frontiers | Frontiers in Computer Science

TYPE Original Research
PUBLISHED 10 August 2023
DOI 10.3389/fcomp.2023.1178972

OPEN ACCESS

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RECEIVED 03 March 2023
ACCEPTED 27 June 2023
PUBLISHED 10 August 2023

CITATION
Chrysanthi A, Katifori A, Kapralos A, Magklis A and Antoniou A (2023) Point of equilibrity. A narrative video game on decision-making during the COVID-19 pandemic crisis. *Front. Comput. Sci.* 5:1178972. doi: 10.3389/fcomp.2023.1178972

Point of equilibrity. A narrative video game on decision-making during the COVID-19 pandemic crisis

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Introduction: Point of Equilibrity (PoE) is a narrative game designed and developed with the aim to simulate the COVID-19 pandemic from a government's point of view and offer different perspectives on the complexity of managing a pandemic crisis. The players are called to make important decisions during a health crisis in the simulated environment while considering significant historic and topical events, as well as possible economic, political, and social implications.

Methods: This paper presents the results of a user study with 37 adult participants aiming to examine (1) the effect of PoE gameplay on the players' perspective on the management of the COVID-19 pandemic crisis, and (2) the effect of the players' FFM and DMQ personality traits profile on the game experience and the decision-making process. The participants played the game and then were asked to fill in an on-line questionnaire.

Results and discussion: The results suggest that the game design offered an engaging game experience and was effective to promote reflection and perspective taking on different aspects of crisis management, as well as the supporting role of relevant historical information in the decision-making process. The study also reports correlations between specific personality traits, such the DMQ Thoroughness and Principled, the FFM Conscientiousness and Openness to experience with specific aspects of the game experience, such as absorption, perspective taking and the preference for more choices in the gameplay.

KEYWORDS

narrative video game, decision-making profiling, crisis management, game simulation, big 5 traits

1. Introduction

Games witness an increasing growth both in the game industry and academia in different application areas, such as communication, cultural studies and education (Laamarti et al., 2014). Today, games include mechanics that communicate information with the aim to introduce novel concepts, to alter attitudes and behaviors, or to offer different perspectives to their players (De la Hera et al., 2021). As regards the latter, often cultural games draw from historical events and archaeological evidence to offer knowledge-making opportunities and perspective to their audiences (Mol et al., 2017). In this context, persuasion games have emerged as a type of gaming that aims to persuade players to adopt a particular point of view or behavior through gameplay mechanics and as such, they can be a powerful tool for promoting awareness, empathy, and action toward social and political issues (Bogost, 2007; De Lange and van der Vlist, 2011; Zagal et al., 2013).

The potential of games to support simlulations with varied and nuanced user agency has made them a prominent tool for the training of soft skills such as decision making in a variety of contexts, including training for emergency situations where decisions need to be made under stress (Williams-Bell et al., 2015; Johnsen et al., 2016; Tena-Chollet et al., 2017). Apart from training, serious games have been also used as diagnostic tools to assess different factors in making decisions like groups decision-making process, the role of uncertainty and communication problems between groups members leading to misunderstanding (Schueller et al., 2020). Games were also very useful in seeing how levels of trust (depending on the type, source, quality, and channel of provided information) affects peoples' decision-making processes (Weyrich et al., 2021).

The recent COVID-19 pandemic greatly enhanced social and political uncertainties by creating difficult, yet largely unexplored problems that required urgent solutions. Soon enough, it became evident that each time a government took certain measures to control the spread of the pandemic they were confronted with strong, conflicting attitudes of both compliance and disapproval by different parts of the citizens. This fact highlighted the strong social, economic, and political implications that this pandemic crisis has had on societies and the need to address the issue of strongly conflicting views and attitudes, creating an escalating tension within society.

This was the starting point of the research study presented in this work, focusing on whether simulating decision making during times of crisis in a playful way can in fact promote perspective taking on the wider implications of making decisions for crisis management. To this end, we designed a narrative game called Point of Equilibrity (PoE) (https://www.cultural-representation.com/pointofqquilibrity/), which was informed by the recent COVID-19 pandemic and relevant sociopolitical developments as well as past historical events relevant to other pandemics that humanity has experienced. The core idea was to create a game simulation system from the point of view of a government, where peoples' satisfaction and the pandemic control would ideally be able to balance in an equilibrium. With the mandate to try and maintain this fragile balance between keeping the social order and ending the health crisis, the player is required to make important decisions depending on the situation presented to them, while prompted to reflect on different aspects of the crisis, also considering historical data from past similar events.

In our study design we aim to address two main research questions focusing on:

(1) the effect of PoE gameplay on the players' perspective on the pandemic, in general, and its crisis management aspects, in particular, and
(2) user preferences and attitudes on the decision-making process itself and its correlation with personality traits relevant to decision-making.

In the remainder of this paper, we briefly present relevant research that has informed our work (Section 2), moving on to an overview of the game prototype in Section 3 and the evaluation methodology in Section 4. Section 5 presents the results of the study while Section 6 discusses these results. Finally, Section 7 concludes the paper.

2. Related work

2.1. The COVID-19 pandemic and crisis management

The COVID-19 pandemic had been a long-term traumatic event with strong impact in all aspects of our everyday life (Apostolidis et al., 2020). Its profound effects have been recognized in different fields, including formal and informal education and cultural heritage, along with proposed digital designs that aim to address them (Vayanou et al., 2020; Anthony and Noel, 2021; Dos Santos, 2022; Schell, 2023).

However, the most complex aspects of the pandemic are those relevant to its socio-political consequences, also related to the crisis managements approach adopted by different governments around the world. As Jedwab et al. (2021) discuss, the pandemic renewed the "interest in understating the economic and social dynamics of historical and more recent epidemics" and "the interplay between poverty and social cohesion" in this context, focusing on "how social responses to past epidemics and pandemics were determined by the epidemiological and non-epidemiological characteristics of these outbreaks". Hilhorst and Mena (2021) focus on ensued social conflict and the "high levels of mistrust in authorities, [which] complicated the implementation of measures", especially in under-developed countries. Organizational decision making related to COVID-19 and its governance and social conflict related aspects (Herbert and Marquette, 2021; Johnson et al., 2022), as well as its psychological effects (Apostolidis et al., 2020; Saladino et al., 2020) have also been the focus of several studies.

The profound and pervasive characteristics of the pandemic, its impact on the population and the controversy it has sparked concerning both its epidemiological and non-epidemiological aspects especially in relation to the crisis management approaches adopted by different governments make it a suitable candidate for our study on decision making in gaming. Furthermore, the government crisis management decision making approach on COVID-19 has been a controversial topic leading to heated debates for the majority of the population and, thus, already familiar to the potential participants of our study.

2.2. Decision making and perspective taking in gaming

Decision making and the wider concept of agency in gaming, have been extensively studied, due, however, to their complexity as a concept, their understanding remains still a subject for research. Some works have investigated different forms of agency and their impact on player engagement or the understanding of internal narrative (MacCallum-Stewart and Parsler, 2007; Sengün, 2013, p. 38; Ryabova, 2021). Generally, agency is considered a key design element of video games, essential to the experience and interactivity

of the game (Habel and Kooyman, 2014) and also a key factor to promote transformative learning (Petousi et al., 2022b).

Regarding decision making several approaches have been developed, mainly due to the complexity and the multifactorial aspects of making a decision. There are several theoretical methods for solving decision making problems, all trying to take into account multiple alternatives and giving different weights to different factors (Zanakis et al., 1998). Such methods lead to the creation of computer simulations that wish to study certain circumstances when decision making is needed. In fact, simulations are considered very useful tools in testing social psychology theories and predicting human behavior (Stasser, 1988). For example, some simulations focus on the types of information people receive (e.g., type of message and decision, reliability of information source, etc.) (Hogarth and Soyer, 2015), while others concentrate on the personality of the decision maker (Raghunathan, 1999).

The quality of the narrative design and available information also being a crucial factor for the overall game experience, also in decision making games (Koenitz, 2018). Simulations can be successful if they respect the complexity of the process and combine multiple factors that seem to influence decision making. For example, a study showed that although the quality of the information available is very important, this seems to influence people in very different ways depending on their domain knowledge, experience levels and confidence. As Raghunathan (1999) comments "The decision quality improves with higher information quality for a decision-maker that has knowledge about the relationships among problem variables. However, the decision quality of a decision-maker that doesn't know these relationships may degrade with higher information quality" (p. 275). Simulations and decision making became very relevant recently due to the COVID-19 pandemic. It quickly became clear that not only the disease transmission rate was a key factor in decisions, but also other social, political and economic issues played an important role. Modeling the different aspects in decisions related to the pandemic became a big challenge and simulations were proposed as good study tools (Currie et al., 2020).

There are several serious games that employ decision making as a mechanic to promote different perspectives. One example is the socio-political persuasion game "The Refugee Challenge" a game that puts players in the shoes of a refugee fleeing from their home country (The Refugee Challenge, n.d.). The game aims to increase players' understanding of the challenges and difficulties faced by refugees and encourages players to take action to support refugees. Overall, decision making in persuasion games can be an effective tool for promoting socio-political awareness by immersing players in interactive experiences that simulate real-world issues and challenges.

Other types of training involved the increase in twenty-first century skills where decision making is a key skill (Romero et al., 2015). In the field of game studies, a number of video games have been developed for research purposes to effectively utilize decision-making strategies for skill improvement. A prominent example is "Neuroracer", which targets cognitive control abilities in older adults through decision-making processes linked to multitasking (Anguera et al., 2013). Similarly, "Crystal Island", an educational game, utilizes narrative-centered learning environments to enhance problem-solving and decision-making skills (Rowe et al., 2011). Another notable example is "Path of Trust", a game specifically developed for research on children's trustworthiness and trust during decision-making activities (Apostolakis et al., 2016). Lastly, Schönbohm and Zhang (2022) explore the potential of serious games as effective tools to facilitate strategic decision making processes, using COVID-19 as a use case. These examples illustrate how video games can be specifically designed utilizing decision-making frameworks to enhance various skills in their players.

In recent years, digital and video games have also demonstrated their potential as a compelling medium to cultivate perspective-taking abilities in players. Commercial games, such as "The Last of Us", stand as prominent examples of fostering empathy and perspective-taking also through narrative elements (Bormann and Greitemeyer, 2015). Similarly, "Life is Strange", is an interactive narrative game, which provides players with diverse narrative perspectives, thereby refining their perspective-taking skills (Isbister, 2016). Complementing these commercial examples, a number of research-oriented games have been designed with similar objectives and outcomes. One such example is the "Journey Home", an intervention tool developed by the University of Wisconsin-Madison that leverages narrative and role-play to foster empathy and perspective-taking (Gaydos and Squire, 2012). Simulation games have been used for political empathy training, encouraging understanding between opposed nations or parties (Cuhadar and Kampf, 2014). These cases highlight the capacity of digital games, both commercial and research-oriented, to harness interactive media for enhancing perspective-taking skills in players.

Our study is situated within this wider field of games promoting reflection and mutliperspectivity to examine the effectiveness of a decision-making game for perspective taking in government crisis management.

2.3. Personality traits and user experience

Personality is "characterized in terms of traits, which are relatively enduring characteristics that influence our behavior across many situations," (Walinga, 2010). These traits are commonly measured in psychology by administering self-reporting personality tests (Cummings and Sanders, 2019) that describe stable patterns of behavior that persist for long periods of time (Caspi et al., 2005). Personality-targeted design has been studied in human computer interaction (HCI) as an important factor for user modeling in a wide range of applications (Eskes et al., 2016; Ucho et al., 2016).

The Five Factor Model (FFM), also known as the Big Five is one of the most widely used personality trait models. It includes five personality traits: Extraversion, Openness to experience, Neuroticism. Agreeableness and Conscientiousness (Costa and McCrae, 1992). It has been applied to several fields including political analyses and profiles of voters (Gonzalez, 2017), marketing (Eskes et al., 2016), road safety rules compliance (Ucho et al., 2016), academic performance

(Giluk and Postlethwaite, 2015), and interactive storytelling for cultural heritage (Katifori et al., 2019). It has also been used in the gaming industry to profile players (Zammito, 2010; Braun et al., 2016; Nagle et al., 2016; Tondello et al., 2016; Halim et al., 2017).

In recent years, the context of games has been used to support research on decision making in different ways. Game theory models and the neuroeconomic approach to the study of social decision-making are combined to study the effect of rewards at the brain level and to "extend our knowledge of brain mechanisms involved in social decisions and to advance theoretical models of how we make decisions in a rich, interactive environment" (Sanfey, 2007). As an example, according to the outcomes of this direction of research, decision making under risk is different from decision making without the risk. Games are more appropriate to study decision making that involves risk (Brand et al., 2006). There are different profiles of decision makers as cluster analysis has shown (Delaney et al., 2015) as well as gameplay action -specific decision profiles (Loh et al., 2016). Decision making has been recognized as a personality trait, recorded with different questionnaires such as the Decision Making Questionnaire (DMQ) which has been used in this study (French et al., 1993).

3. The point of equilibrity game

To explore our research questions on the effect of a decision making game on perspective taking, we developed a narrative game designed to simulate decision-making during the COVID-19 pandemic crisis from a government's point of view Point of Equilibrity (PoE).

The core idea was to create a game simulation system where peoples' satisfaction and the pandemic control would ideally be able to balance in an equilibrium (Magklis et al., 2021). With the mandate to try and maintain this fragile balance between keeping the social order and ending the health crisis, the player is required to make important decisions depending on the situation. Each decision is pivotal for defining the course of the pandemic throughout the game as well as the development of the narrative. The game is designed to offer players a rich perspective on the complexity of managing a pandemic crisis by bringing several parameters to their attention. The decision-making in the game is defined by three axes:

1. Political stability, which is defined by voting specific laws,
2. Communication, as reflected by the choices made during regular press-conferences between law voting sessions,
3. Information on historical and topical events related to pandemics.

The first two are designed in the game mechanics and are quantifiable based on the type of ending that each player experiences, while the third is not measurable and needs to be validated as support to decision making.

The development of the game itself was an important aspect of this study as it provided the simulated environment for running the evaluation study and testing our hypotheses.

3.1. Development

The game was developed in Unreal Engine 4 and utilized visual coding. The main core of the game structure is based on a dialogue system, which is delivered to the user through the game's User Interface (UI) and comprises of interdependent widgets. In order to achieve optimum and stable performance and avoid the use of heavy frame-dependent functions and events, we opted for timers that switch off when the desired effect has been achieved. Moreover, the UI is controlled by a system of flow control which uses a switch on an integer, a multi-gate, or a flip flop (Figure 1).

3.2. The game's narrative structure and gameplay

The narrative design of this game was our priority when creating the game since it would essentially be used as the main vehicle of decision-making for players. The story plot follows a branching narrative structure which is based on four types of scenes presented to the user in a specific order 12 times (Figure 1), (a) The Council scene, (b) The Law Card decision scene, (c) The Press Conference scene, and (c) The News scene. The game narrative progresses through the players' decisions which take place during the second and third scenes. More specifically, the content and function of these scenes are as follows:

3.2.1. Council scenes

The Council scenes serve as a description of the current state as regards the spread of the virus and the socio-political impact of the pandemic crisis. The scene presents the discussion between the prime minister and the ministers on the current status of the pandemic and possible measures to address it. The player can view two available progress bars: (1) the "council" bar on the right shows political stability, (2) the "social order" bar on the left the perspective of the citizens, and (3) the second bar on the left the virus spread (Figure 2).

3.2.2. Law card decision scenes

In this case, the player is called to choose the between two or three laws presented to them, relevant to the specific issue discussed in the previous Council Scene (Figure 3).

3.2.3. Press conference scenes

This scene follows each law decision, and the player is called to choose how to respond to the press which in the end determines the popularity of the government. The prime minister is asked one or more questions, relevant to the passed law and the player haΣ limited time to answer each question by choosing one of the two available options (Figure 4).

3.2.4. News scenes

The News scenes are pieces of information that concern either topical events related to the COVID-19 pandemic in other areas

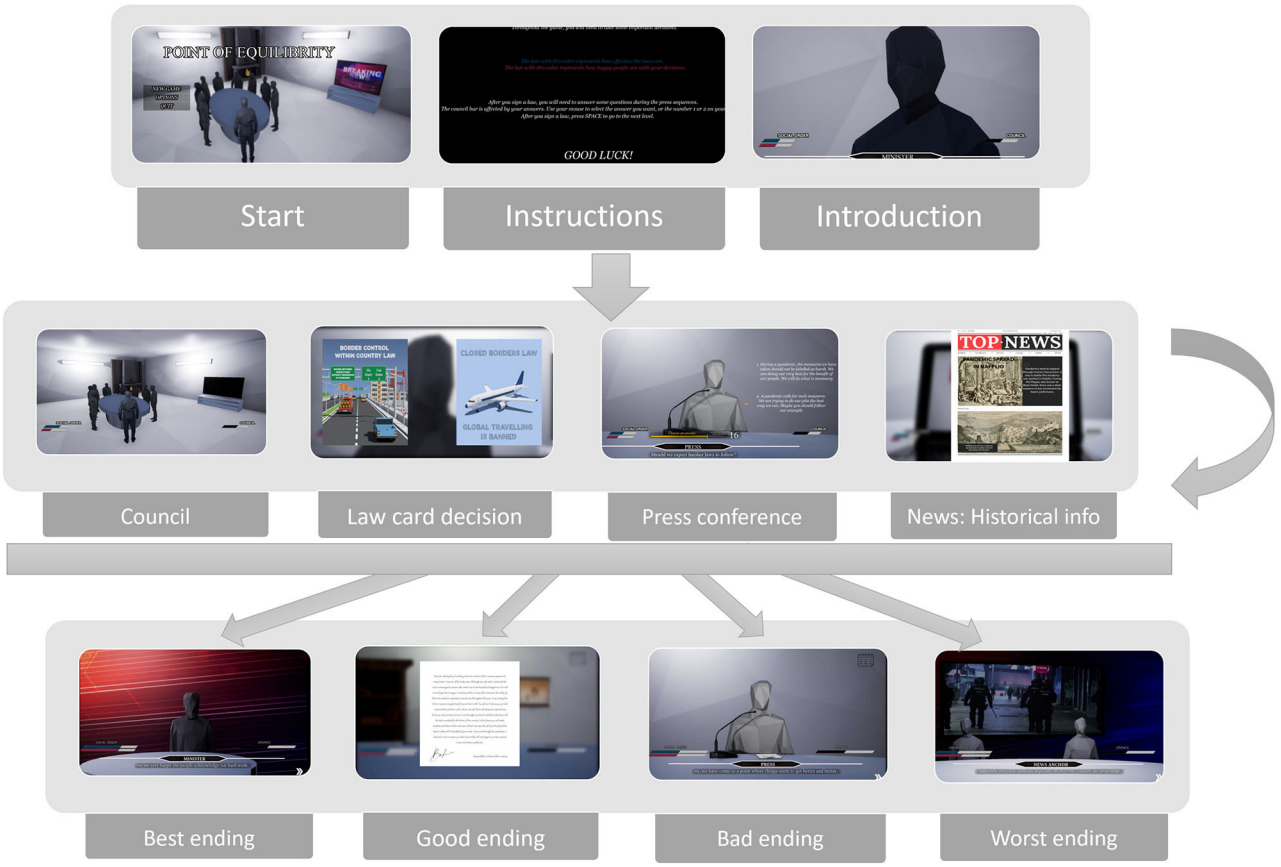

FIGURE 1
The flow of the PoE game experience.

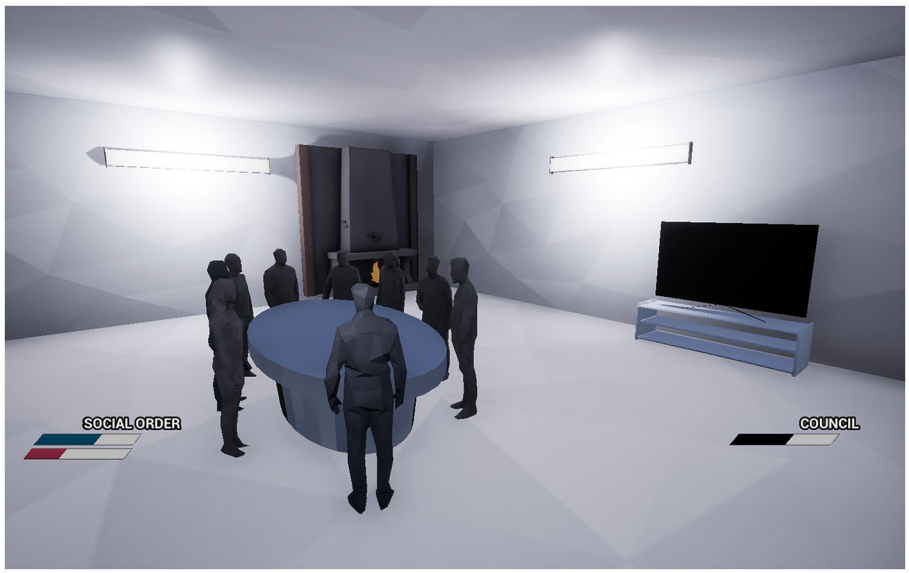

FIGURE 2
An example of a council meeting scene, with the three progress bars.

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FIGURE 3
A law card decision scene.

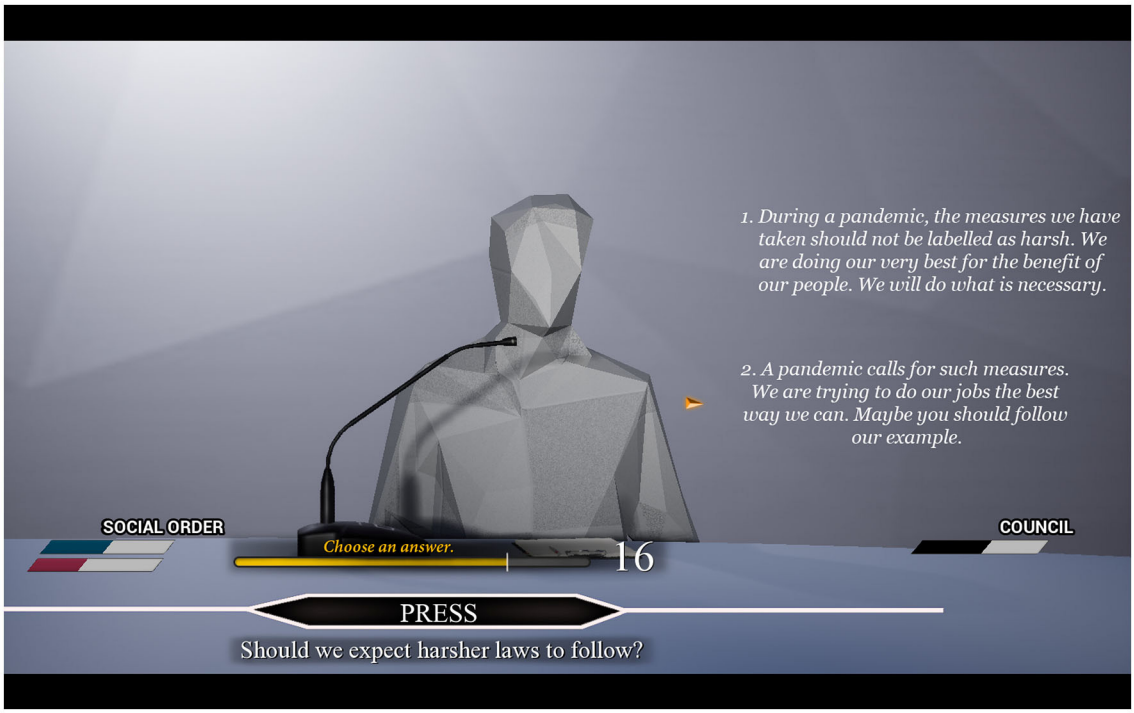

FIGURE 4
A press conference scene.

of the world or past pandemics (Figure 5). The content is carefully chosen to be relevant with the issue in question at the specific part of the game, support the players to make decisions in a more informed way. These scenes do not play a measurable role in the decision-making process. They are designed to support reflection and perspective taking while making decisions throughout the game.

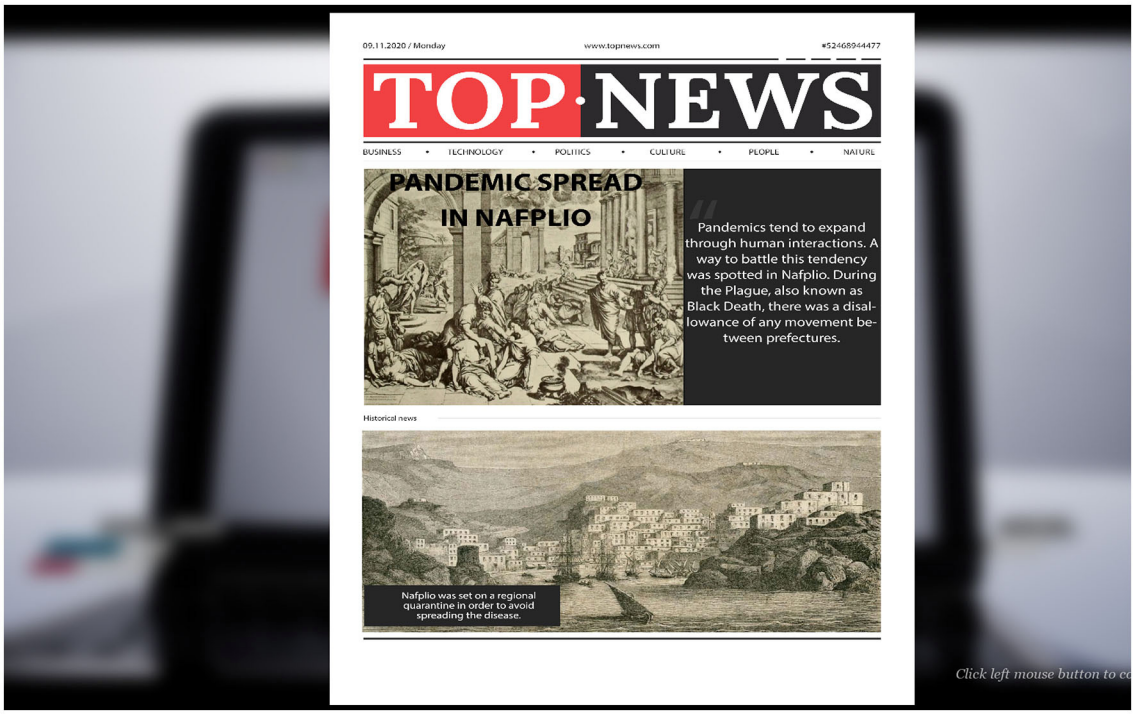

FIGURE 5
An example of a top news: historical information scene.

The consecutive decisions made by the player affect the game's progression system and consequently, the player's experience. In the end, the player will experience one of the four endings of the story depending on the path they shaped throughout their gameplay and how good they were in maintaining the desired equilibrium between keeping citizens safe and content while limiting the spread of the pandemic. The four endings of the game are presented in the form of cutscenes and can be summarized as follows, starting from the best one to the last being the worst one:

1. The game concludes showing the news on TV, where two journalists and a minister discuss how important it was that the government managed, through the measures, to contain the pandemic and, at the same time, maintain the trust of the citizens.
2. After the last press conference, the prime minister goes to his office and receives a letter from one citizen thanking him for the way he managed the pandemic.
3. The news report that during the elections the prime minister's party lost, after the unsuccessful communication management during the pandemic.
4. The news show images of riots. At the council it is discussed that the prime minister should urgently leave the country because the situation is dangerous. The prime minister is at his office, writing his resignation letter.

The ending is determined by the three scores presented to the user throughout the game with the relevant status bars on the Council scenes (Figure 2). For the first- and best- ending, at least one of the bars on the left should be above 70% and the other two above 50%. For the second ending all three bars should be above 50% and below 70%. For the third ending, at least one of the bars on the left should be below 50% and for the worst ending, at least one of the bars on the left should be below 50% and the bar on the right should also be below 50%.

4. Study methods

4.1. Research objectives

The main objective of the PoE design is that by simulating a real-world scenario of the pandemic crisis and offering multiple perspectives on the subject, players will be able to reflect more deeply on real-life decision making and crisis management. More specifically. As already discussed, the main objectives of this study revolved around two main research questions:

4.1.1. Research question 1

What is the effect of PoE gameplay on the players' perspective on the pandemic and its crisis management aspects? Poe is a video game calling its players to assume the role of the government in managing different aspects of the pandemic. In this case we aim to explore to what extent this decision making activity in the context of the game puts players in the perspective of the decision makers. At the same time, we look into bilateral effects of decision making, in relation to user engagement, reflection, preference for similar

decision making activities when playing gems, etc., as these may affect the effectiveness of the game.

4.1.2. Research question 2

What is the effect of user preferences and attitudes and personality traits relevant to decision-making on player engagement and the game experience in general in a decision making game? Player engagement is the first step toward achieving the perspective taking effects of the game. In this study, we also examined the role of specific personality traits on the game experience. We focused on two main groups of personality traits, decision making, as recorded through the Decision-Making Questionnaire (DMQ) and the Five Factor Model (FFM).

4.2. Process and participants

For this study we targeted adult contemporary audiences of diverse gaming backgrounds. We had no restrictions on age or gaming expertise, including any individual that would potentially be interested in playing a similar simple narrative game. To this end, we proceeded with an open invitation forwarded on-line through the authors' personal and academic mailing lists as well as social media accounts. The invitation included a brief description of the Point of Equilibrity game, the project and study objectives as well as the process the participants would have to follow if they agreed to participate. The interested individuals were instructed on how to download and install the game and were provided with an online questionnaire to complete in Google Forms after playing the game. It was clarified to the users that the study was anonymous, and they were asked to fill in an online consent form based on the General Data Protection Regulation of the EU (GDPR 2016/679).

Thirty-seven participants of Greek nationality took part in the study. Eighteen belonged to the first age group between 18 and 25, seven belonged to the second age range (26–35), nine belonged to the third (36–50), while three were above 50 years old. Twenty of the participants identified themselves as women and 17 as men. In terms of their gaming experience, 9 of the participants reported to have little prior experience in playing games, 15 reported that they occasionally play games, and 13 reported that they play games very often.

Participants were also asked about their opinion on the virus pandemic and the management of the crisis from the beginning until spring 2021. The responses were designed as a multiple-choice field, which included six possible answers reflecting people's beliefs concerning the nature of the virus pandemic itself, as well as the measures taken by the governments and the global health organizations in response to the crisis it caused. The users were able to choose more than one options. Table 1 presents the summary of their responses to this question. As it can be seen, only one user thinks that the virus does not exist and 3 do not support strict measures for the pandemic. On the other hand, only 5 users (13.5%) reported that they follow all the measures not only because of the law, but also because they agree with them. The majority held a more neutral stance. Twenty three users (62.2%) reported to follow the measures but do not always agree with them, while, similarly, 23 users felt that we should indeed follow the measures to contain the pandemic.

For the purposes of the subsequent analysis, we divided these responses in three categories summarizing the overall outlook of the participants: (1) positive ("I comply with the measures, they are necessary to stop the spread of the virus."), (2) neutral ("I comply with the measures but don't always agree with them."), and (3) negative ("I don't believe that the SARS-CoV-2 pandemic is real and/or do not support the enforcement of measures for dealing with the pandemic."). In total, 10 participants had a positive outlook to the management of the pandemic, 22 had a neutral stance while 5 had a negative view of the measures and the official information surrounding the pandemic.

4.3. The questionnaire

The design of the questionnaire aimed to reflect our research questions. The questionnaire consisted of a mix of open-ended and closed questions. The Likert statements in the questionnaire were evaluated on a 4-point scale from "Completely disagree" to "Completely agree". Sometimes it is preferable to use a 4-point Likert scale, especially with smaller samples, to avoid the middle-neutral point. As past research has shown, it is often not clear what people really mean when they choose the middle point in a Likert scale when there is one (Garland, 1991). The midpoint can be excluded not only when the sample is relatively small, but also when researchers cannot control how much time people spend answering the questionnaire, since when people hurry they tend to go for the middle option (Chung et al., 2017). Taking into account this research and the fact that the users would fill in the questionnaire unsupervised, we decided for the use of a 4-point Likert scale.

The questionnaire is divided into three main sections. These included:

- Participant demographics and outlook for the virus, recording user information including age, gender, country of origin, experience with gaming as well as their general outlook on the pandemic and its management from the government.
- Personality traits including the Decision Making Questionnaire and the Five Factor Model.
- Quality of the game experience.

4.3.1. Personality traits

As already mentioned, in this study we focused on two groups of personality profiling: the Decision-Making Questionnaire (DMQ) and the Five Factor Model (FFM).

The Decision-Making Questionnaire we included in our study is a short version of the 30-item Decision-Making Questionnaire (DMQ) employed by French et al. (1993). The questionnaire groups these questions into 7 categories, which include: Thoroughness, Control, Hesitancy, Social resistance, Perfectionism, Idealism, and instinctiveness. We retained the same seven categories, reducing the number of statements to 15, to reduce the fatigue of the participants having to fill in long questionnaires. This questionnaire was crucial to understanding the decision-making style of each

TABLE 1 Participants outlook on COVID-19 and the government's measures for the pandemic.

Statement	Number of users	Percentage
I don't believe that SARS-CoV-2 exists or/and that the pandemic is created in labs.	1	2.7%
I believe that SARS-CoV-2 exists but I don't support strict measures for managing the pandemic.	3	8.1%
I believe that the pandemic COVID-19 was used as an excuse to enforce certain policies and laws.	13	35.1%
I follow the measures as directed by the law but I do not always agree with them.	23	62.2%
I believe that we should follow the measures to contain the spread of the virus.	23	62.2%
I follow the measures not only because the law directs it but also because I agree with them.	5	13.5%

TABLE 2 Game experience questionnaire results for A. Engagement and immersion—The statement scores are in a Likert scale from 1 (Completely disagree) to 4 (Completely agree).

Statement	Average/standard deviation
A1. I was totally absorbed by the experience.	2.78/0.71
A2. I hardly noticed the time passing.	2.51/0.8
A3. I felt tense and excited.	2.49/0.73
A4. The experience was too long.	2.32/0.85
A5. I could not concentrate.	1.76/0.68

participant and the relation of such characteristics to the gaming experience of managing the pandemic.

The second personality traits questionnaire is the Five Factor Model FFM. It includes five personality traits (Costa and McCrae, 1992): (1) Openness to experience, related to creativity and imagination, curiosity and willingness to try new things, (2) Conscientiousness, related to self-discipline, (3) Extraversion, as a pronounced engagement with the outside world and others, (4) Agreeableness, which includes kindness, generosity, and trust, and (5) Neuroticism, as the tendency to experience negative emotions, such as anger or anxiety. The short version we used in this study is composed of a set of 15 statements, three for each of the five personality traits (Neuroticism, Extraversion, Openness to experience, Conscientiousness, and Agreeableness), evaluated in a 4-point Liker scale from "Completely disagree" to "Completely agree". For the needs of this study we used a short version of the questionnaire, also employed in Antoniou (2019) and Katifori et al. (2022).

4.3.2. Quality of the game experience

The third section of the questionnaire included statements relevant to game experience aspects which are of interested to our study objectives. This section has been based on questionnaires previously used to evaluate the affective engagement and transformative learning aspects of interactive storytelling experiences (Katifori et al., 2020; Petousi et al., 2022a), on a comprehensive review of user experience evaluation methodologies for art performances and their engagement, absorption, personal resonance and intellectual stimulation aspects (Carnwath and Brown, 2014), as well as the interactive digital storytelling framework by Roth and Koenitz (2016).

The questionnaire statements have been divided in five categories of five 4 point Likert scale statements each, except (E) with 6, as follows: (A) Engagement and Immersion, (B) Affective connection, (C) Learning and Cognitive Motivation, (D) General Game Experience, and (E) Decision making and perspective taking.

At the end of this section, we there was a question about the ending of the game that the players experienced based on their choices. The game offered four different endings ranging from very bad to very good scenarios (see Table 8). We also included a set of open-ended questions to record more in depth input on the views of the players as well as to triangulate the results from the quantitative sections (Creswell, 2009). The first two asked about the three things that participants liked the most and liked the least, respectively, from this game experience. The following three questions asked about the part of the experience that they will remember or made it difficult for them to make a decision and whether it changed any views on the real-life events of the pandemic if any at all, and which?

5. Results

5.1. RQ1—Overall game experience, decision making, and perspective taking

In this section we report relevant findings on the effect of the decision-making game design on the overall game experience, in general, and cognitive stimulation and perspective taking in particular. For the quantitative statements of the questionnaire, we calculate and report the average score and standard deviation, and present the distribution and percentages of the answers for key statements. We also proceeded with a thematic analysis of the qualitative data that were collected from the open-ended questions (Thornberg and Charmaz, 2014). For the thematic analysis, we processed the data as follows: the written replies went through multiple readings by two researchers until the main themes surfaced. Once the themes along with their coding were cross-checked and unified between researchers, the themes were also

TABLE 3 Game experience questionnaire results for B. Affective connection—The statement scores are in a Likert scale from 1 (completely disagree) to 4 (completely agree).

Statement	Average/standard deviation
B1. I felt that I could identify with the story characters and plot.	2.43/0.8
B2 I was transferred to another world and lost track of time.	2.14/0.75
B3. Some parts of the story moved me in an emotional level.	2.24/0.76
B4. Some parts of the story made me feel uncomfortable.	1.84/0.83
B5 Some parts of the experience seemed relevant to the real world.	3.51/0.51

TABLE 4 This table presents the four possible endings designed in the game.

	Ending	Description	*N*. of Participants
1	Very good	The game ends with a political talk show scene, where two reporters discuss with a minister about how the government was successful in both ending the pandemic as well as maintaining people's trust.	12
2	Good	After the final press conference, the Prime Minister returns to his office and receives a letter from a citizen who offers his thanks and appreciation for the way he managed to end the pandemic.	10
3	Bad	At the news a reporter announces that the Prime Minister's party is losing the elections because of the unsuccessful communication strategy they followed during the pandemic crisis.	10
4	Very bad	Scenes of riots are reported in the news. In the meanwhile, the government board is discussing of ways to escape the country as riots spread in the capital city and throughout the country to the point of escalation. The Prime Minister is sitting at the desk of his office and writes the letter of his resignation.	3

quantified depending on the number of mentions each theme contained and were listed accordingly.

5.1.1. Overall game experience

The questionnaire results provide insight on the overall game experience as perceived by the study participants. These results are summarized in Tables 2–7. Overall, the results indicate that the participants' view of the game was positive. The majority of the users (86%) liked the flow of the experience and were interested to try a similar experience in the future.

In terms of engagement and immersion (Table 2), the outlook of the users was overall positive. The majority of the users felt indeed absorbed in the game (Figure 6A). However, overall, the game was not as effective to make the users feel tense or excited (Figure 6B).

With regards to the affective aspects of the experience (Table 3), the majority of the users felt that they could identify with the characters in the game (Figure 7A) and the experience was able to move them up to a point, also strongly feeling that it seemed relevant to the real world (Figure 7B).

Table 4 presents the distribution of the participants in terms of their response on what game ending they experienced. Twenty-two participants experienced the good scenarios, 13 experienced the bad scenarios, and 2 didn't answer the question.

Amongst the positive aspects of the experience, as discussed by the participants, was the story plot which resonated with their choices throughout the game. Other positive aspects included the game aesthetics and graphics, the simplicity of the gameplay as well as the overall design of the accompanying mix-media (texts, images, sounds etc.) and the realistic representation of the dialogues (five participants). As participant #34 reports: "The dialogues in the pressroom were realistic and made me really feel like the course of the country was in big part my responsibility. This was very successful…". The need to combine different data in order to make a decision as well as the feedback objects (social and virus spread bars) and adaptation of the news depending on the players' choices were also notably mentioned by four participants.

However, as it will be presented in the next sections, the interactivity and decision making aspects of the game were the most appealing reported aspect.

5.1.2. Interactivity and decision making

The interactive aspect of the experience was appreciated as most users reported that that they would like to try again a similar experience and almost all (97%) stated that they would try one with more choices (Figure 8; Table 5).

Decision making was explicitly mentioned as one of the aspects of the experience that the participants particularly liked. Fifteen participants reported that they liked the fact that the game brought the player in position of making important choices that simulated real life as well as the fact that it offered many choices in the process.

Few participants commented on specific aspects of the decision making activities that they considered negative. Eleven participants felt that the span time for answering questions after the press conference sessions was too short. Also, six participants commented that they would have preferred more than two choices each time they had to choose between taking a measure to prevent the spread of the virus. Finally, five participants commented negatively on the repetitiveness of the gameplay and the decision-making style. As participant #22 comments "it could have had more variety in interaction because it was a bit of monotonous just making this type of decisions".

TABLE 5 Game experience questionnaire results for D. General game experience—The statement scores are in a Likert scale from 1 (completely disagree) to 4 (completely agree).

Statement	Average/standard deviation
D1. The flow of the experience was without issues.	3.11/0.74
D2. I would try again a similar experience.	3.08/0.68
D3. I would try this experience with immersive VR equipment.	3/0.94
D4. I would like to try a similar experience with more choices.	3.49/0.56
D5. I would have liked to share this experience with a co-player.	2.92/0.86

TABLE 6 Game experience questionnaire results for C. Learning and cognitive stimulation—The statement scores are in a Likert scale from 1 (completely disagree) to 4 (completely agree).

Statement	Average/standard deviation
C1. The experience expanded my views with new ideas.	2.38/0.64
C2. I felt challenged and provoked.	2.89/0.7
C3. It made me think things differently.	2.62/0.79
C4. The experience did not challenge me mentally.	2.16/0.76
C5 I will be probably thinking this experience for some time.	2.41/0.69

5.1.3. Cognitive stimulation and perspective taking

In terms of the user perceived learning value, cognitive stimulation and perspective taking (Tables 6, 7), the majority of the participants indeed considered the game challenged their way of thinking (Figure 9A). Approximately half of the participants (55%) agreed that the experience helped them think things differently and that it made a lasting impression to them (49%) and less that it expanded their views with new ideas (41%).

The majority of the participants did not feel that the experience changed their views and ideas (Figure 9B). However, interesting insight on how the participants views were affected by the experience is the result of the comparative analysis between their outlook on the pandemic management prior to the game experience and their responses to the question whether the game changed their views on the pandemic management and if so, how. Fourteen participants that had a positive or neutral outlook on the pandemic management reported that the game experience didn't change their views on this topic. One of these referred to their changed view with regards the historic pandemics. Eleven participants that also had a positive or neutral outlook on the pandemic management reported that the experience changed their views on the management of the pandemic. Taking a closer look at the responses, the majority referred to the experience as an eye-opener in terms of how difficult it is to make the right decisions in such health crisis situations. As participant #33 characteristically reports: "Yes, because whatever decision is made, at the same time it is very difficult to properly manage the pandemic while ensuring citizens' prosperity. In such crisis, there can be no popularist or totalitarian approach without its consequences." Participant #34 also comments: "Yes, as regards the difficulty of making decisions that actually risk the lives of a large population, while trying to maintain the country at a good level of living, albeit a different one". This is a very important result as the majority of those participants had reported that they comply with the measurements in real life, but they didn't always agree with them. Two participants, who also had a negative view on how the pandemic is managed so far, believing that they don't support measurements at all thinking them as an excuse to limit citizens' freedom, reported to have changed their minds. Participant #35 reports that the reason for this change of mind is two-fold: "(1) It became more obvious to me how pressuring is to be in such a position (of decision-making), and (2) The role of the journalists. I was presented with a government that cared about appearances in front of the press. Honestly, I had forgotten that journalists can be objective…". Interestingly enough, participant #35 experienced the very good scenario in the end, which means that they had to make difficult decisions and take measure that they didn't agree with in real life. Otherwise, they wouldn't have been able to get this balance between limiting the spread and keeping citizens happy. Participant #24 also didn't support the measures against the spread but reported that the experience changed their view on the difficulty and complexity of making such decisions. Finally, only two participants with negative outlooks on the pandemic management reported that their views were not changed at all after the experience.

The user perceived effectiveness of the experience to provide insight on the complexity of decision making for crisis management is also strongly evident in the responses to the statement E1 (Figure 10A): The majority of the participants (70%) considered that the game helped them understand moderately or very much the individuals who are called to make similar decisions in real life. An additional 22% stated that it helped them understand those people "a little" and only 8% not at all.

The participants commented positively about the possibility to assume the perspective of the decision makers at a government level during the crisis. Participant #21 reported: "I liked that it was based in real life events and that I was able to step into the Prime Minister's shoes and take some important decisions" and complementary

TABLE 7 Game experience questionnaire results for E. Decision making and perspective taking—The statement scores are in a Likert scale from 1 (completely disagree) to 4 (completely agree).

Statement	Average/standard deviation
E1. I understand better people that are called to make similar decisions in real life.	2.89/0.91
E2. My actions in the game were based on specific information I received in key points.	2.89/0.88
E3. My choices in the game were affected by the choices of my previous actions.	2.54/0.9
E4. The experience affected my perspective and views in real life.	1.78/0.79
E5. The experience gave me new understanding for people different than me or other cultures different than mine.	1.97/0.8
E6. The experience gave new meaning to what is currently happening in real life.	1.95/1

TABLE 8 Control and experience correlation results.

Control	Experience	Pearson correlation	Sig. (2-tailed)
Control 1—Do you like to make decisions?	B2 I was transported to another world and lost track of time.	0.410*	0.012
Control 1—Do you like to make decisions?	D3. I would like to try a similar experience with more choices.	0.463**	0.004
Control 3—Is it difficult for you to think clearly when you must make a decision quickly?	D3. I would like to try a similar experience with more choices.	−0.329*	0.047

*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

to this, participants #22 and #34 commented that they liked the feeling of responsibility that was bestowed on the player who was in position of calling the shots. In particular, participant #34 commented "I liked that I was in a high responsibility position because it made me understand better the difficulty of being in such a position". Similarly, participant #26 writes "….I also liked the verisimilitude of the story, and that you get into somebody else's position to make decisions as this gives you a different perspective on things", while participant #12 very explicitly writes "I liked that the game made me understand that it is very hard to keep the balance between keeping the citizens content and taking effective measurements (to end the pandemic)".

The responses to the question "Which decisions were harder to make?" offered insight on the effect of difference choices on the participants. Five participants mentioned the closing of schools in order to prevent the virus from spreading as the toughest decision. According to participant #31 "The decision for closing or not the schools… Difficult dilemma and in the end the decision I made didn't end well in the game from the point of view of maintaining the public health". Similarly, participant #14 "The decision about education, which although necessary for social progress, it poses great risks for public health". Also, four participants mentioned the decision about creating new intensive care units over other options because it made them think about the consequences in the case the virus spread exponentially and the number of people in need of increased, respectively (both in real-life and in the game). Three participants also reported that all choices that limited citizens' freedom over health stability were difficult. As participant #23 writes: "The decisions that concerned the enforcement of measures against the spread of the pandemic at the expense of the citizens' freedom were the most difficult, because the government is called to maintain a balance between protective measures and the psychological wellbeing of the citizens". The choice between using police forces to monitor the compliance of measures in the public spaces was mentioned as a tough decision by two participants. As participant #34 characteristically reports: "This choice of using police forces… I was influenced by the government's politics in Greece, thinking at the time the abuse of authority (for maintaining public space restrictions), while at the same time there were severe shortcomings in the health department". Entertainment programs and educating citizens at the time of the quarantine as well as closing the borders were also mentioned as difficult decisions by three participants. Finally, three participants reported that none of the decisions were difficult to make while two thought that all decisions were equally hard to make.

5.1.4. The role of historical information in decision making

As the vast majority of the participants reported, their decisions were a result of their previous decisions in the game (96%), and of the information the game provided at key points (95%) (Figure 10B). Information was provided to the users in the Council scenes and in the News—historical events scenes.

Eleven participants explicitly mentioned that they particularly cherished the historical and contemporary events that were presented throughout the game. Characteristically, participant #13 reports "I find it very interesting that someone thought to create a game on this topic, and I liked many things about it. But my favorite part were the historical events presented in the newspaper. The newspaper was aesthetically pleasing, and I really liked the use of paintings also on a semiotic level. After each press conference, I was eager to read the next news topic."

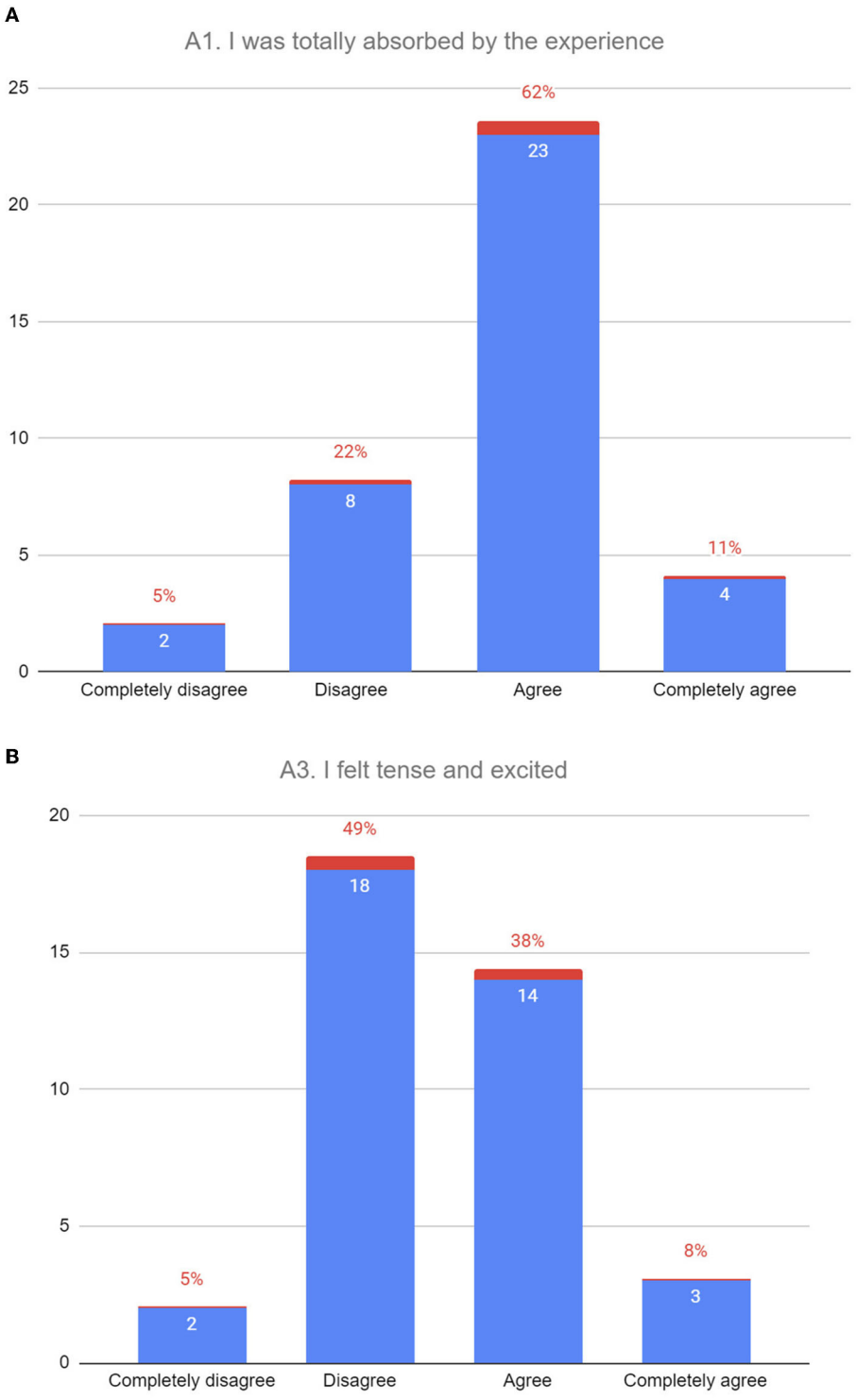

FIGURE 6
Selected results on engagement and immersion. **(A)** This bar chart shows results on experience absorption with most participants reporting that they were absorbed by the experience. **(B)** The bar chart showing that at least half of the participants didn't feel tense and excited during the experience.

The most prominent response to the question about the part of the experience that drew their attention the most also concerns the topical and historical events related to the pandemic that were reported in the news sessions (11 responses). As participant #6 and #26 write, respectively "(The part of the experience that drew my attention the most was) the information about COVID or other historic pandemics because I learnt things I never knew before," "the connection to previous pandemics, because I learnt how similar conditions were dealt with in the past".

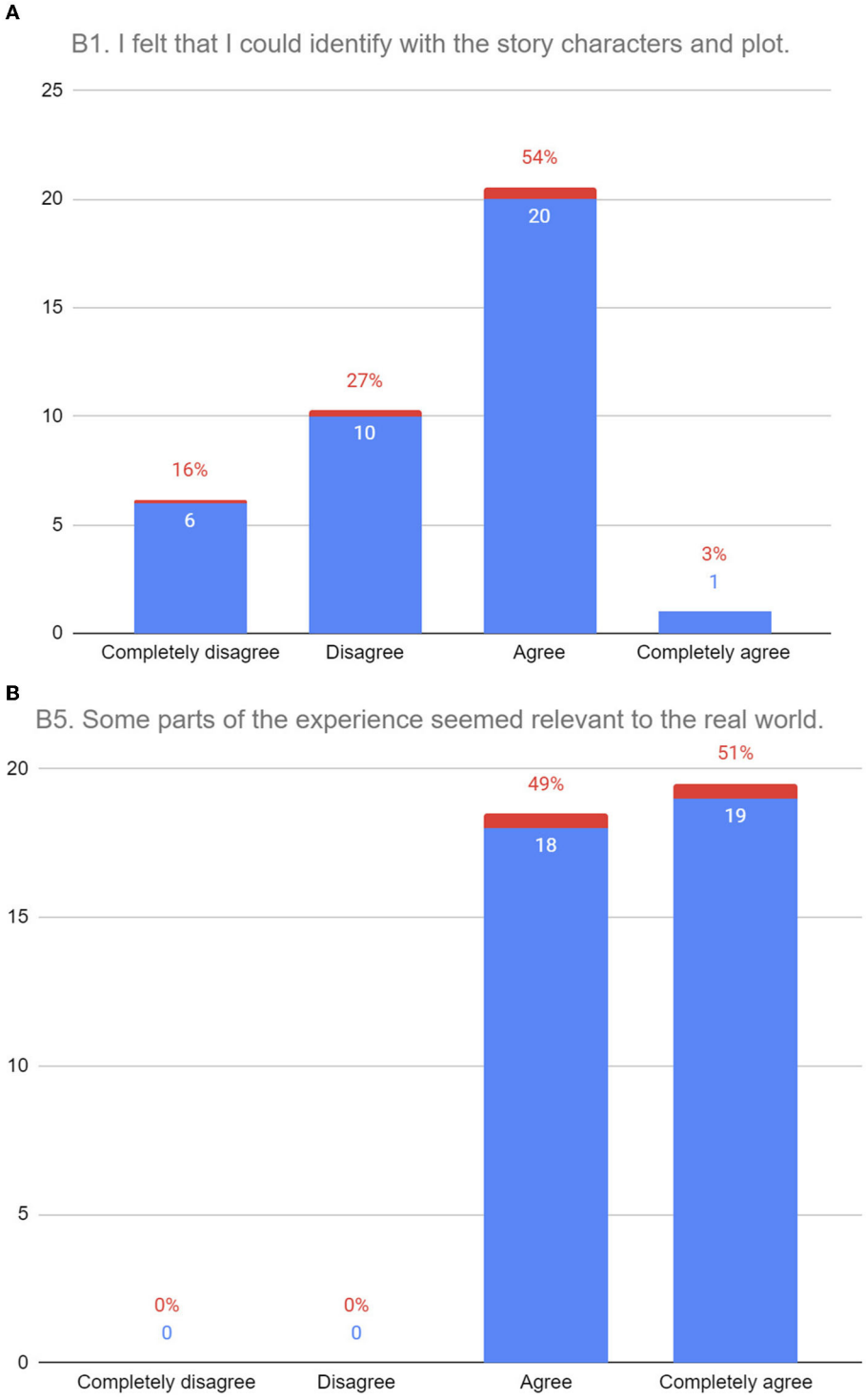

FIGURE 7
Selected results on the affective connection aspects of the game. **(A)** The bar chart showing that more than half of the participants could identify with the story characters and the plot. **(B)** The bar chart showing that all participants thought that some parts of the experience seemed relevant to the real-world events.

5.2. RQ2—The effect of personality traits on the decision-making game experience

The quantitative data were prepared for analysis in SPSS. First, we checked that our sample data were normally distributed and then, we opted for a Pearson's correlation analysis to detect correlations between the results of the personality trait questions and the game experience statements, and if so, whether they are positively or negatively related. The results of this analysis for both the FFM and

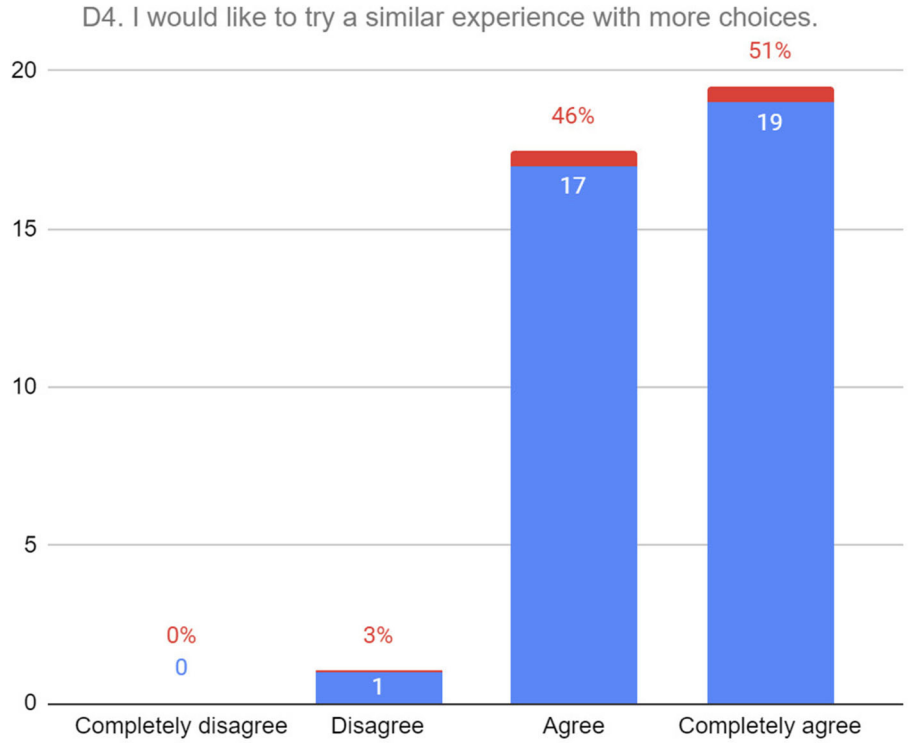

FIGURE 8
Selected results on the interactivity and decision making aspect of the experience. The results showing that almost all of the participants would try a similar experience with more choices.

the DMQ groups of personality treats are reported in this section.

5.2.1. DMQ and game experience

Important results are reported from the correlation analysis between the decision-making questionnaire statements and the game experience—related responses. The first significant results concern the correlation between the DMQ dimension of Control and experience (see Table 8). More specifically, the output of the analysis shows that the appeal of making decisions is positively correlated with absorption in the experience and the feeling of being transported to another world and loosing track of time during the gameplay as well as with the willingness of trying a similar experience with more choices in the future. The latter is in fact positively related at a significant level (0.01). This implied that people who like making decisions are more prone to enjoy experiences that allow them to navigate complex worlds offering many choices. At the same time, the analysis provided a negative correlation between the difficulty of thinking clearly when required to decide quickly and the willingness to try a similar experience with more choices. In other words, people who have difficulties making decisions under pressure, felt that they would not like more choices in similar game experiences.

The data analysis provided another interesting result concerning the way people make decisions based on their belief systems regardless of the practical difficulties that they may have to deal with later because of their choices. More specifically, we observe a positive relation between people who make decisions based on beliefs and ideals and the influence that the game had on them to understand better the people that are called to make similar decisions in real life (see Table 9). In other words, the game offered idealists a deeper understanding on decision-making in similar real life scenarios.

Thoroughness as a characteristic of decision-making was significantly correlated to the gaming experience and particularly to feelings of provocation, expansion of views and understanding of people making similar decisions in real-life (see Table 10). More specifically, making decisions without thinking about the consequences was positively correlated to a better understanding of real-life decision making after the gaming experience. On the other hand, spending a lot of time planning ahead before acting was negatively correlated to the feeling of being challenged and provoked, as well as a feeling that the experience expanded one's views with new ideas. In other words, this result confirms that the less someone is overthinking and planning before acting the more prone and open she is to new ideas, challenges, and provocation.

Hesitancy was also correlated to certain aspects of the experience. More specifically, the tendency to often change decisions made was correlated to feeling uncomfortable with certain parts of the story, while taking the safe option if there's

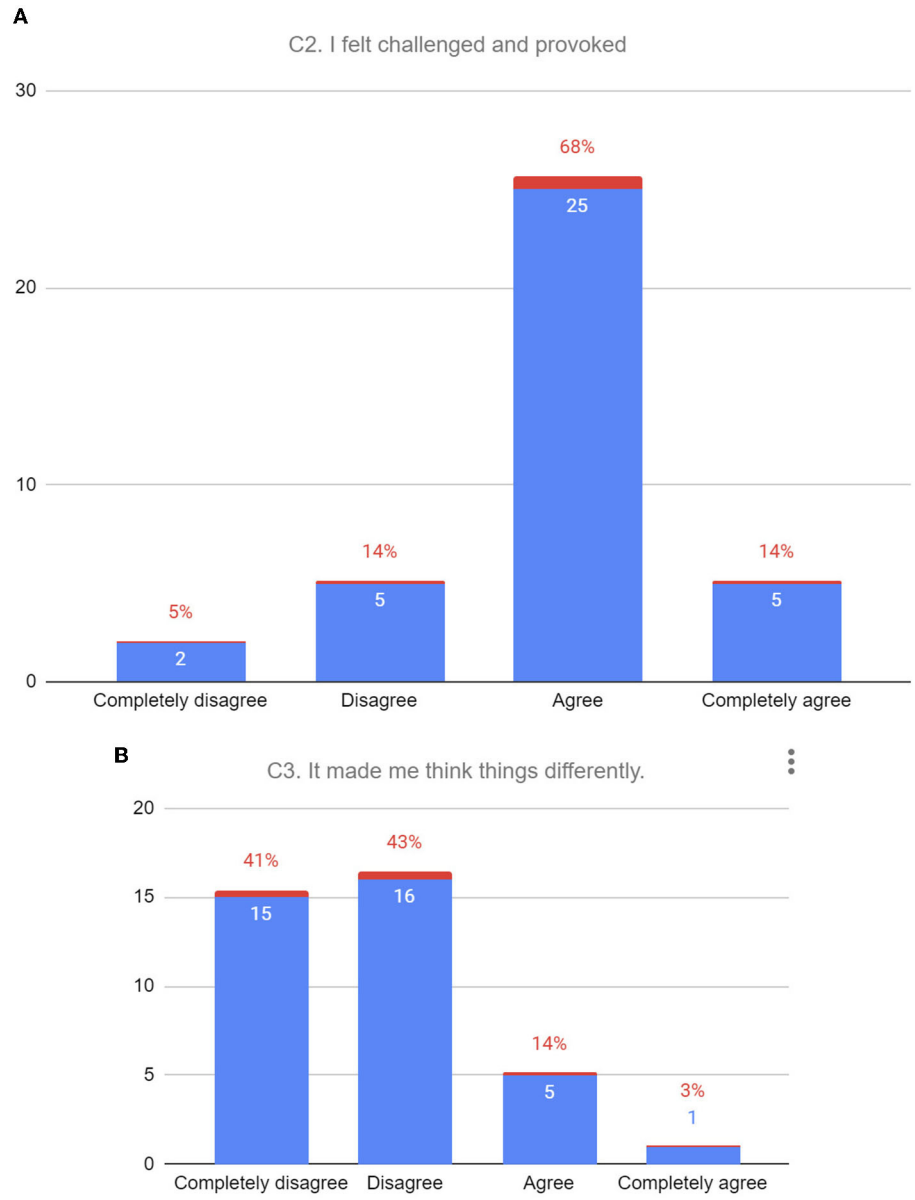

FIGURE 9
Selected results on cognitive stimulation and perspective taking. **(A)** Results showing that the majority of participants found the experience challenging. **(B)** Results showing that the participants did not feel that the experience made them think things differently.

one was negatively correlated to the willingness of trying a similar experience with more choices (see Table 11).

A significant correlation is also found between a tendency for perfectionism and the game experience (see Table 12). More specifically, the tendency to keep searching for a better solution even if already found a relatively good one was negatively correlated to the affective aspects of the story and positively correlated to the willingness of trying a similar experience with more choices as well as understanding better people who are called to make similar decisions in real life. No significant results can be reported in terms of the characteristics of decision-making that are related to instinct and social resistance.

5.3. FFM and game experience

Game experience results were also correlated with specific FFM personality (see Table 13). The results showed that certain aspects of the experience were related to conscientiousness, neuroticism, and mainly openness to experience, while no significant results were reported for agreeableness and extraversion. Conscientiousness, which is the quality of wishing to do one's work well and thoroughly, was positively correlated to absorption and being transported to another world during the gameplay. Openness to experience was significantly (at the 0.01 level) correlated with trying a similar experience with more choices.

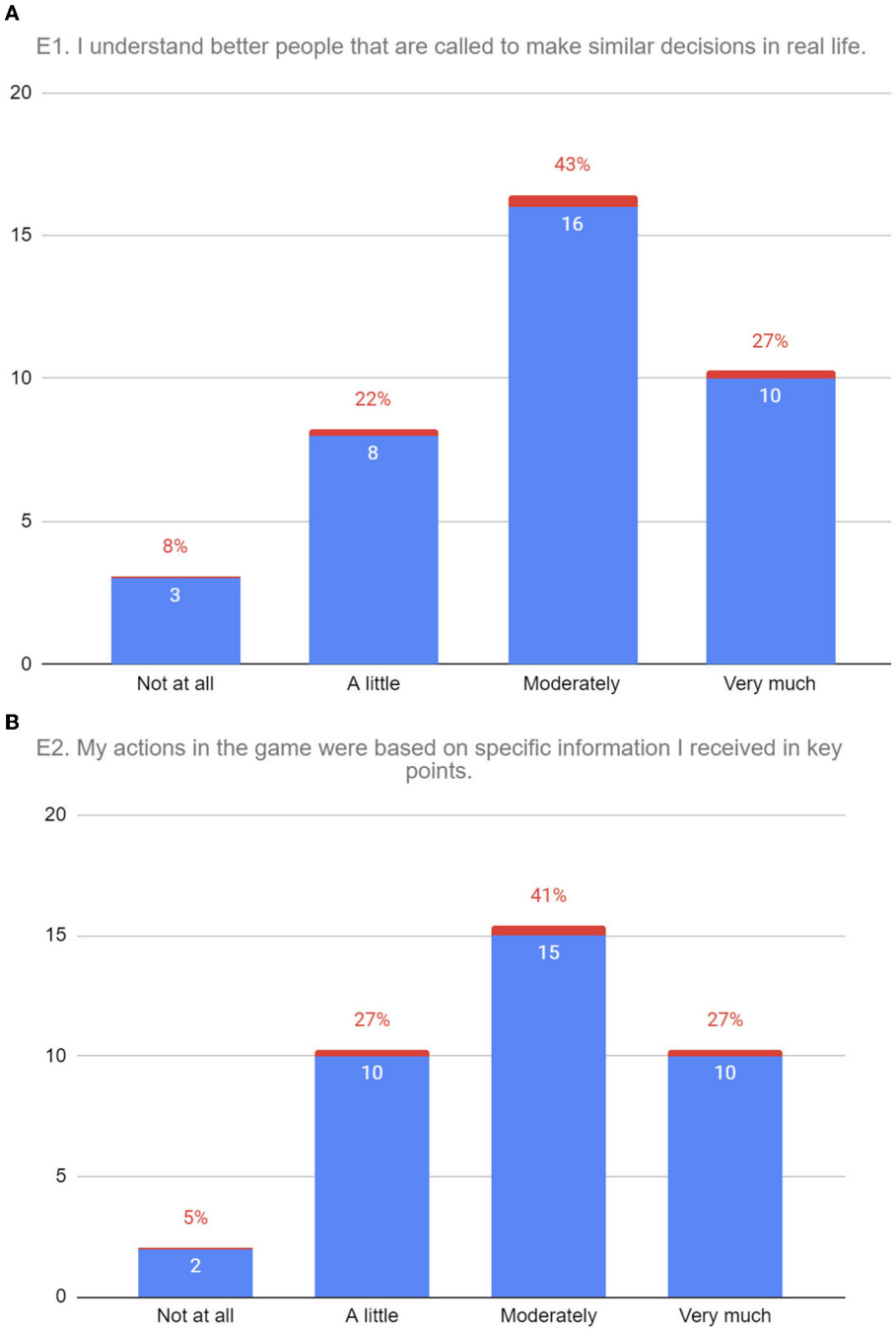

FIGURE 10
Selected results on cognitive stimulation and perspective taking. **(A)** Results showing that the majority of participants felt that the experience helped them understand better people who are called to make similar decisions in real life. **(B)** The results showing that the majority of the participants acted based in specific information they received in key points throughout the game.

This trait was also correlated with understanding people that are called to make similar decisions in real life. Neuroticism, which is typically defined as a tendency toward anxiety, self-doubt, and other negative feelings, was positively correlated to being moved on an emotional level and being affected by the experience in terms of one's perspective and views in real life.

6. Discussion

The outcomes of the study presented in this paper are promising in relation to the application of decision-making games to support perspective taking in crisis management. PoE was designed to guide the players through a series of choices, bringing them player to the position of the decision maker. The game was

TABLE 9 Principled and experience correlation results.

Principled	Experience	Pearson correlation	Sig. (2-tailed)
Principled 1. Do you like to make decisions based on your beliefs and ideals, regardless of practical difficulties?	E1. I understand better people that are called to make similar decisions in real life.	0.353*	0.032

*Correlation is significant at the 0.05 level (2-tailed).

TABLE 10 Thoroughness and experience correlation results.

Thoroughness	Experience	Pearson correlation	Sig. (2-tailed)
Thoroughness 1: Do you make decisions without thinking about the consequences.	E1. I understand better people that are called to make similar decisions in real life.	0.375*	0.022
Thoroughness 2: Do you spend a lot of time planning ahead before acting on something?	C1. The experience expanded my views with new ideas.	−0.330*	0.046
Thoroughness 2: Do you spend a lot of time planning ahead before acting on something?	C2. I felt challenged and provoked.	−0.347*	0.035

*Correlation is significant at the 0.05 level (2-tailed).

TABLE 11 Hesitancy and experience correlation results.

Hesitancy	Experience	Pearson correlation	Sig. (2-tailed)
Hesitancy 1—Do you change your decisions?	B4. Some parts of the story made me feel uncomfortable.	0.377*	0.021
Hesitancy 2—Do you take the safe option if there is one?	D3. I would like to try a similar experience with more choices.	−0.376*	0.022

*Correlation is significant at the 0.05 level (2-tailed).

TABLE 12 Optimizing and experience correlation results.

Optimizing	Experience	Pearson correlation	Sig. (2-tailed)
Even if you have found a relatively good solution, you still try to search for a better one.	B3. Some parts of the story moved me on an emotional level.	−0.353*	0.032
Even if you have found a relatively good solution, you still try to search for a better one.	D3. I would like to try a similar experience with more choices.	0.358*	0.030
Even if you have found a relatively good solution, you still try to search for a better one.	E1. I understand better people that are called to make similar decisions in real life.	0.333*	0.044

*Correlation is significant at the 0.05 level (2-tailed).

TABLE 13 FFM personality traits and experience correlation results.

Personality trait	Experience	Pearson correlation	Sig. (2-tailed)
Conscientiousness	B2 I was transported to another world and lost track of time.	0.344*	0.037
Openness to experience	D5. I would try this experience with immersive VR equipment.	0.426**	0.009
Openness to experience	D3. I would like to try a similar experience with more choices.	0.420**	0.01
Openness to experience	E1. I understand better people that are called to make similar decisions in real life.	0.324*	0.05
Neuroticism	B3. Some parts of the story moved me in on an emotional level.	0.333*	0.044
Neuroticism	E4. The experience affected my perspective and views in real life.	0.333*	0.044

*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

successful in engaging the participants, and the 92% reported that it helped understand up to a degree individuals who are called to make similar decisions in real life.

As discussed in Section 3.2, in the field of serious games and video games in general, decision-making has been widely used to support the development of relevant soft skills of the player (Rowe et al., 2011; Apostolakis et al., 2016), as well as a tool to promote prosocial skills, including empathy and perspective taking (Gaydos and Squire, 2012; Bormann and Greitemeyer, 2015; Isbister, 2016). Although PoE presents the perspective of the government as a decision maker in a time of crisis, its objective is not to fully simulate a complex modern pandemic crisis nor train the player on decision making in this context. In many countries, the intense social conflict resulting from specific adopted measures for the pandemic, led to extreme behaviors with notable adverse effects on different socio-economic aspects as well as on the individual (Apostolidis et al., 2020; Saladino et al., 2020; Herbert and Marquette, 2021; Johnson et al., 2022). Inspired by this intense polarization of opinions on COVID-19 and the subsequent "high levels of mistrust in authorities" we sought to examine a decision-making game as a tool to support reflection on the governance of such a crisis and the complex effects of every decision made, ultimately promoting a more neutral stance and alleviating bias, not only toward the decision makers themselves but also toward those individuals that may support an opposing opinion.

The issue of bias has been widely discussed in the context of history, history education and the understanding of the past (Bevir, 1994), suggesting that neutrality can be attained by sifting through evidence and reaching verifiable and reasonable conclusions. McCullagh (2000) argues that "although absolute freedom from bias cannot be guaranteed, the deliberate attempt to create descriptions, interpretations, and explanations of past events rationally, giving careful consideration to many different and multiple possibilities will certainly be a way toward reducing bias". He endorses such a multiplicity of perspectives as "a possible solution to the problem of overcoming bias". The Council of Europe (n.d.) also advocates for multiperspectivity, stating that it can help students to analyze and interpret evidence critically and responsibly when dealing with controversial and sensitive issues, and to understand that people see the world differently, encouraging open-mindedness, tolerance, empathy and respect for diversity.

PoE has multiperspectivity at the core of its design. In the Council the player has the possibility to access information on the current pandemic directly. After each decision, they can gain insight on the effects, in most cases both positive and negative. Finally, information on relevant historical events presents a wider, timeless aspect. It provides a motivation for reflection on how past management decisions worked out and it also communicates the sense that the current pandemic is not an unprecedented event in human history. Humanity has again faced similar crises and was able to overcome them. Interestingly, the historical information, along with the first-person decision making, was amongst the stronger reported positive aspects of the experience.

The different perspectives on managing a pandemic crisis offered in the game through its playful and thoughtful design succeeded to affect players in different ways. Our second research question revolved around the possible effect of the examined personality traits of the player on their game experience. Our outcomes revealed such correlations. In the case of absorption and the feeling of being transported to another world and loosing track of time, correlations have been detected to both the FFM Conscientiousness and the DMQ Control aspects. In essence, people that like to have Control over their decisions and are thorough and responsible when performing a task are more prone to being immersed in this type of decision making experience. These results on Conscientiousness are consistent with those in Katifori et al. (2019). DMQ Perfectionism and the FFM Neuroticism are, respectively, negatively and positively correlated to being moved by the story of the game on an emotional level. An interesting result concerns the personality traits that are correlated with the interest in experiencing more choices in the game. The results show that the DMQ Perfectionism and the FFM Openness to experience are characteristics of players that enjoy being able to make multiple decisions during the gameplay. On the other hand, Hesitancy was negatively correlated to interest in an experience with multiple choices; a result that further strengthens the aforementioned interpretation.

Another important result concerns the effect that the game had on players in understanding better people who are called to make similar decisions in real-life since this was one the main goals of the game design. In this respect, understanding people who were in charge of controlling the pandemic, while keeping the society content was achieved by players that are characterized by DMQ Idealism, Thoroughness and Perfectionism, and the FFM Openness to experience. This does not necessarily mean that the game was able to change the players' perspective on real-life events, but the results demonstrate that players who possess the above characteristics in decision-making and personality traits are more likely to sympathize with people in charge of complicated situations, such as managing the pandemic.

The results of our study contribute to previous findings on the role personality traits to player preferences and behavior. For example, according to Zammito (2010), agreeable gamers particularly enjoy adventure games as well as the existence of a positive correlation of openness to preference for puzzle games. Braun et al. (2016) report that fans of simulators demonstrate the highest level of conscientiousness. As Zalewski (2021), although personality traits are not a decisive factor for the "a player's preference for specific game genres, and although the relationship between personality and liking particular genres is generally rather small, it undeniably exists. Knowing what personality traits fans of certain genres display and what makes them different from other players, can help developers create better, more engaging games that better respond to their needs". This can be especially relevant for serious games, where the need to maximize the impact of the game on its learning, or other relevant objectives is strong.

7. Conclusions

The main objective of the study which is reported in this article is to determine the effect of a decision making game that brings the player to the position of the government as decision maker in the context of a pandemic crisis. PoE also includes in the design information on significant relevant historic and

topical events, as well as possible economic, political, and social implications though the repetition of four different types of scenes. This combination of design features was positively evaluated by the participants. The results indicate that the game was indeed effective in promoting multiperspectivity and a deeper understanding of the complexity of crisis management, including the need to address and bring different, conflicting factors to an equilibrium. The game experience aims to cultivate perspective taking and empathy through this reflection, aspiring to reduce bias and extreme and rigid views that have a strong and negative impact on social cohesion, especially in times of crisis. A limitation for this work has been the lack of provision for an interview with the participants. A semi-structured interview would allow us to delve deeper in the exact role of different design elements on the effect the experience had on the users.

This work has confirmed and complements previous studies on the role of personality traits in user preferences and behavior when playing. Further, more targeted studies are needed to examine the degree and importance of this effect and decide whether it is a strong enough factor to guide a personalized design of a decision-making game for perspective taking and empathy. PoE can be adjusted to contribute to such experimentation. The next steps would include the design of a new, targeted study, this time possibly including user observation and/or interviews in the methodology, to delve deeper in the effects of decision making on perspective taking as well as the role of personality traits.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the participants was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

Conceptualization, project administration, supervision, and writing—original draft: AC. Data curation, formal analysis, and investigation: AC and AKat. Methodology: AC, AKat, and AA. Software and visualization: AM and AKap. Validation: AKat. Writing—review and editing: AC, AKat, AM, AKap, and AA. All authors contributed to the article and approved the submitted version.

Funding

The research reported in this article was funded by the Research e-Infrastructure "Aegean Interregional Digital Transformation in Culture and Tourism" (Code Number MIS 5047046) which is implemented within the framework of the "Regional Excellence" Action of the Operational Program "Competitiveness, Entrepreneurship, and Innovation". The action was co-funded by the European Regional Development Fund (ERDF) and the Greek State (Partnership Agreement 2014–2020).

Acknowledgments

We would like to thank Dr. Vlassis Kasapakis for offering his advice on the game development phase of this study. We also owe our gratitude to the director and manager of the Image and Sound Cultural Representation Lab (ISCRL), Prof. Dimitrios Papageorgiou and Mr. Alexandros Spathis, respectively, for hosting the video game and offering the facilities of the lab and their assistance in various stages of this research.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fcomp.2023.1178972/full#supplementary-material

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