

Robots in healthcare: A solution or a problem?

Other healthcare related areas of implementation of robot technologies

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Fundamentals

- **Optimization vs. Health vs. Disorders**
 - **Psychological interventions: Assessment/Testing-Conceptualization-Intervention-Relationship**
 - Evidence-based/research-supported psychological interventions
 - Personalized evidence-based psychological interventions

The Effects of Robot-Enhanced Psychotherapy: A Meta-Analysis

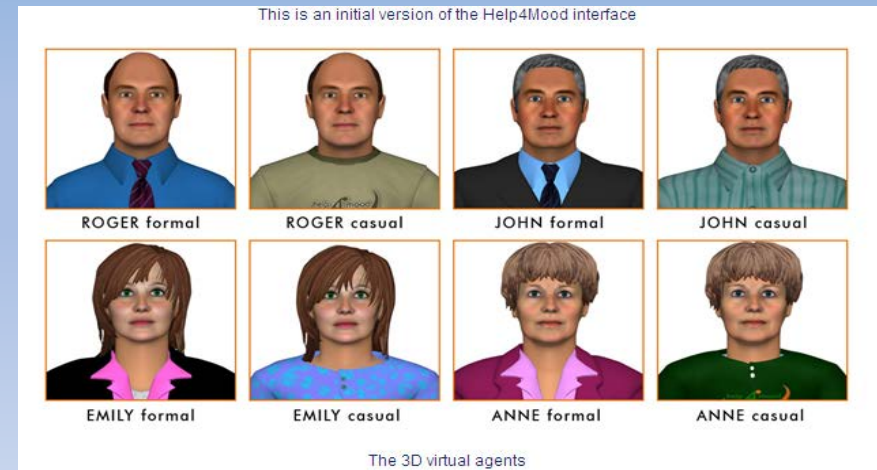
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Through this meta-analysis we aimed to provide an estimation of the overall effect of robot-enhanced therapy on psychological outcome for different populations, to provide average effect sizes on different outcomes, such as cognitive, behavioral and subjective, and to test possible moderators of effect size. From a total of 861 considered studies for this meta-analysis, only 12 were included because of the lack of studies that have reported quantitative data in this area and because of their primary focus on describing the process of robotic development rather than measuring psychological outcomes. We calculated Cohen's *d* effect sizes for every outcome measure for which sufficient data were reported. The results show that robot-enhanced therapy yielded a medium effect size overall and, specifically on the behavioral level, indicating that 69% of patients in the control groups did worse than the average number of participants in the intervention group. More studies are needed with regard to specific outcomes to prove the efficacy of robot-enhanced therapy, but the overall results clearly support the use of robot-enhanced therapy for different populations.

Keywords: robot-enhanced/assisted therapy, psychological outcomes, meta-analysis



Robot-Based Psychotherapy: Concepts Development, State of the Art, and New Directions

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In this article we propose new concepts and a framework of robot-based psychotherapy (or robotics-based psychotherapy; i.e., Robo-Therapist, Robo-Mediator, Robo-Assistant). We also review the state of the art of the field based on this framework and delineate possible but also needed future developments and integrations in the field. Implications for future research, theory development, and practice are discussed in the context of evidence-based psychotherapy (i.e., cognitive-behavioral therapy/CBT).

TABLE 1. The Robot-Based Therapy Framework

Psychotherapy's Phases/ Psychotherapy's Aims	Psychological Assessment	Clinical Conceptualization	Psychological Interventions	Therapeutical Relationship
Human optimization/ development	Robo-Therapist	Robo-Therapist	Robo-Therapist	Robo-Therapist
	Robo-Mediator	Robo-Mediator	Robo-Mediator	Robo-Mediator
	Robo-Assistant	Robo-Assistant	Robo-Assistant	Robo-Assistant
Health promotion/Prevention of mental disorders	Robo-Therapist	Robo-Therapist	Robo-Therapist	Robo-Therapist
	Robo-Mediator	Robo-Mediator	Robo-Mediator	Robo-Mediator
	Robo-Assistant	Robo-Assistant	Robo-Assistant	Robo-Assistant
Treatment of mental disor- ders and/or disorders that involved psychological factors	Robo-Therapist	Robo-Therapist	Robo-Therapist	Robo-Therapist
	Robo-Mediator	Robo-Mediator	Robo-Mediator	Robo-Mediator
	Robo-Assistant	Robo-Assistant	Robo-Assistant	Robo-Assistant

Legend. Robo-Therapist: The robot plays the role of the psychotherapists and thus, completely replaces the therapist, having a direct relation with the client; the actions of the robot are programmed and supervised by the therapist. Robo-Mediator: The robot mediates the activities of the therapists and it is seen as a necessary and specific mediator; in order to be able to implement the activities the therapist needs the specific meditating role of the robot (if the robot is not used, the therapist's activities cannot be implemented or are less efficient). Robo-Assistant: The robot facilitates the activities of the therapist; the robot is seen as a possible tool that optimizes the therapist's activities, although the optimization of these activities can be based on a variety of tools (does not necessarily depend on the robot—it is not necessarily a specific mediator). In all cells, for each of the three conditions we need: (1) outcome studies (both efficacy and effectiveness studies); (2) mechanism of change studies; and (3) cost-effectiveness studies.

Technology in ASD

Abstract

The use of robots in therapy for children with autism spectrum disorder (ASD) raises issues concerning the ethical and social acceptability of this technology and, more generally, about human–robot interaction. However, usually philosophical papers on the ethics of human–robot-interaction do not take into account stakeholders’ views; yet it is important to involve stakeholders in order to render the research responsive to concerns within the autism and autism therapy community. To support responsible research and innovation in this field, this paper identifies a range of ethical, social and therapeutic concerns, and presents and discusses the results of an exploratory survey that investigated these issues and explored stakeholders’ expectations about this kind of therapy. We conclude that although in general stakeholders approve of using robots in therapy for children with ASD, it is wise to avoid replacing therapists by robots and to develop and use robots that have what we call supervised autonomy. This is likely to create more trust among stakeholders and improve the quality of the therapy. Moreover, our research suggests that issues concerning the appearance of the robot need to be adequately dealt with by the researchers and therapists. For instance, our survey suggests that zoomorphic robots may be less problematic than robots that look too much like humans.

Keywords

Robot assisted therapy ASD Autism Ethics of robotics Trust Appearance Safety
Therapy




[Science and Engineering Ethics](#)

February 2016, Volume 22, [Issue 1](#), pp 47–65 | [Cite as](#)

A Survey of Expectations About the Role of Robots in Robot-Assisted Therapy for Children with ASD: Ethical Acceptability, Trust, Sociability, Appearance, and Attachment

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Sections



General Public

Autism is a neurodevelopmental disorder characterized by impaired social interaction, verbal and non-verbal communication, and by restricted and repetitive behaviour. The diagnostic criteria require that symptoms become apparent before a child is three...

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Calendar

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01-03-2014

[The project results have been presented in the 6th International Conference on Agents and Artificial Intelligence \(ICAART 2014\).](#)

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1 2 3 4 5 6 7 8

Hi John, how are you feeling today?

From my reports it seems that you did not sleep very well last night!

I would like you to answer to a simple questionnaire!

Over the last 2 weeks, how often have you been bothered by any of the following problems?

	Not to all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Feeling down, depressed, or hopeless	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Trouble falling or staying asleep, or sleeping too much	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Feeling tired or having little energy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Poor appetite or overeating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Feeling bad about yourself, or that you are a failure, or have let yourself or your family down	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Trouble concentrating on things, such as reading the newspaper or watching television	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Moving or speaking so slowly that other people could have noticed. Or the opposite, being so fidgety or restless that you have been moving around a lot more than usual	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Thoughts that you would be better off dead, or of hurting yourself in some way	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Confirm

Reminders Reports Customization Log out help 4 mood

This is an initial version of the Help4Mood interface



ROGER formal



ROGER casual



JOHN formal



JOHN casual



EMILY formal



EMILY casual



ANNE formal



ANNE casual

The 3D virtual agents

Abstract ▾

Send to: ▾

[J Telemed Telecare](#). 2015 Oct 9. pii: 1357633X15609793. [Epub ahead of print]

Pilot randomised controlled trial of Help4Mood, an embodied virtual agent-based system to support treatment of depression.

[Burton C](#)¹, [Szentagotai Tatar A](#)², [McKinstry B](#)³, [Matheson C](#)⁴, [Matu S](#)², [Moldovan R](#)⁵, [Macnab M](#)³, [Farrow E](#)⁴, [David D](#)², [Pagliari C](#)³, [Serrano Blanco A](#)⁶, [Wolters M](#)⁴; Help4Mood Consortium.

Author information

Abstract

INTRODUCTION: Help4Mood is an interactive system with an embodied virtual agent (avatar) to assist in self-monitoring of patients receiving treatment for depression. Help4Mood supports self-report and biometric monitoring and includes elements of cognitive behavioural therapy. We aimed to evaluate system use and acceptability, to explore likely recruitment and retention rates in a clinical trial and to obtain an estimate of potential treatment response with a view to conducting a future randomised controlled trial (RCT).

METHODS: We conducted a pilot RCT of Help4Mood in three centres, in Romania, Spain and Scotland, UK. Patients with diagnosed depression (major depressive disorder) and current mild/moderate depressive symptoms were randomised to use the system for four weeks in addition to treatment as usual (TAU) or to TAU alone.

RESULTS: Twenty-seven individuals were randomised and follow-up data were obtained from 21 participants (12/13 Help4Mood, 9/14 TAU). Half of participants randomised to Help4Mood used it regularly (more than 10 times); none used it every day. Acceptability varied between users. Some valued the emotional responsiveness of the system, while others found it too repetitive. Intention to treat analysis showed a small difference in change of Beck Depression Inventory II (BDI-2) scores (Help4Mood -5.7 points, TAU -4.2). Post-hoc on-treatment analysis suggested that participants who used Help4Mood regularly experienced a median change in BDI-2 of -8 points.

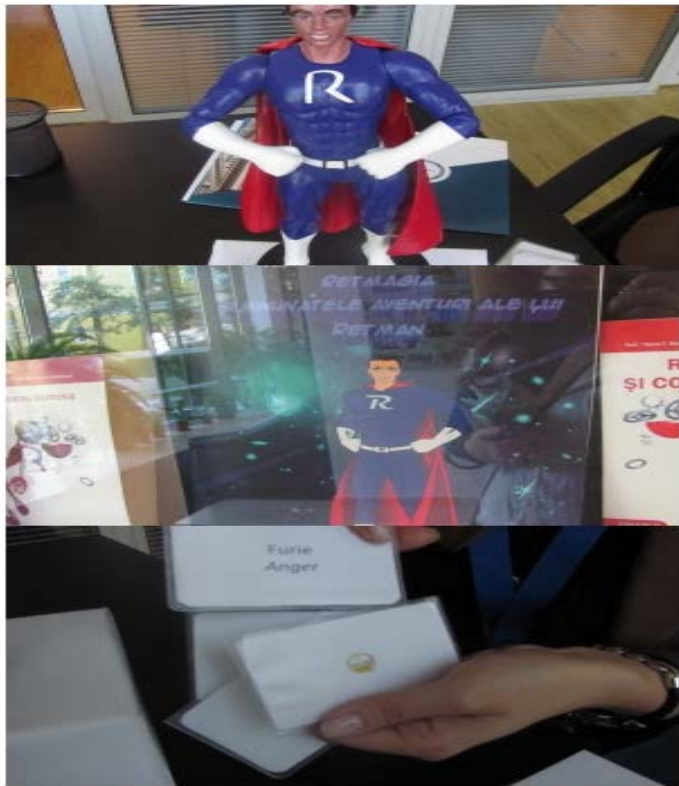
CONCLUSION: Help4Mood is acceptable to some patients receiving treatment for depression although none used it as regularly as intended. Changes in depression symptoms in individuals who used the system regularly reached potentially meaningful levels.

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KEYWORDS: Ehealth; telehealth; telepsychiatry

PMID: 26453910 [PubMed - as supplied by publisher]





Case study: Octav is a 12 years aged boy. He played with roboRetman during one session of therapy in order to learn skills for managing his test anxiety.

"Retman taught me that I am a valuable human being even if I make mistakes. He also told me when I feel anxious to repeat myself that it is not awful even I feel anxious [...] I found Retman's thinking strategies very useful and it was cool playing with him."

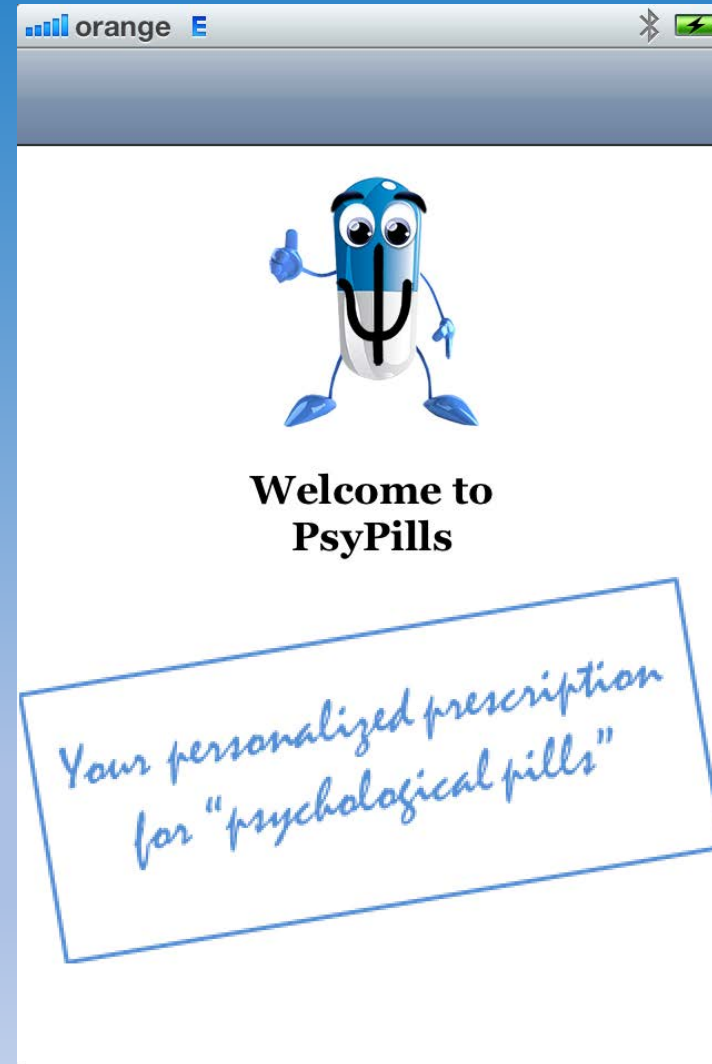


Figure 1. Retman used in a therapy session for reducing test anxiety



Lectorul Oana David explică de ce este în stare roboțelul Retman

The PsyPills app



AVATAR therapy for auditory verbal hallucinations in people with psychosis: a single-blind, randomised controlled trial



Tom KJ Craig, Mar Rus-Calafell, Thomas Ward, Julian P Leff, Mark Huckvale, Elizabeth Howarth, Richard Emsley, Philippa A Garety

Summary

Background A quarter of people with psychotic conditions experience persistent auditory verbal hallucinations, despite treatment. AVATAR therapy (invented by Julian Leff in 2008) is a new approach in which people who hear voices have a dialogue with a digital representation (avatar) of their presumed persecutor, voiced by the therapist so that the avatar responds by becoming less hostile and concedes power over the course of therapy. We aimed to investigate the effect of AVATAR therapy on auditory verbal hallucinations, compared with a supportive counselling control condition.

Methods We did this single-blind, randomised controlled trial at a single clinical location (South London and Maudsley NHS Trust). Participants were aged 18 to 65 years, had a clinical diagnosis of a schizophrenia spectrum (ICD10 F20–29) or affective disorder (F30–39 with psychotic symptoms), and had enduring auditory verbal hallucinations during the previous 12 months, despite continued treatment. Participants were randomly assigned (1:1) to receive AVATAR therapy or supportive counselling with randomised permuted blocks (block size randomly varying between two and six). Assessments were done at baseline, 12 weeks, and 24 weeks, by research assessors who were masked to therapy allocation. The primary outcome was reduction in auditory verbal hallucinations at 12 weeks, measured by total score on the Psychotic Symptoms Rating Scales Auditory Hallucinations (PSYRATS–AH). Analysis was by intention-to-treat with linear mixed models. The trial was prospectively registered with the ISRCTN registry, number 65314790.

Findings Between Nov 1, 2013, and Jan 28, 2016, 394 people were referred to the study, of whom 369 were assessed for eligibility. Of these people, 150 were eligible and were randomly assigned to receive either AVATAR therapy (n=75) or supportive counselling (n=75). 124 (83%) met the primary outcome. The reduction in PSYRATS–AH total score at 12 weeks was significantly greater for AVATAR therapy than for supportive counselling (mean difference -3.82 [SE 1.47], 95% CI -6.70 to -0.94 ; $p < 0.0093$). There was no evidence of any adverse events attributable to either therapy.

Interpretation To our knowledge, this is the first powered, randomised controlled trial of AVATAR therapy. This brief, targeted therapy was more effective after 12 weeks of treatment than was supportive counselling in reducing the severity of persistent auditory verbal hallucinations, with a large effect size. Future multi-centre studies are needed to establish the effectiveness of AVATAR therapy and, if proven effective, we think it should become an option in the psychological treatment of auditory verbal hallucinations.

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This online publication has been corrected. The corrected version first appeared at thelancet.com/psychiatry on November 29, 2017

See [Comment](#) page 2

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Food for Thoughts

- **Human replacement**
 - Humans take new roles
- **Autonomy**
 - Supervised autonomy
- **Safety**
 - Classical+
 - Cyber-security
- **Ethics**
 - Fashion vs. Efficacy/effectiveness + Cost-effectiveness