Humanoid and non-humanoid robot-assisted therapy in Autism Spectrum Disorders (ASD)

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AIM The study will investigate the the efficacy of humanoid and hon-humanoid robotic assistants as therapy aid for children with ASD.

INTRODUCTION ASD individuals experience a difficulty communicating and interacting with others. Due to the nature of autism, robot-assisted therapy has been shown to be beneficial as it develops imitation skills[1,2,3]. It presents children with safe and comfortable environment and allows them to explore and learn about the interaction space involved in social situations[2]. The robotic assistant is able to present information in a manner which the children are familiar with (television and video games). Also, the robot adapts its behaviour and allows the child to learn at its own rates[2]. Previous research has focused on non-humanoid robots and some primitive humanoid robots[3,4,5], while the newest Zeno robot has been developed to resemble a child[5]. This study will investigate the efficacy of Zeno.

RESEARCH OBJECTIVES Humanoid robots have higher impact on basic social interaction skills in children with autism, than non-humanoid robots used in previous studies. It is hypothesised that a humanoid interactive robot will increase basic social interaction skills.

METHODS

Participants: 100 ASD children from Scotland. The size is based on G*Power results for an expected effect size of .3 and a desired statistical power of .8 for factorial ANOVA. All children participating in the study have to be diagnosed with a DSM-5 criteria of Autism Spectrum Disorder, be between 5 to 17 years of age, have an IQ of 70 and above, and have not been diagnosed for other psychiatric disorders. The participants must have basic communication skills and be able to follow instructions. Those will be assessed by local clinical psychologists who will act as gatekeepers.

Procedure: Children will be divided into two groups based on gender, age, IQ, and severity of ASD. There will be experimental sessions twice a week, 1 hour per session, for the duration of 20 weeks. The first group will be receiving therapy with the non-humanoid 'Keepon' robot, the second with the humanoid 'Zeno'.
The dependent variable are the SRS-2 (social responsiveness scale) T-scores (results of 76 and above suggests a diagnosis of ASD while non-ASD patients score below 59)[6]. SRS-2 will be tested before the first and after the last session. The data will be analysed in a 2x2 mixed ANOVA (between-subjects and within-subject).

PREDICTIONS The humanoid robot-assisted therapy will improve the SRS-2 results for both groups. However, the 'Zeno' group will have slightly better results.

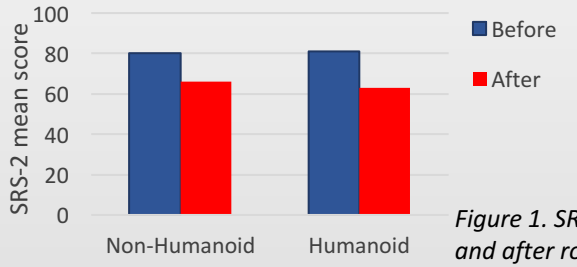


Figure 1. SRS-2 scores before and after robotic-assisted therapy

LIMITATIONS Recruiting 100 children with mild to moderate ASD from a specific geographic area. Providing trained professionals able to conduct a therapy with robots. The costs of purchasing a robot and training therapists.

THEORETICAL IMPLICATIONS The results demonstrate the efficacy of robotic therapy as it can improve social and communication skills in ASD children. It supports the view that humanoid robot-assisted therapies are more effective.

CLINICAL IMPLICATIONS Improvement in social and communication skills of ASD individuals will have a positive impact on their lives. Thus, robot therapy sessions could be incorporated into standard ASD treatment. More emphasis should be put on therapies with humanoid robots. Once the robot purchased it is cheap to maintain and easy to use. In the long term the financial costs of therapy will be reasonable. In the future this method could replace traditional human-assisted ASD therapies[1].

RESOURCES NEEDED Clinical psychologists trained in robot therapy; Keepon and Zeno robots; SRS-2 tests; venue.

References

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