Chocolate or Broccoli? The Effects of Mental Health Messaging on Player Expectations and Game Enjoyment in *Fractured Minds*

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February 22nd, 2026

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I acknowledge the use of ChatGPT-5 (OpenAI) and Google Gemini 1.5 Flash (Google) to generate materials that are included in my work in a modified form (see Appendix).

Abstract

As the popularity of video games grows, so does the interest in serious games for mental health intervention and education. However there still is much debate surrounding the combination of game enjoyment and learning in serious game design. This study investigated how trailer framing and player expectations influence game enjoyment in the serious game *Fractured Minds*. A sample of 144 university students of the University of Groningen were randomly assigned to watch one of two trailers, one advertised the game as a mental health game, while the other advertised the game as a commercial entertainment game. Participants then rated their expectations of fun and attractiveness and proceeded to play the game. Afterwards, players reported their levels of game enjoyment via the Intrinsic Motivation Inventory (IMI). Trailers with explicit mental health messaging did not significantly influence player expectations nor game enjoyment. Instead, player expectations, specifically expected fun, emerged as the dominant predictors of game enjoyment, which functioned independently of trailer framing. For serious games to be most effective, developers should prioritize making the core gameplay inherently enjoyable and increase expectations of fun especially early on.

Chocolate or Broccoli? The Effects of Mental Health Messaging on Player Expectations and Game Enjoyment in *Fractured Minds*

Over the past decades, the popularity of video games has increased dramatically, with approximately 85% of U.S. adolescents reporting that they play video games and 41% of them indicating that they game daily (Gottfried & Sidoti, 2024). Additionally, further advancements in computer technology and increasing interest from the scientific community have led to the question of whether video games could also be applied for educational purposes, aside from providing pure entertainment. This has led to the development of serious games. One of the subsets of serious games, often developed and implemented by psychologists, is referred to as mental health games. These are used to raise awareness and reduce stigma towards people suffering from mental illness and are also used to treat psychological symptoms and improve mental ability, such as attention, memory, and concentration (Weerdmeester et al., 2025). This is especially important, considering that the prevalence and onset of mental disorders are highest among young adolescents (Solmi et al., 2022) – making serious games a viable way to effectively reach and engage this young demographic. Contemporary research has already demonstrated the efficacy of serious games in treating anxiety, depression and post-traumatic stress disorder (PTSD), as well as in promoting healthy nutrition and reducing alcohol consumption (Eshuis et al., 2021; Espinosa-Curiel et al., 2020; Fleming et al., 2012; Hong et al., 2020; Roepke et al., 2015). Additionally, due to the nature of video games, they are often highly accessible, cost-effective, and can in some cases be more motivating and lead to higher cognitive gains and better attitudes towards learning than in conventional teaching methods (Vogel et al., 2020; Wols et al., 2020, 2021; Wouters et al., 2013). However, despite these benefits, there still is much debate surrounding the combination of game enjoyment and learning in serious game

design. While some researchers claim that focusing too heavily on the entertainment aspect diminishes the learning process, others claim that focusing too heavily on the learning aspect removes the fun, therefore the motivation aspect of the game (Franzwa et al., 2014; Thomas & Young, 2010; Warsinsky et al., 2021).

Another important factor that influences game enjoyment prior to gameplay is player expectations. These are thought to shape how players approach, interpret, and ultimately experience a game, thereby potentially influencing both their initial engagement and subsequent enjoyment of serious games (Poppelaars et al., 2018a). This is important because players, particularly young adolescents who are accustomed to fast-paced, high-budget commercial games may enter serious games with high expectations of graphics and engagement. When the actual gameplay is perceived as outdated or slow, an expectation-reality mismatch can occur (Fleming et al., 2025). This discrepancy could, in turn, reduce player engagement and motivation, making it substantially more difficult for serious games to fulfill their purpose. Therefore, it is important to investigate how player expectations are formed and how they are related to game enjoyment in order to make serious games as attractive for players as possible. This study addresses this by investigating the effects of trailer framing – specifically entertainment versus mental health messaging – on both player expectations and game enjoyment in the game *Fractured Minds*. It seeks to determine whether game enjoyment is driven primarily by trailer framing or player expectations, while further examining the sequential relationship between these three variables.

The Effects of Mental Health Messaging on Player Expectations

Another important aspect of player engagement in serious games is player expectations. Namely, to what extent do player expectations influence initial game choice and appeal in

serious games? To answer this question, an article by Poppelaars et al. (2018a) presented participants with two different gameplay trailers and asked them to choose which game they wanted to play. Unbeknownst to the participants however, both trailers presented the same game, with the key difference being how the game was framed. Whereas one trailer framed the game as a mental health game, the other framed the game as a fun entertainment game. Subsequently, they found that participants were 3.71 times more likely to choose the game with mental health themes. Additionally, further analyses by Wols et al. (2020; 2021) revealed a significant interaction between player expectations and trailer design. Specifically, they suggested the possibility that trailer framing primed player expectations, which in turn could make participants more aware of the potential benefits of mental health games. However, this increased awareness did not result in a significant difference in game enjoyment levels between the two groups, indicating that while trailer design predicted game choice and potentially influences how players perceive a game's benefits, it does not necessarily translate into more game enjoyment.

Despite contemporary research, which suggests that mental health messaging does not deter game choice, reactance theory offers a contrasting perspective. According to Psychological Reactance Theory, when individuals perceive a message as controlling or as a threat to their autonomy, they experience a motivational state (reactance) which is aimed at restoring their freedom (Rosenberg & Siegel, 2025; Steindl et al., 2015). Therefore, explicit mental health messaging in serious games could be viewed as overly controlling, which could trigger negative expectations of the game. To address this, this study will compare game enjoyment scores between the mental health and the entertainment conditions. Considering that all participants played the same game, a significant reduction in game enjoyment in the mental health condition would suggest that trailer framing may have triggered psychological reactance. Understanding

whether players are deterred by mental health messaging is essential, as it determines whether the therapeutic potential of serious games is being undermined by their own marketing.

The Effects of Mental Health Messaging on Game Enjoyment

One of the major difficulties in designing serious games with mental health messaging is the intricate balance between learning and game enjoyment (Caserman et al., 2020; Franzwa et al., 2014; Warsinsky et al., 2021). This is especially important because the effectiveness of serious games may depend, at least in part, on players' persistence and engagement throughout the game. This is an issue highlighted by Fleming et al. (2025) which reported low adherence for the serious game *SPARX,* with only 3.4% of participants completing all of its seven modules. This is problematic, as research from Rosenthal & Ratan. (2012) suggested that game progression was positively associated with player beliefs that the game was both fun and educational. Additionally, boredom and a lack of game enjoyment have also been linked to decreased learning and disengagement from serious games altogether (Schernoff et al., 2003). Ultimately, serious game developers are presented with a difficult challenge; how do they motivate their players to learn about serious issues such as trauma or depression, while simultaneously ensuring that the game is enjoyable? Some developers respond to this challenge by attempting to hide the learning content – which they perceive as too dull or scary for the player – with painfully simplistic and playful game mechanics. This is a common mistake made by serious game designers, which is often referred to as the "chocolate-covered broccoli" critique (Hopkins & Roberts, 2015). The "broccoli" in this case represents the educational content which game designers perceive as inherently boring. This critique highlights that instead of layering fun (the chocolate) on top of learning in order to mask the learning objectives, the game must be enjoyable to play at its core. Because if the gameplay feels like a mere delivery mechanism, the

added playful elements may feel forced, which reduces both game enjoyment and learning. Proponents behind this critique mainly argue that learning and game enjoyment are most effective when intrinsically integrated, making the educational content the source of the fun rather than a chore to be hidden (Buday, 2014; Koster, 2013).

In reality, empirical support for this relationship is mixed. For example, Espinosa-Curiel et al. (2020), found that game enjoyment was positively related to and predicted learning gains in healthy nutrition in the serious game *FoodRateMaster*. In addition, Hong et al. (2020), found that game enjoyment mediated the relationship between in-game factors and reduced alcohol consumption. In contrast, a study conducted by Iten & Petko (2016) showed no relation between game enjoyment and learning outcomes – instead, game enjoyment was found to significantly predict students' intrinsic motivation to learn but not learning gains. This inconsistency is also reflected in the way a game is externally presented. As mentioned earlier, research by Poppelaars et al. (2018a, 2018b), and Wols et al. (2021) found that game enjoyment levels did not differ significantly regardless of trailer framing. Understanding the relationship between learning and game enjoyment, and how it is influenced by external framing is essential, because it would clarify whether serious game designers should focus on pure entertainment over learning when designing and marketing their games. Moreover, given that players hold pre-existing expectations regarding mental health messaging, it would be interesting to explore whether these mediate the relationship between trailer framing and game enjoyment.

Purpose of This Study

Due to the rising popularity and increasing demand for serious games, research on how to make them both appealing and educational is needed now more than ever. This research intends to add to the literature by investigating whether participants will experience higher levels of

game enjoyment when the game is framed as a mental health game rather than as an entertainment game. Examining what makes serious games enjoyable will allow serious game designers to learn how they should frame mental health content in order for players to meaningfully interact with it. Furthermore, investigating the sequential relationship between trailer framing, player expectations, and game enjoyment will help clarify whether game enjoyment is driven primarily by external messaging or through the players' own initial impressions and interpretations. This study presents two research questions:

RQ1: Do participants' pre-game expectations uniquely predict game enjoyment, after controlling for trailer condition?

RQ2: Does the mental health messaging trailer increase game enjoyment compared to the entertainment trailer?

To answer these research questions, this study adopts a similar design to that of Poppelaars et al. (2018b) and Wols et al. (2021), in which participants are shown either a mental health trailer or entertainment trailer prior to gameplay. The current study assessed two related but distinct factors that may influence game enjoyment of serious games with mental health messaging. RQ1 assessed whether participants' expectations before playing the game predicted game enjoyment after controlling for trailer condition. This is to better understand the role of internal, individually held player expectations that are not influenced by external framing. Removing these influences ensures we are measuring individual differences in player expectations on game enjoyment. RQ2, on the other hand, assessed whether the inclusion of mental health messaging in the game trailer predicted game enjoyment. This was done to better understand the impact of external framing of the game on player experience. Here the emphasis was placed on trailer design, and whether mental health framing led to an increase in game

enjoyment. Addressing both questions allowed us to separate the effects of internally held expectations from the effects of external framing on enjoyment of mental health games. At the same time, this study will analyze whether game enjoyment differs per trailer condition, to examine whether participants prefer the game when presented with a commercial trailer (the chocolate) or as a mental health trailer (the broccoli).

The hypotheses were formulated based on prior literature indicating that player expectations, regardless of trailer condition, do not influence game enjoyment (Poppelaars et al. (2018a, 2018b; Wols et al., 2021). The hypotheses are presented as follows:

H1: Participants' pre-game expectations will not significantly predict game enjoyment after removing the effects of trailer condition.

H2: Explicit mental health messaging will not significantly increase game enjoyment.

Methods

Participants

A total of 154 participants took part in the study, of whom 10 were excluded from analysis due to technical issues or lack of consent. The final sample therefore consisted of 144 first-year psychology students at the University of Groningen, including 101 women (70.1%), 38 men (26.4%), and 5 participants who identified as non-binary or third gender (3.5%). Gaming frequency was assessed on a scale of 1 (Never) to 5 (3 or more times a week), with 17.4% of participants reporting that they never play video games, and 33.3% reporting that they play less than once a month.

Procedure

Participants were recruited using the University of Groningen's online research participation system, drawing from the Faculty of Behavioral and Social Sciences (BSS) SONA pool. Participants received 1.3 course credits for their participation and were required to be older than 16 years and able to read and understand English or Dutch. Furthermore, no exclusion criteria were applied regarding mental or physical health, and all participants provided informed consent prior to taking part in the study. Lastly, the study protocol was reviewed and approved by the Ethics Committee of the Faculty of Behavioral and Social Sciences at the University of Groningen (PSY-2526-S-0074).

Data collection took place in November 2026 in the research lab provided by the University of Groningen. Upon entering, participants were seated at computers in individual cubicles and received both verbal and written information about the study before providing informed consent. If consent was given, participants were then asked to fill in their gender, first language, and gaming experience on the computer via Qualtrics. Participants were then randomly assigned to watch one of two trailers of *Fractured Minds*. However, they were not informed that different trailer versions existed or that the messaging had been manipulated. This was done to maintain the integrity of the experimental design and to avoid expectancy effects. One of the trailers promoted *Fractured Minds* as a mental health game, whereas the other trailer focused on the game's entertainment value and did not contain any messaging related to mental health. These trailers were identical except for the text variations as shown in Table 1.

Table 1

Framing Differences in Mental Health and Entertainment Trailers.

MENTAL HEALTH MESSAGE	ENTERTAINMENT MESSAGE
Rated 9/10 by psychologists	9/10 on Steam
Incredible visuals with engaging puzzles	Stunning visuals with captivating puzzles
A must-try for self-reflection	A must play game
Psychology Today game of the Year	Nintendo Switch Game of the Year
Both educational and inspiring	Endless thrills at every level

After watching the trailer, participants completed two questions regarding their expectations of the game and whether they played the game *Fractured Minds* before. As no participant reported prior experience with the game, none were excluded on this basis. After participants completed these questions, the researcher(s) explained the rules to the participant. They informed them that a "cheat sheet" with gameplay instructions was available if needed, and that the researcher(s) were present in case the participants had any further questions. To ensure that participants did not exceed the 60-minute time slot of the experiment, the researcher(s) would step in after 30 minutes of gameplay. The majority of participants (N = 90) were able to complete all six levels of the game, while a smaller number (N = 54) did not.

After finishing the game, participants filled out the final set of questionnaires. It should be noted that this study was part of a larger research project that included additional questionnaires, but only those relevant to the current study were included in the analysis. Finally, participants answered a manipulation check on what they think the study was about. While most

participants correctly identified the study's focus on mental health themes, none were able to identify the experimental manipulation of trailer framing, which involved two distinct trailer versions. At the end of the study, all participants received a comprehensive debriefing that explained the study's aims, the manipulation of trailers, and the collection of mental health data. Afterwards, participants were once again asked to provide their informed consent, given that this study involved deception.

Materials

The game used in this study is a serious game called *Fractured Minds* (Mitchell, 2017), described as "an immersive artistic short game, exploring anxiety and mental health issues". The game has won the Young Game Designers Award for successfully demonstrating the reality of living with a mental health disorder with interactive play. Although it was originally designed as an awareness piece rather than a therapeutic game per se, the game provides experiential content aimed to evoke emotional states relevant to the study's aims. For instance, the game entails progressing through six chapters, each of which represents a different mental health obstacle, such as isolation and paranoia, and requires the player to solve puzzles and interact with environments that dynamically distort or become oppressive, thus stimulating subjective experiences of anxiety and depression.

Game Enjoyment

Game enjoyment was assessed using the interest/enjoyment subscale from the Intrinsic Motivation Inventory (IMI; Ryan, 1982, Ryan & Deci, 2000; McAuley et al., 1989) Following Poppelaars et al. (2018a), the items were adapted by replacing the term "activity" with "game." Examples of questions include "*I enjoyed this game very much*" and "*I would describe this game*

as very interesting." Participants responded to seven items on a 7-point Likert scale, ranging from 1 = "*Not at all true*" to 7 = "*Very true*." After reverse-coding two items, an overall mean (α = .894) was calculated, with higher scores indicating greater intrinsic motivation.

Player Expectations

Similarly, two items that assessed player expectations were also adapted from Poppelaars et al. (2018a) and measured using a 10-point Likert scale. Subsequently, player expectations were divided into two questions that examined perceived attractiveness and fun. The first item, "*Please rate the attractiveness of the game based on the trailer you saw,"* was measured from 1 = "*Not attractive*" to 10 = "*Very attractive.*" Similarly, the second item, "*How much fun do you think it is to play this game?*" was measured from 1 = "*Not fun*" to 10 = "*Very fun*."

Statistical Analyses

All statistical analyses were conducted using the IBM SPSS Statistics version 28, and the data was screened for missing values and outliers prior to analysis. To answer the first research question, a mediation analysis utilizing Baron and Kenny's (1986) causal steps approach was conducted, which examined the sequential relationship between trailer framing, player expectations and game enjoyment. This method allowed for the testing of whether player expectations mediated the effects of trailer condition on game enjoyment by conducting a series of linear regressions. Assumptions for linear regression – including normality, linearity, homoscedasticity and the absence of multicollinearity – were assessed using Q-Q plots, standardized residual scatterplots, and VIF statistics. The first step utilized a simple linear regression to examine whether trailer condition predicted game enjoyment (path *c*). The second step also conducted a simple linear regression to analyze the association between trailer framing

and player expectations (path *a*). Finally, the third used a multiple linear regression to examine whether player expectations predicted enjoyment while controlling for the effects of trailer framing (path *b*). Through this final model, the analysis assessed the degree of mediation by comparing the direct effect of trailer framing on game enjoyment (Path *c′)* to the total effect (Path *c*) to determine if the relationship was partially or fully explained by player expectations.

To answer the second research question, an independent samples t-test was conducted to compare game enjoyment means between participants who viewed the mental health trailer versus those who viewed the entertainment trailer. In order to assess the assumptions of normality and homogeneity of variances, Q-Q plots and Levene's test were conducted.

Results

Descriptive Statistics

Before conducting the main analysis, descriptive statistics were calculated and presented in Table 2. Specifically, the means and standard deviations of player expectations and game enjoyment for the total sample (N = 144) are presented and subsequently split by trailer condition. Notably, perceived attractiveness ($M = 6.19$, $SD = 2.19$) and perceived fun ($M = 6.21$, $SD = 1.92$) were rated similarly. When interpreted in a 1-10 Likert scale, this indicates that participants held positive but baseline expectations of the game's overall appeal and enjoyability prior to gameplay. Game enjoyment, which was rated on a 1-7 Likert scale, was also reported at a moderate level ($M = 4.71$, $SD = 1.19$), indicating that participants had a positive yet moderate level of game enjoyment. Finally, preliminary analyses confirmed that all linear regression and independent samples t-test assumptions were met, including the absence of multicollinearity (VIF < 10).

Table 2

Descriptive Statistics and Pearson Correlations for Player Expectations and Game Enjoyment Split by Trailer Condition

Variable	Condition	n	*M*	*SD*	1	2	3
1. Perceived Attractiveness	Mental health	72	6.53	2.33			
	Entertainment	72	5.86	2.01			
	Total	144	6.19	2.19	-		
2. Perceived Fun	Mental health	72	6.36	2.14			
	Entertainment	72	6.06	1.68			
	Total	144	6.21	1.92	.79**	-	
3. Game Enjoyment	Mental health	72	4.66	1.13			
	Entertainment	72	4.75	1.24			
	Total	144	4.71	1.19	.47**	.52**	-

Note. Columns 1-3 represent Pearson Correlation coefficients based on the total sample (N = 144). ** $p < .001$.

Main Analysis

Path *c*: The relationship between trailer framing and game enjoyment

To establish the first step of mediation analysis, a simple linear regression was conducted to examine the total effect of trailer framing on game enjoyment (Path *c*). The results indicate that trailer framing was not a significant predictor of game enjoyment, $\beta = .037$, $t(142) = .441$, $p = .660$, with it explaining less than 1% of variance in game enjoyment, $R^2 = .001$, $F(1, 142) =$

.194, p = .660. This suggests that trailer framing on its own does not have a significant impact on player's enjoyment of the game.

Path *a*: The relationship between trailer framing and player expectations

Following the initial step, the second stage of the causal steps approach examined whether trailer framing significantly predicted player expectations. The findings demonstrate that trailer framing was not a significant predictor for perceived fun, β = -.080, $t(142)$ = -.954, p = .342. In addition, the model accounted for only a small proportion of variance, R^2 = .006, $F(1, 142)$ = .910, p = .342. Similarly, trailer framing also did not have a significant effect on perceived attractiveness, β = -.152, $t(142)$ = -1.838, p = .068, and the model failed to reach significance, $F(1, 142)$ = 3.378, p = .068, R^2 = .023. These results indicate that trailer framing also did not significantly manipulate player's expectations of perceived fun and attractiveness.

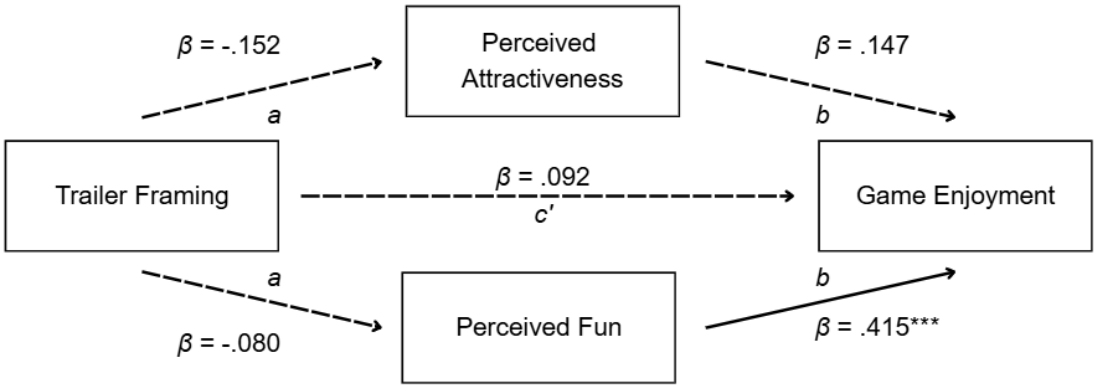
Path *b* and *c′*: The relationship between player expectations and game enjoyment, while controlling for trailer framing

To investigate the final step of the mediation model – a hierarchical multiple linear regression was conducted in two stages (see Figure 1 for the full mediation model). This was done to examine whether perceived fun explained any additional variance or predictive power beyond perceived attractiveness. The first stage included trailer condition and perceived attractiveness as predictors, resulting in a significant model that accounted for 22,2% of the variance in game enjoyment, R^2 = .222, $F(2, 141)$ = 20.138, p < .001. Additionally, perceived attractiveness was a significant positive predictor of game enjoyment (β = .475, $t(141)$ = 6.327, p < .001). In the second stage, perceived fun was added to the model. This resulted in a small-to-moderate increase in explained variance and a significant improvement in model fit, ΔR^2 = .065,

$F(1, 140) = 12.839$, $p < .001$, with the final model accounting for a total of 28.8% of the variance in game enjoyment, $R^2 = .288$, $F(3, 140) = 18.832$, $p < .001$. While perceived fun was found to be a significant predictor of game enjoyment in the final model, $\beta = .415$, $t(140) = 3{,}583$, $p < .001$, perceived attractiveness became non-significant, $\beta = .147$, $t(140) = 1.255$, $p = .212$. Meaning that perceived attractiveness did not uniquely contribute to the model once perceived fun was accounted for (see Figure 1). This is likely due to their high correlation with each other (see Table 2). Finally, the direct effect of trailer framing (Path c′) remained non-significant in the final model, $\beta = .092$, $t(140) = 1.277$, $p = .204$. Ultimately, these results indicate that expected fun is a stronger predictor of game enjoyment than perceived attractiveness. Additionally, because the total effect of trailer framing on game enjoyment was non-significant (Path *c*), the criteria for a mediation relationship between trailer framing and game enjoyment via player expectations were not met.

Figure 1

Mediation Model of Trailer Framing on Game Enjoyment through Perceived Attractiveness and Perceived Fun.



Note. Path values represent standardized coefficients. Path *a* represents the effects of trailer framing on player expectations, path *b* represents the effects of player expectations on game enjoyment while controlling for trailer framing, and path *c′* represents the direct effect of trailer framing on game enjoyment while controlling for player expectations. Dashed lines indicate non-significance ($p > .05$). ***$p < .001$.

To answer the second research question, whether trailer condition predicted game enjoyment, an independent samples t-test was conducted. Subsequently, no significant differences were found in game enjoyment between the mental health trailer ($M = 4.66$, $SD = 1.13$) and entertainment trailer ($M = 4.75$, $SD = 1.24$), $t(142) = -0.44$, $p = .660$. Indicating that participants found the game equally as enjoyable, regardless of trailer framing.

Discussion

Summary of Results

This study investigated the sequential relationship between trailer framing, player expectations and game enjoyment in the serious game *Fractured Minds*. Based on the literature, this study proposed two hypotheses. The first of which stated that player expectations, when controlled for trailer condition, will not significantly predict game enjoyment. Following subsequent analyses, this hypothesis was rejected. The mediation analysis revealed that trailer framing failed to significantly manipulate player expectations and thus had no indirect effects on game enjoyment. Instead, the results indicate that player expectations acted as the primary predictor of game enjoyment, functioning independently of trailer framing (see Figure 1). Notably, perceived fun was found to be a stronger predictor of game enjoyment than perceived attractiveness, suggesting that expectations on how fun the game will be, play a more central role

in shaping game enjoyment than general appeal based on first impressions. The second hypothesis – which stated that trailer conditions will not significantly predict game enjoyment – was ultimately supported. Game enjoyment did not differ significantly between the two trailer conditions, highlighting that participants found the game equally as enjoyable despite trailer framing.

Interpretation of Results

Together these findings indicate that game enjoyment is strongly associated with player expectations. In line with previous research from Poppelaars et al. (2018a, 2018b) and Wols et al. (2021), no significant differences in game enjoyment were observed between participants who viewed the mental health trailer versus those who viewed the commercial entertainment trailer. This can be viewed from the "chocolate-covered broccoli" metaphor. While the mental health trailer was intended to highlight the educational content (the broccoli), it appears that participants were mostly swayed by the game's entertainment elements (the chocolate). Since both trailers consisted of the same "chocolate", it could explain why trailer framing failed to significantly manipulate player expectations.

In addition, given that game enjoyment levels were similar across both trailer conditions, it appears that little psychological reactance took place and that the mental health messaging in our study was not experienced as overly controlling or aversive. In terms of promotion, this study suggests that players are not deterred by mental health messaging, and that game designers should not hide the game's educational content out of fear that it will induce a negative player response. Instead, game designers should focus on ensuring that their gameplay (the chocolate) remains and appears enjoyable in order to keep their audiences engaged.

This is supported by the relationship between the different types of player expectations. While perceived attractiveness and fun significantly predicted game enjoyment individually, perceived attractiveness became non-significant in the final model once perceived fun was accounted for. This is likely due to their high degree of overlap, as evidenced by their high shared variance and correlation. This means that a positive first impression regarding the game's appeal does not uniquely contribute to game enjoyment once expectations of fun are established. This could suggest a possible mediation, in which general appeal influences game enjoyment indirectly by primarily acting as a cue or first impression that shapes players' more dominant expectations of fun.

Limitations and Strengths

This study has several notable strengths. One of those strengths is that this study simultaneously investigated key mechanisms such as player expectations, trailer framing, and game enjoyment – within the context of serious games. Existing literature often examines these variables in isolation or within other media domains, leaving their combined influence on player engagement in serious games unexplored. Secondly, this study also presents a well-controlled experimental design with random assignment to either a mental health trailer or a commercial entertainment trailer. This design allowed for systematic comparisons between trailer conditions and enabled analyses of how trailer framing may influence game enjoyment. Lastly, this study consists of a relatively large sample size of 144 first-year students which enhances the statistical power of our findings. Moreover, given that first-year students represent a population with relatively high prevalence rates of mental health issues (Solmi et al., 2022), they are considered a key target audience for the implementation of serious games (Fleming et al., 2012). Consequently, the findings are particularly important in reaching and engaging this demographic.

However, despite these strengths, this study contains several limitations, starting with the possibility of a weak trailer manipulation. Although the mental health trailer was designed to encourage insight and reflection – thereby influencing player expectations – no significant differences were found between trailer conditions for both game enjoyment and player expectations. As a result, the manipulation may have been insufficient to meaningfully shift player perceptions in this context. Furthermore, because this sample consisted of psychology students – who are likely more familiar with mental health concepts than the average player – participants may have been less susceptible to mental health messaging. Future research should address this by implementing more explicitly different trailer manipulations and by including manipulation checks to confirm whether participants effectively internalized the intended contrast between mental health and entertainment framing. Future trailers could prioritize advertising the game's therapeutic benefits and intended treatment outcomes. This way, serious games are presented more as interventions rather than entertainment mediums. Additionally, future research should investigate whether prior knowledge of or experience with mental health concepts influences player expectations of serious games, and whether this familiarity moderates the relationship between trailer framing and game enjoyment.

Another important thing to consider is that the game used in this study, *Fractured Minds,* was only designed to raise awareness on mental health rather than provide treatment for specific mental health disorders. As a result, the findings of this study might not be generalizable to treatment-focused games, whose audiences – especially those with a personal interest in participating – have more interest in the game's functional utility and therapeutic benefits than its entertainment value. Since the game now has more personal relevance to the player, they may engage more deeply with the serious content, resulting in potentially higher game enjoyment

levels. Future research should investigate this relevancy-effect by comparing clinical samples with general population samples. Doing so would clarify whether motivations of symptom improvement increase the engagement and efficacy of serious games, while also revealing whether intrinsic motivation increases learning outcomes.

Another issue with the trailer manipulation is that the gameplay of *Fractured Minds* was clearly designed and tailored around mental health themes. Thus, participants in the entertainment condition may have experienced an expectation-reality mismatch between a "fun" trailer and the serious messaging in gameplay, leaving little room for open interpretation. This may have subverted player expectations and caused participants to feel disappointment with the game – ultimately resulting in lower game enjoyment levels. Therefore, the results from this study may not extend to more ambiguous games, whose trailers have a lower chance of being contradicted by their gameplay. Considering ambiguous games are more open to interpretation, it is likely that the entertainment messaging would be more effective than it was in the current study. Future studies should investigate whether varying levels of explicit framing – ranging from complete ambiguity to highly explicit messaging – influences player expectations and subsequent game enjoyment. Doing so would clarify if and which direction player engagement changes as mental health themes become more and more explicit.

Implications

This study presents several practical implications for the design and promotion of serious games. Importantly, player expectations – particularly perceived fun – emerged as the dominant predictors for game enjoyment. Furthermore, results from this study suggest that advertising the game with mental health messaging does not significantly influence player expectations and game enjoyment. Considering that all participants watched the same trailer, albeit with different

texts, and ended up with similar game enjoyment scores, serious game designers are once again left with a difficult decision.

On the one hand, if expectations of fun (the chocolate) are a stronger predictor of game enjoyment than mental health messaging (the broccoli), then perhaps developers should adopt an entertainment-oriented marketing strategy – in which trailers are primarily focused on advertising the game's visual aesthetics and engaging gameplay. This will enable trailers to hype up the game to their fullest potential, while the actual gameplay delivers their intended educational content. Ensuring that the gameplay is inherently fun to play and is successfully integrated with the educational content would also address the "chocolate-covered broccoli" critique (Hopkins and Roberts, 2015). This can be achieved by creating immersive environments, providing interactive and immediate feedback, supporting flow, and by enhancing emotional engagement (Caserman et al., 2020; Facchino et al., 2025) – that way, game designers can more directly shape players' expectations early on. Not only does this approach make gameplay more engaging, but it also promotes intrinsic motivation, increasing the likelihood that players both enjoy the experience and engage meaningfully with the game's learning or treatment goals (Espinosa-Curiel et al., 2020). This is supported by Hong et al. (2020), who found that game enjoyment mediated the relationship between in-game factors and reduced alcohol consumption in the serious game One Shot, once again highlighting the effects of game enjoyment on treatment outcomes. Doing so might also attract a wider audience who might otherwise avoid games with explicit mental health themes, possibly due to psychological reactance.

On the other hand, the lack of differences between trailer conditions in the current study could also indicate that our attempts at manipulating player expectations through trailer framing were far too subtle and inexplicit. As seen in research conducted by Poppelaars et al. (2018a),

participants were more likely to choose the mental health game over the entertainment game. Therefore, game designers might want to adopt an even more explicit mental health framing strategy, aimed at highlighting the game's therapeutic benefits and intended treatment outcomes. One of the benefits of this approach is that it is more likely to attract an audience for whom the topic is more personally relevant and who stands to benefit more from playing the game compared to the general audience. One example of a treatment-focused game marketed around their therapeutic benefits is *SPARX* – a serious game which integrates Cognitive Behavioral Therapy (CBT) principles into its gameplay, resulting in significant reductions in depressive symptoms in young adolescents (Fleming et al., 2012, 2015) Another example is the serious game *SuperBetter*, which essentially gamifies real-life obstacles into engaging quests, and has shown similar reductions in depressive symptoms (Roepke et al., 2015). Given that participants are now motivated by advertised functional improvement instead of entertainment, participants might even experience higher adherence to and engagement with serious games as a result (Wols et al., 2021).

In conclusion, both strategies heavily depend on the serious game's intended purpose. If the goal is to promote mental health awareness, then perhaps the engagement-focus strategy is the better option as it can reach a broader audience and deliver its message through subtle gameplay. However, if the goal is to treat specific mental disorders or improve mental ability, then perhaps developers should be more straightforward with their intentions as to attract an audience who stands to benefit most from playing the game. All in all, this confusion between the two strategies shows there is still a lack of information when it comes to understanding how trailer framing, player expectations, and game enjoyment relate to each other in serious games.

Conclusion

This study investigated the sequential relationship between trailer framing, player expectations and game enjoyment. In terms of trailer framing, the results align with Wols et al. (2021), indicating that participants found the game equally as enjoyable regardless of mental health messaging. Instead, player expectations, particularly expected fun, emerged as the dominant predictors of game enjoyment. While general appeal and trailers certainly capture initial interest and attention, they influence game enjoyment only indirectly by shaping expectations of fun. Additionally, this study emphasizes the importance of focusing on fun in serious game design. For such games to be both engaging and educational, game enjoyment should be the top priority. Ultimately, it is through expectations and inherently fun gameplay – especially early on – that the meaningful game content can be experienced positively.

Appendix

AI Use Summery

Example 1

AI systems used: ChatGPT-5 https://chatgpt.com

Final prompt used: “Please state how I can explore the following questions in SPSS: Does game enjoyment differ per trailer condition, and do player expectations positively predict game enjoyment?”

Use case: AI was used to construct a statistical analysis plan in SPSS for the main research questions. This output identified the most appropriate and effective statistical methods and gave step-by-step instructions on how to implement them in SPSS. Additionally, it explained what the output would look like and how it should be interpreted.

Modifications: The most appropriate statistical methods were chosen and later performed in SPSS. Afterward, output denoted in the results section were adapted according to APA-7 guidelines from examples given from this prompt.

Example 2

AI systems used: Google Gemini 1.5 Flash (https://gemini.google.com)

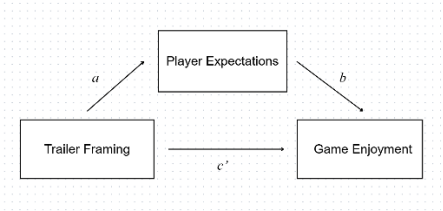
Final prompt used: “How can I perform a mediation analysis in SPSS using trailer condition as the IV, expected fun and attractiveness as the mediators, and game enjoyment as the DV?”

Use case: This prompt was used to explore a sequential relationship between trailer framing, player expectations and game enjoyment. It introduced the Baron and Kenny's (1986) causal steps approach and explained how it worked and how to implement it in SPSS. Following this, analyses were performed according to the instructions and interpretations followed.

Modifications: The description of Baron and Kenny's causal steps approach was adapted from this output and was later rewritten and cited in the Methods and Results section.

Example 3

AI systems used: Google Gemini 1.5 Flash (https://gemini.google.com)



Final prompt used: "Is this mediation model figure sufficient according to APA guidelines?"

Use case: AI was used to determine whether the figure above adhered to all APA guidelines, considering APA can be very strict and prioritizes simplicity. This was also asked to examine whether the separate paths (*a*, *b*, *c*') were in the correct positions and whether values should be added to the model.

Modifications: The feedback was used to improve the model, by separating player expectations into perceived attractiveness and fun, and by introducing standardized coefficients and statistical significances. The note below this figure was also adapted from this output.

References

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. Journal of Personality and Social Psychology, 51, 1173-1182. https://doi.org/10.1037/0022-3514.51.6.1173

Buday, R. (2014). Games for Health: An Opinion. Games for Health Journal, 4(1), 38–42. https://doi.org/10.1089/g4h.2014.0083

Caserman, P., Hoffmann, K., Müller, P., Schaub, M., Straßburg, K., Wiemeyer, J., Bruder, R., & Göbel, S. (2020). Quality criteria for serious games: serious part, game part, and balance. JMIR Serious Games, 8(3), e19037. https://doi.org/10.2196/19037

Eshuis, L. V., van Gelderen, M. J., van Zuiden, M., Nijdam, M. J., Vermetten, E., Olff, M., & Bakker, A. (2021). Efficacy of immersive PTSD treatments: A systematic review of virtual and augmented reality exposure therapy and a meta-analysis of virtual reality exposure therapy. Journal of psychiatric research, 143, 516 527. https://doi.org/10.1016/j.jpsychires.2020.11.030

Espinosa-Curiel, I. E., Pozas-Bogarin, E. E., Martínez-Miranda, J., & Pérez-Espinosa, H. (2020). Relationship between children's enjoyment, user experience satisfaction, and learning in a serious video game for nutrition Education: Empirical pilot study. JMIR Serious Games, 8(3), e21813. https://doi.org/10.2196/21813

Facchino, A. P., Marchetti, D., Colasanti, M., Fontanesi, L., & Verrocchio, M. C. (2025). The use of serious games for psychological education and training: a systematic review. Frontiers in Education, 10. https://doi.org/10.3389/feduc.2025.1511729

Fleming, T., Dixon, R., Frampton, C., & Merry, S. (2012). A Pragmatic Randomized Controlled Trial of Computerized CBT (SPARX) for Symptoms of Depression among Adolescents Excluded from Mainstream Education. Behavioural and Cognitive Psychotherapy, 40(5), 529-541. https://doi.org/10.1017/s1352465811000695

Fleming, T., Lucassen, M., Frampton, C., Parag, V., Bullen, C., Merry, S., Shepherd, M., & Stasiak, K. (2025). Nationwide implementation of unguided Cognitive Behavioral therapy for adolescent Depression: Observational study of SPARX. Journal of Medical Internet Research, 27, e66047. https://doi.org/10.2196/66047

Franzwa, C., Tang, Y., Johnson, A., & Bielefeldt, T. (2014). Balancing fun and learning in a serious game design. International Journal of Game-Based Learning, 4(4), 37–57. https://doi-org.proxy-ub.rug.nl/10.4018/ijgbl.2014100103

Gottfried, J., & Sidoti, O. (2024, May 9). Teens and video games today. Pew Research Center. https://www.pewresearch.org/internet/2024/05/09/teens-and-video-games-today/

Hong, T., Cabrera, J., & Beaudoin, C. E. (2020). The role of enjoyment in a serious game for binge drinking prevention: Pretest-Posttest Quasi-Experimental Study. Journal of Medical Internet Research, 22(11), e21652. https://doi.org/10.2196/21652

Hopkins, I., & Roberts, D. (2015). 'Chocolate-covered broccoli'? Games and the teaching of literature. Changing English, 22(2), 222–236. https://doi.org/10.1080/1358684x.2015.1022508

Iten, N., & Petko, D. (2016). Learning with serious games: Is fun playing the game a predictor of learning success? British Journal of Educational Technology, 47(1), 151–163. https://doi-org.proxy-ub.rug.nl/10.1111/bjet.12226

Koster, Raph. A Theory of Fun for Game Design. Second edition., O'Reilly Media, 2013.

McAuley, E., Duncan, T., and Tammen, V. V. (1989). Psychometric properties of the intrinsic motivation inventory in a competitive sport setting: a confirmatory factor analysis. Res. Q. Exerc. Sport 60, 48–58. https://doi.org/10.1080/02701367.1989.10607413

Mitchell, E. (2017). Fractured minds [Video game]. Wired Productions. https://store.steampowered.com/app/688740/Fractured_Minds/

Poppelaars, M., Lichtwarck-Aschoff, A., Kleinjan, M., & Granic, I. (2018b). The impact of explicit mental health messages in video games on players' motivation and affect. Computers in Human Behavior, 83, 16–23. https://doi.org/10.1016/j.chb.2018.01.019

Poppelaars, M., Wols, A., Lichtwarck-Aschoff, A., & Granic, I. (2018a). Explicit mental health messaging promotes serious video game selection in youth with elevated mental health symptoms. Frontiers in Psychology, 9. https://doi.org/10.3389/fpsyg.2018.01837

Roepke, A. M., Jaffee, S. R., Riffle, O. M., McGonigal, J., Broome, R., & Maxwell, B. (2015). Randomized Controlled Trial of SuperBetter, a Smartphone Based/Internet-Based Self-Help Tool to Reduce Depressive Symptoms. Games for health journal, 4(3), 235–246. https://doi.org/10.1089/g4h.2014.0046

Rosenberg, B. D., & Siegel, J. T. (2025). Psychological reactance theory: An introduction and overview. Motivation Science, 11(2), 133–138. https://doi.org/10.1037/mot0000376

Rosenthal, S., & Ratan, R. A. (2022). Balancing learning and enjoyment in serious games: Kerbal Space Program and the communication mediation model. Computers & Education, 182, 104480. https://doi.org/10.1016/j.compedu.2022.104480

Ryan, R. M. (1982). Control and information in the intrapersonal sphere: An extension of cognitive evaluation theory. Journal of Personality and Social Psychology, 43, 450-461. https://doi.org/10.1037/0022-3514.43.3.450

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. American Psychologist, 55(1), 68–78. https://doi.org/10.1037/0003-066x.55.1.68

Solmi, M., Radua, J., Olivola, M., Croce, E., Soardo, L., Salazar de Pablo, G., Il Shin, J., Kirkbride, J. B., Jones, P., Kim, J. H., Kim, J. Y., Carvalho, A. F., Seeman, M. V., Correll, C. U., & Fusar-Poli, P. (2022). Age at onset of mental disorders worldwide: large-scale meta-analysis of 192 epidemiological studies. Molecular psychiatry, 27(1), 281–295. https://doi.org/10.1038/s41380-021-01161-7

Steindl, C., Jonas, E., Sittenthaler, S., Traut-Mattausch, E., & Greenberg, J. (2015). Understanding Psychological Reactance: New Developments and Findings. Zeitschrift fur Psychologie, 223(4), 205–214. https://doi.org/10.1027/2151-2604/a000222

Thomas, J. M., & Young, R. M. (2010). Annie: Automated generation of adaptive learner guidance for fun seri-ous games. IEEE Transactions on Learning Technologies, 4(3), 329–343. doi: 10.1109/TLT.2010.32

Vogel, J. J., Vogel, D. S., Cannon-Bowers, J., Bowers, C. A., Muse, K., & Wright, M. (2006). Computer Gaming and Interactive Simulations for Learning: A Meta-Analysis. Journal of

Educational Computing Research, 34(3), 229–243. https://doi.org/10.2190/flhv-k4wa-wpvq-h0ym

Warsinsky, S., Schmidt-Kraepelin, M., Rank, S., Thiebes, S., & Sunyaev, A. (2021). Conceptual Ambiguity Surrounding Gamification and Serious Games in Health Care: Literature Review and Development of Game-Based Intervention Reporting Guidelines (GAMING). Journal of medical Internet research, 23(9), e30390. https://doi.org/10.2196/30390

Weerdmeester, J., Poppelaars, M., & Griffioen, N. (2025). Games for wellbeing. In H. Pote, A. Moulton-Perkins, & S. Campbell (Eds.), Psychological Digital Practice: The Basics and Beyond (1 ed., pp. 263-291). Open University Press.

Wols, A., Hollenstein, T., Lichtwarck-Aschoff, A., & Granic, I. (2021). The Effect of Expectations on Experiences and Engagement with an Applied Game for Mental Health. Games for Health Journal. https://doi.org/10.1089/g4h.2020.0115

Wols, A., Poppelaars, M., Lichtwarck-Aschoff, A., & Granic, I. (2020). The role of motivation to change and mindsets in a game promoted for mental health. Entertainment Computing, 35, 100371. https://doi.org/10.1016/j.entcom.2020.100371

Wouters, P., Van Nimwegen, C., Van Oostendorp, H., & Van Der Spek, E. D. (2013). A meta-analysis of the cognitive and motivational effects of serious games. Journal of Educational Psychology, 105(2), 249–265. https://doi.org/10.1037/a0031311