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PERCEIVED STRESS IN OLDER ADULTS THROUGH THE USE OF SOCIAL ROBOTS DURING COVID-19

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Abstract. In 2019, the Coronavirus or Covid-19 pandemic started. The consequences of the social limitations that were imposed on the elderly, with the total or partial absence of physical contact, have caused a decrease in their mental health due to the increase in perceived stress, leading to an increase in depressive or anxious symptoms. This research consists of 22 people between 70 and 90 years of age with mild or moderate cognitive impairment randomized in G.E. and G. C. 15 relaxation sessions are carried out with the tool of a social robot in G.E. and only relaxation in the G.C. The evaluation is carried out with a measurement through the Perceived Stress Scale before and after the process, in addition to a measurement of the heart rate before and after the last session. The results show a significant decrease in perceived stress in the G.E. while it is not significant in the G.C. In both groups, the heart rate decreased significantly. Therefore, the social robot as a therapeutic tool can play a relevant role in the treatment of the mental health of the elderly.

Keywords: Covid-19, geriatric, perceived stress, social robot, cognitive impairment.

Estrés percibido en adultos mayores mediante el uso de robots sociales durante COVID-19.

Resumen. En 2019 se inició una pandemia debido al Coronavirus o Covid-19. Las consecuencias de las limitaciones sociales impuestas en los ancianos con la ausencia total o parcial del contacto físico han provocado una disminución de la salud mental debido al aumento del estrés percibido llegando a desembocar en un aumento de la sintomatología depresiva o ansiosa. Esta investigación consta de 22 personas entre 70 y 90 años con deterioro cognitivo leve o moderado distribuidos al azar en G.E. y G. C. Se llevan a cabo 15 sesiones de relajación con la herramienta de un robot social en G.E. y solamente relajación en el G.C. La evaluación se realiza con una medición a través del Cuestionario de Estrés Percibido antes y después del proceso, además de una medición de la frecuencia cardiaca antes y después de la última sesión. Los resultados muestran una disminución significativa en el estrés percibido en el G.E. mientras que no es significativa en el G.C. En ambos grupos disminuye significativamente la frecuencia cardiaca. Por lo tanto, el robot social como herramienta terapéutica puede tener un papel relevante en el tratamiento de la salud mental de las personas mayores.

Palabras clave: Covid-19, geriatría, estrés percibido, robot social, deterioro cognitivo.

Introduction

In December 2019 an epidemic outbreak of viral origin began in the Chinese city of Wuhan, which subsequently spread becoming a worldwide pandemic and whose official taxonomic denomination was Coronavirus (Cov) type 2 associated with severe acute respiratory syndrome (SARS) being the consequent disease called Covid-19. Some of the most frequent clinical manifestations, especially in the geriatric setting, are fever, dyspnea, dry cough, and acute respiratory syndrome, in some cases showing neurological complications. The long-term consequences of this virus should not be forgotten, such as increased chances of developing post-traumatic syndrome, depression, and anxiety (Gouseff et al., 2020).

Currently, people belonging to the elderly are included in what is called the "risk group" because the incidence of Covid-19 is particularly serious for their physical and mental health (Carod-Artal, 2020). According to Niu et al. (2020) the lethality of Covid-19 in people over 80 years of age was 18.8% and the most common comorbidity was towards diseases such as hypertension (48.8%), coronary heart disease (16.1%), COPD (29.9%), diabetes mellitus (9.7%), and finally cerebrovascular disease with 6.5%, concluding that great attention should be paid to elderly patients diagnosed by Covid-19 due to the high mortality rate presented especially by people with these comorbidities.

At this time, we are living an unusual time due to the virus that has been mentioned above, which makes social norms and behaviors are affected by the risk it poses to the general population, even more so if we talk about groups of special risk such as the elderly, who suffer much stricter social norms in the physical distancing. The main objective in establishing this practice has been to avoid a chain of contagion, in the event that one of the persons was infected, this practice has been called in most cases "social distancing," since in countries around the world it has led to changes in behavioral patterns and in the usual day-to-day functioning (Galea et al., 2020). Several studies such as Wang et al. (2020), Roy et al. (2020), and Burdoff et al. (2020) have analyzed the consequences of these circumstances in the population of older adults, noting an increase in problems affecting their mental health such as disruptive behavioral behaviors, symptoms of anxiety, increased daily stress, even manifesting clear problems for sleep, these analyses have also concluded that the mortality rate has increased, which is a major problem for this sector of the population.

Likewise, other studies also point to a decline in the mental health of the geriatric population during the pandemic, like the general population, they showed high rates of fear and anxiety. However, it was observed that people who previously had a pathological diagnosis in depression or anxiety felt more stressed and depressed, and those with cognitive impairment showed a greater number of defiant behavior disorders (Wang et al., 2020; Losada-Baltar et al., 2020).

In our country it has been found through the analysis conducted by González-Sanguino et al. (2020) that 18.7% of the population revealed a possible diagnosis of depression, there being a probability that 21.6% will be diagnosed in the near future with some anxiety-related pathology (Kang et al., 2020).

Regarding the variables associated with the psychological impact, it has been concluded that loneliness is included as a predisposing risk factor for a greater negative psychological impact and can trigger symptoms compatible with the diagnosis of depression, anxiety, and post-traumatic stress disorder. This is noteworthy due to the fact that the largest range of the population living alone is above 80 years of age (Gallo Estrada & Molina Mula, 2015).

The elderly are especially susceptible to social isolation and changes in their daily routine, which has a direct negative effect on the stability necessary for them to feel vital or hopeful. Therefore, several studies point out that older adults who present depressive or anxious symptomatology, whether overlapping or explicit, may suffer an acute worsening from this

pandemic by raising their stress level if they are not in the company of neighbors, friends, or family (Moutier, 2020; Scholten et al., 2020).

Due to the increase in mental health pathology, some interventions were carried out to alleviate the high rates of anxious and/or depressive symptomatology, such as the development of psychosocial self-help guides that were distributed free of charge to both the elderly and their caregivers, psychological counseling through telephone lines, use of psychological first aid provided by caregivers with on-line support from a psychology professional, implementation of artificial intelligence programs useful in identifying people at risk of suicide, sending questionnaires with structured questions with the function of making a consultation, or diagnosis among others (Galea, 2020).

However, these programs have several deficiencies such as the lack of medical history data, data in the area of psychometrics, nonverbal language, immediate response associated with the context, among others. So it is concluded that the effectiveness of this type of procedure does not have the same result as face-to-face interventions (Huarcaya, 2020).

Recently, great technological advances are being introduced in the field of psychology which allow the patient, among many other advantages, a greater immersion in the therapy or intervention being carried out. Computer-based training has the advantage of allowing individualized therapy, being able to adjust the treatment to the patient's needs (Cipriani et al., 2006).

It has even been concluded that older adults use technology for the purpose of preventing feelings of loneliness which may result in better physical health, increased subjective well-being, reduced depressive feelings, and reduced mortality (Chopik, 2016).

Technology-based intervention for robot therapy has been analyzed with highly positive results, with effects such as increased motivation, improved mood, and stress reduction among others (Hayashi and Kato, 2016; Wada et al., 2010; McGlynn et al., 2014; Heerink et al., 2010).

These interventions are focused on imitating a therapy model based on the intervention with animals with the objective of stimulating through the senses, affecting the different cognitive areas such as memory, attention, reminiscence, motor movements, and social behaviors among others. The benefits of this type of interventions are widely accepted; however, they are still contraindicated in certain situations such as allergic people, animal phobias, places where their entry is prohibited, etc. (Zisselman et al., 1996; Williams and Henkins 2008; Laun, 2003).

Technology is currently changing the world, it is part of our immediate environment, streamlining, optimizing, and perfecting many of the tasks of our daily lives. It is a fact that is also beginning to be used in social work through various formats, some of them as elaborate as social robots. These robots are currently used to carry out sessions with a wide variety of objectives such as: reducing stress, promoting empathy, sociability, oral, and gestural communication, and therapy in advanced dementia among many others, even improving interaction with people close to them and increasing the sense of well-being (Heerink et al., 2010).

Not to be forgotten is the rehabilitation in the motor area that these robots carry out with robot-assisted therapy being equal or superior to conventional physiotherapy therapy, with special emphasis on the upper extremities (Hyuk & Kim, 2013).

Therapeutic robots are designed to facilitate greater interaction with the user through the different sensors they have, as well as the thermoregulator that maintains a pleasant temperature. They are designed with zoomorphic shapes that provide tactile sensations, autonomous behaviors, and the responses emitted by these animals. They are designed so that anyone can handle them without specialized knowledge, their function is to produce sensations such as pleasure or relaxation acting independently with different purposes and motives, these actions can be interpreted as if the robots have feelings (Shibata, 2010).

Other times zoomorphic robots satisfy affective needs (petting and cuddling) and replace a real pet that the elderly person would not be able to care for. Through the use of social robots it is intended to alleviate the feeling of stress or anxiety with the absence of risk of contact between people, so that by performing an intervention with a "robotic stuffed animal" that can be petted, hugged, talked to... and responds to each of these actions in a differentiated way, it is intended to alleviate the feeling of absence of social contact, which in turn will have an impact on an increase in the quality of life (McGlynn et al., 2014).

Among their advantages are that they are recommended for people with allergies. They are totally suitable for people who are afraid of the instinctive reactions of pets that can scratch or bite. They do not spread possible diseases and can be in nursing homes and clinics; they do not need to maintain a continuous responsibility as if they were a live animal and they can be turned off and reserved while waiting for the next intervention.

As explained above, the psychological effects produced by Covid-19 in the elderly setting have led to a generalized increase in anxiety and stress, which becomes a worrisome indicator especially because the interventions carried out are not compatible with close social interaction as has been done so far.

In this age range of the population, precautions have been taken to avoid endangering their physical health by establishing a total absence of physical contact such as kissing and hugging, which increases these stress indicators. Due to all these particularities of the moment, new types of intervention should be considered, such as the use of a social robot with which therapies are carried out where the person can interact with the robot (caressing, kissing, hugging...) and the robot reacts immediately and positively, which decreases the indicators explained above.

The difficulty of establishing physical contact derived from the social norms imposed at this time as a result of the possible Covid-19 infection establishes the main objective of this study, which hinges on the need to evaluate the effectiveness of an intervention on perceived stress in older adults with mild to moderate cognitive impairment during the Covid-19 epidemic using a social robot as a tool. Therefore, the main hypothesis of this study centers on the premise that conducting an intervention with a social robot decreases perceived stress.

Method

The final sample consisted of 22 participants, aged between 70 and 90 years. The distribution was as follows: of the 22 subjects, 11 were men and 11 were women, i.e., the sample consisted of 50% women and 50% men. The marital status of this sample reflects 1 single person, 3 married and 18 widowed. The selection to form the experimental group (E.G.) and the control group (C.G.) was carried out by chance, randomly assigning 11 persons to the C.G. and the remaining 11 to the E.G.

As for the personal characteristics describing cognitive impairment, all of them have been selected according to a previous health diagnosis prescribed by a professional in the area of dementia, in addition to clinical diagnosis of depression and anxiety, so those people who were in the ranges qualified as mild or moderate dementia and absence of diagnosis of depression or anxiety have been included in the sample. Table 1.

Table 1

Sociodemographic characteristics of the experimental and control groups

Variable		Experimental group	Control group	U
Age		82,7	85,8	22
Gender				22
	Women	6	7	
	Men	5	4	
Cognitive impairment				22
	Low	2	3	
	Moderate	9	8	
Address				22
	Individual	1	0	
	Shared	10	11	
Marital status				22
	Single	1	0	
	Married	2	1	
	Widower	8	10	

The E.G. received a total of 15 relaxation sessions using the social robot tool, while the C.G. received 15 relaxation sessions without the social robot tool. The sessions were carried out with both groups in such a way that the only difference was the introduction of the robot with the experimental group.

At the time of conducting the research, the inclusion criteria were taken into account:

- Diagnosis of mild or moderate cognitive impairment.
- Ages between 70 and 90 years old.
- Users of a day center.
- Residence in the city of Santander

On the other hand, the exclusion criteria were based on the following aspects:

- Severe cognitive impairment.
- Absence of cognitive impairment.
- Presence of clinical diagnosis in depression.
- Presence of clinical diagnosis in anxiety.
- Minimum level of sustained care.

The variables studied are based on the aspects of perceived stress, activation, and relaxation with the social robot tool. Perceived stress is known as a process that has the objective of facilitating adaptation to possible changes in the environment, although it can also have the opposite value if it is prolonged over time. One of the most widely accepted views of stress today is that of Lazarus and Folkman (1984), who define it as a relationship between the individual and the environment, which is evaluated by the person as threatening or beyond his or her control and which therefore endangers his or her well-being. It is directly related to the activation variable and inversely related to relaxation.

Perceived stress has been included as a dependent variable, as well as activation; on the contrary, the independent variable has been the relaxation sessions together with the social robot as the main instrument so that the controlled variable has been the user's exposure to several programmed sessions during a determined period of time with the use or absence of a social robot as a therapeutic tool.

Instruments

The following instruments were used to collect the information:

The Perceived Stress Scale (PSS) is a scale proposed by Levenstein et al (1993) that allows stress to be evaluated as the degree to which a situation can be assessed as unpredictable, adding a total or partial absence of control over it, which sometimes impacts on mental health, exceeding coping resources, and generating an imbalance in the normal functioning of people's psychological processes. This questionnaire has several versions among which two stand out, an original version composed of 14 items (PSS-14) and another smaller version composed of only 10 items (PSS-10).

The version used in this project was the original (PSS-14) translated into Spanish by Sanz-Carrillo et al (2001). The 14 items of this scale are distributed on a 4-point Likert-type scale where 0 means never and 4 means very frequently. Items 1, 2, 3, 8, 11, 12, and 14 refer to perceived stress and respond to a direct score that indicates that the higher the score, the higher the level of perceived stress, while items 4, 5, 6, 7, 9, 10, and 13 have an inverse score, that is, the score of the latter items is inverted to calculate the total. The total score is direct, indicating that the higher the score, the higher the level of perceived stress.

The internal consistency of this test scale seems to have evidence in its favor because the studies report a level of Cronbach's alpha coefficient that offers values of 0.9 for the total scale. The test-retest reliability (0.80) was also satisfactory and similar to the original study (San-Carrillo et al 2001).

On the other hand, the measurement of heart rate has been collected through a special device that measures the number of beats per minute.

The instrument used to carry out the intervention is categorized as a social robot. Social or service robotics has the purpose of creating a device that increases the mental and/or emotional well-being of people bringing in turn an improvement in the quality of life. (Guardón Steels, 2018). The social robot used in this project is designed with a weight of 3 kg and a length of 45 cm; it behaves like a domestic pet responding to touch, sound, and movement. The programming allows automatic learning to customize the needs and social preferences of people interacting with it. This robot is in the physical form of an animal, specifically a grizzly bear. It is covered with a soft fabric that makes it pleasant to the touch so that the affective response of the user is more likely to be positive towards the robot. On the other hand, the movements emitted by the robot are previously programmed and typical of the animal it intends to emulate; however, it also includes movements more typical of people such as hugs, caresses, and facial movements of expressions such as happiness and disgust.

Procedure

The development of the intervention has been carried out in a natural and familiar context for all participants, isolated from the other rooms of the center where a close and conducive climate has been created to carry out the relaxation sessions, through a dim and warm light, without noise or interruptions and a comfortable place where to carry out the session. It should be noted that the intervention has been carried out on an individualized basis.

Three sessions were held per week for one month, with an approximate duration of 30 minutes. The groups were randomly assigned, so that there were the same number of people in one group as in the other.

Initially, all participants were evaluated individually using the "Perceived Stress Questionnaire" and adapting the language at times of difficulty.

Subsequently, the E.G. sessions were held:

- Presentation of the robot to the user where the physical characteristics are described and a name is given so that the user can become familiar with it.
- After a period of time where the user interacts by stroking and talking to the robot, it is explained to the user that a voice-guided relaxation session will take place, where he/she must close his/her eyes and imagine what he/she hears.
- The relaxation session in voice-guided imagination is performed.

As for the C.G. sessions, they have been carried out identically to the E.G. except with the elimination of points 1 and 2; therefore, the C.G. has obtained relaxation sessions with the absence of the social robot tool.

Before the beginning and after the end of the last session, each participant was measured by means of a specialized device to determine heart rate. Finally, a second evaluation is performed through the "Perceived Stress Questionnaire" on an individual basis to all study participants.

Results

In order to determine the existence of differences in the level of stress before and after each session and the level of stress perceived before and after the application of the set of sessions, the data obtained were subjected to a descriptive statistic of comparison of means by means of a repeated measures Anova. The treatment of the data has been carried out taking a confidence level of 95% and, consequently, a margin of error of 5% (value of $p<0.005$). An analysis was carried out between the perceived stress variable (V.D.) and the relaxation with social robot variable (V.I.) in the E.G. and in the C.G. in order to study whether there is a correlation between these variables, using the Anova statistic of one factor for repeated measures.

It was found that the experimental group has had a significant result through the statistical techniques implemented, i.e., perceived stress is affected by relaxation with social robot, $F(1,10)=27.158, p<0.005, 2p\eta^{=0}.731$. On the contrary, it was found that the control group has not had a significant result through the implemented statistical techniques, i.e., perceived stress is not affected by relaxation without the social robot, $F(1,10)=1.105, p>0.005, 2p\ \eta^{=0}.1$. Table 2.

Table 2

Comparison of perceived stress pre and post E.G. and G.C. using repeated measures Anova.

Experimental Group						
Variable	Pre		Post			
	Average	DT	Average	DT	F	p
Perceived Stress	3.77	0,69	2.65	0,64	27.158	0.01

Control Group						
Variable	Pre		Post			
	Average	DT	Average	DT	F	p
Perceived Stress	2.65	0.64	3.85	0.68	1.105	0.318

On the other hand, a comparison was made between the activation variable and the relaxation sessions with the social robot in the E.G. and the C.G. It was found that the experimental group has had a significant result through the statistical techniques implemented, that is, the activation is affected by the relaxation with the social robot, $F(1,10)= 13.042, p<0.005$, , $2p\ \eta^{=204}.045$. Similarly, it was found that the control group has had a significant result through the statistical techniques implemented, i.e., activation is affected by relaxation without the social robot, $F(1,10)=23.58, p<0.005$, , $2p =0\eta^{\cdot 702}$. Table 3.

Table 3

Comparison of pre and post E.G. and C.G. activation measurement by repeated measures Anova.

Experimental Group						
Variable	Pre		Post			
	Average	DT	Average	DT	F	p
Activation	84.55	7.802	78.45	6.105	13.042	0.005

Control Group						
Variable	Pre		Post			
	Average	DT	Average	DT	F	p
Activation	78.36	6.31	72.45	5.52	23.58	0.001

Finally, an analysis was carried out between both groups using the repeated measures Anova statistic in order to analyze the interaction effect with time in the two types of therapy (with social robot and without social robot). It was found that there is interaction between the variables time (pre and post) and type of therapy on perceived stress, $F(1,20)=55.71, p<0.005$, $2p\eta = .714$. Therefore, according to the interaction effect test it seems that the effect of time on perceived stress depends on the type of therapy.

An analysis was also carried out between both groups using the same statistic in order to analyze whether the interaction effect on activation is equal in the two types of therapy (with social robot and without social robot) where it was found that there is no interaction between the variables time (pre and post) and type of therapy on activation, $F(1,20)=0.008, p>0.005$, $2p\eta = .091$. Table 4.

Table 4

Comparison of interaction effect between time (pre and post) and type of therapy (with robot and without robot) between E.G. and C.G.

Variable		η^{2p}	p	F
Stress	Time x Therapy	14.714	0.000	55.71
Activation	Time x Therapy	0.091	0.931	0.008

In conclusion, it has been detected through the applied statistical analysis that there is a significant difference in the level of perceived stress when the social robot tool is used in the sessions; however, this is not evident when the robot is not used. Regarding the activation variable, a significant difference was detected between the measures obtained before the beginning of the session and those obtained at the end of the session in both groups (E.G. and C.G.).

Discussion and conclusions

The present study is described with the main intention of evaluating the effectiveness of an intervention on perceived stress in older adults with mild to moderate cognitive impairment during the Covid-19 epidemic using a social robot as a tool. This intervention consists of several sessions composed of a relaxation exercise with the addition of a special tool such as a robot, which provides added qualities related to sensory and emotional stimulation. The main hypothesis is that carrying out an intervention with a social robot reduces perceived stress. The general objectives are to determine the effectiveness of an individual session, to analyze the results of perceived stress before and after the intervention with the robot, and to analyze the results of perceived stress before and after the intervention without the robot.

Regarding the results obtained in this research, a significant effect was found in the results of the Perceived Stress Scale in the E.G.., that is, it was found that the level of stress perceived after the relaxation sessions with the social robot was lower than before starting the sessions. However, no statistically significant difference was found in the C.G., so that the level of perceived stress before and after the sessions without the robot was not statistically relevant.

With regard to the measurement of heart rate, there were significant differences in the decrease of heart rate in all participants, i.e., both the sessions with and without the robot were

useful to reduce stress shortly. Therefore, it can be discerned that the relaxation sessions with and without robot lower the physiological stress level in the short term.

These results may suggest that the differential effect provided by the use of the social robot as a tool can reduce the level of perceived stress in older adults, which has a direct impact on their mental health and therefore on their emotional well-being and quality of life. The emotional state of these people, who are in the last phase of their existence, becomes one of the most important objectives to maintain satisfaction with life (Ortiz and Castro, 2009).

Some authors such as Lin and Ensel (1989) consider that mental health in the elderly is largely based on psychosocial well-being, which is enhanced by increasing personal and social resources so that important sources of social support and affection are available. The feeling of loneliness that can be caused by the social and affective restrictions derived from Covid-19 can provoke a feeling of loneliness in the elderly.

There are several studies that support the interaction through social robots with the aim of reducing the degree of stress and the feeling of loneliness, improve mood, and increase emotional well-being, being the tactile experience of the robot one of the most influential factors. These zoomorphic robots also meet the affective needs such as caressing, hugging, and kissing, and also through other behaviors such as dialogue, or even discharge of aggressive physical or verbal responses. Social robots are designed to respond in a manner consistent with the stimulus provided so that the interacting person receives an appropriate response to each situation, which facilitates the lowering of the stress level in each user (Wada et al 2008, Robinson et al 2013, Rabbitt et al 2015).

Currently it is estimated that a large percentage of the robots studied are animal-shaped, although these prototypes can incorporate surveillance and security functions, social robots have been designed primarily as robots for physical and psychological stimulation. With this type of robots, the aim is to provide more than mental health to the elderly; the objective is to achieve a better quality of life in all aspects, reducing social isolation and the feeling of loneliness (Padilla-Góngora and Padilla-Clemente, 2008).

Therefore, as mentioned by Acaril et al. (2008), Shibata et al. (2010), and Takayanagi (2014), it is considered essential to create programs aimed at implementing this project in elderly care centers such as day centers or residential centers, also as a stimulus for people who, although they do not attend centers such as those mentioned above, are prone to the absence of social contact, so that the most affected population would be those living alone. Within the therapeutic dynamics of the day center, this design can be integrated as an intervention within the multidisciplinary approach, varying the intervention at individual or group level, replacing the usual relaxation sessions or including the intervention as a complete individualized therapy.

Limitations can be found in this study based on assessing the effectiveness of a social robot as a method or tool to reduce the level of perceived stress in older adults may be:

On the one hand, the formulation of the research objectives in such a way that by increasing the specificity of the objectives a greater collection of data can be obtained which could increase the specificity of the conclusions; this has been complicated since the time lapses to carry out the project in the center were restricted. Another of the most important limitations is based on the small sample size mainly due to the current restrictions that prevent contacting a larger number of people. Finally, the lack of previous studies in the area of physical affect in elderly people during the Covid-19 pandemic should be pointed out, since it is a recent topic where several investigations are still being carried out.

The generalizability of the results of this project (external validity) may be influenced by elements such as the size of the sample, organismic factors in the selection biases due to the

selection of users from a single day center, who live in very close geographical areas and who also live with other people in their daily lives, as well as the so-called "novel phenomenon" where the introduction of an unusual tool may cause a variation in the participant's response, the effects of which may be absent as the intervention progresses. This opens the way to new lines of research for the future where we can analyze whether this therapy extended over time maintains its effectiveness or is altered, whether the effectiveness lies in the characteristics of this particular robot or can be generalized to robots with other types of structure such as a humanoid, as well as whether the need for physical contact derives from the current restrictions or also exists in different conditions such as the loneliness of people living alone.

This research presents favorable results regarding the use of robots as therapeutic tools aimed at reducing perceived stress in older adults, which opens a new challenge towards the future, expanding the horizon in psychogeriatrics where robots are part of structured therapies where they can encourage activities that promote good mental health. To this end, research must consider the needs of users in this age range and develop robots that they can manage without the digital divide being an obstacle.

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