Original

Software development to increase coping skills in adolescents[☆]

Desarrollo de un programa de cóputo para aumentar las habilidades de afrontamiento en adolescentes

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Abstract

Non-suicidal self-injure behavior, depression and anxiety can be reduced by some variables as coping skills; for the treatment based on these skills is proposed the use of a software based on HyperText Markup Language, version 5 for different platforms as mobile systems and personal computers. The software is developed in the form of social interaction, in order to support the assimilation of these cognitive constructs in the adolescent population. Furthermore this program can be used as a teaching instrument for students of psychology which can facilitate understanding of skills and symptoms that the software takes into account. This article describes the development of coping skills enhancement software (SAHA Spanish acronym) based on traditional cognitive behavioral techniques for the reduction of negative thoughts and feelings, increased use of coping strategies focused on the problem, and reduction of thoughts related to Self-harm. The development takes into account review of cognitive behavioral therapy techniques, script, art design, programming, 3d modeling, edition, among other actions. As a result we obtained an application for the increase of coping skills that can be used in different operating systems.
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Keywords: Cognitive behavioral; Treatment; Software; Assertiveness; Teenage

Resumen

Las habilidades de afrontamiento son una variable que puede limitar la conducta de autolesión no suicida, la depresión y la ansiedad; para el tratamiento basado en esas aptitudes, se propone el uso de un programa informático desarrollado en lenguaje HTML5 para acceder a múltiples plataformas como móviles y computadoras personales. El diseño usa un enfoque de interacción social para que apoye la asimilación de estos constructos cognitivos en la población adolescente, además de su uso como instrumento de enseñanza a estudiantes de Psicología, con el cual se comprenderán las habilidades y síntomas que toma en cuenta el programa informático. Este artículo describe la elaboración del software para el aumento de habilidades de afrontamiento (SAHA) basado en técnicas cognitivo-conductuales tradicionales para la disminución de pensamientos y sentimientos negativos, aumento en el uso de estrategias de afrontamiento centradas en el problema y disminución de pensamientos relacionados con la autolesión. El desarrollo toma en cuenta la revisión de técnicas de terapia cognitivo-conductual, guion, diseño de arte, programación, modelaje 3D y edición, entre otras acciones. Como resultado se obtuvo una aplicación para el aumento de habilidades de afrontamiento que puede ser usada en diferentes sistemas operativos.
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Palabras clave: Cognitivo-conductual; Tratamiento; Software; Asertividad; Adolescencia

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Introduction

The self-guided treatment supplied by computers have 40 years since its first apparition, among the oldest are the "chatterbots" designed by Kenneth Colby in the 60s, on that basis, Joseph Weizenbaum developed in 1966 "ELIZA" that mimicked a psychologist's questions instead of give advices; these software used natural language and capture patient's information via text (Cartreine, Ahern, & Locke, 2010).

Self-guided treatments, manage by computer, by definition, have its primary development with computer technology, those can be used depending on their characteristics in health institutions or home, also, if the software is developed with multi-language it can support people who otherwise would not have access to this intervention. This type of treatment, are designed to treat clinical problems or to help patients to change their behavior and improve their health; usually these programs are highly interactive and can use multiple techniques such as video, audio, text and animation and can be distributed over the internet or hardware like CDs, DVDs, etc. (Cartreine et al., 2010).

The cognitive behavior therapy (CBT) supported by software, varies according to its application and provides certain advantages such as: remote application, lower costs, communication through dynamics and support for people with phobias, limiting anxiety or physical disability, when these make difficult the traditional therapy (Cartreine et al., 2010).

Most of the contemporary self-guided software are CBT based and they are focused to depression treatment, however, treatments for aliment related problems, tobacco and drug abuse are also been developed (Cartreine et al., 2010).

During the development of life, a person experiences different events, based on these events the subject develops cognitive schemata about life, these constructs can be positive or negative for the individual; when they are negative, they can predispose or cause that an individual experiences easier feelings and negative experiences such as stress, anguish, anxiety, poor self-image, depression, among others (Shapiro, 2008), for example if John began to play soccer and fails to score and then played basketball and neither did it well, John could think that simply is not good for sports in general, developing a negative self-image of him about sports.

Some patients may have deficiencies in coping skills, this can lead to depressive thoughts and feelings; whereby one of the coping methods is the learning and use of skills to solve and address problems, which are intended to support the patient in everyday problems that cause distress, the patient is encouraged to seek solutions by being asked about how they have solved such problems in previous situations, or how they recommend to a friend to solve that problem. Then the therapist offers potential solutions, if necessary (Beck, 2011).

Next some software packages that are developed for depression treatment are reviewed, every one uses different approaches: The program Coping Cat Cat CD-ROM (Khanna & Kendall, 2008) is based on coping skills, and uses animations, audio and pictures; The software Treasure Island (Brezinka, 2012) develop CBT basic concepts specifically the triad: thought,

behavior and feelings; The informatics program gNats (Coyle, McGlade, Doherty, & O'Reilly, 2011) use avatar based navigation in 3d environments to introduce mental health concepts, depressive thoughts identification, consequences and how to address them. Finally another approach for the use of software in behavioral therapy is the assessment via Stroop for different health problems like smoking (Calleja & Hernandez-Pozo, 2009).

Method

In order to explain the software's development, it has been decided to expose it from two angles, the first one is to address technical aspects and general production, and the second is to review the software's goals and the therapeutic techniques that the informatic programs use.

The software development process in general, was carried out in the following stages:

Research of techniques: During this stage, appropriate techniques of CBT were reviewed to address a specific cognitive problem, but also these techniques should be feasible to use as a software.

Script writing based on the techniques already selected: a script is developed taking into consideration the techniques for story mode, which, should be consistent.

Art design (characters and environments) taking as a guideline the needs of the script: In this part the visual elements are developed to convey with the elements of the narrative.

Voice recording: For the square breathing technique an animation was developed to leads the subject for relaxation, this multimedia element needed the voice of the avatar to guide the subject while having closed eyes.

Development of graphic elements and animations: Based on the art design, the final elements that were required for the software where produced, including 3D modeling (Fig. 1), animation and 2d pictures.

Programming: This step corresponds to software development with the use of a programming language, in this case was chosen one with a wide range of compatibility, which is described in a later section.

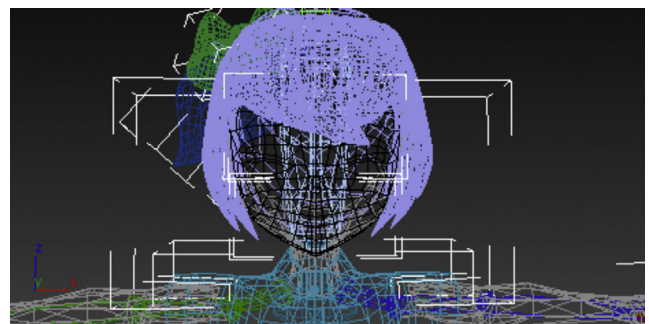Evaluation and correction: After the programming phase, software function tests were performed to detect errors in

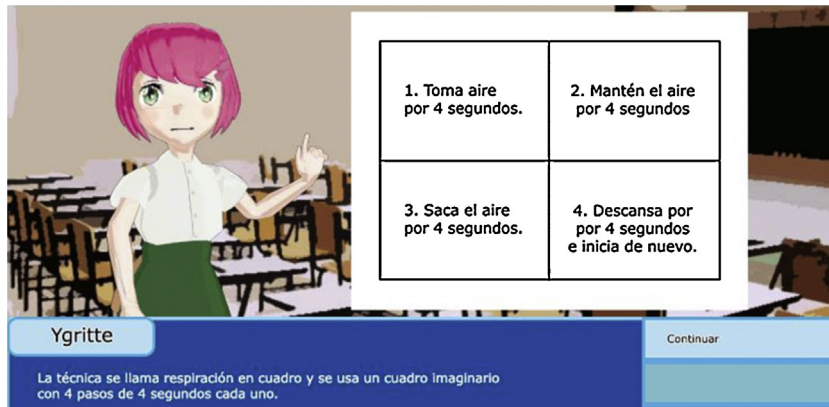

Fig. 1. 3d model for software SAHA.

Fig. 2. Square breathing instructions.

Table 1
Cycle of life relation.

Cycle of life stages	Software SAHA development
Planning and requirement analysis	Selection of programming language, platforms, CBT techniques, time and interaction approach.
Defining requirements	Based on approach, language and platforms, were decided which assets needs to be designed.
Designing the product architecture	Based on time and needs of the software an unofficial approach to develop was decided.
Building or developing the product	Development based on HTML5
Testing the product	Beta test of programming problems, grammar and orthography, with 5 participants.
Deployment	The software was used in research with adolescents with non-suicidal self-harm.

programming and texts; errors detected were corrected during this stage.

The realization of the program did not follow the traditional life cycle for software (Tabares, Alferez, & Alferez, 2009) development or SDLC (Software Development Life Cycle) however in Table 1, a relation is made.

This application's development was made with HTML5, this provide low cost and compatibility with a range of operative systems (OS) and platforms; HTML5 is a web based language that almost every internet navigator can use. When the SAHA application was developed the language do not provide the best

Table 2
Relation problem – techniques.

Problem	Techniques
Anxiety and Stress	Relaxation
	Exposition
Negative thoughts and feelings	Identification and refocusing of thoughts
	Coping cards
	Assertive behavior
Difficulty for solving problems	D'Zurilla and Nezu method
	Assertive behavior

support for audio and video, so different techniques were used according to the OS of the software.

The software version for Windows used HTML5 except for audio and video reproduction, in this case were used Flash. Android version was developed with HTML5 only, since there is no compatibility of Flash Player with the operating system, the animation was limited to a single scene and there was no audio playback. By the time this article was written, the problems with audio and video is solved in HTML5.

It was decided not to make the iOS and/or Mac OS X version, the cost involved is high because it is required to buy additional hardware for the publication; however, if is necessary operating systems like Linux, iOS and/or Mac OS X could access the application through a Web browser, with minimal compatibility issues.

For the development of the program's content with regard to CBT, a relation was made between the needs of the cognitive and the techniques that could cover it (Table 2).

SAHA software is based on six sessions and every session is complemented by the therapist in a later discussion, also the use of coping cards is required which serve to remind the patient the coping techniques at any place and time of a regular day.

The first session of the software corresponds to the guided practice of relaxation technique called mindfulness (Didonna, 2008) and "square breathing" (Drewes, 2009). For the square breathing technique, the avatar performs the technique and instructs (Fig. 2) through audio, for mindfulness technique, another avatar explains how to perform the technique as a conversation.

Second session includes the technique for troubleshooting of D'Zurilla and Nezu (1999), in this session the avatar faces a problem and the patient make decisions to help the avatar to solve it, then the subject review the procedure (Fig. 3) to solve problems.

During the third session a didactic approach to assertive behavior was made in software and for assertive rights knowledge, coping cards where used. When the subject interact in the session 3, the avatar will be presented to several problems and situations, then, the subject will be asked to help the avatar to resolve them, every decision will have immedi-
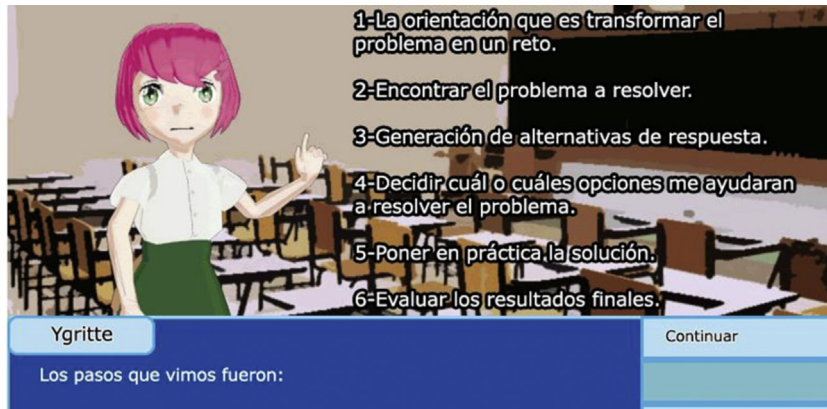
Fig. 3. Procedure revision.

Fig. 4. Negative thoughts detection.

ate feedback, informing whether it was an assertive, aggressive or passive decision in the case of the latter two, the subject will be told the reason why the decision was passive or aggressive.

The fourth and fifth sessions include a technique for the identification, detection and refocusing of negative thoughts that the avatar experience during the history of the sessions (Fig. 4), the method of cognitive restructuration is based on the ABC technique Albert Ellis (Caballo, 2008).

The final session emphasizes in coping skills and assertiveness techniques as "fog bank" and "scratched disc" (Smith & Sharp, 1994), the latter is adapted by Amelia Suckling as the technique of "robot voice" to facilitate implementation and greater understanding in younger people (Suckling & Temple, 2006). This being the last session, is developed like a typical videogame boss, and the user is expected to put into practice what he learned in previous sessions.

Results

This document describes the development of software to increase coping skills in adolescents, it was revised from a point of view of general and specific production with regard to behavioral problems and techniques to deal with them.

In the general development it was detected the need for programming languages that are compatible on different OS, so the possibilities of use are increased for many platforms as a personal computer, mobile phone and web browsers.

In the particular development, the need to investigate appropriate techniques to facilitate their translation to software with minimal modification from the original therapeutic strategy was discussed.

Conclusions

Based on SDLC in his 5th Stage which is "testing the product" the software pass through a beta testing process to ensure academic quality where PhD in psychology Rocio Hernandez-Pozo and MA in psychology Enrique Berra test the correct use of language, on other hand, to find functionality errors participate as beta testers a psychologist, and teenagers (Annex 2 for full credits).

The software visits different techniques that traditionally have been used to improve coping capacities in adolescents, but is pending to review the operation of the same techniques modified for application via software. In addition, it is considered that can be made more sessions for each technique in the program, this could help to, through constant review of the techniques, can relate when and how to apply, assimilate and generalize

such schemes (APA, 2013), so, sooner or later the patient can make part of his daily life the coping techniques.

Authors' contribution

Authors contributed to the study in the following manner: MAML: design and test of the software, data collection, writing of the paper, translation. MRHP: supervision of the construction of the software, review of the draft and final version of the paper.

Annex 1. Coping cards

Mindfulness.

Haz un alto.
Concentrate en tu respiración,
como entra y sale de tí.
Pon atención a cada parte de tu cuerpo.
Como se siente en la posición en la que se encuentra.
Que olores percibes.
Que sonidos alcanzas a reconocer.

Reucerda enfocar todos tus sentidos en una sola actividad por lo menos una ves al día, ejemplo, al comer una fruta, como se seinte su textura en tus manos, cuanto pesa, percibe su olor, que colores la componen, como se siente cuando la vas mordiendo, como se siente en tu lengua, identifica su varidad de sabores… experimenta.

Mi tarjeta de afrontamiento personalizada

Tecnicas de comportamiento asertivo.

Banco de niebla: Cuando seas hostigada o menos preciada, responde a los comentarios agresivos o burlas con enunciados que no sean pasivos o agresivos (recuerda la etapa del monstruo) por ejemplo: puede ser, quizá, ¿Entonces?, bueno, si tú lo dices, no sabía que te importara tanto. Debes mantener un tono tranquilo evitando ser agresiva con la voz y mantener la vista a la persona agresora.

Voz de robot: Cuando no quieras hacer algo o quieres hacer algo pero no te tratan de convencer de lo contrario. La técnica consiste en repetir la misma respuesta una y otra vez con el mismo volumen de voz y movimiento corporal, como si un robot lo estuviera repitiendo y solo tuviera esa respuesta programada.

Comentarios: Recuerda que eres responsable de como usas estas técnicas.
Si una agresión se vuelve física o eres amenazada, acude a pedir apoyo o acércate a un mayor.
Suckling y Temple, 2006

Manuel J. Smith, 2005.

- A decir: "No lo entiendo", "No me importa" y/o "No lo sé".
- A tomar decisiones que pueden no parecer lógicas.
- A ser independiente de la gracia de los demás ante mi actuar.
- Tengo derecho a cometer errores… y asumir la responsabilidad de estos.
- Tengo derecho a cambiar de opinión.
- los problemas de otros individuos.
- Tengo derecho a decidir si me interesa encontrar soluciones para mi comportamiento.
- Tengo derecho a no dar excusas o razones para explicar mi comportamiento.
- Tengo derecho a hacerme responsable de realizarlos y sus consecuencias.
- Tengo derecho a juzgar mi comportamiento, pensamiento y emociones y hacerme responsable de realizarlos y sus consecuencias.
- Tengo derecho a decir no y a no sentirme culpable por ello.

Mis derechos asertivos.

Los pasos para afrontar y resolver problemas.

1o. Convierte el problema en un reto a vencer!

2o. Determina cual es el problema a vencer.

3o. Piensa en varias soluciones posibles, puedes hacer una lista.

4o. Decide cuáles son las soluciones más adecuadas y elige una, ¡Puedes hacer una lista de ventajas y desventajas de cada una!.

5o. Pon en práctica la solución elegida.

6o. Califica los resultados que tuviste con esa solución, quizá puedas cambiarla o combinarla con otra para obtener mejores resultados.

D´Zurilla y Nezu, 1999.

Albert Ellis

Ejemplo: con el primer pensamiento te puedes sentir con tranquilidad y con el segundo, culpable e incluso agredida.

C: la consecuencia del pensamiento, como nos sentimos al pensar algo.

Ejemplo: vas pasando por una casa y un niño que está dentro empieza a llorar y lo regaña la mamá.

A: evento o situación que nos hace pensar y sentir algo.

Cambiando pensamientos negativos con la técnica ABC.

B: Lo que piensas al ocurrir ese evento.

Ejemplo: Puedes pensar algo paso por el niño lloro… o puedes pensar negativamente: cuando pase provoque que el niño se lastimara y la mamá esta enojada conmigo, pero como no pudo gritarme se desquito con el niño.

D: Discutir tus pensamientos negativos y cambiarlos.

Ejemplo: Te das cuenta que tuviste un pensamiento negativo, en este caso fue "personalización" luego piensas para ti misma: en realidad no tengo pruebas de que se haya tenido que ver con el llanto del niño, además de que el está dentro de la casa, es más probable que llore por algo que paso dentro.

Reconociendo pensamientos negativos.

Pensamiento todo o nada, bueno o malo, perfecto o desastre.

Sobre generalización: Un solo evento se toma como algo que demuestra que todo será igual en el futuro.

Descalificando lo positivo: Se rechazan las experiencias positivas insistiendo en que no cuentan por cualquier razón.

Sacar conclusiones antes de tiempo: Hacer interpretaciones negativas aun sin pruebas.

Leer la mente: Se concluye porque sí, que alguien está pensando negativamente acerca de uno.

El error de la lectura de la fortuna: Anticipar que las cosas van a salir mal y darlo por hecho.

Magnificación o minimización: Exagerar lo malo y minimozar lo bueno.

Razonamiento emocional: Creer que las emociones negativas necesariamente reflejan las cosas como son.

Oraciones con "debo".

Etiquetar a otros y si mismo en lugar de la acción que se comente.

Personalización: Verse como la causa de eventos externos negativos sin ser el responsable directo de estos.

Varios autores.

En el cuadro de respiración:

1. Toma aire por 4 segundos.
2. Mantén el aire por 4 segundos.
3. Saca el aire por 4 segundos.
4. Descansa por 4 segundos e inicia de nuevo.

Annex 2. Software SAHA full credits

Production, animation, 3d modeling, editing, programming:
  Miguel Ángel Munóz López
Academic direction:
  Dr. María del Rocío Hernández Pozo
Academic Dictamination:
  Lic. Cristina González Méndez
  Mtro. Enrique Berra Ruiz
Ygritte Voice:
  Miriam Selene Villalpando Hernández
Character design:
  Eva Lucia Criado Saenz
  Miguel Ángel Muñoz López
Beta testers:
  Siegfried Uriel Muñoz Romero
  Miriam Selene Villalpando Hernández
  María Guadalupe Muñoz López
  Dr. María del Rocío Hernández

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