create the playthrough recording, timestamps were used indicating average times at which play testers and pilot study participants clicked on key objects. It was not possible to know where these people were looking, only what they were interacting with. The playthrough and recording was done by the author and although care was taken to make the playthrough as natural as possible, bias was an inevitable consequence. Not all players are going to notice everything in the game. For example, the mannequin heads stalking the players in the dark might have gone unnoticed by some. Conversely, the author was aware of everything happening during each section of the game and might have created a playthrough that emphasises more frightening content than the average player would be exposed to. As such, the recording could have been scarier, on average, than would otherwise be expected.

Overall, the lack of difference is still somewhat surprising. Firstly, the above paragraph is mostly speculative and does not take into consideration the large variability of fear scores. Secondly, the game is, by design, engaging. Player attention is required to progress. Conversely, the recording is probably not as engaging. Therefore, even if

agency is roughly equivalent between all groups, it could be reasonably expected that fear would be higher for players.

Lastly, average fear scores were below the mid-point of the PANAS-X scale. That is to say, when asked to rate their agreement with sentences in the likeness of "I feel afraid", participants generally responded with disagreement. In spite of this, we still believe the game to have been frightening. In our use of the PANAS-X, we instructed participants to respond based on how they currently felt while answering the questionnaire. It would have been more appropriate to have participants reflect on their experience in the game and respond as best they could about how they felt while playing or watching. This could account for the generally low scores as participants had time to settle down after exposure and also explain, in some capacity, why there were no significant differences between watchers and players. Additionally, questionnaire data was only obtained from participants who completed the game. It would therefore be expected that these people would rate the game as less scary than those who were too afraid to finish; possibly leading to biased data. Having those participants who did not finish the game complete a questionnaire would have been useful and should have been done.

6.3. Alternative Study Design Possibilities

While we believe our study to be well designed, there are several other possible study designs that might better highlight the potential relationship between agency and fear.

Firstly, the chosen agency manipulation was to give directives to some players and no directives to the others. The idea was that players with directives would perceive themselves as having less of a choice, or simply not needing to make a choice, thereby reducing their perceived sense of agency. The manipulation itself is not necessarily bad, but it was perhaps not entirely harmonious with the design of the game. Because the game was a simple, and importantly, linear escape room, there was rarely, if ever, any confusion about where to go and what to do next. The instruction to pick up a key on the desk and unlock a door does not reveal a secret or obscure series of steps that was hidden from the other players. Furthermore, if any non-directed player was stuck, they had access to hints, which would alleviate any confusion. If the same manipulation had instead been applied to a non-linear escape room, such as in an explorable house with several rooms, players with directives would not have had to search for the next clue and, as a result, hopefully experience less agency. Exposure time could become a factor in an environment such as this, but this is only meant to serve as an example of the type of change that could be applied to achieve a different result.

Second, a different manipulation could be used that would be better suited for linear game experiences. As an example, imagine players in one condition are required to perform a task(s) under time pressure whereas others have longer or unlimited time to complete the same thing. It is not hard to see how players under time pressure might perceive their agency as being threatened by this manipulation. This would also work to increase the game's difficulty, which could become a confounding variable, but changes to game difficulty might very well be an inevitable consequence of many agency

manipulations. To avoid the previously mentioned issue of a possible exposure time effect, the allotted time to complete the game in the time pressure condition could be more than what the slowest expected time would ever be. Simply introducing a time limit could be enough to cause tension in players and lower their sense of agency. It would also be possible to outright deceive players in one condition into believing there exists some threat, when in reality, there is none. *Amnesia the Dark Descent* (Frictional Games, 2010) had an in-game hint warning players that low character-sanity (a system in the game similar to a health bar) would cause the monster to find them more easily. This logic was never programmed into *Amnesia* and the hint was only meant to increase tension [48]. These kinds of manipulations could be particularly effective for reducing agency, as similar ones, namely misrepresentations of character health, have already been found to affect player behaviour [45]. In this study, players that were deceived adopted a more defensive playstyle than their non-deceived counterparts.

It is important to realize that certain types of manipulations should be used with caution. In the game used for this study, a jump scare occurred at the very end when participants turned around and a zombie jumped out at them. A cut-scene could have been used to force players to turn around and have control temporarily taken away from them. The danger here is that during the cut-scene, agency (theoretical) is reduced to zero for the duration. Depending on the desired outcome, this could be a good or a bad thing, but understanding the effect of the chosen manipulation(s) is important. It follows that using a cut-scene in this way would only temporarily remove agency from the player, as

opposed to reducing agency globally throughout the experience, as was the goal for this experiment.

Chapter 7 Conclusion

This work brings into question previously observed relationships between some of our measured factors; namely fear, presence, and agency. This study suggests that some of these effects may not translate smoothly to more uncontrolled environments such as those outside the lab. Specifically, presence did not behave in the predicted manner and may have a smaller effect outside the lab than expected.

Additionally, this study highlights a need for tools designed to measure specific emotions, such as fear, within the context of video game experiences, assuming enough sensitivity to measure these differences is achievable with a questionnaire.

Similarly, there was some disagreement between results from our chosen measure of agency, the PENS autonomy scale, and what intuition would lead one to believe about levels of agency between our conditions. As this study used a novel design, that is the player^{HighAgency} vs. player^{LowAgency} vs. watcher paradigm, there currently does not exist a questionnaire designed specifically to measure agency for these types of studies. This work demonstrates a need for a video-game-specific agency questionnaire that would benefit all future work using a similar design.

The data for the major factors trend in the right direction. This suggests that an effect might exist. However, beyond using enhanced measurement tools, it could be that the effect is smaller than expected and a much larger sample size may be required for this type of study. Additionally, the existence of significant correlations between several of the factors provides some insight if certain assumptions hold, specifically that the agency

scores are accurate, but otherwise lead to several questions about why expected results were not found.

This work contributes meaningfully to our understanding of agency and fear in video games, by providing a new paradigm and testing environment for assessing fear in a game. We also demonstrate and highlight limitations of previous studies and find that the relationship between fear and agency is likely not to be as strong as intuition might lead us to believe. We provide an important starting point for future work in understanding the experience of fear in video games.

7.1. Future work

We believe that it would be worthwhile repeating our study in a more controlled setting (i.e., a laboratory) using both physiological measures and questionnaires. If the results of that study hold with this work and the previously reported work [12, 28] - that is, there are physiological differences, but no subjective differences captured - the difference between metrics will need to be reconciled. In particular, it could be that improved questionnaire instruments need to be created to better capture and represent the subjective experience of fear; or, it could be that the differences between definitions of fear need to be reconciled (i.e., biological manifestation of fear vs. the psychological subjective experience of fear).

The idea of using something like cut-scenes as a temporary removal of agency would lay the foundation for an interesting future study comparing the effect of momentary changes vs. global changes to agency on fear. It is strongly recommended that such a study make use of physiological data. This is because a post-play

questionnaire is unlikely to inform on, for example, the scariness of a jump scare with and without the temporary agency manipulation. Heart rate, breathing rate, and skin conductance would serve as much better indicators of fear at that instant.

Similar to momentary vs. global agency alterations, deciding whether a manipulation should act upon theoretical agency, perceived agency, or both should be considered. If an effect exists, it might not result equally from manipulations to one or the other. This study attempted to manipulate perceived agency with the directives; future studies might consider comparing manipulations to both of these and how they affect fear. Alternatively, developing questionnaires to measure specific facets of the four-category model of agency [30] would benefit all future research deriving from this model.

As a final note, from a game design perspective, an interesting consideration is as follows: is the desire to maximally scare players on a global scale, throughout the play experience, or to provide intense momentary fear? The two do not necessarily conflict; however, it could be the case that manipulating agency to make a single jump scare more frightening has the effect of reducing total fear levels over the course of the game. Alternatively, this might simply have no effect whatsoever on players' experience of fear as a whole. This is purely speculative and may not be the case, but it remains that the consequences of changing a player's control over the game temporarily should be considered within the larger scope of the entire play experience.

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