ROSS JACKELINE DE ABREU FERREIRA

SYSTEMATIC REVIEW ABOUT SERIOUS GAMES

Orientadora Científica: Professora Doutora Ângela Leite

Universidade de Lusófona do Porto
Faculdade De Psicologia, Educação e Desporto

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Systematic Review about Serious Games

Dissertação apresentada na Universidade Lusófona do Porto para obtenção do grau de Mestre em Psicologia Clínica e da Saúde

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Composição do júri: Presidente: Professor Doutor Diogo Lamela; Arguente: Professora Doutora Maria Teresa Souto; Orientadora: Professora Doutora Ângela Leite

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Universidade de Lusófona do Porto

Faculdade De Psicologia, Educação e Desporto

Porto

2015
Acknowledgments

First of all I want to thank God for allowing me to have come this far in my career, for always making me go in the right path and helping me fight for my dreams. I want to thank my supervisor Professor Ângela Leite for all her knowledge and advices, for her time, patience and support at all times. I want to thank Lusófona University for giving the opportunity to continue my career, for the experience and knowledge. I want to thank my classmates for making this experience a beautiful one, for their help and friendship, these closest friends will forever be in my heart. I would like to thank my family as well; my husband who I thank God has been there for me, supporting me and making me believe in myself, my daughter who is my inspiration and my strength to keep going every day, my parents whom I thank for teaching me to fight and not ever give up, my brother and sister that have always been my best friends, I am grateful for their unconditional love and support always, and my nephews who are a part of me and my life.
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 have 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 (Szczesna, 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 Szczesna, 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* Blumberg, 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 from 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

<table>
<thead>
<tr>
<th>YEAR</th>
<th>AUTHOR</th>
<th>INSTITUTION</th>
<th>MAGAZINE</th>
<th>TITLE</th>
<th>ABSTRACT</th>
</tr>
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<tbody>
<tr>
<td>2014</td>
<td>Kapil Bhasin</td>
<td>Focus zone Media, Incorporation.</td>
<td>Learning Solutions Magazine.</td>
<td>Gamification, Game-based Learning, Serious Games: Any Difference?</td>
<td>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.</td>
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<tr>
<td>2014</td>
<td>Shujie Deng, Julie A. Kirkby, Jian Chang, Jian J. Zhang.</td>
<td>Bournemouth University.</td>
<td>International Journal of Serious Games Vol. 1, Issue 4.</td>
<td>Multimodality with Eye tracking and Haptics: A New Horizon for Serious Games?</td>
<td>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.</td>
</tr>
<tr>
<td>2014</td>
<td>Lee Taylor-Nelms,</td>
<td>Texas Woman's University.</td>
<td>International Society, Journal of Assessing 3D Virtual</td>
<td>Recognizing the best ways for education and organization training has become necessary to</td>
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</tr>
<tr>
<td>Year</td>
<td>Authors</td>
<td>Institution</td>
<td>Journal/Source</td>
<td>Summary</td>
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<tr>
<td>2014</td>
<td>Arlen Moller, Sara Majewskil, Melanie Standish, Pooja Agarwal, Aleksandra Podowski, Rebecca Carson, Biruk Eyesus, Aakash Shah, Kristin Schneider</td>
<td>Illinois Institute of Technology</td>
<td>Journal MIR Serious Games. vol. 2, issue 2</td>
<td>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.</td>
<td></td>
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<tr>
<td>2014</td>
<td>Valerie Hill.</td>
<td></td>
<td>Serious Games Vol. 1, Issue 4.</td>
<td>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.</td>
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Active Fantasy Sports: Rationale and Feasibility of Leveraging Online Fantasy Sports to Promote Physical Activity.
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<th>Year</th>
<th>Authors</th>
<th>Institution</th>
<th>Journal</th>
<th>Title</th>
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</table>

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.

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<th>Year</th>
<th>Authors</th>
<th>Institution</th>
<th>Journal</th>
<th>Title</th>
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<tbody>
<tr>
<td>2014</td>
<td>Maite Frutos-Pascual, Begoña García Zapirain and Amaia Méndez Zorrilla.</td>
<td>Faculty of Engineering, University of Deusto.</td>
<td>International journal of environment and public health. Vol. 11, issue 1.</td>
<td>Adaptive Tele-Therapies Based on Serious Games for Health for People with Time-Manage</td>
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</table>

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.
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.

<p>| 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 Evaluation 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. |</p>
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<th>Year</th>
<th>Authors</th>
<th>Institution</th>
<th>Journal</th>
<th>Title</th>
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<tr>
<td>2014</td>
<td>Igor Mayer, Geertje Bekebrede, Casper Harteveld, Harald Warmeling, Qiqi Zhou, Theo van Ruijven, Julia Lo, Rens Kortmann and Ivo Wenzler</td>
<td>University of Technology, Northeastern University</td>
<td>British journal of Educational Technology</td>
<td>The research and evaluation of serious games: Toward a Comprehensive methodology.</td>
</tr>
<tr>
<td>2013</td>
<td>Stefano Piana, Alessandra Staglianò, Antonio Camurri, Francesca Odone</td>
<td>University of Genova, InfoMus Lab in Casa Paganini International</td>
<td></td>
<td>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</td>
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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.

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<thead>
<tr>
<th>Year</th>
<th>Authors</th>
<th>Institution/Institute</th>
<th>Journal/Publication</th>
<th>Methodology/Meta-Analysis/Description</th>
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<tbody>
<tr>
<td>2013</td>
<td>Albert Rizzo, JoAnn Difede, Barbara Rothbaum, J. Martin Daughtry &amp; Greg Reger.</td>
<td>Institute for Creative Technologies, University of Southern California. Weill Cornell Medical College. Emory University, New York University, National Center for Telehealth and Technology</td>
<td>Virtual reality as a tool for delivering PTSD exposure therapy.</td>
<td>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.</td>
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<tr>
<td>2013</td>
<td>Pieter Wouters, Christof Van Nimwegen, and Herre Van Oostendorp.</td>
<td>Utrecht University Eindhoven University of Technology.</td>
<td>Journal of Educational Psychology, Online First Publication.</td>
<td>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</td>
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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
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<tr>
<th>Year</th>
<th>Authors</th>
<th>Institution/University</th>
<th>Title</th>
<th>Details</th>
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<tr>
<td>2013</td>
<td>Ana B. Fagundo, Juan J. Santamaria, Laura Forcano, Cristina Giner, Susana Jimenez, roser grander.</td>
<td>University of Genova, University of Barcelona, King’s College of London.</td>
<td>European eating disorders Review vol. 21.</td>
<td>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.</td>
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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. |
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<tr>
<th>Year</th>
<th>Author(s)</th>
<th>Institution(s)</th>
<th>Journal/Book Title</th>
<th>Description</th>
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<tr>
<td>2013</td>
<td>John L. Sherry</td>
<td>Department of Communication, Michigan State University.</td>
<td>Zeitschrift fur Psychologie; Vol. 221, issue 2.</td>
<td>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.</td>
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<tr>
<td>2012</td>
<td>Alasdair G. Thin</td>
<td>School of Life Sciences, Heriot-Watt University, Edinburgh</td>
<td>Advances in Human-Computer Interaction Volume 1.</td>
<td>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</td>
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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, Michaëla 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.

<table>
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<tr>
<th>Year</th>
<th>Authors</th>
<th>Institution</th>
<th>Journal/Publication</th>
<th>Title</th>
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<tbody>
<tr>
<td>2012</td>
<td>Kiili, K., de Freitas, S., Arnab, S., Lainema, T.</td>
<td>Ampere University of Technology, Finland, Serious Games Institute, Coventry University, Coventry, United Kingdom, Turku School of Economics, University of Turku.</td>
<td>Procedia Computer Science, Vol. 15.</td>
<td>The design principles for flow experience in educational games.</td>
</tr>
<tr>
<td>2012</td>
<td>Igor Mayer</td>
<td>The Scientific Programme Committee of VS-Games.</td>
<td>Procedia Computer Science Vol. 15.</td>
<td>Towards a Comprehensive Methodology</td>
</tr>
</tbody>
</table>

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.
<table>
<thead>
<tr>
<th>Year</th>
<th>Authors</th>
<th>Institution</th>
<th>Article Title</th>
<th>Summary</th>
</tr>
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<tbody>
<tr>
<td>2012</td>
<td>Gordon P. D. Ingram, Joana Campos, Charline Hondrou, Image, Assimina Vasalou, Carlos Martinho, Adam Joinson.</td>
<td>INESC-ID and Instituto Superior Tecnico, Technical University of Lisbon, Video and Multimedia Systems Lab, National Technical University of Athens.</td>
<td>Evolutionary psychology. Vol. 10, issue 5.</td>
<td>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.</td>
</tr>
<tr>
<td>2012</td>
<td>Sylvester Arnab, Riccardo Berta, Jeffrey Earp, Sara de Freitas, Maria</td>
<td>Serious Games Institute, University of Coventry, UK 2 University of Genova, Italy</td>
<td>Electronic Journal of e-Learning Volume 10 Issue 2.</td>
<td>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</td>
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### 2012

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<tr>
<th>Authors</th>
<th>Institution 1</th>
<th>Institution 2</th>
<th>Abstract</th>
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<tbody>
<tr>
<td>Popescu, Margarida Romero, Ioana Stanescu, Mireia Usart</td>
<td>Online journal Springer-Verlag Berlin Heidelberg</td>
<td>Education.</td>
<td>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.</td>
</tr>
<tr>
<td>Agnieszka Szczesna, Marta Tomaszek, and Aleksandra Wieteska</td>
<td>Silesian University of Technology, Institute of Informatics, Jagiellonian University, University of Silesia, Institute of Psychology.</td>
<td>The Methodology of Designing Serious Games for Children and Adolescents Focused on Psychological Goals.</td>
<td>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 behavioral-cognitive in the virtual world. In this article the main procedures of designing psychology serious game based on cognitive comportment methods are offered. The methodology contains consideration in setting goals in informal learning process using to actions change and description of game influence.</td>
</tr>
<tr>
<td>2011</td>
<td>Agnieszka Szczesna, Jakub Grudzinski</td>
<td>Master your fear. Serious Games and Applications</td>
<td>Computer games are more and more used for serious purposes not only for entertainment. In few last years it can be observed a</td>
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<tr>
<th>Year</th>
<th>Authors</th>
<th>Institution</th>
<th>Conference</th>
<th>Title</th>
<th>Abstract</th>
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<tbody>
<tr>
<td>2011</td>
<td>C. Botella, J. Breton-López, S. Quero, R.M. Baños, A. García-Palacios, I. Zaragoza, M. Alcaniz</td>
<td>Universidad de Valencia, instituto de Bioingeniería y Tecnología Orientada al Ser Humano, Universidad Politécnica de Valencia</td>
<td>Game Prototype for Preschool Children.</td>
<td>Computer in Human Behavior, volume 27, issue 1.</td>
<td>Treating cockroach phobia using a serious game on a mobile phone and augmented reality exposure: A single case study.</td>
</tr>
<tr>
<td>2011</td>
<td>Elizabeth Boyle, Thomas M. Connolly,</td>
<td>School of social science, faculty of health, education And social science.</td>
<td>Entertainment computing 2 vol. 1.</td>
<td>The Role of Psychology in Understanding</td>
<td>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...</td>
</tr>
<tr>
<td>Year</td>
<td>Authors</td>
<td>Institution</td>
<td>Journal/Publication</td>
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<tr>
<td>2010</td>
<td>Thomas Hainey</td>
<td></td>
<td>the Impact of Computer Games</td>
<td>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.</td>
<td></td>
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<tr>
<td>2010</td>
<td>Tomasz Grudzinski, Robert Mikuszewski, Agnieszka Szczesna, Mariusz Szynalik, Kamil Urbanek</td>
<td>The Silesian University of Technology, Institute of Computer Science</td>
<td>Journal of Medical Informatics &amp; Technologies, Vol. 16</td>
<td>Scripting Language in Serious Games for Psychology.</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>T. Atilla Ceranoglu</td>
<td>Massachusetts General Hospital</td>
<td>Review of General Psychology, Vol. 14, Issue 2</td>
<td>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</td>
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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.


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.


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.

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

<table>
<thead>
<tr>
<th>YEAR</th>
<th>AUTHOR</th>
<th>EDITOR</th>
<th>TITLE</th>
<th>ABSTRACT</th>
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<tbody>
<tr>
<td>2014</td>
<td>Thomas M. Connolly, Thomas Hainey, Elizabeth Boyle, Gavin Baxter, Pablo Moreno-Geri.</td>
<td>IGI Global book series Advances in Game-Based Learning.</td>
<td>Psychology, Pedagogy, and Assessment in Serious Games.</td>
<td>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.</td>
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</table>
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.

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<tr>
<th>Year</th>
<th>Authors</th>
<th>Title</th>
<th>Description</th>
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<tbody>
<tr>
<td>2012</td>
<td>Nancy Johnson, Jacqui Moffatt, Kate Smith, Cathy White.</td>
<td>Ridge Meadows Child Development Centre Society.</td>
<td>A Guide to Early Intervention Group Therapy.</td>
</tr>
<tr>
<td>2012</td>
<td>Fran C. Blumberg, Debby E. Almonte, Jared S.</td>
<td>Institute of Newgen.</td>
<td>Serious Games: What Are they? What Do they Do? Why Should We Play them?</td>
</tr>
<tr>
<td>Year</td>
<td>Author(s)</td>
<td>Title</td>
<td>Details</td>
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<tr>
<td>2011</td>
<td>Patrick Felicia</td>
<td>An Imprint of IGI Global</td>
<td>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.</td>
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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. |
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<tr>
<th>Year</th>
<th>Authors</th>
<th>Title</th>
<th>Summary</th>
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<tbody>
<tr>
<td>2011</td>
<td>Damien Djaouti, Julian Alvarez, Jean-Pierre Jessel</td>
<td>Classifying Serious Games: the G/P/S model.</td>
<td>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.</td>
</tr>
<tr>
<td>2011</td>
<td>Richard N. Landers and Rachel C. Callan</td>
<td>Casual Social Games as Serious Games: The Psychology of Gamification in Undergraduate Education and Employee Training.</td>
<td>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.</td>
</tr>
<tr>
<td>2011</td>
<td>Ma, M., Oikonomou, A., &amp; Jain, L. C.</td>
<td>Serious Games and Edutainment Applications.</td>
<td>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.</td>
</tr>
<tr>
<td>2010</td>
<td>Ute Rittefeld, Peter Roelofsma, Priscilla Haring, Dimitrina Chakinska, Misha van den Bosch, Leo Versteeg.</td>
<td>Center for Advanced Media Research (CAMeRA), VU University.</td>
<td>Head First Into Serious Health Gaming: a2e2 as a new approach of digital exercise coaching for seniors.</td>
</tr>
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</table>

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 talks 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

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 talks 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 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.
Bibliography


