

Social robotics in the training of psychologists: New paradigms and opportunities for professional skills development¹

Paulina Tsvetkova, PhD

Associate Professor, Institute of Robotics, Bulgarian Academy of Sciences

Mayiana Mitevska, Prof. D.Sc.

Plovdiv University "Paisii Hilendarski", Faculty of Pedagogy, Department of Psychology, Bulgaria, Plovdiv.

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Abstract: Social robotics is an innovative field in the development of cyber-physical systems, which is finding increasingly widespread application in areas requiring intensive human communication, such as education and psychology. This article examines the role and potential of social robots as a tool in psychological practice, as well as for the training and development of key professional skills in future psychologists. The main types of social robots used in the field of psychology are presented and their effectiveness is analyzed. Emphasis is placed on the opportunities that social robotics provides for simulating real social interactions and supporting the development of communication, diagnostic, and therapeutic skills. It also discusses the challenges related to the reliability, standardization, and adaptability of robots, as well as the need for new methodologies for their effective integration into the training of psychologists. The document outlines future directions for research and development that can contribute to transforming the educational environment through social robotics and improving the quality of training for psychology professionals.

Keywords: social robotics, psychology, training, professional skills

Introduction

Social robotics is a rapidly developing field related to the design and implementation of robots capable of interacting with humans in a socially acceptable and natural way. While social robots were initially used mainly in industries such as services and elderly care, in recent years their role has expanded significantly in the fields of education and psychological practice. Among its many applications, social robotics is attracting increased interest in education at all levels (Johnson J., 2003). The Japanese Robotics Society (JRS), the United Nations Economic Commission (UNEC), and the International Federation of Robotics (IFR) report an increase in the market for personal robots, including educational robots (Kara, D., 2003). The European Union's interest in social and educational robotics is also growing steadily.

The training of future psychologists requires the development of a complex set of skills, including effective communication, emotional sensitivity, and the ability to handle social interactions in a variety of contexts. In this sense, social robotics opens up new opportunities for creating innovative learning environments that simulate real social situations and support the development of key professional competencies.

This article examines the current applications of social robotics in psychological practice, analyzes the advantages and limitations of the systems used, and outlines future directions for development. Attention is paid to the pedagogical and psychological challenges associated with the use of social robots by psychologists. The aim is to highlight new paradigms that social robotics offers for improving the quality of psychologists' work, as well as the

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possibilities of social robotics in the training of psychology specialists.

Current applications of social robotics in psychological practice and the training of psychologists

Over the last decade, social robotics has gradually entered both the training of psychologists and real psychological practice. Technologies allow the creation of a controlled, safe, and adaptive environment in which future specialists can improve their skills and patients can receive innovative forms of support. This section looks at leading examples of the application of social robots in this field. Table 1 presents a summary of the applications of the main social robots used in psychology and the reported results.

Social robots as therapeutic and social coaches

Social robots are also used as tools for psychological support and coaching. One study examines the use of a social robot coach to provide positive psychology interventions to students living in dormitories. A total of 35 students participated in the study, with the robot conducting daily positive psychology sessions and providing additional services such as weather forecasts and reminders. The results show a statistically significant improvement in the psychological well-being, mood, and willingness of participants to make behavioral changes to improve their well-being. In addition, a significant relationship was found between the effectiveness of the intervention and the personality traits of the students (Jeong, S. Et al., (2020)

Another innovative development is the social robot "Ryan," which administers internet-based cognitive behavioral therapy (iCBT) to older adults with depressive symptoms (Dino, F., et al., 2021). In the study, Ryan conducts seven iCBT sessions using an artificial intelligence-based dialogue system. The results show an improvement in the mood and engagement of the participants, which supports the idea that social robots can be effective in therapeutic contexts.

In addition, social robots are already being used to conduct mindfulness practices, including relaxation, meditation, and stress management sessions. A study has developed a framework for teletherapy that allows a human trainer to conduct mindfulness training through the Pepper robot (<https://www.softbank.jp/en/robot/>), reproducing the movements of the trainer's upper body and head in real time. The person uses a virtual reality headset (HMD) to see from the robot's point of view and communicates with participants via a two-way audio link. Over a period of five weeks, the researchers compared the participants' interactions with the robot trainer and with the live trainer. The results show that sessions with the human consistently receive high ratings (above 4 out of 5), while ratings for the robot trainer improve over time, especially in terms of movement and conversation. Both training methods elicited positive reactions from participants, but the human trainer was rated significantly higher on indicators such as liveliness, likability, and perceived intelligence (Bodala, I. P., Nikhil C., & Hatice G. (2021).

Social robotics in clinical environment simulation and virtual patients

One of the most promising approaches is the use of social robots to simulate a clinical environment and "virtual patients" through which future psychologists practice psychological interviews and interventions. An example of such an application is the robot developed by Furhat Robotics (<https://www.furhatrobotics.com/>). A study by a team at Linköping University (Sweden) presents a prototype of a simulated environment for psychotherapy training in which Furhat plays the role of a virtual patient. The goal is to create a safe and realistic environment in which therapists can practice techniques such as ISTDP (Johansson, R, Thellman, S., Skantze, G., 2017). This study finds preliminary indications that clinical psychologists have a high level of interest in using the Furhat robot as a training tool. Furthermore, the GODSPEED scale measures—animacy and likability—appear to have predictive value, explaining over half of the variation in psychologists' interest. These results suggest that a psychotherapy training environment using a social robot appears feasible. It can be argued that two of Furhat's strengths are its highly realistic facial expressions and perceived "friendliness." Therefore, the results of this study suggest that Furhat is indeed a good choice for this type of training environment.

Another application of the Furhat social robot is a training environment for psychotherapy with virtual patients (Johansson, R., Skantze, G., Jönsson, A. (2017). The system conducts a training program with different modules,

starting with the acquisition of basic psychotherapeutic skills and moving on to tasks in which these skills must be applied in an integrated manner. This type of training relies heavily on observing and dealing with both the verbal and nonverbal behavior of the patient during sessions. This makes the Furhat robot an ideal platform for this purpose. This article describes the concept behind the system and its technical implementation.

Social robots as mediators in the therapy of people with special needs

Social robots are successfully used as mediators in therapeutic sessions, especially with children with specific needs, such as autism.

In this publication (Palestra, G., et al., 2021), the authors present a comprehensive review of the use of NAO in therapeutic interventions with children with autism. Various programs are described, including ROB'AUTISME and NAOTismIA, which use NAO to stimulate communication skills, imitation, and social interaction. The main conclusions of the report indicate that NAO supports communication and social interaction in children with autism by acting as a non-judgmental, predictable, and engaging mediator. Furthermore, within programs such as ROB'AUTISME and NAOTismIA, NAO is used to stimulate skills such as imitation, eye contact, emotion recognition, and motor coordination. The robot is perceived by children as a friend or team member, which facilitates the therapeutic process and increases motivation to participate. Therapists and educators report that NAO facilitates trust-building and creates a structured and safe environment for practicing social skills. The report highlights NAO's potential to be integrated into multidisciplinary interventions combining technology and behavioral therapies.

In another study, the authors examine the use of Kaspar in individuals with special needs and collect opinions from 54 specialists (therapists, educators, and psychologists) who work with children with autism (Huijnen, C. et al., 2016). The main conclusions are that Kaspar is perceived as a valuable tool for supporting communication, social interaction, play, and emotional well-being. The robot is considered suitable for individualized interventions, especially for children who have difficulty in traditional social situations. The study proposes 10 key goals to which Kaspar can contribute in therapeutic and educational contexts.

Social robots supporting emotional health through interpersonal communication

Behaviors in interpersonal communication, such as self-disclosure and social sharing, can support emotional health by providing and receiving support, improving mood, creating an environment for expressing feelings, and regulating emotions (Zaki & Williams, 2013). In a long-term experiment, 39 participants from the general population in the United Kingdom talked to the social robot Pepper (<https://www.softbank.jp/en/robot/>) twice a week for 5 weeks (a total of 10 sessions), revealing common everyday experiences to the robot. The researchers found that as the sessions progressed, participants revealed more to the robot (in terms of the duration of disclosure in seconds and the number of words), and over time they perceived the robot as more socially competent and comforting. Repeated interactions also led to improved mood (after each session and over time) and reduced feelings of loneliness (Laban, Kappas, et al., 2022, 2023).

Table 1. Applications of social robots in psychology

Type of robot	Specific applications in psychology and the training of psychologists	Reported results	Sample reference
Furhat	Simulation of psychotherapy sessions with "virtual patients"; training of psychologists in a controlled environment	High interest from trainee psychologists; positive assessment of realism and "friendliness"	Johansson et al. (2017), Intelligent Virtual Agents, Springer
Ryan	Conducting internet-based cognitive behavioral therapy (iCBT) in adults with depressive symptoms	Improvement in participants' mood and engagement	Dino et al. (2021), arXiv preprint arXiv:1909.06670
Pepper	Teleoperated mindfulness and	Gradual improvement in	Laban, Kappas et al.

Type of robot	Specific applications in psychology and the training of psychologists	Reported results	Sample reference
	relaxation sessions; improving emotional state through conversation	perceived social skills of the robot; reduction in loneliness and improvement in mood	(2022, 2023)
NAO	Therapy for children with autism — stimulation of social and communication skills, imitation and recognition of emotions	Improvement in social interaction; positive perception by children and therapists	Palestra et al. (2021), Softbank Robotics & ERM
Kaspar	Supporting children with special needs — communication, social interaction, and play	Rated as effective for individual interventions with children who have difficulties in social situations	Huijnen, C. et al. (2016)

Advantages and disadvantages of social robots in psychological practice

Social robots used in the training and practice of psychologists offer a variety of opportunities to improve the learning process, but they also have certain limitations. Table 2 presents the main advantages and disadvantages of this type of robot in the field of psychology. Among the main advantages of these technologies is the ability to create a safe and controlled environment for training and therapy, as well as to stimulate the engagement and emotional connection of participants. Robots such as Ryan and Pepper allow for standardized psychotherapy or relaxation sessions that increase motivation and accessibility to psychological support. Other platforms such as Furhat provide a high degree of realism through facial expressions and flexible scenarios suitable for simulating psychotherapeutic situations. At the same time, robots such as NAO and Kaspar are successfully used in the therapy of children with special needs, developing social and communication skills in a playful way.

Along with the advantages, there are also a number of disadvantages that limit the application of these technologies. Some robots have poorly developed nonverbal communication skills and limited emotional expressiveness, which makes them unsuitable for complex psychological interactions. In some systems, such as Pepper, the initial perception of participants may be lower than that of a human trainer, which affects the effectiveness of training. Robots designed to work with children, such as NAO and Kaspar, have a narrowly specialized application and are not universal tools for training psychologists. In addition, the technological complexity and high cost of some devices, such as Furhat, pose additional challenges to their widespread implementation.

In conclusion, social robots are a useful addition to training and practice in the field of psychology, but their effectiveness depends on their specific role, degree of realism and adaptability, and their proper integration into the learning process.

Table 2. Advantages and disadvantages of social robots in psychological practice

Robot	Main advantages	Main disadvantages
Ryan	Conducts standardized iCBT, improves engagement	Limited flexibility, poor nonverbal communication
Pepper	Friendly design, emotional support	Initially low perception, limited movements
Furhat	Realistic facial expressions, patient simulation, highly developed conversational artificial intelligence	High price, technological complexity
NAO	Effective with children, develops social and communication skills	Limited for adults, poor expressiveness
Kaspar	Suitable for therapy with children with special needs	Narrow specialization, limited interaction

Challenges for social robotics in psychological practice and in the training of psychologists

Social robots such as Ryan, Furhat, Pepper, NAO, and Kaspar show potential for supporting training and practice, but their reliability is still questionable due to various factors. Users often perceive social robots as "less animated," "limited in expressiveness," or "more mechanical." Robots often depend on external systems (internet connectivity, power supply), which raises questions about reliability in real training environments. Furthermore, there is no uniform standardization in the use of social robots. Furhat is suitable for simulating virtual patients with expressive emotional facial expressions, while NAO or Kaspar are mainly used for children with specific needs and have limited expressiveness. Training methods based on social robots are still being developed individually for each platform. There are currently no widely accepted standards for how social robots should be integrated into the training process of psychologists. Differences in approaches hinder the comparability of results and make implementation in academic programs difficult. Despite technological advances, most robots still lack sufficiently dynamic algorithms that allow for intuitive adaptation to the individual learning style or psychological profile of the learner. Most systems are developed in English and do not take cultural characteristics into account, which is essential for the training of psychologists working in diverse social environments.

Conclusion

Social robotics is gradually establishing itself as an innovative and promising tool both in psychological practice and in the training of future psychologists. The examples presented — Furhat, Ryan, Pepper, NAO, and Kaspar—demonstrate a variety of applications, including simulation of therapeutic sessions, provision of cognitive-behavioral therapy, positive psychology coaching, mindfulness practices, and support for children with specific needs such as autism. The advantages of social robots are related to the ability to create a safe, controlled, and reproducible environment for training and therapy. Robots allow for the practice of skills that are difficult to simulate with traditional methods, provide constant feedback, and help build confidence in learners. In psychological practice, they facilitate interaction with hard-to-reach groups such as children with special needs, older adults, or people with social anxiety. Among the main difficulties are:

- limited adaptability of robots to the individual characteristics of patients and learners;
- insufficient standardization in the design and application of robots in educational and therapeutic contexts;
- the need for new, validated methodologies for assessing the effectiveness and ethics of using social robots;
- limited social interactivity and naturalness of communication, which in some cases reduces user engagement;
- perceptions of low animacy and emotional authenticity in some platforms.

Social robots have significant potential to improve psychological education and practical interventions, especially when used as a supplement to traditional methods. To realize this potential, developments are needed in the direction of greater technological reliability, adaptability to individual needs, ethical regulation, and scientifically based effectiveness assessment. Only under such conditions can social robotics make a sustainable contribution to the quality of education and psychological assistance.

Discussion and future directions

Social robots offer significant potential for enriching the training of psychologists. Reliability remains critical for building trust in the system, and standardization is essential for ensuring a level playing field and valid results. Adaptability is key to individualizing training and maximizing engagement. New methodologies are needed to integrate robots into a holistic educational process that combines technology and human expertise. To fully implement social robots in the training of psychologists, targeted methodological changes are needed. Structures are needed that combine theoretical knowledge, practical simulations with social robots, and skills assessment. It is necessary to create uniform criteria for effectiveness, measurement of emotional interaction, communication skills, and the ability to adapt to the patient/trainee. A clear ethical framework regarding the limits of interaction with social robots is needed to prevent misconceptions about their capacity and role.

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