Can Robots Support Recovery from Mental Health Issues in Immigrant Populations in the Netherlands?

Thosha Moodley, Mirjam de Haas

***Abstract*— This is a proposal for research that we would like to conduct in the future regarding applying robots to the challenges experienced by immigrant populations with mental health problems in the Netherlands. Immigrants make up 25% of the Dutch population and commonly have issues getting access to effective mental health care. These problems include language and cultural barriers, access to useful and supportive information, social stigma and preventing backsliding. We propose the use of a robot programmed with cultural awareness in mind and providing care in the user's own language to assist different immigrant groups in prevention of regression during the remission period after mental health issues. The robot will assist the user to manage their own recovery process and be complementary to usual care.**

I. Introduction

Immigrants make up 25% of the Dutch population, but they historically have had difficulty in getting access to adequate mental health care [1]. Problems experienced include: a) language barriers, b) Dutch healthcare providers not understanding their personal cultural or religious context, c) social stigma related to mental health care d) treatment being Western and Caucasian focused and e) access to effective and useful sources of information about their problem and recovery [2] [1][3] [4]. One of the aspects of the process which could be addressed to help immigrants is recovery from mental health episodes (This was determined during an interview with a Dutch mental health organisation, detailed below). This research proposal looks at whether a culturally sensitive, language-adaptive robot could help address these problems. The aim is to support recovery in the remission phase, reduce relapse risk, and give immigrants tools to manage their own healing while easing pressure on the healthcare system.

II. Background

A. Mental health system for people with a migration background

People with a migration background have a higher risk of psychological disorders [1]. We conducted an interview with a Dutch mental health care organisation and discovered that a problem that affects people with a migration background, specifically, is getting help that is culturally relevant to them. Sometimes, people from ethnic backgrounds, for example, include spirituality or religion in their view of mental health. It can take a lot of time to share their cultural background and beliefs with Dutch health care providers which delays treatment. During the interview, it was mentioned that a different approach is needed because even twice the number of therapists would not be enough to address the current workload. The interview indicated that people often do not have access to relevant information on mental health care. They search for information on the internet and sometimes this information is wrong, does not align with Dutch mental health care practices or creates a negative impression of their prognosis (this could be especially so if they search for information in their own language).

Previous literature has addressed the challenging circumstances of immigrants in the Dutch mental health care system. In one study on immigrant mental healthcare based in the Netherlands, it was discovered that general practitioners show bias by being less inclined to refer immigrants to mental healthcare professionals [1]. Immigrants are often affected by cultural stigma against admitting to having mental health issues, as well as experiencing language barriers [2] [1]. During a study by Liu et. al [3] on why people of Chinese ethnicity underutilise the Dutch mental healthcare system, it was determined that cross cultural understanding is a problem. Even when patients speak Dutch well, they show the need to be treated in a culturally sensitive way with an understanding of what it is like to be a minority [2].

B. The remission phase of mental health healing

In previous literature, mental illnesses such as depression are described as progressing through different phases: from being symptom-free, to experiencing some symptoms, then developing a full-blown disorder (defined by clinical criteria), followed by remission and, ultimately, recovery [5][6]. A relapse is defined as an episode occurring during remission. In this research we will be targeting the remission period, the phase after to the full-blown occurrence of the illness. Previous interventions during this phase have yielded successful results in assisting patients to reduce relapse [5][7] and patients are more amenable to interventions during this phase due to their motivation being optimal at this time [5]. Research has shown that patients prefer to be involved in their own recovery process [8] and that it helps them to normalise their vulnerability to relapse [9].

C. Depression Self-Management Interventions

Self-management interventions during the remission phase have been shown to improve relapse rates. A study in which an online system was used to educate patients about their illness and recovery was met with patient approval as having

been very helpful and supportive [8]. In an intervention consisting of a telephonic counsellor and self-help book, participants were less likely to relapse [5]. Based on a systematic review by van Houle et al [10], depression self-management programs often incorporate a range of strategies aimed at empowering individuals to manage their symptoms and prevent relapse. These strategies include developing structured plans to change health-related behaviors such as increasing physical activity [*Action Plan*] and scheduling enjoyable or meaningful activities to enhance mood and engagement [*Behavioral Activation*]. Improving how individuals interact with healthcare providers and their social networks is also emphasized [*Communication*]. Programs typically support the development of techniques to deal with negative emotions that may arise from living with a chronic condition [*Coping with Emotions*], as well as providing accurate information about depression, including its symptoms, treatment options, and course [*Patient Education*]. Encouraging healthy routines around sleep, exercise, diet, and relaxation helps reinforce the connection between physical and mental health [*Health Habits*]. Skill-building activities are also included to promote problem-solving, stress management, and emotional regulation [*Skill Learning*]. Regular tracking of symptoms is encouraged to support early detection of worsening mood [*Self-Monitoring*], and consistent adherence to prescribed treatment is emphasized to reduce the likelihood of recurrence [*Treatment Adherence*].[10].

D. Robots for Mental Health Care

Building on the evidence that self-management interventions can help individuals take an active role in their recovery, previous literature has shown that robots can also support patients in becoming more independent and engaged in their mental health care. For example, they have been used to deliver therapy effectively, provide emotional support, and combat anxiety and depression [3] [11][12].

Robots can also be used to augment traditional mental healthcare options when the user cannot easily reach mental health care providers [3]. They have been found to be effective in responding empathetically and reducing loneliness [3]. Moreover, they can make use of calming voices and soothing designs to increase their effectiveness in mental health care [3]. An important advantage of this type of technological intervention is that robots can be used in the home context while regular therapy usually takes place in health care institutions. Robots are also constantly available compared to regular health care providers [3].
In terms of robot interventions, in one study, a robot, Hyodol, would play individualised religious messages, tell stories, take the user through exercises and conduct meditation sessions. Caregivers could check the activities of the patient and set alarms for them to, for instance, take medication, via an app that interfaced with the robot [12]. This had a positive effect, and a similar approach could be applied to immigrants.

In this context, a robot can be used to overcome some of the drawbacks of the Dutch mental healthcare system. Robots can be programmed to be unbiased towards people from different cultural backgrounds (this must be done mindfully to prevent existing biases from being programmed into the system, as is a risk with AI). Information which is difficult and unscalable for doctors to obtain, for example, cultural and religious information, can be programmed once into a robot and be applied as needed [11].

The advantage of robots over, for example, a mental health care app is that robots are embodied, and therefore can be touched by the user, which can be therapeutic for them [11]. Embodiment also means that the robot is present and cannot be ignored, which helps with engagement, a typical problem with apps used in this context [13]. The robot can also make movements, and this adds to the interaction experience of the user [11]. They also provide a form of social interaction which can have a positive effect on user's mental health [11]. In previous literature we also see that robots are seen as non-judgemental and create a safe space for treatment to occur, preventing embarrassment and shame when asking for specific information or discussing non adherence to treatment [11] [13][14]. Robots and other technology interventions can also prevent the social stigma associated with psychotherapy [14].

Chin-Chin Tseng [11] has found that robots have also been used effectively to help immigrants in Asian contexts (with language learning), however not much work has covered the use of robots to assist immigrants with mental health issues.

E. Robots and Cultural Sensitivity

In this study we would like to make use of robots to bring cultural sensitivity to the current mental healthcare context in the Netherlands. Culture can be defined as meanings, behaviours and practices that groups of people develop over time [15]. It includes beliefs, values, ideas, language, communication and norms [16].

The topic of culturally specific or adaptive robots has been addressed in previous literature. We see that robots which are culturally aware are more accepted [17] [16]. People like and trust culturally similar robots due to a sense of familiarity, understandability, relatable non-verbal communication and because they can communicate in their own language [17] [16]. In general, cultural competence is correlated with improved patient satisfaction and acceptance [18]. Robots can be culturally adapted with gestures, choice of phrases, tone and volume of voice [16]. At the same time, we see that there is great risk in generalising culture. For example, during studies comparing the Gulf region to participants from North-African regions, the former participants appreciated an Arabic robot more than the latter [17]. We also see in a study between Germans and Americans choosing the ear positions of a rabbit, that non-verbal cues can also differ within different Western cultures [17]. But in a further study comparing German to Dutch

preferences, these were found to be more similar than German to Japanese preferences [17]. Further risk occurs when we consider that society is increasingly multi-cultural and multi-lingual [15] [17].

To create a culturally aware or responsive robot, the robot must be designed by including people of different cultures [15]. In one study, expert knowledge from the field of nursing was used to imbue cultural specificity [16]. Care should be taken not to propagate stereotypes in our efforts to be culturally specific [15]. Bruno et. al [16] used video footage of people from different cultures to define culturally specific behaviour and prevent stereotyping. These systems should also be tested by people from different cultures [16].

In the CARESSES project, conducted with elderly English and Indian participants in the UK, and Japanese participants in Japan, robots were programmed to be culturally specific in greetings and conversation topics, non-verbal communication and actions they could take [18]. They used personal data from the first week of the study to tune the cultural specificity of the robot to the individual in the second week, to prevent stereotyping. They also ensured the robot would confirm any assumptions made about culture with the user towards this aim [18]. In this study, the culturally aware robot was more effective than the control robot [18]. To summarise, care must be taken to ensure that culturally specific interventions are meaningful, authentic and sensitive to the specific needs of the individual.

F. Ethical, Legal and Societal concerns of using a robot for mental health recovery

While culturally adaptive robots can enhance acceptance and effectiveness in mental health care, their use also raises sensitive ethical, legal, and societal concerns that must be carefully addressed.
When we examine the literature on the use of robots for vulnerable populations some distinct topics stand out. The first is that the intervention should be beneficial to those who make use of it [14]. This will have to be carefully assessed to ensure the robot is adding the intended value. Another risk is that the robot can malfunction or act in unpredictable ways [14]. A further concern is data privacy and the potential for hacking and non-authorised monitoring. Standards are needed to ensure the privacy of the users, especially since robots can expose a much deeper level of surveillance than other technologies [14][19]. The consent to data processing might need an innovative approach which allows users to progressively or on-demand consent to or deny their data being processed [19]. Furthermore, there is a risk incurred by a lack of regulation - since robots used in mental health is an emerging field, more regulation is needed to protect the rights of the vulnerable, and this should be designed into the robot. Also, professional guidance is needed on how best to incorporate these types of interventions into regular therapy [14] [19]. There is additionally the question of who will be held responsible if harm occurs- the manufacturer, the designer or for example the robot itself [19].

Moreover, there is potential to replace regular health services with technology, thereby increasing health inequalities [14], but also, it's possible that the robot will become more trusted than the health care professionals or that there will be loss of work due to the robot intervention. It is important to remember that this intervention is intended to be complementary to care and provide more space in the health care system which is sorely needed [19].
In regular mental health care, the possibility of the patient being a risk to themselves and others creates a moral responsibility to inform the right stakeholders if the patient seems at risk, but how this will be treated by a robot with embedded AI needs to be considered mindfully [14]. It should be clear to the patient that they are dealing with an autonomous machine so that they don't assume there is a human behind the system [14]. People are also more compliant when a robot asks them to do something - this persuasive property should not be used to convince people to do wrong [14]. The robot should not replace human contact - patients in recovery should still be monitored by mental health care staff and caregivers and the intervention should be suspended if people start to miss human contact [14][19]. People might start to bond with the robot but there will be no authentic reciprocation of these emotions as there would be in a regular therapy scenario - this needs to be explained to them [14] [20]. Since this technology will make use of AI which can contain biases, the potential for these biases should also be clearly explained to participants [14].

III. THIS STUDY

We would like to investigate if a robot could be used to support immigrants in remission from mental health problems. The robot would provide validated and safe information on the patient's mental illness and medications, do check-ins, exercises and give patients tools to cope with daily life. It could providing tailored information in the immigrant's own language, help them reflect on their recovery and provide personally adaptive activities so to help aid in their recovery process [12][21][11]. These robots would be culturally sensitive, thereby bridging a gap in the Dutch mental health care system. The project will be known as **I**mmigrant **M**ental Health **C**ar**E** **R**obot (**IMCER**).

A. Hypothetical use case

What follows is a hypothetical use case of how a robot could be used to assist a person in recovery. The details of the use case are fictitious but based on cases in literature and the above interview.

Faiza is a woman in her early 30's and of Moroccan descent. She is married with two children. She has a diploma and a fulltime job, from which she was put on sick leave for 6 months due to what was classified by the company doctor as a burnout. She was diagnosed with depression and has started a course of medication to combat it. She has been seeing a psychologist nurse bi-weekly to help her with her in remission. During the period of acute symptoms, she lost

touch with her friends and felt ashamed to let people know she was having difficulties. Her family was supportive but did not understand why she could not simply have a positive attitude or pray her way to healing. She also felt that her problems could be due to a lack of faith or punishment for past transgressions. Her self-care declined and her energy levels and motivation were too low to do regular chores like go to the supermarket. Seeing friends and even family was difficult. She was not sure if she would ever be 'normal' again and what a path to normality would look like.

B. *Application of a robot to assist in recovery*

In this case, Faiza would be evaluated to see if a recovery robot could be of help to her. If she was willing, and the situation allowed for it, a small and affordable robot would be demonstrated to her, and then sent home with her. It would be customised to her culture and her most comfortable language, which is Arabic, knowledge of the disorders that she has, and medications she is taking, as well as recovery programs most likely to assist her. Local knowledge of facilities, locations like parks, and support groups could also be provided. People in her support network could also be added as well as her GP, mental health care professionals or primary caregiver.

The goal of the IMCER robot is to support patients with mental health problems during remission, by aiding the user in a culturally sensitive way and in their own language. This occurs in the user's own home and allows them to self-manage their recovery up to a certain extent [13]. The solution should be as low cost as possible to reach as many people as possible. To achieve a culturally sensitive and effective intervention, great care must be taken in the training of the AI to input appropriate cultural information and context. To achieve this, cultural input should be provided by a group of representatives of the culture in question, with varied characteristics, for example in terms of age and gender.

Based on the strategies described by van Houle et al [10], and previous studies, the IMCER robot could provide the following features:

- *Skill Learning*: Teaching techniques for relaxation, coping skills [10]. Meditation, mindfulness or mental health exercises like square breathing [21]
- *Coping with Emotions*: A check in to log moods [10][7].
- *Treatment adherence*: Log medication taken daily or provide reminders [21] [10]
- *Health Habits*: Log sleep quality, exercise, diet, relaxation [10]
- *Physical activity*: Suggestions about simple, low threshold exercises and possibly demonstrations or videos played back on a screen [13][10]
- *Patient Education*: Information about the disorder, recovery rates, what to expect about what patients can still achieve in the future, encourage them to look forward and have a positive outlook [10]
- *Behavioural Activation and Communication*: Suggestions to contact people in their support network, or send a text to a person, to initiate a chat [10] Suggestions about groups and activities in the neighbourhood that could support them [source: Interview]
- Positive reinforcement about faith, and encouragement to view faith positively as a supportive factor, providing comforting quotes, scripture or encouragement to pray [21]

C. *Examples of robot dialogue*

1) *Mindfulness exercises*

Robot: "*I see that you are feeling anxious. How about we try a mindfulness exercise, some movement-based exercises, or contact a friend?"*

Based on the user response, the next time the robot can offer a further advancement of the same category that was previously chosen or help the user to choose a new category to help them get out of their comfort zone.

Robot: "*You have done so well with our mindfulness exercises. Would you like to try a more advanced exercise today?"*

The robot can also keep track of how the activity went and use that information to influence if the user needs more encouragement next time or praise for an achievement.

2) *Sleep Report*

Robot: "*Here is your weekly report. Your sleeping pattern seems irregular this week. Would you like to hear about ways you can improve your sleep?"*

A graph can be shown on a screen to create a visual representation of the sleeping patterns.

IV. Conclusion

This proposal explores the use of culturally sensitive, language-adaptive robots to support recovery in immigrant populations in the Netherlands during the remission phase of mental illness. The IMCER robot will deliver validated self-management strategies, personalised to cultural and linguistic needs, to help prevent relapse and empower users in their own recovery. By complementing overstretched mental health services with accessible, empathetic, and ethically designed technology, this approach addresses barriers such as stigma, language obstacles, and lack of culturally relevant care.

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