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Article

The Effect of Procedural Rhetoric and Narrative Content in a Narrative Game-Based Fear Appeal

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Abstract

The current study evaluates the relative contributions and interaction of procedural arguments and narrative content in health interventions. Passive health interventions often fail to make health threats relevant for a young target population. While serious games have shown promise in eliciting health behaviors, the relative contribution of mechanics themselves is often hard to attribute. The current study addresses the question of whether the presence of meaningful game mechanics, in the form of procedural arguments, contributes uniquely to persuasion by heightening susceptibility and behavioral intention. Using an interactive fear-appeal the authors present the design and evaluation of a boardgame that aims to capture persuasive arguments surrounding alcohol addiction. The mechanics and narrative framing were manipulated to be able to isolate their contributions. The study supports the notion that mechanics and rules alone might not be sufficient for players to identify the content of a procedural argument, with implementation of narrative content being an important factor in making mechanics persuasive. The current study contributes to the field by being one of the few works that operationalizes the concept of procedural rhetoric, providing implications for the design of mechanics and their integration for serious games used in health behavior change.

1. Introduction

According to the World Health Organization (WHO) alcohol consumption is responsible for 13.5 % of premature deaths in people aged 20-39 years old and has been identified as a contributing factor over 200 diseases and injuries [1]. Higher alcohol consumption in late adolescence and early adulthood has been linked with later alcohol dependence and decreased positive life outcomes in adulthood [2]. Alcohol consumption often peaks during early adulthood with college students showing increased risk for immediate health risks as well as alcohol dependence later in life [3],[4]. Brief alcohol interventions have been shown to be able

to effectively reduce alcohol consumption thereby reducing alcohol-related health risks [5]. Highlighting the adverse outcomes of risk-behaviors, fear appeals have proven to be an effective way to elicit prevention-focused behavior [6]. While fear-based appeals have been shown to be effective for a myriad of different behaviors for adult populations, the results for interventions designed to prevent substance abuse remain mixed and there is a need for more diverse modes of communication aside from passive textual interventions [7].

The Extended Parallel Process Model (EPPM) [8] is one of the most studied models utilizing fear as a motivator for behavior and has been shown to be effective for a wide range of health behaviors [9]. For substance abuse however, there is a strong tendency of young adults to underestimate their risk towards addiction in later life, leading to low perceived susceptibility even when confronted with high susceptibility information in a fear appeal [10], ,[11]. This underestimation of risk by young adults towards relevant health threats is defined as optimistic bias, first introduced by Weinstein [12]. Overcoming this optimistic bias by increasing perceived susceptibility presents a core issue when trying to elicit behavior change in young adults who may see the presented threat as severe but simply don't think they are susceptible to it. This challenge is not only limited to the EPPM, but has been found across other models for behavior change, such as the often-used health belief model [13].

The development of serious games for health interventions has gained considerable attention over the last decade [14],[15], theoretically enabling new possibilities to specifically raise susceptibility and overcome the optimistic bias of young adults. According to Fogg [16], games can serve as simulations that persuade people by letting them observe a link between cause and effect through immediate feedback of their actions. Since temporal distance of the threat in real life can lead to issues in creating susceptibility for fear appeals [17], using games we can potentially overcome this by simulating temporally distant threats for the player in short time-spans. As has been shown in other work, using games, as opposed to passive interventions, can have positive effects on learning and persuasion [18]. Through interaction with the game message receivers become an active part of the intervention rather than being passively exposed to the message. Interaction in game studies is often defined as player agency, although this definition is far from homogenous with definitions ranging from the players perceived competence, their perceived control over game outcomes or even simply the number of available options to players [19]. The focus on agency as commitment to meaning on the other hand focuses on interaction as a communicative attempt [20]. The possible interactions presented to the player (by means of mechanics and rules) enable the author to communicate with the player. The interactions thereby become procedural representations of real-life events and processes that convey meaning using procedural arguments instead of textual or audiovisual means [21].

Bogost [21] coined this procedural rhetoric (PR) to describe the persuasive power of games through procedural representations of real-life cause and effects. Whereas much of games research is concerned with the difference between inclusion and exclusion of interactivity itself, PR as a concept is helpful in order to study qualitative differences in argument design. The issue of the relative contribution of PR, i.e., whether it can function as an independent contributor to persuasion, is largely an issue of missing concept isolation in related work. There have been a number of researchers trying to analyze existing games concerning their procedural rhetoric, aiming to link the presence of procedural arguments to effectiveness in persuasion and learning (see, e.g., [22],[23]). However, there is little work experimentally isolating the concept of PR in order to obtain relevant evidence for its function and relative effectiveness in a persuasion attempt. The question central to the current investigation is to what extent the fit of procedural argument and real-world process contributes to effectiveness of a persuasion attempt.

As shown in the meta-analysis by Zhou et al. [24], there is also increasing interest in studying narrative game-based interventions in health communication. There is evidence across

a wide range of health behaviors to show that narrative game-based interventions can in fact increase knowledge about health issues as well as elicit perceived self-efficacy for the behavior promoted [24]. However, in their analysis they found no effect of narrative game interventions on attitudes or behavioral intention. This finding is counterintuitive to findings in this field, where a wide variety of evidence can be found linking traditional narrative health interventions to changes in attitudes, intentions and behavior [25]. This brings into question whether adding interactive elements to narratives causes interventions to result in different outcomes than purely passive experiences. Therefore, the second research question is concerned with the relative contribution of a procedural argument in an interactive fear appeal. Does the provision of procedural arguments alone affect persuasive outcomes or is this process modulated by narrative content?

For the current study, we take a two-pronged approach that embeds a procedural argument within the framework of a well-researched health communication theory (i.e., the EPPM) and manipulates the presence of a procedural argument to be able to isolate the relative effectiveness of procedural rhetoric alone in affecting behavioral intention. The advantage of this approach is to not only be able to distinctly determine the contribution of interaction (formalized as procedural rhetoric) on persuasive outcomes, but to further be able to assess potential interactions with narrative content to inform the design of narrative games for health persuasion.

2. Related Work

2.1 Fear appeals in health communication

One of the most well-researched theories in the domain of fear appeals is the Extended Parallel Process Model (EPPM) [8]. The EPPM proposes two sequential appraisals by the message recipient when confronted with a persuasive message. First, the provision of severity and susceptibility information creates fear in the message recipient by elaborating upon the danger the threat poses and the risk of being affected. To alleviate the fear created in the first appraisal, the message receiver obtains efficacy information, which communicates an effective solution that negates the threat (response efficacy) and is portrayed as easy to execute (self-efficacy). According to the EPPM, if the first appraisal fails to create the motivation for behavior change (i.e., fear is not elicited), the efficacy information is disregarded and hence the appeal will fail to strengthen the intention to perform the desired behavior. If the first appraisal is successful however, the message receiver will evaluate the response and self-efficacy of the proposed solution in order to decide whether or not to engage in the proposed behavior.

As shown by Tannenbaum et al. [6], in their meta-analysis, fear appeals not only affect attitudes, but further turn newly formed attitudes into behavioral intentions and consequently behavior. However, in the case of low susceptibility, even if the threat is perceived as severe, and both response efficacy and self-efficacy are perceived as high by the message recipient, the message receiver does not feel any need for action as the threat is simply not relevant to them (see, e.g., [26]). Immediate or near-future consequences of threats have been shown repeatedly to be more effective at increasing perceived susceptibility and behavioral intention than distant health threats in a variety of health domains [27], [28]. As laid out in the following section, games are unique in possibly being able to overcome this temporal distance in real-life by condensing the events leading up to the threat in a simulation of real-world processes.

2.2 Procedural rhetoric for susceptibility concerns

The definition of procedural rhetoric sets itself apart from other definitions of game interactions in the field as it is more concerned with the interplay of mechanics and rules that together

communicate a worldview or attitude [21]. As is the case with more traditional kinds of rhetoric (e.g., textual or visual rhetoric), procedural rhetoric aims to persuade the message receiver, but does so with the use of procedural arguments. For example, the game *My Cotton Picking Life* [29] asks the player to step into the shoes of a child laborer being forced to hand-pick cotton. The game entails repeatedly going through the same actions for hours thereby mimicking the monotony and workload of child laborers. The player can decide to give up at any point in order to be confronted with how little they would have earned if they were in the position of the character. The gameplay itself can therefore be seen as a communicative attempt, even potentially without other explicit content (e.g., textual or visual) that further augments the arguments made [20]. As also shown by Castronova [30], for example, utilizing point systems in a boardgame enables the designer to give the player insight into complex issues. Further, the differences in the design of mechanics for the same topic have been shown to lead to different learning outcomes [31], enabling game designers to consciously embed information in mechanics to persuade the player (i.e., exocentric persuasion [32]). Players are able to experience, rather than just read about, events and processes that they would ordinarily not experience in real-life, facilitating insight generation about these processes [33].

For the current study we hypothesize PR to significantly influence perceived susceptibility perceptions, thereby ultimately heightening behavioral intention for the target behavior. Support for this hypothesis is based on the Attitude Gameplay Model [34], which argues that games can persuade by making the threat more relevant to the player. The model argues that this happens through the "degree to which a player can (correctly) correlate the representation of the attitude object or concept (in the game world) to the represented attitude object or concept (in the real world).". We argue that a procedural argument that accurately models real-world cause-effect chains leading up to alcohol abuse are more effective in making players understand their susceptibility to the threat. They themselves experience through the boundaries set by the rules and mechanics in the game how their current behavior connects to being susceptible to the threat later in life.

Much of the work that exists does unfortunately fail to isolate PR as a distinct factor in eliciting susceptibility. Khalil et al. [35], for example, asked young adult college students to play a game in which they took control of a nanorobot tasked with destroying cancer cells. The authors argue that the information presented in the game, e.g., cell division and invasion, lets player experience cancer risk thereby heightening susceptibility perceptions. They observed that an interactive intervention (as opposed to passive viewing of pictures of the game) led to higher susceptibility perceptions towards cancer. While this does support the notion of interactivity itself being able to increase susceptibility perceptions, comparing the presence and absence of interaction itself fails to capture qualitative differences in the design of the interaction and the ability of interactions to carry meaning. Similarly, Jacobs et al. [36] findings do support the notion of PR as an independent contributor to persuasion, however they only varied argument strength, making it difficult to ascertain whether the presence of PR itself makes a difference in affecting persuasive outcomes.

For the current study we aim to provide a novel approach to studying PR by comparing a carefully designed procedural argument against a version of the game whose rules and mechanics do not match real-life processes leading to alcohol addiction. We therefore expect the presence of an accurate procedural rhetoric argument to heighten perceived susceptibility to the threat and consequently lead to higher behavioral intention than a non-procedural argument.

H1a) A procedural argument in the game will lead to higher behavioral intention to reduce alcohol consumption than a non-procedural argument.

H1b) Perceived susceptibility mediates the effect of procedural rhetoric on behavioral intention, with procedural arguments leading to higher perceived susceptibility compared to a

control group without procedural arguments, which in turn will lead to higher behavioral intention.

2.3 Narrative persuasion

While there is evidence to assume that procedural rhetoric (PR) can be beneficial to persuasion, the question is whether PR itself uniquely contributes to heightening susceptibility perceptions. As Smith [37] argues, procedural rhetoric itself might increase the degree of "vividness" (i.e. the degree to which the subject matter is brought to life) of the persuasive appeal, but do not see procedural rhetoric as necessarily unique in its function to persuade. They argue that similar levels of "exciting representations" of events can also be achieved with traditional textual rhetoric, with promising results on the side of procedural rhetoric stemming from the lack of fully realizing vividness in textual persuasion. They do however note that games as persuasive devices, while not distinct in persuasive outcomes, do offer different strategic options that might be more useful in some contexts.

We argue that narrative elements serve to contextualize procedural arguments, while procedural arguments uniquely contribute to susceptibility perceptions by letting the player experience consequences of distant behaviors. The narrative framing thereby only strengthens the procedural arguments by letting the player identify the relationships of the process, i.e., closer to the experience of a real-life person, rather than a textual description of facts. Work in the field does show support for the notion that narratives aid the identification of procedural arguments to help facilitate persuasion. As can be seen by the study of Andersson et al. [38], providing context through textual and audio-visual elements leads to players being able to more accurately identify the argument made and enables significant changes in attitudes as opposed to a procedural argument alone. Andersson et al. [39] show further evidence by highlighting the importance of consistent narrative framing (with real life) in order to enable attitude change. It is difficult to ascertain whether narrative elements interacted with narrativity in either study as the 2019 study [38] did not use comparable stimuli between conditions and the 2020 study [39] did include narrative framing that was qualitatively different instead of different in relative strength between conditions.

While the authors of this manuscript argue that procedural rhetoric alone can have a positive effect on attitudes and intentions, we further argue that this effect is strengthened when narrative framing increases identification with the protagonist in the game. High narrativity helps players to correlate real world processes with in-game processes, which in turn heightens susceptibility [34].

H2a) Narrativity moderates the effect of procedural rhetoric on perceived susceptibility, with high narrativity strengthening the effect of the procedural argument on perceived susceptibility, whereas low narrativity weakens the effect of the procedural argument on perceived susceptibility.

As mentioned above, PR is hypothesized to be an independent contributor to persuasiveness of the intervention, while other elements can still serve to strengthen the intervention by helping to identify the procedural argument (H2a) or by simply directly affecting susceptibility perception as they would in a passive intervention. Passive narrative interventions have shown to be effective for improving persuasive effects in the health domain [25]. Especially for fear appeals narratives this could be promising to heighten affect, which has been shown to lead to stronger persuasive effects [40]. For the current study we hypothesize that narrativity itself does further affect susceptibility perceptions directly by increasing the vividness of the stimuli.

H2b) Narrativity has a direct effect on susceptibility with the high-narrativity conditions resulting in higher perceived susceptibility than the low-narrativity conditions.

3. Methods and Material

3.1 Design

Data for the current study was collected from May 2nd, 2023, until October 23rd, 2023. The study design and analyses were preregistered on the Wharton Credibility Lab preregistration platform. The design of the study was a two by two between-subjects design with procedural rhetoric (present / absent) and narrativity (narrative / factual) serving as the independent variables. The dependent variables measured through self-report questionnaires were perceived susceptibility and behavioral intention to perform the proposed health-behavior.

3.2 Participants

Participants were recruited using the human subjects pool of Tilburg University and received one course-credit for their participation. A total of 179 participants took part in the study. Participants were included in the final sample if they (1) finished the game, (2) passed the attention check embedded in the questionnaire and (3) were consuming alcohol at least once per month. Three participants were excluded because they failed to complete the game, a further nine were excluded for failing the attention check and 18 were excluded for indicating that they 'never' drink alcohol. The final sample consistent of 149 participants (61 male, 86 female, 2 non-binary) who were between 18 and 39 years old (M=21.46, SD= 3.52). All participants were currently enrolled in a bachelor's program at Tilburg University. About 60% of participants had obtained a high school diploma (N=90), 37% a bachelor's degree (N=55) and four participants had obtained a master's degree. With regard to indicated alcohol consumption, roughly 28% of the sample indicated consuming alcohol monthly or less (N=42), while 42% (N=62) stated drinking two to four times a month. About 30% of the sample indicated that they consume alcohol either two to three times a week (N=39) or more than four times a week (N=6). Scoring the results of the alcohol use disorder identification test (AUDIT) revealed that about 52% (N=77) of participants show signs of low-risk consumption, 37% (N=55) signs of harmful consumption and roughly 11% (N=17) showed signs of a likelihood of alcohol dependence (Figure 1).

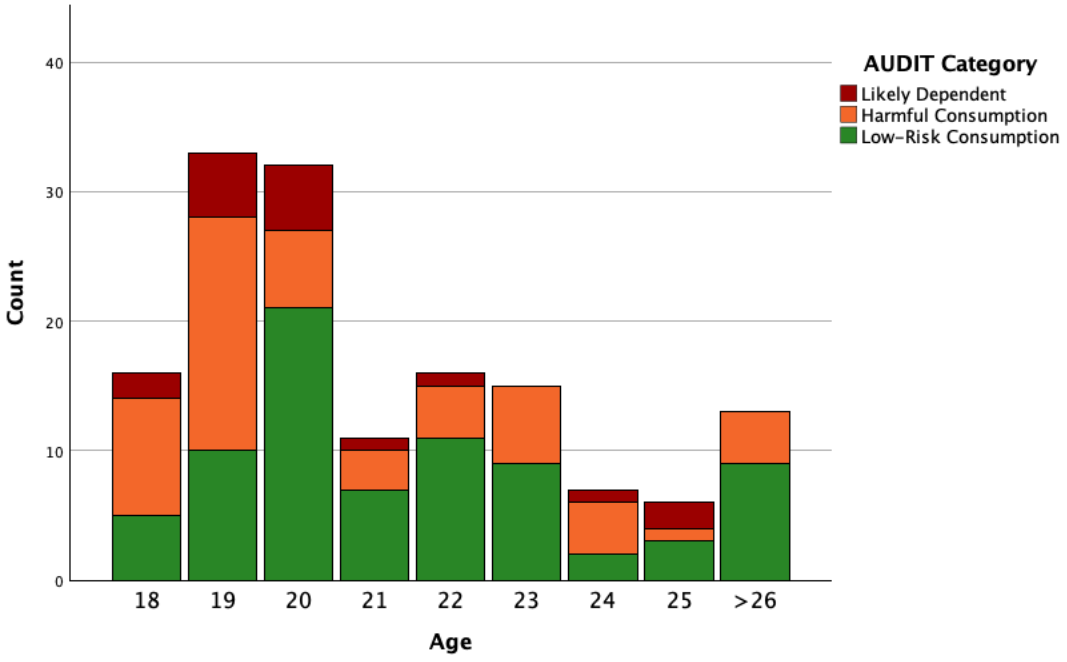

Figure 1. Alcohol use of participants as categorized through the alcohol use disorder test (AUDIT), clustered by age.

3.3 Materials

3.3.1 Game and narrative overview

Game of Life consists of two components - gameplay and narrative. The narrative made use of the theoretical framework of the EPPM [8] by communicating severity, susceptibility, response efficacy and self-efficacy information to the player. The EPPM was used as it incorporates both threat and efficacy information, thereby reducing the risk of potential adverse effects stemming from a lack of guidance on how to avoid the threat (i.e., reducing psychological reactance through provision of efficacy information [41]). This model has further shown to be effective for eliciting other health behaviors among young adults such as handwashing [42], smoking cessation [43] or getting vaccinated [44], making it a potentially good fit for the topic of alcohol abuse as well.

The player is told that he takes control of the life of a university student and makes decisions for their life over the course of the next 15 years. The aim was to condense the timescale of real-life events into the duration of a game to have players experience the process of addiction from social binge drinking, over problematic drinking behaviors, causing issues with health and relationships, all the way to an addiction leading to a fatal outcome. As has been shown in previous work on fear appeal narratives [45], it was important to not only discuss health effects in the game as social outcomes tend to be more effective for young adults when communicating severity information (Figure 2).

(3)
I am quite proud of myself I must say. I've kept up reasonably well with studying - your average Joe's uni success story. A couple of failed courses here and there, but that's ok. Sometimes being young and dumb is really all that it's cracked up to be. The parties are worth all the hassle that follows... even if I don't remember half of them. I mean it's collective amnesia at least, not only me. After all, you are only young once, so let's enjoy it while I still can.

(4)
These past years have been a blast, but I am getting a bit anxious by now. All things are coming to a close soon, with my thesis and graduation in a couple of months. I need to really sit my butt down and see this through. I don't plan on abandoning what little time of student life I have left (weekends are there for partying hard), but I need to make sure to hit the books during the week for my final exams and thesis. If everyone else can do it, so can I.

(8)
Fuck it, I am done. My boss found me with a small bottle of vodka in the breakroom. I am on probation now apparently. I was just trying to get through the day without screaming at one of my seriously incompetent co-workers. My day is such a farce …my partner has been tracking me down at the bar several times last year, so even that is not a safe place anymore. Apparently, I "have been neglectful". Tze, neglect… where is my fucking pity party. I am just using the park next to our house as my shelter now after work.

Figure 2. Excerpts from the narrative showing social facilitation of drinking (round 3 and 5) and social consequences of alcohol abuse (round 8).

The game itself is played over the course of 10 rounds. Each round the player first obtains a part of the narrative and is then presented with the decision board (Figure 3) where the player makes decisions for the protagonist on how to prioritize different parts of their life. The player's goal is to move the answer slider on the board from the current status indicator (blue) to the desired position expressed by the protagonist in the story (red). To do this the player is asked to make three decisions per round, one for each category on the board (*social*, *health*, *education*). It should be noted that the "education" category is replaced halfway through the game with the "career" category in order to better match the narrative content. For each decision the player can choose between seldomly, occasionally and frequently by placing a decision stick into each slot of the decision board. After each decision the researcher adjusts the game board to reflect the decisions made in terms of the new positions of the slider for each

category. If all three targets are reached the player can move on to the next round. If the player fails to reach all targets the board is reset and they can try again.

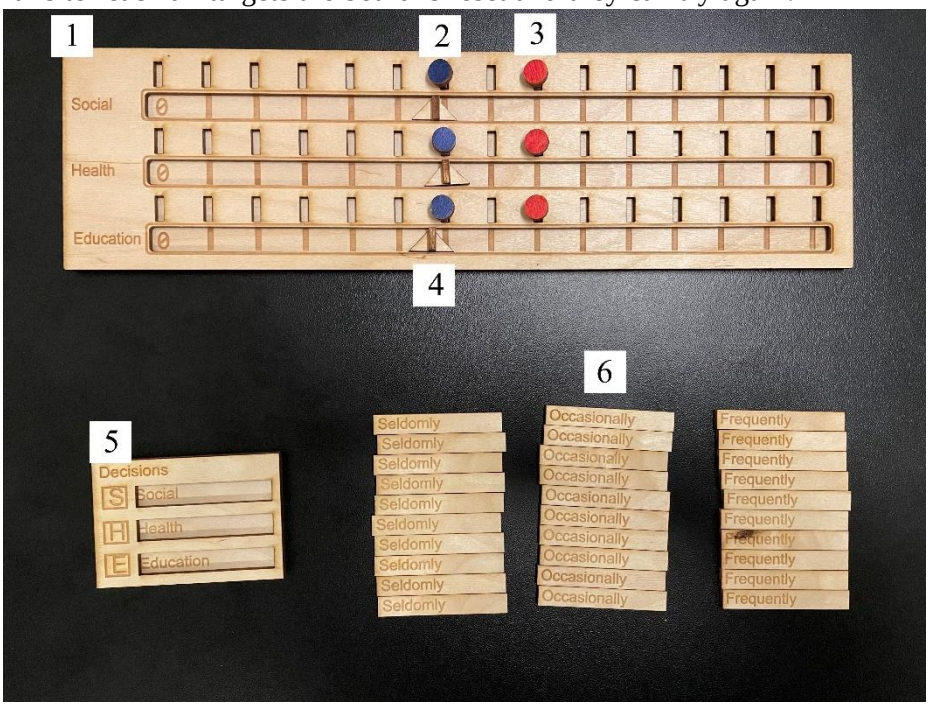

Figure 3. Overview of the gameboard (1), status indicator (2), target indicator (3), answer slider (4), decision board (5) and decision sticks (6) as presented to the player.

3.3.2 Implementation of procedural arguments

The argument that was integrated into the mechanics of the game was the susceptibility of falling victim to an alcohol addiction by means of high frequency drinking as a young adult. While the drinking itself is mentioned in the narrative, its effects on other parts of the protagonist's life is not explicitly stated (or discussed as problematic) until the last few rounds. This is done in order to enable the player to discover the interrelation of frequent alcohol consumption and negative social- and health-outcomes through the game mechanics themselves.

The procedural argument is embedded into multiple parts of the rules and mechanics in the game. First, hitting the targets by choosing the correct decision sticks to place per category requires the discovery of the interrelation of the point allocation between different categories. At the beginning of each round the participant was given a part of the narrative and then asked to make three decisions, one per category. If the participant reached all three targets, they moved on to the next round. For each category, *frequently* moves the slider up by six, *occasionally* by four and *seldomly* by two points of the specific category for which it was placed. However, higher frequencies of behavior for one category have an effect by means of a reduction of points for another. Choosing *frequently* or *occasionally* for social will deduct four or two points from *health* respectively. The same applies to the effect of *health* on *education*, as well as *education* on *social*, highlighting the interrelatedness concepts relevant to a balanced life (see Table 1). Using this interrelatedness we can model the process of different life-stressors affecting the protagonist's ability to stop drinking in order to show how easily ineffective stress management and social facilitation can lead to problematic drinking. The exception to the interrelatedness of concepts is *seldomly*, which does not affect other categories, but is often not enough in order to reach the set targets in the game. The argument presented is one of balance, but also concessions that need to be made in order to effectively balance different phases of life without relying on alcohol consumption to buffer stress. It is important to note that neither the topic related to the study goal (alcohol addiction /

consumption), nor the interrelation of concepts and associated point values were disclosed to participants. This resulted in the participant having to figure out how concepts relate through trial and error without any explicit instructions. This was done to ensure that participants had to engage deeply with the mechanics and thereby identify the procedural argument. It should be noted that early prototypes were designed to have each decision affect all three categories instead of two. However, playtesting showed that this made puzzles too complex to solve in a reasonable amount of time by inexperienced players. This increased complexity was further deemed risky in potentially undermining the clarity of the procedural argument and was hence reduced.

Table 1. Gameboard changes per decision as expressed by slider movement.

Category	Decision	Effect
Social	Frequently	Social: +6 Health: -4
	Occasionally	Social: +4 Health: -2
	Seldomly	Social: +2
Health	Frequently	Health: +6 Education: -4
	Occasionally	Health: +4 Education: -2
	Seldomly	Health: +2
Education	Frequently	Education: +6 Social: -4
	Occasionally	Education: +4 Social: -2
	Seldomly	Education: +2

The second part of the procedural argument is the board itself, which presents the player with different target goals of the protagonist. While this does start with a relative balance of concepts (i.e., all red targets are somewhere around the midpoint), over the progression of the game the *health* and *education* / *career* targets become smaller and smaller to signify the decline of the importance of these categories for the protagonist once the addiction takes hold of their life. This is also used to express a sense of continuity of decisions made earlier in the game affecting long-term progression throughout. One additional way the game-board is utilized is by exchanging the starting board (Figure 3) with a board with a negative *health* range (extending past zero to the left) after round eight. The change in board represents the extremes of the health consequences, which are difficult to foresee early on in the game (or in life) but reveal themselves later through a variety of health issues for the protagonist.

Lastly, the decision board itself is used to show the helplessness experienced by the protagonist once their addiction has manifested itself fully. In the last two rounds the player is only allowed to make one decision for the *social* category while the other two are blocked, forcing him/her to continue the destructive behavior of the protagonist by being unable to balance out the high priority of social with other categories.

3.3.3 Non-procedural and factual text format conditions

In the non-procedural condition participants played the same game, albeit with slight modifications. For one, the scoring of different answers (*seldomly*, *occasionally* and *frequently*) still moved up the respective slider for the given category, however did not deduct points from a different category. This thereby did no longer highlight the interrelatedness of concepts in the interaction with the game. Further, targets were always kept on the mid-point throughout the entirety of the game thereby breaking the relation between story content and interaction, as well as removing the feeling of progression that was enabled through continuously decreasing targets in the procedural condition. Since the targets did not move, the board also remained

constant throughout all rounds. Removing the ability to make decisions for the last two rounds was also reversed in this condition enabling the player to make three decisions in all rounds. With the difference in scoring in mind, the current status (blue indicators) and targets (red indicators) were set to make sure that regardless of condition all players would have to make the same decisions.

For the text format change the narrative texts were adapted to a factual text while keeping relative length of segments and content the same between conditions. Instead of a first-person narrator, the factual format made use of a third person description of students in general. Words implying relative frequency of drinking behavior were avoided throughout the text in order to not affect susceptibility perceptions by using phrasing such as 'most students' or 'many students'.

3.4 Pilot testing

A pilot was conducted in order to validate the recognition of the procedural argument, identification with the protagonist, understanding of the game rules and credibility of the narrative presented. The pilot made use of the Rhetoric Content Scale [38], identification scale [46] (both seven-point scales), as well as a semi-structured interviews post intervention. For the pilot test only the narrative version of the game was tested with 19 participants (12 male, 7 female) who were between 18 and 26 years old (M=21, SD=2.40) and received one course credit for their participation. Participants did perceive the game to contain rhetorical content (M=3.71, SD=.41), with the majority of participants also indicating verbally that the game contained an argument (N=17). Participants showed moderate perceived identification with the protagonist (M=4.39, SD=.99).

The majority of participants indicated that they found the events in the narrative to be believable (N=18). Seven participants said that they can relate to the story due to personal experience (themselves or people they know) and most indicated (N=15) that they believe the events to be likely to happen to other people. All participants stated that they enjoyed the game. Lastly, all participants understood the rules after a single explanation and were able to finish the game without intervention by the researchers. Based on the positive pilot results no changes had to be made to the mechanics or narrative to be able to conduct the main study.

3.5 Procedure

Participants played the game in a room at the Media Design Lab. The player was sitting at a table facing the researcher on the opposite end. After the informed consent the participant was given a sheet with instructions for the game. After completion of the game the participant filled in a questionnaire measuring perceived procedural rhetoric content and questions measuring perceived susceptibility and behavioral intention to limit alcohol intake in the future. Next, participants answered questions assessing cognitive identification and transportation as well questions measuring perceived severity, response efficacy and self-efficacy. After this they were presented with items measuring challenge perceptions, perceived agency, perceived fear, identification with the protagonist and indicated the frequency of their drinking behavior. Lastly, participants provided their age, gender and information regarding their highest obtained educational degree. Upon completion of the questionnaire participants were debriefed, given resources for getting information about alcohol addiction as well as contact information for local addiction support groups.

3.6 Measures

To measure our behavioral intention (dependent variable) participants were presented with four statements adapted from the approach used by Engelbrecht et al. [26]. The statements provided context cues to ask participants whether they would '*limiting alcohol intake to low amounts*'

in general, on special occasions, when being with friends and when being by themselves. The items were scored on 7-point Likert ranging from *Strongly Disagree* to *Strongly Agree*. The scale showed good reliability (M=4.64, SD=1.25, Cronbach α=.744).

To measure the degree to which the game is perceived to contain an argument, the Rhetoric Content Scale (RCS) [38] was used as a manipulation check. The RCS contains ten items to measure the perceived degree of rhetoric content of a game, and the degree to which people perceive a game to contain rhetorical bias. This scale is scored on a 5-point Likert scale with the items ranging from *Strongly Disagree* to *Strongly Agree*. The scale showed acceptable reliability (M=3.77, SD=.46, Cronbach's α=.627).

In addition to the RCS scale the cognitive identification scale adapted from Jacobs et al. [36] was also used as a manipulation check. This scale makes use of the concept of cognitive identification measuring the degree to which the players perceive a game to resemble real world events and scenarios. The scale consists of five items scored on 5-point Likert scales from *Strongly Disagree* to *Strongly Agree*. The scale showed acceptable reliability (M=3.85, SD=.58, Cronbach α=.653).

For validating the manipulation of our narrative conditions transportation and identification were measured. For the transportation measure the attention-focused transportation scale adapted from Ooms et al. [47] was used. This scale drops several items from the widely used scale of Green [48] in order to better capture transportation for a healthy population reading about a sick protagonist. The participants indicate their agreement with 6 items of a 7-point Likert scale ranging from *Strongly Disagree* to *Strongly Agree*. The scale showed questionable reliability (M=5.07, SD=.76, Cronbach α=.546). To measure whether participants were able to identify with the protagonist(s) in the texts the identification scale by De Graaf [46] was used. The eight item scale measures the degree to which participants imagine events from the position of the character, experience empathy with the character and feel like being the character. All statements are assessed using a 7-point Likert scale ranging from *Strongly Disagree* to *Strongly Agree*. The scale showed good reliability (M=4.61, SD=1.12, Cronbach α=.886).

The AUDIT test [49] is widely used to identify problematic drinking in adolescents as well as young adults. The scale assesses dependence symptoms and harmful alcohol use and was utilized to ensure randomization across conditions in this study. This allows participants to be categorized as (1) low risk drinkers, (2) excessive drinkers, (3) harmful/hazardous drinkers and (4) alcohol dependent using ten items. Although this measure is traditionally done in an interview format, the following questions was answered via a questionnaire for the current study. The scale showed good reliability (M=8.06, SD=5.04, Cronbach α=.808).

Each of the four EPPM concepts, perceived severity, perceived susceptibility, response efficacy and self-efficacy, was measured using the three item scales adapted from Shi [50]. Participants were asked to indicate their agreement with statements discussing alcohol addiction as a threat, highlighting the role of limiting alcohol intake in preventing addiction and the ease with which drinking behavior can be limited to low amounts. All items were measured using 7-point Likert scales ranging from *Strongly Disagree* to *Strongly Agree*. The scales showed unacceptable to good reliability (severity: M=6.57, SD=.62, Cronbach α=.419; susceptibility: M=2.26, SD=1.27, Cronbach α=.844; response efficacy: M=5.89, SD=.93, Cronbach α=.818; self-efficacy: M=6.02, SD=1.04, Cronbach α=.897). Due to the low reliability of the severity measure, it was decided to only use a single item of the three-item scale for further analysis. The item "An addiction to alcohol is a serious health risk." has been chosen as it is the least ambiguous item of the scale.

For exploratory analyses we additionally measured perceived agency. Perceived agency was measured using the scale by Engelbrecht et al. [26] who adapted a scale originally created by Fendt et al. [51]. The scale asks participants to indicate their agreement with statements relating to the perceived influence their actions had on the narrative. The five items were measured on

7-point Likert scales ranging from *Strongly Disagree* to *Strongly Agree*. The scales showed good reliability (M=3.66, SD=1.33, Cronbach α=.800).

Lastly, we measured challenge perceptions and perceived fear as potential confounds of our manipulation. Challenge perceptions were measured using parts of the Game Experience Questionnaire (GEQ) by IJsselstijn et al. [52]. The participant was presented with three items asking them to what degree they felt challenged, thought the game was hard and felt that they had to put a lot of effort into the game. All items were measured on 4-point Likert scales from *Not at all* to *Extremely*. The scale showed good reliability (M=2.04, SD=.69, Cronbach α=.837). Based on the recommendation by Witte [53] self-reported fear was measured using mood-adjectives. Participants were asked to indicate to what degree they felt afraid, scared, worried and anxious while playing the game. The items were scored on 7-point Likert scales from strongly disagree to strongly agree. The scale showed good reliability (M=2.59, SD=1.30, Cronbach α=.871).

4. Results

4.1 Randomization and confound checks

We conducted a chi-square test to see whether gender was randomly distributed. We observed no significant difference of gender across the different conditions (X^2 (6, N = 149) = 2.6, p = .857)). Next, we assessed a number of potential confounds that might have affected our measures by looking at their differences in means across conditions. We conducted five One-way ANOVAs to see whether the conditions had an influence on the obtained AUDIT score indicating the degree of potential problems with their drinking behavior, as well to test the stability of fear, severity, response efficacy and self-efficacy perceptions across conditions. We obtained no significant differences for the conditions on AUDIT score (F(3(148)) = 2.13, p = .099, η^2 = .04). Group membership had no significant effect on fear (F(3, 148) = 0.50, p = .682, η^2 = .01), severity (F(3,148) = .765, p = .515, η^2 = .01), response efficacy (F(3,148) = .491, p = .689, η^2 = .01) or self-efficacy (F(3,148) = .296, p = .829, η^2 = .01). We can thus assume successful randomization of drinking behavior as well as severity, response efficacy and self-efficacy across groups. To check for potential differences in difficulty perceptions across conditions, we performed an independent samples t-test between the procedural / non-procedural conditions and challenge perceptions. Participants in the procedural rhetoric condition perceived the game as significantly more challenging (M = 2.36, SD = 0.66) than participants in the non-procedural condition (M = 1.71, SD = 0.56), t(147) = -6.40, p < .001.

4.2 Manipulation checks

In order to see whether both the procedural rhetoric and narrative manipulations were successful, multiple manipulation checks were performed. First, the effect of the presence of a procedural argument on both the rhetoric content scale [38] and the cognitive identification scale [36] was determined by means of two independent sample t-tests. Neither the rhetoric content scale nor the cognitive identification scale showed a significant difference between the procedural and non-procedural argument conditions, t(147) = -.990, p = .324 and t(147) = -.217, p = .828. This shows that the participants in the procedural condition did neither report a higher degree of perceiving the game to contain a rhetoric argument nor perceived the procedural arguments as more reflective of real life than the participants in the non-procedural argument conditions. Another two independent sample t-tests were performed to see if the narrative text format led to significantly different transportation and identification scores than the factual format. The narrative text did not significantly affect the transportation measure,

t(147) = -1.326, p = .187. For identification on the other hand, the narrative condition did lead to significantly higher identification (M = 4.81, SD = 1.07) than the factual text (M = 4.41, SD = 1.135), t(147) = -2.215, p = .028, thereby rendering the manipulation successful at inducing higher identification.

4.3 Main analysis

Since the focus of H1a was only concerned with the differences between the presence and absence of procedural rhetoric on behavioral intention, we decided that a One-way ANOVA to be the best fit for the data. A One-way ANOVA with procedural rhetoric as the independent and behavioral intention as the dependent variable was conducted. We observed no significant effect of the procedural rhetoric (PR) conditions on behavioral intention ($F(3,148) = .035$, $p = .853$, $\eta^2 = .00$), thereby not finding any evidence for the support of H1a (procedural: M = 4.66, SD = 1.30; non-procedural: M = 4.62, SD = 1.22). An overview of the outcome measures per condition can be found in Table 2 and Figure 4.

Table 2. Means and standard deviations of susceptibility and behavioral intention per condition.

Procedural Argument	Format		Susceptibility	Behavioral Intention
Absent	Factual	Mean	2.27	4.63
		Std. Deviation	1.19	1.11
	Narrative	Mean	2.47	4.61
		Std. Deviation	1.37	1.34
	Total	Mean	2.37	4/62
		Std. Deviation	1.28	1.22
Present	Factual	Mean	2.18	4.48
		Std. Deviation	1.28	1.41
	Narrative	Mean	2.11	4.84
		Std. Deviation	1.25	1.17
	Total	Mean	2.15	4.66
		Std. Deviation	1.26	1.30
Total	Factual	Mean	2.23	4.56
		Std. Deviation	1.23	1.26
	Narrative	Mean	2.29	4.73
		Std. Deviation	1.31	1.25
	Total	Mean	2.26	4.64
		Std. Deviation	1.27	1.25

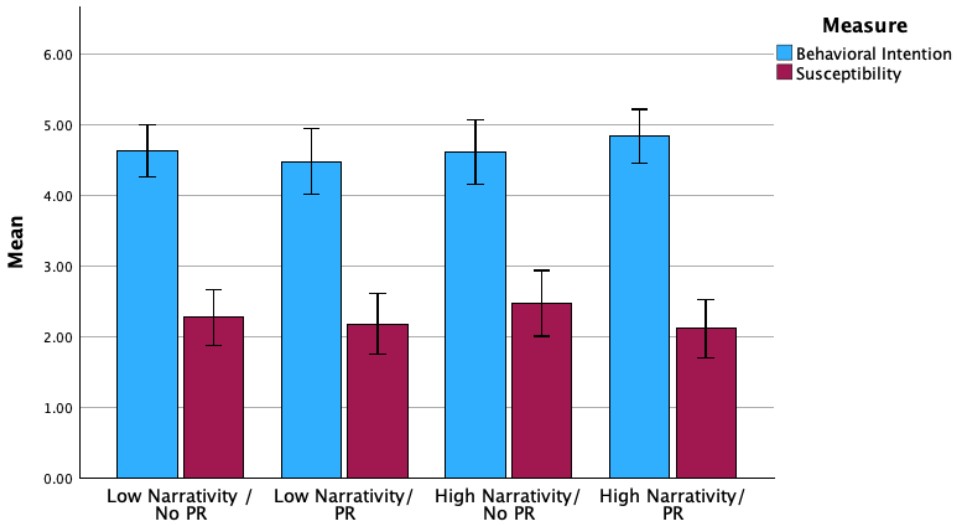

Figure 4. Overview of mean values of behavioral intention and susceptibility across conditions, including 95% error bars.

In order to test the remainder of the hypotheses, a moderated mediation analysis was conducted using the PROCESS plugin in SPSS [54]. The moderated mediation model 7 was used for the analysis with 5000 bootstrap samples. As can be seen in Figure 5, we further obtained no evidence that PR is a significant predictor of perceived susceptibility (path a1: b = 1.747, t = .2653,p = .7912; procedural: M = 2.15, SD = 1.26; non-procedural: M = 2.37, SD = 1.28). However, we did find a significant relationship between perceived susceptibility and behavioral intention (path b: b = -.3090, t = -3.9538, p = .0001). The moderated mediation index is not significant (effect = .0823, BootSE = .1327, BCa 95%CI [-.196,.342]), with no mediation for neither the factual (effect = .028, BootSE = .092, BCa 95%CI [-.141,.223]) nor the narrative format (effect = .111, BootSE = .097, BCa 95%CI [-.091,.303]). Thus, we have not found any support for H1b.

Looking at the role of the narrative format (NF), we did not obtain evidence that NF moderates the relationship between PR and perceived susceptibility (H2a, path a2: b = -.266, SE = .417, BCa 95%CI [-1.091,.559]) and did further not observe a direct effect of NR (compared to factual) on perceived susceptibility either (H2b, path a3 b = .467, SE = .661, BCa 95%CI [-.840,1.774]). We therefore have not obtained any support for neither H2a nor H2b.

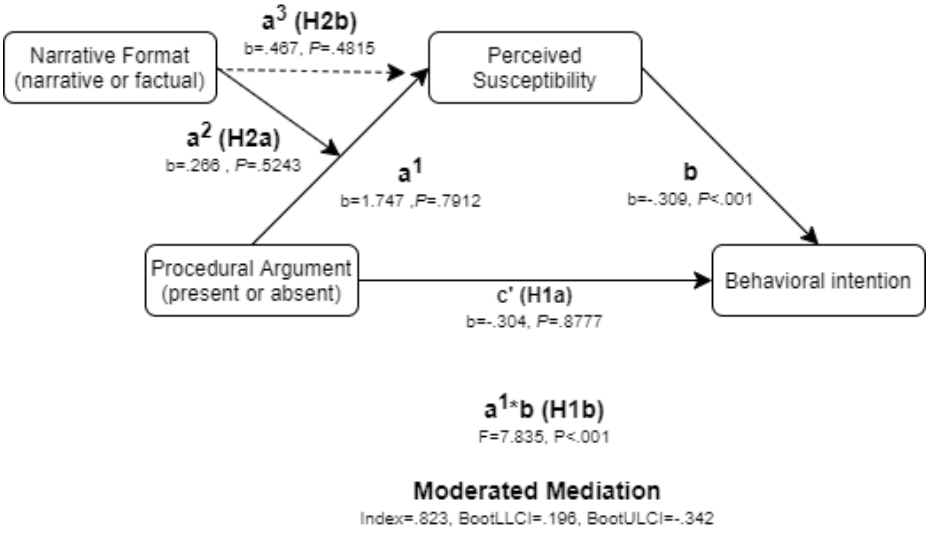

Figure 5. Process model 7, moderated mediation analysis of procedural rhetoric on behavioral intention through perceived susceptibility.

4.4 Exploratory analysis

Due to the non-significant effect of the procedural argument conditions on the rhetoric content measure it was decided to conduct the same Process model 7 analysis but use a median split to divide the participants into separate groups based on the rhetoric content measure itself. As can be seen in Figure 6, the resulting analysis does closely match the findings obtained in the main analysis. However, we did obtain a significant direct effect of the perceived rhetoric content on behavioral intention (path c', b = .422, SE = .195, BCa 95%CI [.037,.807]). The remainder of the effects mirror the main analysis with no significant findings for the effect of perceived rhetoric content on perceived susceptibility (path a1, b = -.518, SE = .656, BCa 95%CI [-1.815,.779]) and no significant effect of NF as a moderator of perceived procedural content on perceived susceptibility (path a2, b = .510, SE = .416, BCa 95%CI [-.312,1.332]).

In order to further investigate possible alternative explanations for failed manipulation checks we investigated the relationship of our procedural rhetoric manipulation with the adjacent concept of agency.

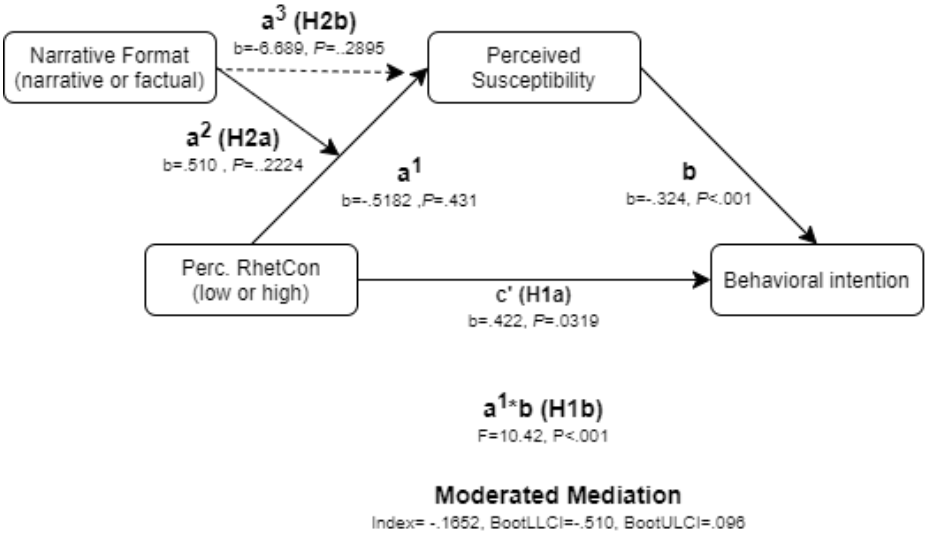

Figure 6. Process model 7, moderated mediation analysis using group assignment through media split on rhetorical content measure.

Procedural rhetoric did have a significant effect on perceived agency (t(147) = -2.650, p = .009), with a procedural argument showing higher agency (M = 3.936, SD = 1.332) than the non-procedural argument condition (M = 3.370). Agency further shows a significant negative correlation with susceptibility (r(147) = -.169, p = .039).

In the same way as agency seems to have captured a relevant aspect of our manipulation that affects susceptibility, we hypothesize that identification might have functioned similarly – meaning that while our narrative manipulation itself affected relevant as well as irrelevant factors for the purpose of altering perceived susceptibility, identification might have captured the more relevant part. We observed a significant difference between the factual (M = 4.407, SD = 1.135) and narrative (M = 4.807, SD = 1.072) conditions for identification (t(147)=-2.215, p=.028). Identification further shows a significant positive correlation with susceptibility (r(147) = .303, p < .001).

In both cases we can hypothesize that while our original manipulation did not directly affect susceptibility, they have possibly significantly contributed to changes in perceived susceptibility through agency and identification respectively. To test this assumption we performed a mediation analysis using Process model 4 [54]. We obtained a significant indirect effect of PR on susceptibility through agency (effect = -.085, SE = .044, BCa 95%CI [-.218, -

.001]) as well as a significant indirect effect of NF on susceptibility through identification (effect = .062, SE = .208, BCa 95%CI [.013, .310]).

5. Discussion

In the current study, we did not observe a significant effect of the presence of procedural rhetoric (PR) on behavioral intention to limit alcohol consumption (H1a) or perceived susceptibility (H1b). Further, we did also not obtain any evidence for a significant moderation of PR and susceptibility through narrativity (H2a) or a direct effect of narrativity on susceptibility (H2b).

5.1 Effect of procedural rhetoric on behavioral intention

In our study, we tested the impact of procedural rhetoric by changing the rules and mechanics of the game, leading to no significant measurable differences between our PR conditions on behavioral intention (H1a). As can be seen in related work, modifying argument strength by tweaking game rules, while providing explicit narrative framing, can lead to measurable significant differences in persuasion [36]. However, our findings seem to confirm the emerging evidence that embedding an argument in mechanics alone might not be sufficient, leading to issues in players being unable to match interactions to a specific rhetorical argument [38]. This means that even if our players identified that a procedural argument was present in general, the interpretation of the argument may not have been consistent enough across players to create a significant difference between conditions.

Our exploratory findings further support the notion that argument identification might be too difficult using mechanics alone. The median split using the perceived rhetoric content itself, rather than our manipulation, did show a direct effect on behavioral intention. So, while there seems to be a mismatch between Bogost's [21] original definition, as operationalized in our study, the conceptual definition of PR measured in Andersson et al.'s [38] rhetoric content scale does seem to affect behavioral intention. The rhetoric content scale assesses whether participants perceive rhetoric content resulting from the game. However, the majority of items refer to the overall intentions of the game rather than the implementation of mechanics and rules specifically, meaning that a clear separation of procedural and narrative content (as intended by the authors) was possibly not measured. For the procedural content scale, only one of the items measuring rhetorical content refers explicitly to 'the rules of the game'. It could be argued that our operationalization of PR was not strong enough to affect a difference in perception of overall argument strength (procedural and narrative content) given that the measures do not specifically focus on mechanics alone, but it might still have been an appropriate operationalization of PR as defined by Bogost [21].

As seen in the exploratory results, our operationalization did significantly affect perceived agency, which is often used to define the meaningfulness of game interactions [55]. The significant effect of procedural rhetoric on susceptibility through agency as a mediator points to our manipulation having at least partly captured meaningful interaction that affected behavioral intention indirectly. More interestingly, the relationship of agency and susceptibility show a significant negative correlation, meaning that higher agency was related to feeling less susceptible to the threat. In game studies, higher agency is often hypothesized to lead to more successful persuasive outcomes. The idea is that providing player with higher agency engages players [55], provides more meaningful interactions [20] and strengthens competence perceptions [56], which enables game experiences to affect antecedents necessary for persuasion. However, arguing from the procedural argument definition, a procedural argument is persuasive to the degree that it captures 'real world events and processes' [21] through rules and mechanics. Hence, if the process being simulated requires the player to feel less competent

and more helpless, as could be argued is the case for a game modelling addiction like ours, less agency might lead to more persuasive outcomes. This has been referred to as the 'disorienting dilemma', first coined by [57], which aims to subvert the players expectations by using interactive affordances in a way that challenges their world view [58],[59]. In other words, dealing with the problem of unrealistic optimism in younger cohorts, a persuasive experience might need to actively challenge the perception of invulnerability and control by actively taking away agency from the player.

5.2 Moderation of procedural rhetoric through narrative content

As for narrativity, we did not find evidence for narrativity moderating the effect of procedural rhetoric (PR) on susceptibility (H2a) nor for narrativity directly impacting susceptibility (H2b). A possible explanation for this is the non-significant manipulation using transportation as an indicator of differences in narrativity. The narrative fragments were of relatively short length, which could have negatively affected transportation. Additionally, the procedure for the current study alternated between the participant reading the narrative fragments and then engaging with the gameplay. The gameplay sessions themselves required the participant to focus on solving the puzzle thereby possibly diverting attentional resources from being transported into the storyworld. As laid out by Ooms et al. [47], transportation itself is an important factor in enabling narrative fear appeals to be effective. As being transported into the storyworld requires a longer narrative [25] and a coherent narrative whole [60] to take effect, using short narrative fragments and interrupting the narrative with gameplay elements might have undermined the elicitation of transportation. It is further possible that the lack of vividness of our narrative content stems from the purely textual manipulation. Utilizing audiovisual means to enable stronger transportation might have helped to enhance the potential moderating role of narrativity on our PR manipulation.

However, while possibly not reaching significantly different perceived transportation between participants, our exploratory analysis shows a significant effect of narrativity on susceptibility through identification as a mediator. This finding is in line with existing work in the field highlighting the mediating role of identification in narrative persuasion [40] and confirms its relative importance in interactive interventions.

Similarly to H1, the null results for H2a do pose further questions regarding the proper implementation of PR arguments when considering both narrativity and game mechanics together. While the mere presence of narrative content might be important for accurate identification of procedural arguments [38], the way the narrative content is integrated with the mechanics might play just as important of a role. In line with the argument made by Smith [37], the assumption is that procedural rhetoric alone may not change persuasiveness of a message, but simply alters the vividness. If players cannot easily integrate both narrative and mechanics, neither by themselves might be sufficient enough in creating enough vividness to affect persuasion.

The inconclusiveness of our results, while contrary to some findings in the field, do however align with the notions expressed on the current state of the field by other researchers. As discussed by de la Hera and Raessens [61], it may not be a question of whether rule-based representations can be used to persuade, but rather how to effectively employ different strategies to affect changes in attitudes and behavior. Procedural rhetoric may be one tool in the toolbox of designers, but it may neither be the most important, nor an entirely independent dimension, to realize the potential of games for persuasion. For example, similar to this study, the work by Van ’t Riet et al. [62], showed that their persuasive game did not outperform video- and text-based appeals in creating behavioral intentions, while attributing these null-effects to higher immersion of the non-interactive conditions. They conclude with the notion that simply including interactive elements does not necessarily mean creating more relevance of the content for players, highlighting that other communication channels should remain an important

consideration. The road ahead for future work is therefore in need of more encompassing approaches that take into account multiple dimensions, such as audio-visual means of communication, as well as personality characteristics of players [63] in order to create a more cohesive picture of the potential of games as a persuasive medium.

5.3 Limitations and future work

While this study aimed to contribute to the field by making well-reasoned decisions regarding the implementation of a procedural argument into a narrative game-based intervention, we did identify several limitations of our approach. First, it should be noted that our manipulation of the presence of a procedural argument led to significant differences in the perceived challenge by participants. This highlights the difficulties in manipulating the concept of procedural rhetoric, as the alteration of a procedural argument often inherently affects changes to mechanics and rules, translating to a potentially different player experience beyond just the contained rhetoric argument. This could have further contributed to null findings as it does make player literacy a potential confound in this investigation. For future work it is hence important to consider player literacy, in order to account for individual differences in player experience that might affect outcome measures. Further of consideration should be more in-depth pre-testing that ensures proper operationalization of the procedural- / non-procedural conditions before the main investigation. Given the non-significant manipulation check for procedural rhetoric in this study, additional pre-experiment testing would have enabled us to potentially strengthen the manipulation or alter its implementation to ensure a stronger operationalization. As shown in related work, another possibility is also the manipulation of the strength of the procedural argument rather than the removal of it in order to create meaningful comparisons while still investigating the contribution of procedural rhetoric to persuasion [36].

Second, the integration of the game interactions and narrative content has potentially led to issues with heightening transportation and may have suppressed the joint effect of interactivity and narrative content, as they were not encountered simultaneously. Although this study does represent an ecologically valid operationalization for a subset of games (e.g., games using cutscenes to deliver narrative content), for future work simultaneous integration of both should be considered to better assess their joint effects. This could be achieved by combining different communication channels, such as using voice-over narration during gameplay or by relying on environmental storytelling.

Lastly, the current study focused on constructing a procedural argument surrounding the development of alcohol abuse disorder and in turn the design of the mechanics put the players intentionally in an unwinnable situation. While this was a good fit for the current study, it should be noted that depending on the goal of the intervention, e.g., the development of self-efficacy for health-behaviors, the design of the procedural argument needs to be adjusted. It might therefore be of value for future work to assess the utility of procedural rhetoric in affecting different antecedents for health behavior change [64].

6. Conclusion

The current study aimed to isolate and test the effect of procedural rhetoric (PR) and narrativity on perceived susceptibility and behavioral intention in an interactive narrative fear appeal. Although we hypothesized PR to be an independent contributor to behavioral intention, our findings support the notion that PR alone might not be sufficient for affecting persuasive outcomes. As mechanics alone might be too abstract to allow for appropriate argument identification, the synergy between narrative framing and mechanics might be necessity.

Attention needs to further be paid to the way narrative content is integrated with mechanics. Alternating narrative content and gameplay portions might result in a stronger disconnect between the two types of rhetoric, while also undermining transportation into the storyworld. As is the case with passive narrative interventions, identification does play a significant role in raising susceptibility concerns in game-based interventions.

Our findings do further challenge the notion that high agency is always a desirable goal for persuasive experiences. We argue that the match between simulated process and agency is important in aligning the narrative and procedural argument for joint impact on the message receiver. Furthermore, intentionally restricting agency as a means to simulate real-life processes aimed to communicate future threats might be a promising area for future studies to explore. Lastly, while intricacies of the implementation of procedural arguments themselves need further study, narrative content itself can also take a wide variety of different forms. As such, future studies should consider the usage and evaluation of different audio-visual means to obtain evidence for their relative contribution to intervention effectiveness.

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Conflicts of interest

There are no conflicts of interest to declare.

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