Roll for Robot: A Tabletop Role-Playing Game for Designing Socially Assistive Robots for Depression Management

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Abstract. Imagining and creating a future with a robot tailored to an individual's needs and wants provides a unique challenge to both designers and perspective users. Using both an existing base zoomorphic robot, Therabot^{TM} in a specially designed tabletop role-playing game, we have explored what it would look like for someone living with depression to go through a "day in the life" with their newly designed robot companion. Inspired by this collaborative co-design technique, eight participants explained their own relationship with depression, identified a character that they connected with, and chose the physical form, sensors, and abilities for a socially assistive robot. Using this character and robot, participants described how they might overcome depression symptoms and identified uses when managing depression symptoms for the robot.

Keywords: Socially Assistive Robot · Design Game · Depression

1 Introduction

Games have the unique ability of allowing individuals to explore worlds and scenarios that they may not get to experience otherwise, just as role play allows individuals to experience new scenarios as someone different. These techniques allow for novel research opportunities as well: through role play designers may gain more empathy for those they are designing for [32], and through play participants are enabled to discuss difficult topics without fear of judgement [30].

This paper presents a table top role-playing game (TTRPG), with the goal of employing both the imaginative aspects of role-playing as well as the relaxed atmosphere of a game in order to aid those living with depression in exploring the design and uses of a customized socially assistive robot. Utilizing the base physical form of the Therabot^{TM} robot, participants who have experienced depression played the role of a character living with depression; they then designed the

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robot and went through a "day in the life" keeping their character and potential interactions with the robot in mind. Through the use of their characters traits and robots abilities, participants overcome common depression symptoms before evaluating their robot, while discovering important aspects related to the robots design and use.

Depression is one of the most common mental illnesses worldwide with core symptoms such as depressed mood [12] While many treatment plans currently exist in order to manage depression symptoms and its comorbidities, socially assistive robots are emerging as an additional tool for addressing depression symptoms. One such example is the use of the socially assistive robot Paro in the homes of older adults living independently and with a depression diagnosis, in which researchers found a decrease in depression symptoms [23]. However, due to the complex nature of depression and its comorbidities, having a robot which has been personalized to the individual, just as their care plan can be [22], may aid in the effectiveness of the robot.

In order to explore this personalization aspect and find key design insights that could be applied to the Therabot robot, participants were invited into a world where they could experience life with the robot of their design. Participants would go through the day from waking up in bed, to finally going to sleep at night, with freedom to choose the actions they took between. During these actions participants may face depression symptoms that they cannot overcome alone and where they must use the robot - or abandon the task altogether. In this way this game provides insights into what traits, abilities, and sensors the participants found most important for their robotic companions when facing depression symptoms, that could later influence Therabot overall design, sensors, and behaviors.

2 Background

2.1 Socially Assistive Robots

Socially assistive robots (SARs) are robots engage users in diverse social interactions, often providing companionship [7] and encouragement [4] rather than completing physical tasks. These robots have been used in a breadth of areas, including working with older adults with dementia to decrease loneliness and increase socialization both in elder care facilities [5] and in the home [15]. SARs have also been used to aid in reminders regarding therapeutic tasks presented by therapists [2], or to perform cognitive behavioral therapy [10]. However, when looking at the wider context of SARs in the management of depression, less than half showed a significant decrease in depression symptoms [1]. This suggests that further research is needed to understand the effects of a SAR on depression symptoms, as well as the robots uses within these scenarios.

2.2 Depression

In 2021 an estimated 14.5 million adults in the United States alone had experienced depression [13]. This illness has a wide array of symptoms, including

depressed mood, diminished interest, a change in weight or appetite, sleep complications, psychomotor agitation, fatigue, feeling worthless, an inability to concentrate, or reoccurring suicidal ideation [12]. Depression also brings with it many comorbidities, ranging from other mental disorders such as generalized anxiety disorder [26], physical effects such as heart disease [25], or substance abuse disorder [24]. These comorbidities require multiple types of care, and may change based upon the individuals experiences with depression. Many forms of treatments exist for those living with depression including traditional therapy such as cognitive behavior therapy (CBT) [28], or medication as prescribed through a psychiatrist [8]. Other treatments exist outside of the traditional, such as animal-assisted therapy, where a non-human animal is brought in to interact with the individual [27]. These interactions can be interacting with the animal before a therapy session, structured play during a therapy session, or physical interaction with the animal such as petting [14]. Even outside of a therapeutic setting, it has been proposed that pet ownership may reduce depression symptoms [21].

2.3 Design Games and Role Play

Games act as a way for individuals to come together in specific terms and explore new scenarios together [11]. Design games take this further as a tool to include potential users within the design process through new defined scenarios, and are often flexible in their definition depending on the context [31]. These games allow participants to explore new realities, technologies, and scenarios from a distanced perspective within the context of defined rules [3] where there are fewer real-life personal or physical consequences for design choices.

Role play, or the act of assuming a new identity for a time, has been used extensively within areas related to design and is a tool that therapists may use within their practice with their clients [18]. This technique allows for participants to engage in play as someone new, without the fear of judgement on themselves personally. Role play can serve many functions, such as eliciting empathy for those living in or with conditions that the researchers may have not experienced, such as through life action role-play [20]. It also can facilitate discussion regarding particularly difficult scenarios such as childhood trauma [9]. In this way, role play provides a unique opportunity to allow participants to discuss complex topics they may have experienced, through another.

3 Study Layout

The game itself follows the same rule set as previously presented with those who did not have to declare if they had experience with depression, with the exception being run in person instead of online [6]. All players of the in person version played independently, alone with the researcher. Before discussing the robots, participants were first asked a series of questions regarding their experiences with their depression, including when they last felt depression symptoms

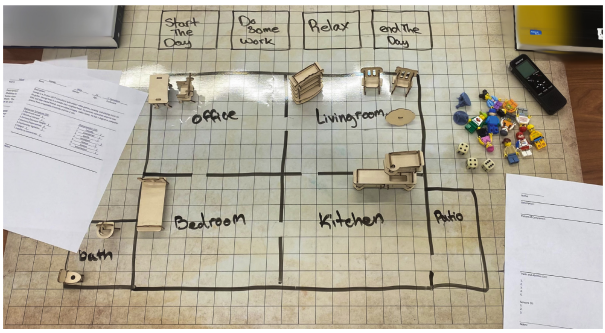

Fig. 1. Game Map and Materials

and what symptoms they experienced. Once participants had completed this interview as well as a demographic questionnaire including the PhQ-8 a depression assessment questionnaire [16], participants were then introduced to SARs. This was done through a brief description of how these robots have been used with other populations (i.e. older adults), as well as their overall purpose. Three robots were physically presented to participants including the Joy for All cat, and Paro the seal. They were also presented a stuffed animal, to show a potential covering for Therabot^{TM} which is currently a beagle dog, which was developed by the Mississipi State University STARs Lab to support those with mental health conditions, such as Post-Traumatic Stress Disorder (PTSD) [17], to serve as animal assisted therapy, without the concerns of allergies or diseases. This game utilizes a map that participants played upon (Fig. 1) which depicted a one bedroom apartment. The map also includes basic doll furniture, placed throughout based upon each room. Participants were not limited to objects that had a corresponding piece of furniture however, and were encouraged to imagine new things within the home for them to interact with. At the beginning of the game, each participant picks one of the three characters to role play as. This character sheet (Fig. 2) contains information such as the gender, age, interests or hobbies of the character, as well as their depression symptoms and some general characteristics. This sheet lists seven common depression symptoms with 20 points distributed amongst the seven. The higher the intensity of that symptom, the more points are assigned to that symptom. To combat the depression symptoms, the characters are also assigned different characteristics, chosen at random. To represent the player, they were given the option of ten Lego characters to move around the map to indicate what room their character was currently in. They were also given a 3D printed miniature of a robotic dog to represent their newly designed SAR.

Participants would start by writing a general description, then they would then draw a picture to represent the robot that they had pictured in their mind. They would then move into the aspects of the robot that would be used within the game. They would list five traits or abilities for the robot, which could be

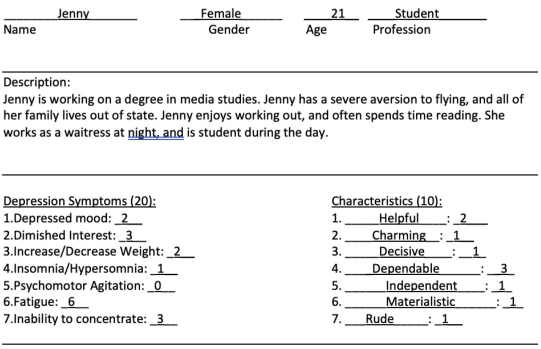

Fig. 2. Example character sheet for the role-playing portion of the game.

anything from the texture of the fur of the robot, to a certain behavior the robot might perform. They had ten points to distribute amongst those five traits and abilities and indicated which were the most important by assigning more points to the specific trait or ability. Then they were asked to list three sensors for the robot. Rather than giving participants a list or asking for the participants to name the sensors, they were to just list what the sensors was recording. Once they had their three sensors, they were given five points to divide amongst those three sensors. After identifying a character and designing a SAR for that character, the game is explained and a practice round is done. Once the game was complete, participants were asked follow-up questions regarding their experience with the game and their final thoughts regarding their personally designed SAR.

3.1 Game Rules

To begin participants are told that they have four goals that they must complete, but they define when those goals are complete. The goals are to: start the day, do some work, relax, and end the day. Participants may do whatever they wished in order to complete those goals, with the researcher checking in periodically to ensure that each goal has been completed. Once participants were ready, the researcher would describe a scene and participants would describe an action that they wished to do, such as "getting out of bed."

In the case of a depression symptom occurring, the researcher would then roll one six-sided die, and add that to the depression symptom's "intensity" or the number next to that symptom on that character's sheet. This becomes the depression roll. Participants could then choose a characteristic from their characters sheet and make an argument about how that characteristic helps them overcome that depression symptom. If the combination of the characteristic and participant roll beats the depression symptom roll, they will complete that action. If they do not, they could use an aspect of their robot. If the participant decided to utilize the robot, they would choose a trait, ability, or sensor from their designed SAR. They would then roll again, and add that number to the

number that they assigned that ability or sensor. If their rolls combined are larger than the depression roll, they will complete the action. If they still fail to beat the depression roll, they are then asked to try a new action.

4 Results

Eight participants living with depression who completed the game and interviews, with P1 and P2 who had participated in other studies regarding SARs (Table 1).

Table 1. Participant Demographic

P#	Age	Gender	Race	Education	PHQ-8
P1	58	Female	White	Graduate	8
P2	39	Female	White	Associates	11
P3	31	Male	White	High School	10
P4	27	Male	Asian	Graduate	8
P5	20	Female	Black/African American	High School	9
P6	28	Female	White	Undergraduate	18
P7	20	Male	White	High School	17
P8	20	Male	White	High School	8

All study sessions were audio recorded which were then auto-transcribed before being checked by a secondary member of the research team. Once the audio was transcribed, all transcriptions were coded by the first author using a pre-determined code set with additional codes added throughout based upon participant choices (i.e., "Participant Activities" was a preset code, but "Make Coffee" was a child code added after participant request). All codes were then discussed and reviewed by three members of the research team.

4.1 Player Choices

In total there were 27 unique activities that participants decided to do during the day. These activities included: reading ($n = 5$), sitting on the patio ($n = 3$), scrolling online ($n = 2$), among others.

Participants were faced with 44 instances of depression throughout the eight sessions. On occasion participants were able to overcome those instances of depression on their own, using the characteristics presented to them. Participants often used the characteristics as a reflection tool, or motivator, such as P8 who used the characteristic "friendly" to reflect inward through "like being friendly to yourself, instead of just putting yourself down." Not all characteristics were obviously helpful during times of depression instances; however, participants found

ways of utilizing the normally negative traits into something positive. P5, for example, used the normally negative connotation of the characteristic "materialistic" to encourage their character to finish cleaning the living room through "materialistic, because she wants to take care of her stuff so it looks good to other people."

When faced with a depression symptom that they were unable to overcome, participants most commonly opted to utilize some aspect of the robot. Participants used aspects regarding the robot's ability to move ($n = 7$), the robot's ability to sense the environment ($n = 7$), the robot's ability to sense the user ($n = 4$), the robot's ability to create or record sound ($n = 5$), and the robot's ability to be touched ($n = 15$). Participants were particularly interested in the robot's ability to sense emotion, such as P6 who mentioned the robot's ability to pick up increased heart rate, and related the characters psychomotor agitation to her own anxiety, "Well, if it's anything like me, the psychomotor agitation would be related to anxiety. So in theory, we would have our sensor for that and the robot would somehow know that." Touch was by far the most used with all eight participants mentioning using some aspect of touch during the game, and eleven instances of the robot receiving pets or cuddling.

Notably, participants would often place the robot in bed with their character at the end of the day.

4.2 Post Interview

After completing the game, participants reviewed their experience and were asked about their thoughts of the game as well as what aspects of their robot they would like to change and what aspect of the robot was their favorite. Two participants mentioned being nervous at first before slowly getting comfortable such as P1 "Well, at first I felt a little self-conscious, but yeah, then I got comfortable with it." P6 echoed this and expanded by saying "Also hard to decide what the difference between this person you're playing and what you would do in real life and how that merges. So once you said that, I think I took the pressure off myself a little bit more and then I could just do stupid silly things and see what actually maybe help and then it was more fun."

Seven of the eight participants found the game helpful for understanding how they might use SARs, with P7 saying "I honestly had never thought about it before I knew, like, I wanted an ESA [Emotional Support Animal] of some sort, but I also don't think that I could take care of a real pet so like thinking of something like this is interesting could be helpful." Participants also requested additions to the game and robots; P3 drew an analogy to video game expansions provided as additional downloadable content (DLC) saying: "Needs a DLC with work." P4 asked about the ability to include other players, to replicate friends coming to visit. All eight participants wanted to change at least one aspect of their robot, or adjust so that they could add something new.

5 Discussion

Through this table top role-playing game, participants experienced a "day in the life" of a character with a socially assistive robot of their design. Through "battling" depression symptoms, participants had the opportunity to explore the abilities of a SAR and discover new insights into their potential uses. Overall participants reported that the game was helpful, interesting, and helped them consider what aspects of the robot may be more useful than others. Though limited to the home, participants provided key insights into the complex role that a SAR may take when acting as a mental health tool.

With their designs participants imagined the robot existing both as a social agent or caretaker similar to a emotional support animal, as well as a tool. This included using the robot as a way to set reminders which has been explored within the context of teenagers and depression to remind them of their therapeutic tasks [2]. In the same vein, participants wanted the robot to be soft and to provide comfort through touch as they may receive from an animal, but also desired the robot to be able to play music, suggesting that they view the robot as both a machine as well as a companion - something new.

This game also provides participants with a unique opportunity to adjust their robot if they find an aspect unhelpful. All of the participants indicated wanting to change some aspect of their robot once the game was played, similar to those who did not have to declare if they had experienced depression [6]. In this way participants honed the robot, such as P3 who wanted the robot to be able to record and playback sound, but later added that the robot should also be able to play music. This needed ability to change or be adaptable is recognized by other researchers for supporting the interaction between the human and robot [29], and through this game participants got to address this need personally clarifying how the robot should be changed. While this game provided insights into the design of a SAR, participants also provided feedback on the method. Seven out of the eight participants finding this game helpful, and participants who had participated in SAR-related design studies before mentioned that the game helped them think of new ways they might use their robot. This supports the idea that design games and role-play provide ways of thinking about novel problems and exploring solutions [19].

Future work should focus on expanding the sample size as currently only those who self-reported as having experienced depression have participated. Through working with outside mental health facilities and resources would be beneficial to test this method not just with those living with depression, but also to get clinician feedback on the designs. Finally, this game provided key insights into the design of a SAR for those living with depression, how they consider the robot, and how they may use the robot in times of depression symptoms. By gamifying the process of design and exploration participants both gave and received new insights into the potential uses of a SAR within the context of depression.

6 Conclusion

Through a table-top role-playing game participants who had experience with depression explored the design and uses of a self designed socially assistive robot. By overcoming depression symptoms with their robot participants assessed the importance of their initial robot abilities, and explored new potential ways to utilize the robot.

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