Journal of Regenerative Biology and Medicine

ISSN: 2582-385X
Bittmann S, et al., 2020- J Regen Bio Med
Editor Note

The Role of Social Robotics: Diminishing Social Isolation in COVID-19 Pandemia

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Received Date: 12-24-2020
Published Date: 01-25-2020

Keywords: Social Robotics; Isolation; COVID-19; Pandemic

Editor Note

In the near future, robots will be found more and more frequently in the lives of everyday users. This is very clearly illustrated by the example of household and care robots, which will increasingly assume the role of roommate and companion in view of an aging society. This is accompanied by the desire to make human-robot communication more human-centric. It is no longer just about performing tasks efficiently, but also about creating a pleasant interaction experience for humans and establishing a relationship of trust with the robot. Social robots that assist humans with various tasks or simply serve as entertainment is increasingly penetrating the everyday environments of users. Due to demographic change, this development is becoming particularly apparent in the field of nursing. In Japan in particular, care robots are already being used very successfully in the care of the elderly. But this topic is also attracting increasing attention in Europe. Acceptance among older people is lower than among younger people. Nevertheless, surveys show that more and more seniors have a positive attitude toward the use of care robots. These include physical tasks such as tidying and cleaning the home or helping with personal hygiene, but also cognitive tasks such as medication reminders or social tasks such as storytelling. Among other things, the assistance provided by the robot can enable older people to live a self-determined life at home for longer. The willingness and ability to empathize with

the attitudes and emotions of other people is not only important in interpersonal communication, but should also be considered in the development of social robots. While machines cannot feel true empathy, they should still be able to emulate appropriate behavior. This task first involves perceiving the human emotional state, for example on the basis of social signals that can be captured using

Citation: Bittmann S, Weissenstein A, Villalon G, Alieva EM, Bittmann L, Luchter E. The role of social Robotics: diminishing social isolation in Covid-19 pandemia. J Regen Biol Med. 2021;3(2):1-4.
DOI: https://doi.org/10.37191/Mapsci-2582-385X-3(2)-052

video or audio data. Subsequently, an adequate reaction should be shown in which the robot itself expresses signs of empathy. In addition to the targeted use of emotions, this also includes showing understanding. That is, the robot must evaluate situations from a user's perspective in order to understand the user's emotions. To establish and maintain a connection with humans, social robots should be able to show interest in the progress of an interaction and demonstrate that they are following the course of communication. Ideally, robots should align their communicative behaviors with those of humans, constantly reaffirming and validating the shared background of speech. This requires the targeted use of verbal and nonverbal social cues such as making eye contact, nodding, or shaking heads. Conversely, the robot should also be able to recognize when the user's engagement is waning and take countermeasures. A major challenge is that the user does not always express lack of engagement explicitly, but communicates it implicitly through social cues such as averting gaze or lack of feedback signals. Sidner coined the term of an "always-on" robot. This means that a robot is permanently available and aware of the user without the user having to turn the robot on every time. To do this, the robot must be able to understand when the user wants to interact and when not. A prerequisite for this is the ability to sense and respond to human presence. The robot should be able to draw attention to itself on its own initiative to prompt interaction when needed. Robots in the role of companions should be able to remember previous content across conversations in order to refer to it or provide users with information as needed. However, it is not only the remembering itself that is important, but also the targeted forgetting of content from earlier conversations or events. A human companion will rarely be able to remember the exact wording of conversations. With an artificial companion this would not be a problem, but not necessarily desirable. Since forgetting is human, a robot that can recapitulate all events including all details at any time may lose credibility. In addition, there is a risk that such a robot may cause discomfort as people feel that their privacy has been violated. According to Lim, forgetting also allows a robot to focus on important aspects, similar to humans, which may promote consistent behavior and personality expression in the long run. Establishing a trusting relationship between user and agent is an essential prerequisite for longer-term use. Bickmore and Cassell rely on small talk to build common ground between people and agents and to strengthen mutual cohesion. In order to accommodate the individual preferences, likes, but also limitations of the human counterpart, a social robot should be able to perceive them and learn to behave appropriately according to the situation. Here, short-term and long-term changes have to be distinguished. On the one hand, the current needs of the counterpart must be taken into account; on the other hand, the interaction should also be designed to be sustainably appealing so that the user remains engaged even after months or years. In addition, it must be taken into account that users' interests, needs, and abilities change over time. In order to provide an interaction that is customized to the individual, the robot must be able to learn from the user and

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adapt its own capabilities to the personality, mood, and preferences of the human. Breazeal has coined the term "socially situated learning" for this behavior.

From the results of scientific research before COVID-19, it is known that social isolation increases morbidity in elderly patients due to induced depression, anxiety, panic, etc. Therefore, the increase in some symptoms is also caused by a reduced immune defense. This work promotes the use of social robots and digital technologies in general to encourage interaction even at a remote location. A social robot is an anthropomorphic or zoomorphic robot that interacts with people according to certain social rules. The best robot to interact with older people in the case of isolation might be the humanoid. The advantages and disadvantages can be a starting point for social experiments. For example, robotics experiments should determine the improvement in some symptoms due to isolation after using robots or what functions a robot must provide in the interaction in order to be efficient. It is not essential to certain aspects in a robot that interacts with the elderly. The touch would not have a positive effect from an emotional point of view, as it is typical of an emotional and psychological context that the human brain does not automatically recognize in the robot. Instead, it is important from a robotics perspective. Finally, they leave room for research into the effects on isolation after the use of robots in COVID-19 patients.

Further intensive research of social robotics in pandemics like COVID-19 is necessary and will help severe ill COVID-19 patients to get better life quality despite their severe course of illness on intensive care units.

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