

ROSS JACKELINE DE ABREU FERREIRA

SYSTEMATIC REVIEW ABOUT SERIOUS GAMES

Orientadora Científica : Professora Doutora Ângela Leite

Universidade de Lusófona do Porto

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Ross Jackeline De Abreu Ferreira

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Orientadora Científica: Professora Doutora Ângela Leite

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Dedication

I want to dedicate this paper first of all to God because without him this would have not been possible. To my husband and my daughter for being my support, my parents for being my role models and life teachers. I want to also dedicate this paper to my brother and sister for their love, because even far away from each other you are every minute of every day in my thoughts, my nephews for fulfilling my life with joy, love and laughter, and the rest of my family and relatives, my cousins, grandparents, also to the ones who are no longer with me, you will be forever in my heart. This these is dedicated to all of you who are always in my thoughts and heart and have always being part of me and with me in every step of the way, I would not be who I am today without any of you in my life.

Abstract

Computer games play a big role in people's life nowadays, since the video games industry was created it has attracted not only children and adolescents' interest but also adults.

When speaking of a serious (computer) game, we mean that the objective of the computer game is not to entertain the player, which would be an added value, but to use the entertaining quality for training, education, health, public policy, and strategic communication objectives. Psychology plays an important part connecting biological, cognitive and social sciences (Boyle, E., Connolly, T., & Hainey, T., 2011).

Nowadays, serious games are used in various domains such as training, education, advertising, medical field and communication. The idea is that games could be used for more serious purposes such as education, simulating real world phenomenon and relations in the world, increasing life quality through health, rehabilitation and therapy applications or raising interest to the problems in our global world (Szczesna, Tomaszek & Wieteska, 2012).

This paper aims to do a systematic review about serious games that are related to psychology since 2010 until now. The methodology of this paper is based on a systematic review about serious games, using articles and books.

There are used 29 articles and 9 books to obtain any information about serious games being used in the psychology field. This shows there are a lot of serious games being used in different psychological pathologies. It is shown that serious games used in psychotherapeutic interventions are effective.

Key Words: Serious Games, Psychology, Psychopathology

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Introduction

Over the course of the years, since the video games industry was created, it has increased tremendously, impacting society and people. Nowadays not only children and teenagers play and entertain themselves with it but also adults have shown interest in video games.

Serious games have become important in psychology, although it is not well known for some, it plays a positive and influential role in people who play it. It helps healing and overcoming different types of pathologies these gamers are suffering from without realizing it while playing.

This paper is a systematic review about serious games. It aims to show the impact of serious games in psychotherapeutic interventions, identifying the role of serious games in different psychopathologies in general, like bulimia nervosa, autism disorder, post-traumatic stress disorder, among others. Through this systematic review it is pretended to know if there are a lot of serious games used in different psychological pathologies as well as show if serious games used in psychological interventions are effective.

This paper is structured, first of all, by the state of art in which is presented a brief definition of serious games and its use in psychology, continuing by the methodology that explains the process in which this paper was made that is a systematic review, principal objective, specific objectives, hypotheses, variables, procedures, results and finally the discussion.

2. State of Art

Computer Games (named most of the time as serious games or game-based learning) have been propagated over time, thanks to its benefits, researchers have used it in different areas but especially in learning and instruction. For the purpose of this systematic review, authors have described computer games in terms of being interactive for the user (Prensky, 2001 *cit. in* Wouters, P., Van Nimwegen, C., Van Oostendorp, H., & Van Der Spek, E., 2013). Serious Games is based on a set of agreed rules and limitations that are mostly directed toward a clear goal that is often set by a challenge (Malone, 1981, *cit. in* Wouter, P., *et al*, 2013). In addition, games often provide the player with score or a change in the world as they keep playing so they know their progress. This way is used to provide feedback and progress to the gamer toward his goal which would be to end the game, or get to the final world. (Prensky, 2001, *cit in* Wouters, P., *et al.*, 2013).

Serious games are technology based games that have other purposes besides being entertaining for users. Computer games are used with a goal of improving and adding somehow feelings and thoughts about politics, publicity, social sciences, among others, while the user does not really have any knowledge of the real intention of the game. Serious games have educational purposes, although the user finds the game entertaining its principal outcome would be to inform about something specific.

These games are now being used with educational purposes more than before, an example would be war games and the way it shows how team help becomes successful to overcome the difficulties of fighting the enemy in every episode of the game, which intentionally shows the primary intention of getting the interest of users for them to relate and think about being part of the military forces, so they will consider enlist in it.

Serious games usually refer to games used for training, advertising, simulation, or education that are designed to run on personal computers or video game consoles. According to Corti (2006 *cit. in* Djaouti, D., Alvarez J., Jessel, J. 2011), game-based learning or also called serious games “*is all about leveraging the power of computer games to captivate and engage end-users for a specific purpose, such as to develop new knowledge and skills*” (Djaouti, D., *et al.*, 2011).

Mental health care as well as other fields have found their way through video games, academic interest in the clinical use of serious games in adolescents have been increasing over the years. In a group therapy of adolescents in distress, virtual games were also found to be useful as to overcome and facilitate a change in this adolescents moral's behavior by just being part and participating in this group therapy (Sherer, 1994 *cit. in* Ceranoglu, A., 2010). Different games are still being tested to prove their efficacy in adolescents looking for a solution-focused intervention. Mental health professionals are participating in this study; the issues and challenges in the games play a role of discussion between the therapist and the patient. Therapists observe the game being played to provide a structure to sessions, which helps build an effective patient–therapist relationship. Virtual games also improve patient engagement in the therapeutic process (Coyle, Doherty, & Sharry, 2009 *cit. in* Ceranoglu, A., 2010). Games to enhance social skills training for children with developmental disorders also exist (Mineo, Ziegler, Gill, & Salkin, 2009 *cit. in* Ceranoglu, A., 2010). These programs used in children are mostly based on different virtual environments where the gamer controls an “avatar,” which is an actor within this environment, using a keyboard or a mouse. The player may practice problem solving skills as well as learned social competences through interactions with the virtual environment (Ceranoglu, A., 2010).

Serious game is a general term used for application that is developed using a computer game technology and game design principles but are used for non- entertainment purposes. We can say that these applications are entertaining games with non-entertainment goals. Serious games has different areas to emphasize, but as one of them are game for health. The results of the study made in this area (health) showed that interactive games with computers had a positive effect on people's physical and mental health (Springer-Verlag & Berlin Heidelberg, 2012 *cit. in* Szczesna, A., Tomaszek, M., & Wieteska, A., 2012). These games have as example "Re-Mission" games which have as a purpose improve young people's lives as they struggle with illnesses like cancer, diabetes among others. Another examples are using serious games for cognitive distraction from pain or games support rehabilitation. Innovative use of computers, in the form of psychotherapeutic games, in therapy may help patients cooperate as well as offer new ways of treatment for those looking for some relief (Szczesna, A., *et al.*, 2012).

Literature on use of serious games in psychology has been limited but the one that exists suggest that games can help, especially adolescents, become motivated and excited about

therapy. Games may facilitate and improve relations with the therapist. It may also help evaluate patients' cognitive skills (for example social skills, memory, motor skills and planning competence, frustration, anxiety, tolerance, intellectual competences, among others) and create on and resolve problems during the therapy process (Szczena, A., 2012). Some of these games examples used in the psychology field, can be: "Treasure Hunt" for cognitive behavior therapy; "Personal Investigator" this game is focused on solution making therapy along with five other therapeutic strategies that help create conversation and a positive relationship between therapist and patient. These strategies are: setting goals, recognizing exceptions, coping, identifying resources and the miracle question (Springer-Verlag & Berlin Heidelberg, 2012 *cit. in* Szczena, A., *et al.*, 2012)

Behavioral change is a field that has been research extensively; especially change of health behavior. This amount of research has led to a variety of health behavior change models that offer different strategies which can be applied to facilitate and promote these changes. Different factors can be recognized to be playing a role in several models as significant predictors for behavior changes, some of these are self-efficacy, susceptibility, perceived benefits and barriers and threat severity. Most health behavior change has one important limitation and that is that models must be acknowledged. They are primarily built as cognitive models assuming high levels of rationality and logic within the user. A gaming environment is well suited to apply these alternative strategies, already mentioned, and the development of this idea reveals itself in the field of serious games (Ritterfeld, Cody, & Vorderer, 2009 *cit. in* Ritterfeld, U., Roelofsma, P., Haring, P., Chakinska, D., Bosch, M., & Versteeg, L., 2010).

Just as in education, many computer games have been used to promote health improvement among patients as well as surgical training for health care professionals. A variety of games have been design to increase the patient's coping with treatment and also improve doctors' medical skills. In fact, serious games started their way into the medical field before 1980, when the first commercial video games were actually used for therapeutic purposes, until later, where it was an improvement in the development of more customized games for medical care intervention (Kato, P., 2010). Not only have serious games been used for training doctors in the medical field but also have been developed for other things and treatments, such as delivering information relating health, modeling positive behaviors (e.g., Re-Mission , Kato, 2008 *cit. in* Kato, 2010), providing opportunities for gamers to always practice positive health

conducts, physical therapy and rehabilitation resulting from a traumatic brain injury (e.g., Jannik, van der Wilden, Navis, Visser, Gussinklo, & Ijzerman, 2008 *cit. in* Kato, P., 2010). Serious games also have been shown to be effective replacements for costly forms of health care technology. For example, biofeedback is an intervention in which individuals learn how to do physiological activity for the purposes of improving health (Durand & Barlow, 2009 *cit. in* Kato, P., 2010).

Computer games have been used to support mental health care treatment as well and have been related to improved patient cooperation and adherence in the therapy process (Resnick, 1986 *cit. in* Szczesna, A., *et al.*, 2012), to a positive connection between therapist and patients (Clarke & Schoech, 1994 *cit. in* Szczesna, A., *et al.*, 2012), and engagement among treatment in children who are really resistant of assisting therapy, children with behavior disorder who already had dropped out of therapy several times (Kokish, 1994 *cit. in* Szczesna, A., 2012). The first serious game supporting cognitive-behavioral therapy, which was Treasure Hunt, produced positive reports from the therapist in the perspective of pilot studies, where children patients responded in a positive way to the treatment, producing a change in behavior that engaged in the tasks of the games independently. However, conclusions about the game's efficacy for treatment were limited (Szczesna, A., *et al.*, 2012).

A new type of serious game has been recently created which is named exergames. This type of game require exercise and physical activity for game play. These games (e.g., Dance Dance Revolution, Wii Fit, Dance Central) have been linked to positive benefits and improvement in stress control, caloric intake and energy consume of children and adolescents playing (Kato, 2010; Staiano & Calvert, 2011 *cit. in* Blumberg, F., Almonte, D., Anthony, J., & Hashimoto, N., 2012). For example, Graf (2009 *cit. in* Blumberg, F., *et al.*, 2012) found that energy expenditure among preadolescents and adolescents during Dance Dance Revolution and Wii Sport game play was comparable to "moderate-intensity" walking. Exner (2009 *cit. in* Blumberg, F., *et al.*, 2012) found weight loss among youth with low income as a result of Wii Sport tennis play, particularly after play against peers as opposed to virtual characters. Staiano (2011 *cit. in* Blumber, F., *et al.*, 2012) also recently reported it was helpful to play Wii Active over some period of time because it resulted in weight loss among overweight and obese youth relative to a control group (Blumberg, F., *et al.*, 2012).

Ultimately, relatively little empirical evidence has yet to appear in the scientific literature to support the efficacy of serious games for health on positive health outcomes (Kato, 2010). Accordingly, efforts have been made to change this situation.

3. Methodology

3.1 Systematic Review

A systematic review is an accumulation and research of different empirical evidence that fits a criteria in order to answer a specific research question. It uses explicit, different systematic methods that helps reduce and minimize bias, as well as providing more reliable findings from which conclusions can be drawn and decisions can be made (Antman 1992, Oxman 1993 *cit. in* Moher, D., Shamseer, L., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M. & Shekelle, P., 2015)

The most important characteristics in a making of a systematic review are: a stated set of objectives with criteria for the research; a methodology is an important part of it; a search made being systematic would then lead to find of a variety of studies made that could be a part of the search criteria; control of the validity and fidelity of the studies found and a synthesis as well as a systematic presentation of the studies that met the criteria of the search (Moher, D., *et al.*, 2015).

Meta-analysis are included in most systematic reviews. This term (meta-analysis) refers to the use of different statistical methods to review the results of independent studies (Glass 1976 *cit. in* Haddaway, N., Woodcock, P., Macura, B., & Collins, A. 2015). By gathering information a meta-analysis facilitate investigations of the consistency of evidence across studies and search, and the study of differences across studies.

Systematic reviews may focus on treatments or therapies and their effectiveness in the patient and therapist, as well as diagnosis and outcome, epidemiology, viewpoints based on qualitative studies, and theories. Other systematic reviews may focus on measurement or the methodological rigor of studies and so on (Petticrew & Roberts, 2008 *cit. in* Haddaway, N. *et al.*, 2015).

3.2 Principal Objective

This article has as objective to do a systematic review about serious games that exist in psychology since 2010 until now.

3.3 Specific objectives

- To know the impact of serious games in psychotherapeutic intervention.
- To evaluate the effectiveness of serious games in psychotherapeutic intervention.

3.4 Hypotheses

- There are a lot of serious games in different psychological pathologies.
- Serious games used in psychotherapeutic interventions are effective.

3.5 Variables

It is conclusive then as our dependent variable serious games and as independent variables psychopathology in general.

3.6 Procedures

The systematic review done in this paper was made from different sources of internet media, articles and books using as key words psychology, psychopathology, serious games and mental health. Most of the information gotten was form different medical web pages like LudoScience, International Journal of Serious Games, Serious Games Association, among others. The criteria of selection is psychology related. The inclusion criteria would be time, there were used only articles from 2010 until nowadays. There are no participants in this paper but articles and books used to make the systematic review.

4. Results

In table 1, we find several abstracts about different selected articles that have already been mentioned before in this paper.

Table 1

Papers on Serious Games and Psychology.

YEAR	AUTHOR	INSTITUTION	MAGAZINE	TITLE	ABSTRACT
2014	Kapil Bhasin	Focus zone Media, Incorporation.	Learning Solutions Magazine.	Gamification, Game-based Learning, Serious Games: Any Difference?	Games have had a lot of success in the general industry, it has redefined expectations in the learning process, bringing with it a different model in design. The author optimisms about the best practices that has been explored here provide a helpful outline to promote a method to the gamification of organizational learning.
2014	Shujie Deng, Julie A. Kirkby, Jian Chang, Jian J. Zhang.	Bournemouth University.	International Journal of Serious Games Vol. 1, Issue 4.	Multi-modality with Eye tracking and Haptics: A New Horizon for Serious Games?	This review has as objective to show the developing use of virtual reality and different types that can advantage learning-based games. The authors initially outline studies that have used eye tracking and haptic response autonomously in serious games, and then review some innovative applications that have already combined eye tracking and haptic devices in order to provide appropriate multimodal contexts for learning-based games.
2014	Lee Taylor-Nelms,	Texas Woman's University.	International Society, Journal of	Assessing 3D Virtual	Recognizing the best ways for education and organization training has become necessary to

	Valerie Hill.		Serious Games Vol. 1, Issue 4.	World Disaster Training Through Adult Learning Theory	study. The authors examined the extent to which 3D virtual tornado simulation trainings work through the methodology of observation, interviews, and reflection on action which was analyzed for correspondence to adult learning theory. The results confirm that 3D virtual worlds appear to bring into line some meanings to adult learning theory.
2014	Arlen Moller, Sara Majewskil, Melanie Standish, Pooja Agarwal; Aleksandra Podowski; Rebecca Carson; Biruk Eyesus; Aakash Shah; Kristin Schneider.	Illinois Institute of Technology.	Journal MIR Serious Games. vol. 2, issue 2.	Active Fantasy Sports: Rationale and Feasibility of Leveraging Online Fantasy Sports to Promote Physical Activity.	Active video games (AVGs) has risen steeply over the last decade and been accepted. However, research suggests that the most popular AVGs, which rely on synchronous incorporation between players' action and game structures, does not promote any physical activity outside of the game or for extended periods of commitment. This is a drawback that has directed researchers to consider AVGs that involve asynchronous integration of players' ongoing physical activity with game structures.

2014	Francesco Ricciardi and Lucio Tommaso De Paolis.	Department of Engineering for Innovation, Salento University.	International Journal of Computer Games Technology Vol. 1.	A Comprehensive Review of Serious Games in Health Professions.	Serious games explains how some type of technology can educate and train while being entertaining. This kind of training can be valuable for health professions because it improves learning results creating a new way of learning and a new model of teaching. Serious games are so beneficial in the health field in that it is cheaper than traditional training methods that use cadavers or mannequins. Many papers confirmed that serious gaming is a useful skill that increases learning and skills for health professionals.
2014	Maite Frutos-Pascual, Begoña García Zapirain and Amaia Méndez Zorrilla.	Faculty of Engineering, University of Deusto.	International journal of environmental research and public health. Vol. 11, issue 1.	Adaptive Tele-Therapies Based on Serious Games for Health for People with Time-Management	This article shows an intelligent tele-therapy tool based on serious games that has been proven to be beneficial in improving time management skills and prioritizing different tasks in children with Attention Deficit Hyperactivity Disorder (ADHD). Preliminary results of the pilot-phase in an experiment accomplished to assess the use of adaptive tele-therapies within a group of developing children and adolescents without ADHD.

				ment and Organi- zational Problems	Authors based their experiments on the collection of limitations and the conduct of surveys for assessing time management skills. The results of a time management survey emphasized that the participants did not use any precise or effective time management techniques. This study may help to understand these users' needs, as well as increasing time management skills among teenagers with and without ADHD.
2014	Chiara E. Catalano, Angelo M. Luccini, Michela Mortara.	University of Deusto.	International Journal of Serious Games volume 1, Issue 1.	Best Practices for an Effective Design and Evalua- tion of Serious Games	Serious games have shown a lot of potential for education and training in many disciplines. However, research still see a lack of methodologies, guidelines and best practices on how to create an effective serious games and how to integrate them in the actual education and training processes. In this paper the authors present an overview on the factors that make serious games effective in the viewpoint of increasing the learning impact and discuss the present efforts in assessing this effect.

2014	Igor Mayer, Geertje Bekebrede, Casper Hartevelde, Harald Warmeling, Qiqi Zhou, Theo van Ruijven, Julia Lo, Rens Kortmann and Ivo Wenzler	University of Technology. Northeastern University.	British journal of Educational Technology.	The research and evaluation of serious games: Toward a Comprehensive methodology.	In this article the authors show the organizational background and fundamental research on the scientific assessment of serious games and or computer-based simulation games (SGs) for innovative education. The main research questions are: (1) what are the requests and scientific methodology for the assessment of SGs? (2) To what extent do SGs improve advanced learning? (3) What aspects contribute to this learning? and (4) to what point and under what circumstances can SG-based learning be transmitted to the real world? This article shows the study exemplary, the quasi-experimental plan and the evaluation tools.
2013	Stefano Piana, Alessandra Staglianò, Antonio Camurri, Francesca Odone.	University of Genova.	InfoMus Lab in Casa Paganini International.	A set of Full-Body Movement Features for Emotion Recognition to	This paper aims to help provide solutions to assist children affected by Autism Spectrum Conditions (ASC), in order to screen their behavior while playing with a communicating serious game that will help them in accepting and imitating emotions. The structure will examine the voice, the face and

				Help Children affected by Autism Spectrum Condition	the body of the player to have a description of the emotion the child is feeling/trying to play. In this work the focus is on the body movement analysis. Preliminary results show impact in these children.
2013	Albert Rizzo, JoAnn Difede, Barbara Rothbaum, J. Martin Daughtry & Greg Reger.	Institute for Creative Technologies, University of Southern California. Weill Cornell Medical College. Emory University, New York University , National Center for Telehealth and Technology	The Office of Naval Research and U.S. Army Research.	Virtual reality as a tool for delivering PTSD exposure therapy.	Virtual experience therapy has proved to be effective at different types of anxiety disorders. If experimental studies continue to demonstrate the benefits of virtual reality, it can be applied to a new targeting people. The use of Virtual Reality Exposure Therapy for the treatment of PTSD will then be detailed followed by a description of the visual Iraq and Afghanistan VRET system and the results from its use with service members.
2013	Pieter Wouters, Christof Van Nimwegen , and Herre Van Oosten-dorp	Utrecht University Eindhoven University of Technology.	Journal of Educational Psychology, Online First Publication.	A Meta-Analysis of the Cognitive and Motivational Effects of	Serious games impacts learning in 2 ways, by altering cognitive processes and by affecting motivation. However, research has shown little proof for these assumptions. Authors used meta-analytic methods to explore whether serious games are more effective in terms of learning and

	Erik D. Van der Spek.			Serious Games.	more motivating than conservative instruction methods. As results, Serious games were found to be more effective in terms of learning and retention, but they were not more motivating than conventional instruction methods.
2013	Simon McCallum and Costas Boletsis.	Gjøvik University College.	Serious Games Development and Applications Lecture Notes in Computer Science; Vol. 8101.	Dementia Games: A Literature Review of Dementia Related Serious Games.	Presently, there is a propagation of cognitive training, exercise and social games, targeting one of the most dangerous disease of the era which is dementia, along its symptoms and stages like Mild Cognitive Impairment (MCI) and Alzheimer's disease (AD). This article debates the impact that games have related to dementia conditions. The Authors conclude that games are being used for health reasons, even though, when many games were established for entertainment purposes, obtaining the features of serious games and also, dementia games do have an impact on cognitive impaired people.
2013	Francesco Bellotti, Bill	Department of Naval Electric, Electronic and	Advances in Human-Computer	Assessment in and of	Serious games effectiveness in terms of learning outcomes is still understudied mainly due to the

	Kapralos, Kiju Lee, Pablo Moreno-Ger, and Riccardo Berta.	Telecommunications Engineering Faculty of Business and Information Technology, University of Ontario Institute of Technology, Case Western Reserve University.	Interaction Vol 1.	Serious Games: An Overview.	complexity involved in assessing intangible measures. A systematic approach, based on established principles and guidelines, is necessary to enhance the design of serious games, and many studies lack a rigorous assessment. An important aspect in the evaluation of serious games, like other educational tools, is user performance assessment.
2013	Ana B. Fagundo, Juan J. Santamaria, Laura Forcano, Cristina Giner, Susana Jimenez, roser grander.	University of Genova, University of Barcelona, King's College of London.	European eating disorders Review vol. 21.	Video game therapy for emotional regulation and impulsivity control in a series of treated cases with Bulimia nervosa.	Although typical psychological treatments have been fruitful in treating several essential features in eating disorders, other characteristics such as emotional regulation or impulsivity appear to be more resistant to change. There is a growing body of evidence to support the efficacy of cognitive remediation for cognitive and emotional difficulties in eating disorders through video games.

2013	John L. Sherry	Department of Communication, Michigan State University.	Zeitschrift fur Psychologie; Vol. 221, issue 2.	Formative Research for STEM Educational Games Lessons From the Children's Television Workshop.	Millions of euros and dollars have been spent structuring and testing video games for education, for health, and serious games. Why is this being done? What educational video game has had spread and impact of Sesame Street or Blues Clues television shows? By comparison, the Children's Television Workshop (CTW) managed to get Sesame Street off the ground within a couple of years, writing the basic scientific literature on educational television strategy in the process.
2012	Alasdair G. Thin	School of Life Sciences, Heriot-Watt University, Edinburgh	Advances in Human-Computer Interaction Volume 1.	A Game Basel Virtualized Reality Approach for Simultaneous Rehabilitation of Motor Skill and Confidence.	This study aimed to examine if a recovery training programme using game-based methods (GBVR) could instantaneously improve both motor skill (MS) and confidence (CON). The study was performed using a no dominant hand motor deficit model in no ambidextrous strong young adults, whereby dominant and no dominant arms acted as control and intervention settings, separately. CON and MS were measured by having each subject perform a comparable real-world

					motor task (RWMT) before and after training. Starting point of CON and MS for performing the RWMT were significantly lower for the non-dominant and improved after GBVR training, whereas there were no changes in the dominant (control) arm. These results demonstrate that by using a GBVR approach to address a MS deficit in a real-world task, developments in both MS and CON can be eased and such methods may help increase patient compliance.
2012	Andreas Alexiou, Michaéla Schippers, Ilan Oshri	School of Business and Economics, Loughborough University, Loughborough, UK.	Scientific research Psychology Vol. 3.	Positive Psychology and Digital Games: The Role of Emotions and Psychological Flow in Serious Games Development.	In this paper it is discussed how positive psychology can contribute to the design of digital games and training applications like Serious Games. Whereas digital games have been known for their ability to deeply submerge gamers, motivate the senses and tap into a broad variety of emotions, it has established rather challenging to use them as a way for learning. The theory of psychological course and the role of positive emotions in people's thought-action selections bring some real-

					world visions. Yet there are still major challenges to be explored in order for the technology to bring what has been assured.
2012	Kiili, K., de Freitas, S., Arnab, S., Lainema, T.	Ampere University of Technology, Finland Serious Games Institute, Coventry University, Coventry, United Kingdom Turku School of Economics, University of Turku.	Procedia Computer Science, Vol. 15.	The design princi- ples for flow experien- ce in educa- tional games.	This article describes the construction of course experience that can be used to design attractive and operative educational games for official and informal learning circumstances. The context provides the principles for good educational game design, based upon associative and cognitive learning theories, as well as engagement and pedagogic elements with a focus upon response and course principles. Furthermore, the paper clarifies the relation between the flow experience and immersion. Overall, the results indicate that flow framework is a valuable instrument in education game-based learning experiences.
2012	Igor Mayer	The Scientific Programme Committee of VS-Games.	Procedia Computer Science Vol. 15.	Towards a Com- prehen- sive Metho- dology	The author presents the operational backgrounds and underlying research design of an on-going scientific research project concerned with the scientific evaluation of serious

				for the Research and Evaluation of Serious Games	game for advanced learning. The author presents the quasi-experimental design and evaluation instruments. This focus in this article is on practice and data-set to establish a proper foundation for approaching publications on empirical results.
2012	Gordon P. D. Ingram, Joana Campos, Charline Hondrou, Image, Assimina Vasalou, Carlos Martinho. Adam Joinson.	INESC-ID and Instituto Superior Tecnico, Technical University of Lisbon. Video and Multimedia Systems Lab, National Technical University of Athens.	Evolutionary psychology. Vol. 10, issue 5.	Applying Evolutionary Psychology to a Serious Game about Children's Interpersonal Conflict.	This article defines the use of evolutionary psychology to notify the design of a serious computer game aimed at improving 9–12-year old children's struggle to resolve tasks. The design of the game will contain active narrative generation and emotional classification, and there is a solid evolutionary rationale for the effect of both of these on conflict resolution. Gender differences will also be taken into attention in designing the game.
2012	Sylvester Arnab, Riccardo Berta, Jeffrey Earp, Sara de Freitas, Maria	Serious Games Institute, University of Coventry, UK 2 University of Genova, Italy	Electronic Journal of e-Learning Volume 10 Issue 2.	Framing the Adoption of Serious Games in Formal	An occasion attracting particularly close consideration to learning processes is Serious Games (SG), which offer significant potential for enabling both informal and formal learning. SG appear to offer the chance to “hook” today's digital

	Popescu, Margarida Romero, Ioana Stanescu, Mireia Usart.			Educa- tion.	generation of young learners, who are at risk of decreasing into an ever-widening gap between “networked” lifestyles and the relative motionless environment they practice in school and college.
2012	Agnieszka Szczesna, Marta Tomaszek, and Aleksandr a Wieteska	Silesian University of Technology, Institute of Informatics, Jagiellonian University, University of Silesia, Institute of Psychology.	Online journal Springer- Verlag Berlin Heidelberg.	The Metho- dology of Desig- ning Serious Games for Children and Adoles- cents Focused on Psycho- logical Goals.	Developing serious games for universal health applications has grown exponentially in recent years. The practice of serious games in psychological care and psychotherapy is made thinkable by the removal of the traditionally recognized purpose and methods of therapy and behavioral-cognitive in the virtual world. In this article the main procedures of designing psychology serious game based on cognitive comporment methods are offered. The methodology contains consideration in setting goals in informal learning process using to actions change and description of game influence.
2011	Agnieszka Szczesna, Jakub Grudzinski	Silesian University of Technology, Institute of	Master your fear. Serious Games and Applications	The Psycho- logy Serious	Computer games are more and more used for serious purposes not only for entertainment. In few last years it can be observed a

	, Tomasz Grudzinski, Robert Mikuszewski and Adrian Debowski.	Informatics Gliwice.	for Health (SeGAH), IEEE 1st International Conference.	Game Prototype for Preschool Children.	very fast market development of serious games. They are used in different fields as education, simulation, research, health and therapy purposes.
2011	C. Botella, J. Breton-López, S. Quero, R.M. Baños, A. García-Palacios, I. Zaragoza, M. Alcaniz.	Universidad de Valencia, instituto de Bioingeniería y Tecnología Orientada al Ser Humano, Universidad Politécnica de Valencia.	Computer in Human Behavior, volume 27, issue 1.	Treating cockroach phobia using a serious game on a mobile phone and augmented reality exposure : A single case study.	In vivo experience has proved its benefits in the treatment of specific phobias; nonetheless, not all patients benefit from it. Communication and information technologies such as Virtual Reality (VR) and Augmented Reality (AR) have enhanced contact treatment faithfulness and acceptance. Serious games (SG) could also be used in order to ease exposure treatment. A line of research on Serious Games is developing which efforts on health issue.
2011	Elizabeth Boyle, Thomas M. Connolly,	School of social science, faculty of health, education And social science.	Entertainment computing 2 vol. 1.	The Role of Psychology in Understanding	Computer games have become an extremely popular leisure activity for adolescents and adults for its entertainment purposes but also there has been an interest in the potential of serious games to help

	Thomas Hainey.			the Impact of Computer Games.	in learning, skill acquisition and attitude and behavior change.
2010	Tomasz Grudzinski, Robert Mikuszewski, Agnieszka Szczesna, Mariusz Szynalik, Kamil Urbanek.	The Silesian University of Technology, Institute of Computer Science.	Journal of Medical Informatics & Technologies, Vol. 16.	Scripting Language in Serious Games for Psychology.	This article describes main features of serious games used for psychology. Specialists prepare situations of games with therapeutic points. To fast, easy and well-organized, applying such scenario of game, the scripting language can be used. In this paper the main structures of the scripting language into games is to support implementing serious games for psychology use as it was described.
2010	T. Atilla Ceranoglu.	Massachusetts General Hospital.	Review of General Psychology, Vol. 14, Issue 2.	Video Games in Psychotherapy.	Limited literature found on use of video games in mental health care suggests that they can help young patients become more cooperative and enthusiastic about psychotherapy. Recent experience suggests that video games may facilitate therapeutic relationships, complement the psychological assessment of youth by evaluating cognitive skills, and elaborate and clarify conflicts during the therapy

					process. Concerns about video game content, perceived effects on youth, and lack of familiarity with this medium may form a barrier in their use in therapy offices.
2010	Christopher J. Ferguson.	Texas A&M International University.	Review of General Psychology Vol. 14, Issue 2.	Introduction to the Special Issue on Video Games.	Video games are fast becoming one of the most common media of choice among children and young adults. As with any new media appreciated by youth, but comparatively unused by elders, countless responses may be observed, going from interest and wonder to fear and concern. New media have endured periods of reactionary fear from politicians, activists, and scientists alike until youth themselves age into the elders of society and acceptance becomes a commonplace.
2010	Pamela M. Kato.	University Medical Center Utrecht.	Review of general psychology Vol. 14, Issue 2.	Video Games in Health Care: Closing the Gap.	Examples in the scientific literature of commercially available games used for education and training with patients and medical students and doctors are summarized in this article. There is a history of using video games with patients from the early days of gaming in the 1980s, and this has evolved into a

					focus on making games for different groups. More recently, some basic computer games have been developed and evaluated to train doctors in clinical skills. The studies presented in this article represent a body of work outlining positive effects of playing video games in the area of health care.
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Out of all the articles that were suggested in the systematic review, 14 of them have to do with learning new patterns of behavior or changes in behavior, 3 other articles talk about the influence that psychology has in the design of serious games. One article shows several ways in which serious games can be used and applied (healthcare, education, civism, among others). Another article talks about healthcare and medical treatment. Another article talks about the influence of serious games in physical activity. The rest of the articles (which are 9), emphasize aspects of different subjects, all of which are psychology related: that goes from serious games application and uses to the psychotherapeutic process, like its uses in attention deficit hyperactivity disorder and autism spectrum disorder, its implications to treat anxiety, phobias and eating disorders, as well as its application in different cognitive rehabilitations, dementia and the conflict resolution and empowerment for elderly.

In table 2, we can see several abstracts on subjects taken from books, carefully selected using the systematic review methodology.

Table 2

Books on Serious Games and Psychology

<u>YEAR</u>	<u>AUTHOR</u>	<u>EDITOR</u>	<u>TITLE</u>	<u>ABSTRACT</u>
2014	Thomas M. Connolly Thomas Hainey Elizabeth Boyle, Gavin Baxter, Pablo Moreno-Geri.	IGI Global book series Advances in Game-Based Learning.	Psychology, Pedagogy, and Assessment in Serious Games.	The authors present a methodology for researching and evaluating Serious Games (SG) and digital (or other forms of) Game-Based Learning (GBL). The methodology consists of the following features: first; frame-reflective analysis; second; a methodology explaining the basis behind a conceptual-research model; third; study designs and data-gathering procedures; fourth; authenticated research tools, fifth; a form of information that offers operationalized models and hypotheses; and sixth; qualified ethics. The methodology is intended to resolve the dilemma between the “generalization” and “normalization” required for qualified, theory-based research and the “specificity” and “flexibility” needed for assessing exact cases.
2013	Johnson L., Adams Becker, S., Cummins, M., Estrada, V., Freeman, A., and Ludgate, H.	The New Media Consortium.	NMC Horizon Report: 2013 Higher Education Edition.	The six technologies featured in the NMC Horizon Report: 2013 Higher Education Edition are located along three adoption horizons that indicate likely time settings for their entrance into conventional use for teaching, learning, and creative inquiry. The near-term horizon adopts the probability of entry into the mainstream for higher

				education establishments within the next 12 months; the mid-term horizon, within two to three years; and the far-term, within four to five years. It should be noted at the beginning that the NMC Horizon Report is not a prognostic instrument. It is meant, rather, to highlight emerging technologies with considerable potential for our focus areas of education and interpretation. The projects authors show here reveal the promise of a wider impact.
2012	Nancy Johnson, Jacqui Moffatt, Kate Smith, Cathy White.	Ridge Meadows Child Development Centre Society.	A Guide to Early Intervention Group Therapy.	Intervention is used to describe the work of the Ridge Meadows Child Development Centre occupational therapists, physiotherapists, speech/language pathologists and rehabilitation assistants who provide pediatric recuperation services. Therapy, group, treatment and facilitation are used through the text of this guide, as well, to refer to the same work. Throughout this guide the term parents is used to refer to all caregivers of children involved in early intervention services.
2012	Fran C. Blumberg, Debby E. Almonte, Jared S.	Institute of Newgen.	Serious Games: What Are they? What Do they Do? Why Should We Play them?	This chapter analyses classifications of serious games and the theoretical viewpoints, Social Cognitive Theory to be the most notable that have been used to account for their effects, and game

	Anthony, and Naoko Hashimoto.			foundations such as identity, immersion, and interactivity. It also studies the different fields in which serious games have been used, such as health, education, civic engagement, and advertising. Identifying future directions for serious game design research and development will endorse transmission of skills and content from the game to the real world, including examination and explication of players' behaviors and cognitive skills while playing the game.
2011	Patrick Felicia.	An Imprint of IGI Global.	Handbook of Research on Improving Learning and Motivation through Educational Games: Multidisciplinary Approaches.	This chapter introduces a new learning plan that benefits from computer games' popularity and engagement to help students comprehend algorithms better by designing computer games that visualize algorithms. To teach an algorithm, an educational computer game, namely an Algorithm Game must have a game-play that pretends the behavior of the visualized algorithm and graphics depict the features of its data structure. Algorithm games attract students to learn algorithm using active engagement, enjoyment, and internal motivation. Algorithm Games attributes make them appropriate to visualize algorithms have been identified.

2011	Damien Djaouti, Julian Alvarez, Jean-Pierre Jessel	Patrick Felicia.	Classifying Serious Games: the G/P/S model.	The purpose of this study is to introduce an overall classification system for Serious Games. The meaning of this classification is to guide people over the area of Serious Games by providing them with a general summary. For example, it may appeal to educators who wish to find games with strong educational potential; they may find them in the “edugames” field.
2011	Richard N. Landers and Rachel C. Callan	Marie Ma et al. Springer-Verlag.	Casual Social Games as Serious Games: The Psychology of Gamification in Undergraduate Education and Employee Training.	Serious games are best used to support the learning process. One way to do this is gameification (or gamification), which will be well-defined here as the addition of essentials usually associated with games to an educational or training program in order to make the learning process more attractive.
2011	Ma, M., Oikonomou, A., & Jain, L. C.	Minhua Ma, Andreas Oikonomou, Lakhmi C. Jain	Serious Games and Edutainment Applications.	Serious Games have been used with the primary objective of entertaining. While playing, the gamer promotes physical activities, learning skills and knowledge, support social and emotional development, and treat psychological and physical disorders. Videogames are an inexpensive instrument that used in the right way it can offer fun, distraction and confidence of control over the game to a diversity of people of all ages.

2010	Ute Rittfeld, Peter Roelofsma, Priscilla Haring, Dimitrina Chakinska, Misha van den Bosch, Leo Versteeg.	Center for Advanced Media Research (CAMErA), VU University.	Head First Into Serious Health Gaming: a2e2 as a new approach of digital exercise coaching for seniors.	With the development of an Adaptive Ambient Empowerment tool for the Elderly (a2e2) a group of specialists and media psychologists defy the challenge to change unhealthy life styles. The main goal is to increase physical activity in elders who are at risk of acquiring or are already suffering from chronic diseases. The a2e2 system incorporates exergames and applies a daily organization by using a digital coach.
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Out of all books resulting from the systematic review, 3 of them talk about serious games validation and use, one book talks about the history of serious games and another one about its classification. Only two books talk about learning, other with child psychotherapy and another one with behavioral change in elderly people.

Discussion

Our first hypothesis (there are a lot of serious games in different psychological pathologies) has not been confirmed. On the contrary we find just a few articles and books about serious games uses in different pathologies. It goes against what we suppose, which means the use of serious games is still being directed toward questions about learning and not as much about psychotherapeutic interventions.

Computer Games (named most of the time as serious games or game-based learning) have been propagated over time, thanks to its benefits, researchers have used it in different areas but especially in learning and instruction (Wouters, P., Van Nimwegen, C., Van Oostendorp, H., & Van Der Spek, E., 2013).

Out of all the articles that were suggested in the systematic review, 14 of them have to do with learning new patterns of behavior or changes in behavior, 3 other articles talk about the influence that psychology has in the design of serious games. One article shows several ways in which serious games can be used and applied (healthcare, education, civism, among others). Another article talks about healthcare and medical treatment. Another article talks about the influence of serious games in physical activity.

Serious games usually refer to games used for training, advertising, simulation, or education that are designed to run on personal computers or video game consoles. According to Corti (2006 *cit. in* Djaouti, D., Alvarez J., Jessel, J. 2011), game-based learning or also called serious games “*is all about leveraging the power of computer games to captivate and engage end-users for a specific purpose, such as to develop new knowledge and skills*” (Djaouti, D., *et al.*, 2011).

The rest of the articles (which are 9), emphasize aspects of different subjects, all of which are psychology related: that goes from serious games application and uses to the psychotherapeutic process, like its uses in attention deficit Hyperactivity Disorder and autism spectrum disorder, its implications to treat anxiety, phobias and eating disorders, as well as its application in different cognitive rehabilitations, dementia and the conflict resolution and empowerment for elderly.

Computer games have been used to support mental health care treatment as well and have been related to improved patient cooperation and adherence in the therapy process

(Resnick, 1986 *cit. in* Szczesna, A., *et al.*, 2012), to a positive connection between therapist and patients (Clarke & Schoech, 1994 *cit. in* Szczesna, A., *et al.*, 2012), and engagement among treatment in children who are really resistant of assisting therapy, children with behavior disorder who already had dropped out of therapy several times (Kokish, 1994 *cit. in* Szczesna, A., 2012).

Out of all books resulting from the systematic review, 3 of them talk about serious games validation and use, one book talks about the history of serious games and another one about its classification. Only two books talk about learning, other with child psychotherapy and another one with behavioral change in elderly people.

Not only have serious games been used for training doctors in the medical field but also have been developed for other things and treatments, such as delivering information relating health, modeling positive behaviors (e.g., Re-Mission, Kato, 2008 *cit. in* Kato, 2010), providing opportunities for gamers to always practice positive health conducts, physical therapy and rehabilitation resulting from a traumatic brain injury (e.g., Jannik, van der Wilden, Navis, Visser, Gussinklo, & Ijzerman, 2008 *cit. in* Kato, P., 2010).

Our second hypothesis (serious games in psychotherapeutic interventions are effective) cannot be confirmed, because only one article talks about this specific subject. The fact that serious games efficacy applied to psychology does not agree with our expectations can be related to a recent and little uses of it, which has not been possible to validate yet.

Conclusions about the game's efficacy for treatment were limited. A new type of serious game has been recently created which is named exergames. This type of game requires exercise and physical activity for game play. These games (e.g., Dance Dance Revolution, Wii Fit, Dance Central) have been linked to positive benefits and improvement in stress control, caloric intake and energy consume of children and adolescents playing (Kato, 2010; Staiano & Calvert, 2011 *cit. in* Blumberg, F., Almonte, D., Anthony, J., & Hashimoto, N., 2012). For example, Graf (2009 *cit. in* Blumberg, F., *et al.*, 2012) found that energy expenditure among preadolescents and adolescents during Dance Dance Revolution and Wii Sport game play was comparable to "moderate-intensity" walking.

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