Psychoeducational design of an adventure video game as a tool in the treatment of depression

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ABSTRACT
A development project was implemented to design an online adventure video game as a psychoeducational tool in the treatment of adolescent girls with depressive symptoms. The game design followed the narrative structure of the hero's journey and ideas from the cognitive behavioral and interpersonal psychotherapy models for depression. Fifteen adolescent in psychotherapy treatment tested the game. The majority of the players reported that the video game functioned well. Data about the in-game decisions is presented. The project offers some ideas on how to incorporate psychotherapeutic notions in digital ludic environments.

RESUMEN
Se implementó un proyecto de desarrollo para diseñar un videojuego de aventura en línea como una herramienta psicoeducativa en el tratamiento mujeres adolescentes con síntomas depresivos. El diseño siguió la estructura narrativa del viaje del héroe e ideas de los modelos psicoterapéuticos cognitivo conductual e interpersonal. Quince adolescentes en tratamiento psicoterapéutico probaron el juego. La mayoría de las jugadoras reportaron que el juego funcionó bien. Se presenta información acerca de las decisiones dentro del juego. El proyecto ofrece algunas ideas sobre cómo incorporar nociones psicoterapéuticas en ambientes lúdicos digitales.

Categories and Subject Descriptors
J.4. [**Social and behavioral sciences**]: psychology

General Terms
Performance, Design, Experimentation, Theory

Keywords
Video games, interactive narratives, psychoeducation, depression

1. INTRODUCTION
In the last decades, there have been diverse initiatives to design and utilize videogames for educational purposes and in psychotherapeutic work with children with diverse psychopathological conditions. Promoters of the use of video games for learning and psychotherapy argue that: video games can contribute to establish the therapeutic relationship; video games can provide stimuli for therapeutic conversation; they can help to generate opportunities for the expression of unconscious aspects; in some contexts, the use of video games can provide diagnostic information; some video games have incorporated psychoeducational content, have integrated elements to model behavior and opportunities to exercise social problem resolution. Some of the most recent and interesting experiences are based on psychotherapeutic models that propose activities, modeling of desired behaviors, and the delivery of information for the physical and mental health of children and adolescents. The games reviewed, though without doubt innovations of great value for the child and adolescent psychotherapy, did not take advantage of the potential of the narrative as a resource that contributes to a positive game experience, which is hope to be accomplished in the game constructed for these project.

Adventure games offer the possibility of integrating narrative and ludic elements. The narrative element of this genre offers possibilities in the divulgence of information and modeling. It is estimated that the narrative scheme of the hero's journey, used frequently in movies and commercial video games, can serve as a starting point for the creation of a narration that includes aspects of youth culture, the condition of depression, and its resolution. On the other hand, interactive and game aspects offer the opportunity of communication interactions that are pre-structured between the player-protagonist and the game characters, and the possibility of presenting interpersonal problems that require a solution. Due to these characteristics, it is estimated that this game genre can allow for the incorporation of elements present in cognitive behavioral therapy, as well as other psychological ideas that help in the treatment of depression that contribute to a positive game experience.

Designing a videogame that complies with therapeutic means and is also entertaining for adolescent youth is challenging and implies technological, esthetic, psychological, and above all, creative aspects. This article presents some of the fundaments that guided the design, it describes a model for psychoeducational videogames and presents some data in the play performance of fifteen patients that tested the videogame.

2. THEORETICAL BACKGROUND

2.1 The potential of adventure video games for learning
Research in educational and psychotherapeutic games has shown that while games have a pedagogic value, not all genres of game are equally important for any given goal [13]. For example, drill-and-practice games can be used in treating objectives related to language learning. Virtual reality games can be applied to the training of social skills and phobias [13]

Adventure games are videogames in which the player takes the role of the protagonist in an interactive story that is motivated by exploration, manipulation of objects, and/or the exchange of information between the characters that allows for the resolution of puzzles or problems. Adventure games can be seen as puzzles inserted into a narrative frame [12]. A puzzle is a challenge in which there is no active opponent, rather, there is a problem that needs to be solved. The solution requires logical thinking, instead

of physical skills. Usually, puzzles have one solution, even though there can be more than one way to reach the solution [11].

The characteristics of adventure games make them particularly convenient in motivating learning. These games offer a narrative in which problems can be integrated, stimulating learning through the resolution of problems. The player must learn about the game through permanent exploration, conversing with the characters, examining objects and manipulating them. While the player explores, he/she obtains information about the world.

Puzzles are central components to the view that recognizes the potential of adventure games for learning. For learning game designers it is important to keep in mind: a) the integration of the narrative and the puzzles and b) the characteristics of the problems being posed. There will be greater flow and continuity in the experience of games if the puzzles are integrated into the story and there will be implicit and procedural learning when the puzzle solving process integrates the knowledge and skills that it intends to promote. In some puzzles, when the solution patterns appears in several puzzles, the player is not learning the response to a specific question, rather, a strategy of problem resolution [12] or a cognitive schema (a stimulus pattern generates a response pattern). The resolution of a problem generates a positive response of achievement in the player. In an adventure game that is well designed, where one puzzle leads to another, the feeling of achievement is recurring, providing an incentive to keep playing. These steps are reinforced when giving the players a new type of prize: from obtaining a prize to opening a new area of the game to seeing a new scene that reveals what happens next in the story.

Puzzles are situated in a domain; there can be puzzles in which the solution is ubiquitous in the area of language or implies logical, mathematical, or social reasoning.

2.2 Interactive Narratives

Some authors have focused on the narrative aspects of videogames [17, 23]. Stories and tales have been used to share personal experiences or to teach youth social and ethical values [22]. This is an old strategy; for example, Campbell [3] points out that for the most part, myths have a pedagogic function. The narrative permits people to assign meaning to their experience. According to Robinson & Hawpe [22] the narrative is a type of casual thinking in which the narrative schema identifies categories (protagonists, situation, conflict, results, etc.) and relevant types of relationships (temporary, motivational, and procedural). Stories and narratives usually attract individuals feel empathy towards their protagonist and are effective when the protagonist shows changes in their value system (for example, courage or cowardice), exemplifying a lesson that can be learned. In a story, the writer can incorporate conflicts that demand a change in values, obstacles are situated so that the protagonist must overcome them, serving as a model of problem resolution [1]. Dickey [10]), refers to various works by other authors, shows that integrating narratives into contexts of learning provides opportunities of reflections, evaluation, illustration, comprehension, and search.

Crawford [6] maintains that the principle elements of interactive narratives are people and their relationships, and that the main cognitive modality implied is social reasoning.

Champagnat et al., [5] propose that adventure games and virtual learning environments share the same context: the users interact with the simulation of a process. These authors affirm that interactive narratives can communicate information that is relevant to pedagogic objectives combined with the benefits of virtual interaction. The direct participation in a story and the adoption of a first person perspective in control of the events unfolding, are central aspects of interaction in some videogames. As in real life, the players learn through planning, decision making, and personally observing the relationship between cause and effect. In role playing games, for example, the players combine the emotion of narrative with becoming immersed in the character. In adventure games, the narrative provides initial and permanent motivation for the game. In these types of games, the narrative provides an environment in which the players can identify and construct causal patterns that integrate what is known (underlying story, environment, rules, etc.) with what is conjectural, yet plausible within the context of the story. The game designer can structure the interactive options to afford significant feedback in terms of the player's decisions. Feedback is a form of reinforcement, information for future decisions, or sequences of experiential learning (for example, interactions with animated characters that provide theoretical specific experiences) [1].

Ritter et al. [21] appreciate the potential of videogames and interactive stories to foster sensibility on social aspects. The basic idea is to integrate -in a subtle way- the topics in ludic environments of exploration, based on a narrative, with the purpose of increasing intrinsic motivation in order to deal with the topic at hand. Role playing games have the potential of encompassing different perspectives, allowing the player to situate himself/herself in a role and exploring the topic. The concepts of interactive narratives, provide the opportunity of increasing enthusiasm and the immersion of the players when recurring to: 1) characters behaving realistically -finally resulting in a game experience that is immersive for the player and b) dramatic concepts previously tried out (theme and story models) [21].

In regards to this last point, it is interesting to consider Delmas, Chapagnat, and Augeraud's [9] proposal to create an interactive story of the hero's journey [3]. The authors propose a monitoring architecture of the hero's journey plot for educational purposes. The proposal is to adapt the original structure into an interactive medium, keeping in mind three aspects. In this type of game the player must always remain at the center of the action and all the key action points must go through him or her for the game to progress. Also, each time the player is given an option, each reaction must be valid, allowing for the game and the story to follow its course. The game must consider the failures and the frustrated attempts of the player-hero in the same way it considers his/her successes so as not to interrupt the progression of the game. Help, which is frequently part of hero stories, should take form of activities that appear in case the hero fails at the first try.

In commercial games, narrative is generally found in role playing games, action games, and in adventure games [10]. The use of the hero's journey narrative pattern is commonly used in movies and in commercial videogames [10]. The original proposal by Campbell was modified by Vogler [24] as a structure to create narratives applied for entertainment purposes and it has been adapted by other authors for interactive games [15]. Additionally, Campbell and Vogler expand on the hero's journey by referring to the work of Carl Jung [18] in order to describe archetypal characters that are recurrent in stories [15]. Apart from the hero, these include the mentor, the herald, the allies, and the shadow. With frequency, the narrative is integrated in the way that a story gives context to the game or short animated videos that appear as the player progresses.

The analysis carried out by Ip [16] in 11 popular commercial action video games found that all of them had the narrative structure of the hero's journey. Ip found that not all the phases of a hero's journey were equally represented in terms of frequency and length; it is interesting to note that the phase that occurs most regularly in the games studied is the "getting closer to the deepest cave"; a symbol that is frequently interpreted with death prior to the rebirth of the transformed hero, the dark night, or the depressive phase of people on track to development.

In contrast to what Ip [15, 16] reports for commercial video games, the games oriented towards mental health, at least the ones reviewed during the development of this work, there is no reference to the incorporation of archetypal theory as a narrative resource.

2.3 Treatment and prevention models of depression

A review of articles of different efficacious interventions for depression showed that although there are differences in the actions and emphasis between preventing and psychotherapeutic modalities, in both situations, effective interventions share theoretical views with respect to the factors that influence the development of the disorder and of positive change. Even though the models represent different schools of thought, there are understandings, interventions and particular emphasis that have common elements.

Cognitive-behavioral psychotherapy attributes depression to cognitive distortions and its effect on social behavior and relationships, and/or an alteration in the behavioral reinforcement patterns [2, 8]. Distortions related to depression arise from cognitive schemas that are derived from experiences from infancy to current day [25]. Interventions seek to modify cognitions and promote functional tools to cope with stress and improve interpersonal relationships [14].

The interpersonal model also recognizes the influence of inadequate interpersonal relationships from early infancy as a factor of vulnerability for depression. The intervention emphasizes the identification of current interpersonal difficulties and stimulates strategies to face these difficulties.

The model of interpersonal dynamic therapy and traditional psychoanalysis share the importance they give to early attachment for the development of psychological capacities related to mental health. The therapy is centered on the current relationship difficulties, helping the patient to identify dysfunctional patterns and stimulating through the therapeutic relationship, the capacity to reflect on one and others.

Frequently prevention interventions are multi-modal, including diverse and complementary actions.

In synthesis, the interventions focus on the present situation, particularly gearing attention towards the identification of relational patterns and dysfunctional cognitive styles. All the interventions follow and stimulate the process of recognition and reflection of the patient´s own mental state and others, and its relationship to behavior and the consequences over affect and mood. Interventions that promote a real and positive perception of oneself are common. Behavioral activation is stimulated, as well as personal strategies to face problems, looking for healthy alternatives for problem solving and reviewing social skills. All these strategies are not just promoted for overcoming a current state of depression; they also seek to be available in future situations that could trigger the recurrence of depressive symptoms.

3. OBJECTIVES

a) To design a video game, sustained in a psychological model, oriented to the treatment of depression in adolescent women.
b) To adapt the narrative structure of the hero´s journey to the interactive format of an online adventure game for the treatment of depression.
c) To describe the game decisions made by the players.

4. METHOD

A process of iterative design was followed; phases of gathering of data about game playability and game experience fed phases of game design.

In parallel, the researcher initiated and maintained contact with three psychotherapists to share ideas and to sanction the game design.

A small pilot study was conducted to test the videogame. This article presents some aspects of the design and some data about the performance of the patients during play. Information about the acceptability and opinions of the therapists can be found elsewhere [4].

4.1 Procedure

4.1.1 Process of creating and writing the story

Three focus groups in two schools were conducted with girls between 14 and 18 years old. The overall objective of these activities was to obtain information for a user centered videogame design. The focus groups lasted between 40 and 60 minutes. Writing the story was a creative process that had the additional difficulty of incorporating the elements required to make it useful for psychological ends.

It became evident that writing a story for a game had particularities related with the interactivity. Since the actions of the player affect the course of the narrative, several alternatives had to be written. When considering the best way to write the game story, a couple of programs were reviewed: HypeDyn and Twine. These are hypertext authoring tools to create text-based interactive stories that adapt to reader choice; although, in the end, none of these tools were used in this research, they indicate a type of tool that can potentially be used in future projects. Text-only interactive stories could also be used for education and mental health. Interactive stories in text would allow more freedom to create fictional worlds.

When trying to create the story several considerations related with the literary gender (fiction, realism, magical realism?) and narratives devices (for example: narrative point of view, narrative time, narrative voice) aroused. This experience suggest a line of research that could explore which narrative devices can serve best not only the enjoyment of reading but the psychological and educational objectives.

In the first attempt, the story was located in the future in a dystopian society. Soon it became evident that the creation of a fantastic world would require the design of visual elements that were to complex or expensive to produce for this project. Therefore a more realistic narrative approach was taken.

The process of thinking about the story, reading novels, watching movies and trying different approaches to write the story took about three months. The actual writing of the story script was accomplished in about a week.

The complete story script was presented to five psychologists to sanction it and to receive suggestions. Based on this comment the final version of the script was prepared.
Once the story and dialogues were ready, it began the process of taking photos and videos with the volunteer "actors".

4.1.2 Web page design

From a design point of view, the idea was to construct a simple but attractive and functional web site. Several web sites for teenagers were reviewed to inspire the selection of colors. The web page was built integrating HTML, PHP, MySQL databases.

4.1.3 Video-game design process

The videogame was constructed in Adobe Flash Professional CS5 and its programming language ActionScript 3.0. This choice was based in the fact that games created using this technology are accessible on most common web browsers that, generally, have already installed Flash Player. Besides, Flash Professional comes integrated with Adobe Photoshop (for editing photos) and Adobe Premiere (for editing Videos), which were both used in the process of making the game.
To create the visual elements that the game story required, it was decided to find volunteer "actors" to video and photograph them. Ten actors participated, near 400 hundred pictures were taken and one hour of video was recorded, all these in 8 different locations. Most of the pictures and films were obtained in El Salvador, Central America and one sequence of the game was shot in Santiago de Chile.
As a first prototype test, a storyboard like Power Point presentation with photos and videos was showed to three girls and afterward they were interviewed. The purpose was to evaluate the acceptability of the game story.

Once a playable version of the game was finished, it was presented to two girls. With minimal instructions these girls played the game. The purpose was that the players informed any game malfunctioning or any aspect that negatively affected the game experience. After they played they were interviewed. Also, girls were observed while playing.

4.1.4 Psychotherapists' participation in the game design

In the beginning of the design, eight psychotherapists were invited to collaborate in the game design process; three of them accepted. So, it can be said that the final game and web page contents were influenced and sanctioned by these three psychotherapists.
In some specific moments, two other psychotherapists provided comments on the development of the game.
The design of the game and of the web page received important contributions by the team at the Heidelberg Center for Psychotherapy Research from Germany.

4.1.5 Pilot study

Two psychotherapists in private practice and three psychotherapists working in two public health institutions consented to participate and provided cases to the study.
The psychotherapists selected patients, invited them to participate and asked parents for their consent. When consents were explicitly given, patients received their access code to the online system. This code was previously entered by the researcher in a user database that linked each patient code with its respective therapist.
The registration asked for a user name, a password and an e-mail address. After the registration an automatic e-mail was sent asking the user to confirm its registration.
Only registered patients were able to play the game. Patients played the video game at their homes. An automatically generated e-mail was sent to the researcher and to the therapist informing that a particular patient finished the game.
In the following sessions, therapists evaluated the situation of the patients and if they considerate appropriate debriefed the game experience and its relation with the patient problems.

4.2 Subjects

All the participants were patients in natural psychotherapy sessions. According to their therapists, all these patients had symptoms of depression, mild or moderate depression. The exclusion criteria were: severe depression, suicide attempt, psychosis and intellectual disability. Several patients manifested comorbid disorders (eating disorders, for example) or other symptoms (anxiety) or their depressive symptoms were part of a disorder different of depression (adjustment disorder). Fifteen patients, girls between 11 and 18 years old, consented to participate and played the game.

4.3 Instrument and Data collection

Each decision that a player made during the game was automatically recorded in an online database. The play time for each player was also recorded in this manner.
After playing, patients responded an online questionnaire that included two questions about the functioning of the video game. Each item was a phrase that expressed an opinion about the game experience. The instructions asked the testers to express their level of agreement for each phrase by choosing one of five possible answers ("Nothing"; "Slightly"; "Moderately"; "A lot"; "Extremely") for each sentence.

5. RESULTS

A revised public version of the videogame can be played here: http://juego.cgjung.cl/maya/

5.1 Story

In the following paragraph a condensed version of the story is presented:

> Maya was an average teenager but she was feeling a little sad. During a walk in a park where she uses to go, she meets Izel, a girl about her age. Izel is a vivacious girl and after a small talk, Izel invites Maya to participate in an ecological movement and to go to a protest to stop the destruction of the park. Maya realizes that the day of the protest she has an exam at her school, so she goes to talk to her teacher, who denies the permit to go. Maya must ask another teacher to intercede to obtain authorization. She goes to the protest and unexpectedly she runs into her father, a lawyer who is representing the ecological movement. Then the story shows Izel who has information that could stop the destruction of the park. Izel asks Maya if she has a camera and that if she dares to take a risk helping her. Both girls go to photograph a government bureaucrat taking a bribe from an employee of the company that wants to

destroy the park to build an industry. The girls are discovered so they flee with the evidence that later Maya passes to her father and that, in the end, it helps him to win the case and to save the park.

5.2 Mapping the hero's journey narrative structure

The creation of the story followed the narrative structure of the hero's journey as originally stated by Joseph Campbell [3] and later adapted by Chistopher Vogler [23]. In Table #1, the hero`s journey stages and its corresponding episodes in the video game story are presented.

Table # 1
The hero's journey structure (Vogler's version) in the game story

Maya Story		Hero's journey
Backstory		The ordinary world The belly of the whale
Maya sleeps		
Maya gets up	Maya keeps sleeping	The call to adventure
Maya walks in the park		Crossing the first threshold
Izel invites Maya to join the movement		The call to adventure
Maya accepts	Maya rejects	
Maya invites Aria	Aria reiterates the invitation	The call to adventure
Teacher says "students cannot go to the protest"		Tests, allies and enemies The meeting with the mentor
Mayas asks other teacher for help		
Maya goes to the protest		The approach to the innernost cave
Maya takes photos of the villans		The ordeal
Maya and Izel escape		The magic flight
Maya gives the photos to her father		The reward
Epilogue		The resurrection

5.3 Gameplay design

In overall terms for this game, players had to navigate and make decisions to move forward in the game story. This gameplay required to design and program different types of interactions:

- Navigation. Navigation required making buttons or graphic objects react and take the story to a different point in the narrative timeline. This implied also the arrangement of elements and the writing of scripts to load and control the display of story sequences (pictures, videos, text, and interactive objects).
- Making choices. It was important to allow, at least in some instances, meaningful choices that notoriously affected the course of the game. The presentation of alternatives required to create text boxes with mouse-over effects, that once clicked, moved the story in a certain direction or that presented other graphic element. In some cases it was necessary to write conditional scripts to allow or disallow a particular game functionality when certain condition was met. These logical conditions were also programmed for the dialogue simulation in some scenes.
- Hidden objects. In some of the instances the game challenged the player to find a hidden object; this required that the player explored the scenes with the computer mouse and click to make the object appear.
- Drag and drop functionality. In one of the moments, the player had to take a picture within the game. For this, a camera viewfinder was simulated, it was possible to move it with the mouse cursor until certain position that allowed the player to take the picture and that, in turn, it triggered a sequence of images and sounds.

The playability tests suggested that it was important to include some brief instructions and to make explicit the objective of the game; these elements were presented at the start.

5.4 Score system and feedback

In the beginning of the project, the idea was to design a system that rewarded the decisions considered as positives in terms of the psychological theory and that it punished, subtracting points, the negative ones. After a discussion with the colleagues at the Heidelberg Center of Psychotherapy Research and considering that the game was aimed at girls with symptoms of depression it was decided not to punish the players' scores. Thus the game only provided cues about the positive game behavior in the areas of "Recognition and modification of negative cognitive bias", "Interpersonal skills and interpersonal problem solving" and "Behavioral and physical activation". This form of immediate feedback was presented by means of: a) an audio sound; b) an increase in the percentage value next to the icon that represented the three areas already mentioned. No especial instructions on how to obtain a higher score were given to the players; this decision was made considering that providing explicit information about the positive behaviors could cause oppositional attitudes that affected the spontaneous play and the game experience. Thereby the score system just gave hints and a more explicit feedback was left to the end of the game.

To allow the score system it was necessary to create, via code within the main game file, variables that could take different values. Besides the decisions made by the player, the play time was also registered. These variables were then used to calculate the score and to personalize the final feedback. Moreover, automatically after a player finished the game their values were stored in a database and sent via e-mail to the researcher and to each player's respective therapist. It is worth mentioning that the in-game decisions could be considered performance data that could be analyzed for research purposes.

Using the same method of variables, information about the game progress was calculated and presented in the top bar of the game interface.

Immediately after ending the game, each player had a personalized feedback based on her decisions. The feedback reinforced the positive behavior, presented questions for self-reflection and provided information related with the three areas of interest. The options of feedback text were stored in a MySQL database and called depending on the variable values obtained by the player. The number of feedback alternatives for the three areas

were: "Recognition and modification of negative cognitive bias, 3; "Interpersonal skills and interpersonal problem solving" 6; "Behavioral and physical activation"; 2.

5.5 Psychotherapeutic elements in the videogame

Based on the review of prevention and treatment programs for depression, aspects of the cognitive behavioral model and the interpersonal model served as the fundaments to guide the video game design. Three topics were considered: recognition and modification of negative cognitive bias; interpersonal skills and interpersonal problem solving; behavioral and physical activation. These aspects were included in four ways: as decisions that the player should make as part of the unfolding story; as a score system that tracks and provides immediate feedback cues about the three areas; as a post-game feedback text; as an information text in the "Mind your mind" section of the hosting website. A description about how these ideas were incorporated in the game follows next.

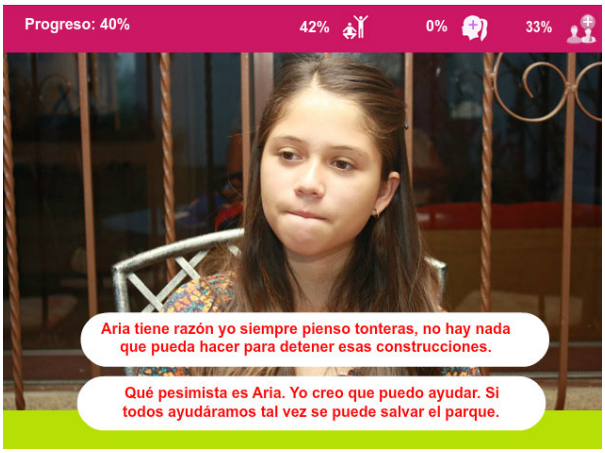

Figure #1. *Recognition of negative cognitive bias*

Recognition and modification of negative cognitive bias. The story of the game presents two situations referred to cognitive bias:

a) When Maya's request to her teacher is rejected, she thinks: "…It was another dumb idea of mine to think that he would allow us to go". Aria, her friend, corrects her thinking and encourages her by saying: "It is not a dumb idea. It is a good idea but it is not easy that this guy allows us to go. We have to keep trying".

b) In one of the branches of the story, Maya tells Aria that she is thinking about joining a movement to try to stop the destruction of the park; Aria responds: "You are so naïve, how can you think that we could to anything to stop it!". Then Maya faces two alternative ways of thinking (Figure #1): i) "Aria is right. I always think dumb things". ii) "Aria is a pessimist. I think that we can do something".

Interpersonal skills and interpersonal problem solving. The story of the game presents four situations referred to the interpersonal area:

a) Maya received an invitation to participate in a social movement that is trying to stop the destruction of the park. Maya must decide whether she participates or not.

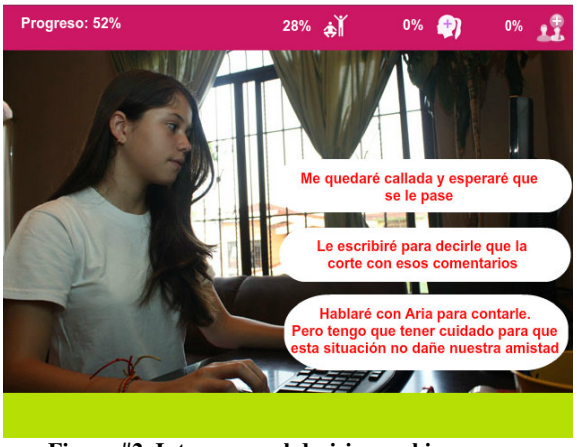

Figure #2. Interpersonal decision making

b) Aria's boyfriend is sending e-messages that Maya considers inappropriate. Maya must choose one of three options (Figure #2): i) ignore him once more; ii) confront him; iii) talk to Maya about the situation.

c) When asked, the teacher refuses to change the date of the test. Maya can react in two ways: i) Upset, saying "You understand nothing"; ii) Thinking diplomatically and insisting politely.

d) After the refusal and the encouragement from Aria, Maya considers how to persevere on her intention: i) "I have to find a way to solve this problem. I will go to talk with teacher Uli. Maybe he can help us"; ii) "I does not matter what this guy says. I am going anyway with or without his authorization".

Behavioral and physical activation. The story of the game presents two situations referred to physical activity:

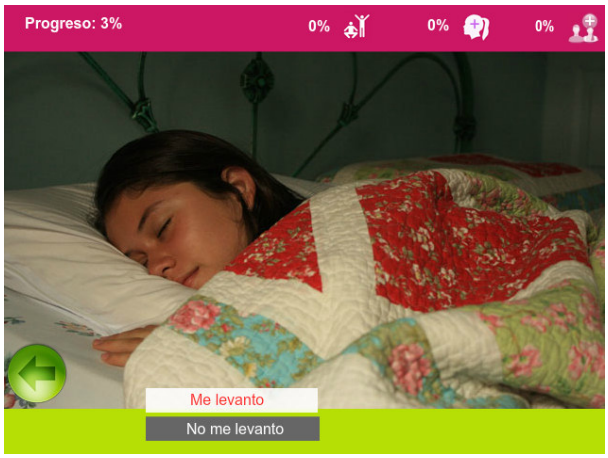

Figure #3. Behavioral and physical activation

a) The story starts showing Maya waking up and presents the players with two options (Figure #3): i) Maya keeps sleeping; ii) Maya gets up

b) When Maya wakes up, there is a scene where she can prepare to go out by: i) brushing her hair; ii) having a healthy breakfast; iii) brushing her teeth; iv) dressing up.

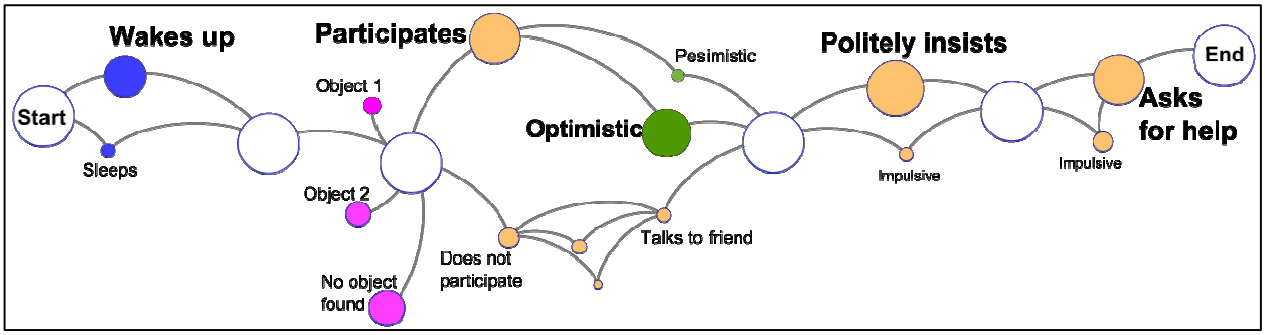

Figure # 4. Maya video game path analysis. Group choices.

5.6 Functioning of the video game system

The game system was always available when visited. Only one patient reported problems to register and she needed the assistance of her therapist. There were not e-mails coming from the platform reporting problems or questions about the game system.

53% of the patients chose the option "Nothing" and 27% chose the alternative "Slightly" when asked about their level of agreement with the statement: "The game did not work well". 67% of the patients chose the option "Nothing" and 29% chose the alternative "Slightly" when asked about their level of agreement with the statement: "There were technical difficulties that affected the experience of playing this game". The majority of the players reported that the video game functioned well.

Some of the patients and therapists reported that some videos that were part of the game did not play smoothly, which negatively affected the overall play experience. This was more troublesome when the internet connection was slow.

5.7 Patients' decisions during play

There were 19 game path records because 4 patients played twice. The average of play time was 11:57 minutes (SD= 03:42 minutes). Figure # 4 shows the possible routes within the video game; the circles represent the stations or stages of the game, the diameter of the circles varies depending on the number of people visiting each station. Most of the patients followed a common path:

> Maya wakes up. The hidden object is not found. She decides to participate in the movement to stop the destruction of the park. She reacts optimistically when confronted with Aria's negative remark. She politely insists to her teacher. In the final game decision and facing an obstacle, she asks for help.

Given the nature of the psychological difficulties shown by the patients, it was expected that their in-game decisions would show lack of social engagement and dysfunctional interpersonal behaviors however, most of the girls played differently. They accepted a social invitation, reacted optimistically and responded politely.

It is difficult to interpret this performance with no previous research found on the topic as part of this study. One could speculate that the decisions during play are mainly determined by the intention to move the game forward. In the other hand, the observation of behavior in other forms of play shows that players project their personalities in their style of play. It is also true that in the virtual world some people consciously decide to present themselves and behave differently as they usually do in the real world. It is possible also that the videogame lacks the complexity and challenge to bring about different styles of play.

In any case, the possibility to record play performance in videogames offers an interesting avenue of inquiry in future psychoeducational videogames. It would be interesting to relate play styles with personality traits or with the presence of psychological disorders.

6. CONCLUSIONS

Aspects of the cognitive behavioral model and the interpersonal model served as the fundaments to guide the video game design. Three topics were considered: recognition and modification of negative cognitive bias; interpersonal skills and interpersonal problem solving; behavioral and physical activation. These aspects were included in four ways: as decisions that the player should make as part of the unfolding story; as a score system that tracks and provides immediate feedback cues about the three areas; as a post-game feedback text; as an information text in the hosting website. The narrative aspect of the game presented interpersonal situations that required psycho-social reasoning and that allowed the integration of theoretically relevant elements.

A web page was created: to host online the video game; to create a private online environment for patients and therapist that participated in the research; to deliver complementary information about depression; to log the players' activities; and to deploy instruments of evaluation. Also an automatic email was sent to the respective therapist and the research informing the game decisions of the players. It could be said that the web platform and the game were integrated in an online game system that met the requirements of access limited to participants of the research, of confidentiality, of online access and that made possible to obtain part of the information for the pilot evaluation.

It was possible to create an interactive story based on the hero's journey narrative structure that, at the same time, included elements intended to foster mental health. This elaboration integrates the pedagogical value of the widespread narrative pattern of the hero, as a metaphor for transformation, and theoretically relevant psychological elements. As mentioned in the first part of the report, although the use of the hero's journey structure is very common in commercial games is much less common in education and even less common in games for mental health. The video game constructed as part of this research provide a functional prototype and, hopefully, a good starting point for more complex and sophisticated future initiatives of this sort in the field of mental health.

The writing of the game story had particularities related with the interactivity. Since the actions of the player affect the course of the narrative, several alternatives had to be written.

Given the resources needed to create fantasy worlds, interactive stories in text could allow more freedom to create fictional worlds. Text-only interactive stories could also be used for education and mental health.

When trying to create the story, several considerations related with the literary gender and narratives devices aroused. For example, during the development of the game, the girls that tested the videogame mentioned that they liked dystopian films and that they did not want to see their lives reflected in the game. Dystopian narratives use the device of displacement [7]. This method provides dystopias with a distorting mirror that can magnify an aspect of the present and show a possible, sometimes paradoxical, scenario with negative tones. In this way, a relevant aspect of reality can be presented to a critical revision without providing an answer and presenting an opportunity for intellectual and moral considerations for the emergent faculties of adolescents. This could be a useful resource for adolescent to review the values and lessons that adults offer them. This experience suggest a line of research that could explore which narrative devices can serve best not only the enjoyment of reading but the psychological and educational objectives.

In other aspect derived from this research, it is interesting to highlight the fact that play activity can be recorded (the game path analysis in this study); this performance data could be associated with other variables of interest (e.g. different levels of depressivity and different disorders) or as form of assessment embedded in video games [19]. This could be another subject for future explorations.

An overview of the design process clearly shows the need of a multidisciplinary approach when developing projects like this and to advance science in this intersection. For one parte the psychological aspect is fundamental and also knowledge coming from the narrative field and from game studies. Of course this must all be sustained by information technologies.

7. ACKNOWLEDGMENTS

This research was supported in part by grants from Chile's National Commission for Scientific and Technological Research (CONICYT) and from the Fund for Innovation and Competitiveness (FIC) of the Chilean Ministry of Economy, Development and Tourism, through the Millennium Scientific Initiative, Grant N° IS130005. The author is particularly grateful for the advice and support during the development of the research provided by Doctor Juan Pablo Jiménez (Universidad de Chile), Doctor Hans Kordy (Center for Psychotherapy Research, University Hospital Heidelberg), Doctor Mariane Krause (Pontificia Universidad Católica de Chile) and Doctor Benjamin Zimmer (Center for Psychotherapy Research, University Hospital Heidelberg).

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