

## Assessment of the usefulness and appeal of stigma-stop by psychology students: a serious game designed to reduce the stigma of mental illness.

Adolfo J. Cangas<sup>1,\*</sup>, Noelia Navarro<sup>1</sup>, Juan J. Ojeda<sup>2</sup>, Diego Cangas<sup>2</sup>, Jose A. Piedra<sup>2</sup>, José Gallego<sup>4</sup>

<sup>1</sup>University of Almería, Department of Psychology, 04120, Almería, Spain

<sup>2</sup> University of Almería, Department of Computer Science, 04120, Almería, Spain

<sup>3</sup> University of Almería, Department of Education, 04120, Almería, Spain

### ARTICLE INFO

Article history:

Received: 05 March, 2017

Accepted: 11 April, 2017

Online: 24 April, 2017

Keywords :

Stigma

Mental health

Video games

### ABSTRACT

The present work describes the first serious game designed to reduce the stigma among students towards mental health problems. The game is called Stigma-Stop, and it features characters who suffer from various mental disorders. Players are provided with information about different mental illnesses, and they are presented with several options on how to act when they encounter characters with these problems. In addition, the game questions the participants as to whether they have ever felt like the individuals portrayed in the game, with the goal of fostering empathy for those that suffer from these types of disorders. Stigma-Stop was applied to a sample of second-year university Psychology students to evaluate the game's usefulness and appeal. The results demonstrate the importance of this game and that these students consider it to be highly useful. The most notable characteristics are described in depth in the present paper.

## 1. Introduction

The present work is an extension of the study presented at the 8th International Conference on Games and Virtual Worlds for Serious Applications (VS-GAMES) called "Stigma-Stop a Serious Game against the Stigma in Mental Disorders" [1] which focused on developing the first serious game designed for the purpose of reducing the stigma towards mental illnesses.

The game features characters with various mental disorders (schizophrenia, agoraphobia, depression, and bipolar disorder). The objective is for the player to convince all the characters to work towards a common goal, which is to form a group to participate in a contest. Over the course of the game, the player is given different options on how to behave when interacting with the characters; the game also provides them with information on which is the most appropriate choice. It gives further details about each of the mental disorders and asks the players questions which seek to foster empathy towards those who suffer from these problems.

\*Corresponding Author: A.J. Cangas, Department of Psychology, University of Almería. Crta Sacramento, s/n CP04120, La Cañada de San Urbano, Almería, Spain. E-mail: [ajcangas@ual.es](mailto:ajcangas@ual.es)

The video game also features four mini-games, whose ultimate goal is to provide knowledge and dispel traditional myths about mental health [2-5].

In a previous study, the game was successfully used with a sample of 168 secondary school students. In this case, stigma towards mental health disorders was significantly reduced among the students who played the video game, compared to the control group which played other video games and did not display any changes [6].

In this way, Stigma-Stop seeks to familiarize young people with mental disorders, particularly at this age because most of these problems manifest themselves during adolescence. The game intends to increase their knowledge on this subject and strengthen their awareness, while emphasizing the importance of biographical and/or contextual experiences related to these illnesses and that anyone can experience similar problems over the course of their life. The game teaches how to interact with those who suffer from these disorders, fostering interest in helping these individuals. This aspect is of vital importance considering young people are

acquiring and consolidating values they will act on as future citizens.

The present study intends to analyze Psychology students' opinion of Stigma-Stop. Their point of view is quite relevant considering, firstly, they will be future working professionals in the field of mental health, and, secondly, they are at an age (the sample was of second-year Psychology students) when they are very familiar with the use of video games.

The game is optimized to be used in schools and can be applied on an individual basis or in groups. This flexibility makes it possible to initiate discussions in class about these topics, where they can be addressed "naturally" and any misconceptions can be identified and clarified.

## 2. Method

### 2.1. Sample

The sample consisted of 26 students in the second year of their Psychology degree at the University of Almería (Spain). Participants were between the ages of 18 and 28 ( $X=20.12$ ;  $S.D.=2.85$ ). In this group, 76.92% were female, and the remaining 23.08% were male.

### 2.2. Tools

**Stigma-Stop.** This is a serious game designed in a non-immersive virtual reality environment. Stigma-Stop was developed with Unity3D software for three platforms (PC, website and Smartphone application) and it is aimed primarily at young people between the ages of 14 and 21. The player can choose the sex of the avatar they are going to play with. During the game, different characters appear who suffer from various mental disorders (depression, schizophrenia, bipolar disorder and agoraphobia). Figure 1 shows some of the scenes from the program.

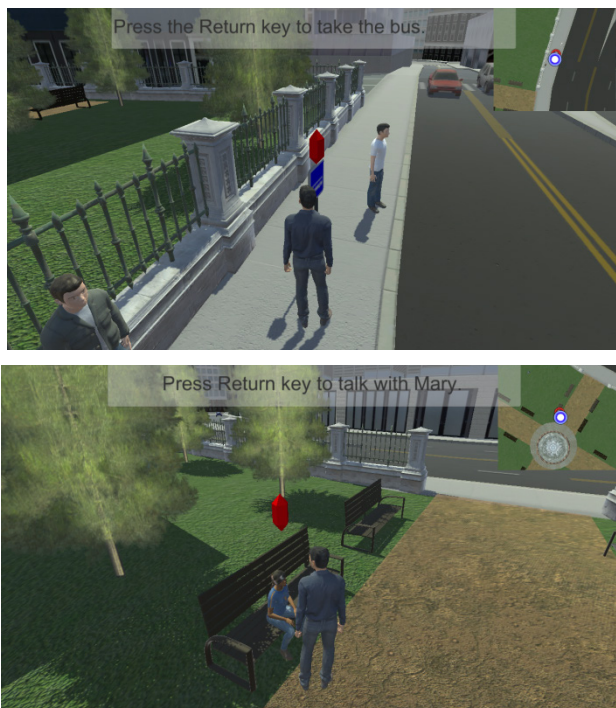


Figure 1. Scenes from "Stigma-Stop".

The objective of the player is to interact with each one of the characters and convince them to contribute their knowledge to a project and work towards a common goal: design a video game for a contest. The player does not follow a predefined plot in the game. The player's freedom to choose the character who they visit at any given point in the game was incorporated using a machine of finite states. This machine contains each one of the situations that the user could experience and keeps track of the situations that the user has already completed so each character is visited only once. The user interacts with the characters through dialogs which reveal some of the symptoms of the various disorders. Once the objective of the dialog has finished, the player is presented with three options for solving different dilemmas that arise, only one of which is correct. If one of the less appropriate choices is selected, information is provided explaining why a different option should be chosen and the player is given another opportunity to select a new one. Similarly, a short form will appear with questions about general knowledge concerning each disorder and the user is able access additional information about the current condition of the characters and what circumstances led them to develop these types of problems. Finally, after meeting each character, the player is asked if they think the character is emotionally well, if they themselves have ever felt the same, and if they think they would be able help that person (specifying how). User answers are stored in a database located in an external server. Communication between said database and the serious game is carried out using RESTful Web Services equipped with PHP at the server end. The information transmitted by these Web Services will be in JSON format. When the user chooses the correct option, they will be redirected to the "mini-game" state, where they can play with one of four mini-games included in the program. Each one focuses on a mental illness and provides the user with more relevant information, apart from that already shown throughout the game. The four mini-games are (figure 2):

- **Memory:** In this mini-game players must match faces of famous people who suffered from different mental disorders to make pairs. These famous individuals include Leonardo da Vinci, Edgar Allan Poe, Vincent van Gogh, John Forbes Nash, Charles Darwin and Robert Schuman. The objective is to complete the game in as few turns as possible. In this way, players will learn that various famous individuals throughout history suffered from some type of disorder. Once they have matched the two cards of the same character, information is displayed about that person (name, profession, mental illness, etc.).

- **Trivial:** In this mini-game the user will have to answer questions related to mental disorders, specifically whether depression is something that only happens to "weak" people; If we are ever depressed, it means that we will be depressed forever; Whether a depressed person can be helped; If people with mental disorders, especially those diagnosed with schizophrenia, are more dangerous, aggressive and unpredictable than those who do not have a mental disorder; and whether people with mental disorders can work. The questions have been designed in the form of affirmation so that the user answers 'True' or 'False'. In case the person is wrong the program tells then why it is incorrect and they will have to respond again.

- **Running with Dali:** In this mini-game the user must move through a scene in as little time as possible, while avoiding obstacles and collecting pieces of paintings. If the player hits an obstacle, their time will increase by a specific increment, which depends on the obstacle itself. When they collect one piece of a

painting, the time on the clock will decrease. Once the game finishes, the pieces of the painting collected will be displayed along with a brief biography of the painter Salvador Dali, who also suffered from a mental illness.

- **Stigma Shooter:** This mini-game contains concepts related to mental illness. The job of the player is to “trap” positive concepts (such as overcoming, improving, independence, acceptance, able to work) and “destroy” negative concepts (unpredictable, dangerous, vague or aggressive) by shooting them.

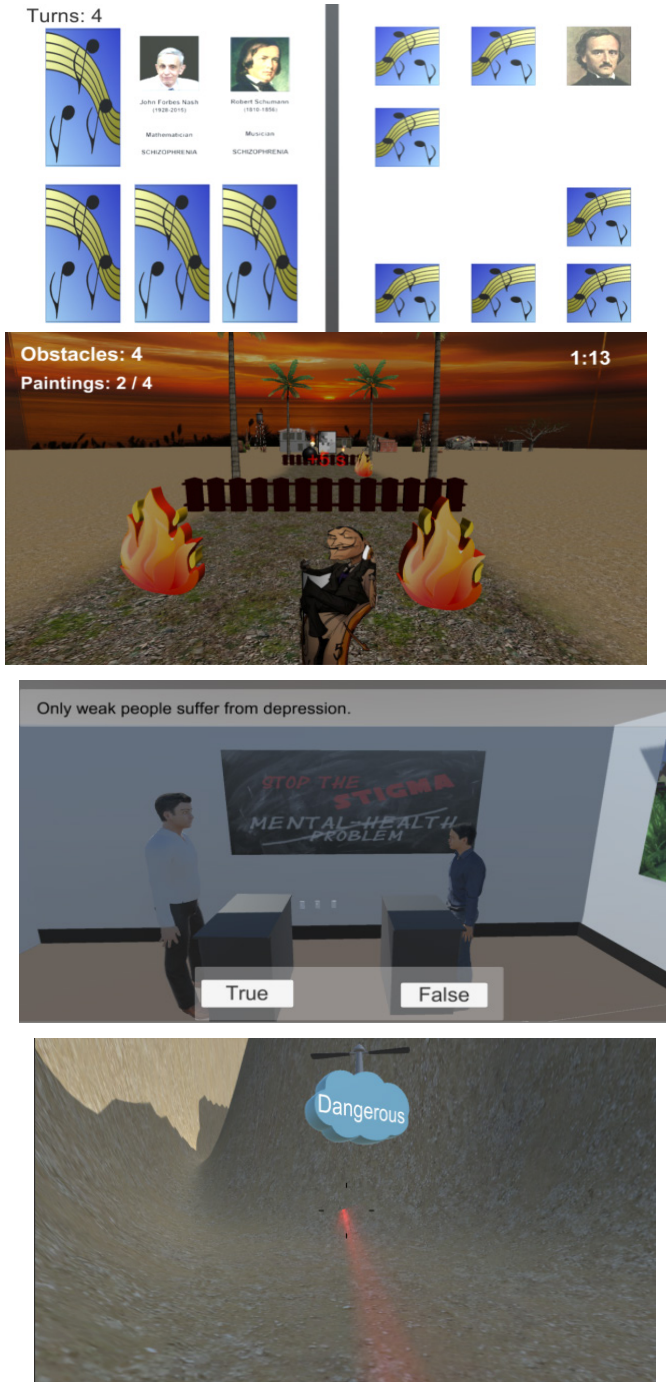


Figure 2. Four mini-games

At the end of each mini-game, the player’s results are displayed, and users can see details about their performance. These results

will also be stored in the database previously mentioned with the objective of ranking participants and motivating players.

In this serious game artificial intelligence resources have been included to make the game seem more realistic. Routes have been created to simulate the movement of pedestrians and cars through the city, thus giving the sensation of activity. These paths are formed by a set of waypoints [7], which contain the position of the three-dimensional space and are assigned to the position of the 3D model. In addition, each route has a certain speed associated with the movement of the 3D model to ensure that the behavior of pedestrians and cars do not have the same pattern, which would give a feeling that their behavior is predictable and artificial.

The cars, apart from using the waypoints, have an algorithm implemented so that when they detect the presence of a character on the road they do not pass over it and stop until the character is at a safe distance, at which time the vehicle continues its path. The scenes of the city where the user interacts with their character are designed so that the avatar can only cross at the pedestrian crossings and when it is detected that the user wants to pass the road, an invisible wall is created to prevent passage and force them to cross at the crosswalk.

Decision trees [8] is another strategy that has been used in this video game regarding the animation of the characters. As mentioned before the protagonist has to visit his friends to achieve the goal. In each of the visits to his friends, the protagonist will engage in a conversation with his friend. These dialogues are composed of a series of animations that give the 3D models movement. Decision trees determine the animation of the different characters; depending on who the protagonist is talking to, certain actions or others will be shown. The options that the user chooses in response to the situation that arises will be another factor that influences the animations chosen during the dialogue.

Stigma-Stop assessment questionnaire. It evaluates on a scale of 0-10 the degree of attractiveness of the video game and also the interest it arouse. They should also describe what they have learned from the program and whether or not they would recommend its use to a friend. Likewise, for each of the characters that appear in the video game, participants are asked to indicate whether they believe they are psychologically well, if they think they could help the character and if they have ever felt like them.

### 3. Procedure

The experimental application of the video game took place at the University of Almería in quiet room equipped with tables, chairs and a desktop computer connected to a projector. The activity was conducted in group format in which four participants interacted directly with the video game. Each member of the group visited one character while the others observed on the projector screen. After finishing the program all students completed the Stigma-Stop assessment questionnaire.

### 4. Results

In terms of the quantitative data, on a scale of 1-10, the participants gave the program an average score of 8.08 (SD=1.35) for its usefulness and 6.58 (SD=1.21) for its entertainment value. In addition, the 26 participants (100%) indicated that they would recommend the game to a friend. As for the question: What do you think you have learned from Stigma Stop? responses were

classified as follows (bearing in mind that some responses may be included in more than one category):

1. Answers that emphasized the educational value of the video game in terms of the information it provides regarding the symptoms of the various disorders in the game, making them easier to recognize. (e.g. answers: “more easily diagnose a mental illness since the symptoms are clearly shown”; “try to diagnose the characters and help them”).

2. Answers that specifically highlighted the acquisition of intervention strategies for dealing with the disorders, promoting prosocial and helpful behavior. (e.g. answers: “teaches ways in which you can help people with these disorders”; “how to treat these individuals and how to behave”; “how we should help to improve the situation of the person”).

3. Answers that mainly emphasize the usefulness of the game in raising awareness against stigma, dispelling myths, and normalizing the disorders by considering them responses to specific adverse biographical and/or contextual circumstances. (e.g. answers: “end specific stigmas associated with the label of mental disorder”; “the experiences of people are very important for understanding their unusual behavior”).

The students’ answers were distributed quite evenly among the three categories. 56% of the responses were classified under the second option (teaching intervention strategies) and 52% were categorized under the first and third options (usefulness in providing information on symptoms and capacity to raise awareness against social stigma, respectively).

Table 1. Participant responses regarding characters in percentages

	Panic disorder with agoraphobia (%)		Schizophrenia (%)		Bipolar Disorder (%)		Depression (%)	
	YES	NO	YES	NO	YES	NO	YES	NO
<i>Do you think the character is emotionally well?</i>	4	96	4	96	27	73	0	100
<i>Do you think you could help this person?</i>	100	0	88	12	79	21	92	8
<i>Have you ever felt like this person?</i>	11	89	0	100	31	69	42	58

With respect to the questions where participants indicated whether they thought the character was emotionally well, nearly 100% responded ‘no’ in every case except for bipolar disorder, which registered at 73 %. These percentages remained similar regarding whether they thought they could help the characters after discovering their problems; virtually all responded ‘yes’ except in the case of bipolar disorder (79 %). With respect to question as to whether participants had themselves ever felt like one of the characters, 42 % responded ‘yes’ in the case of depression, less for bipolar disorder (31 %) and considerably less for panic disorder with agoraphobia (11 %). None of the participants identified themselves as having ever experienced schizophrenia (Table 1).

## 5. Discussion

Serious Games have shown to be highly beneficial in various fields of education [9], problem solving [10], psychological interventions [11] and even job-oriented development of university students [12]. Nevertheless, “Stigma Stop” is the first Serious Game to date that focuses on providing information about mental illnesses and raising awareness among young people about this topic, thereby promoting sensitivity and empathy towards people who suffer from mental health problems.

In the case of the Psychology students in this study, their assessment of the game was highly favorable. This is very significant considering we are dealing with future healthcare professionals, most of whom will work with individuals suffering from mental health disorders. Their evaluations were especially positive in terms of the game’s usefulness, yet they were somewhat lower with regard to its entertainment value. In addition, the students highlighted three main benefits of the serious game, namely the fact that it provides intervention strategies, information on symptoms, and raises awareness against social stigma. In regard to this last aspect, although it may have received a lower score than expected, we must bear in mind that many healthcare professionals also display high stigma towards mental disorders and do not recognize them as problems [13-15]. The students similarly scored the other characteristics which they were learning about in their course studies, such as the identification of disorders and intervention and also raising awareness about stigma.

In terms of other issues, most of the students recognized that the characters in the serious game had some psychological problem. However, the percentage for bipolar disorder was much lower (73 %) than for the remaining three (panic disorder with agoraphobia, schizophrenia and depression), which were above 90%. We believe that this aspect is important and reflects the video game’s accurate portrayal of the different psychological disorders. Furthermore, it is noteworthy that the psychology students stated they had felt, at some time, similar to the characters with depression and bipolar disorder (42 % and 31 %), something which did not occur in the case of panic disorder with agoraphobia (11 %) or schizophrenia (0%). Finally, as expected, the majority felt capable of helping the people with different disorders.

Ultimately, “Stigma Stop” fulfills three functions: inform on disorder symptoms, provide intervention strategies, and dispel misconceptions and myths; thereby normalizing disorders. Thus, it educates young people about psychological disorders, while always emphasizing the importance of biographical and/or contextual experiences related to these problems. Moreover, it teaches users that we are all susceptible, given specific situations, to experiencing similar problems during our lives. Finally, the game provides players with basic intervention strategies that make them more prone to help individuals with such disorders.

## 6. Conclusion

Finally, the interest shown by the Psychology students who participated in this study and their favorable assessment of the game’s usefulness constitute strong testaments to its effectiveness. It is also especially noteworthy that they unanimously stated that they would recommend using the program to others. As regards the limitations of the present study, we can cite its small sample size, Being necessary to replicate it with a broader sample, as well as to carry out a controlled experimental study, not only descriptive like in this case. Also, the present study did not evaluate the mental

state of students (whether or not they have a mental disorder), an aspect that could also influence the results.

### Conflict of Interest

The authors declare no conflict of interest.

### Acknowledgment

This work was funded by the Regional Government of Andalusia (Excellence Research Projects SEJ-7204).

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