

The effect of personalizing a ChatGPT based psychotherapy conversational agent on therapeutic alliance and usage intentions

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While mental health problems are a very common, many people experience barriers when seeking help due to their personal attitudes or costs associated with therapy. Psychotherapy chatbots may offer a possible solution as they are always available, anonymous, low-cost and allow users to treat their mental health problems on their own. Research shows that these chatbots are able to significantly reduce symptoms of anxiety and depression. However, the effect of being able to personalize these chatbots on health outcomes has not yet been studied. To investigate this, a personalizable psychotherapy chatbot was developed which used ChatGPT to provide personalized help. In a randomized controlled trial, 54 participants were either assigned to a personalisation condition in which they could personalize their chatbot or a control condition in which they could not. The participants used the chatbot for a week. At the end of the week, it was found that the personalisation condition had a significantly higher therapeutic alliance with the chatbot. In fact, the therapeutic alliance was similar to that between a psychologist and his client. This is an important result because in psychotherapy, a high therapeutic alliance is robustly linked to therapeutic success. The study also revealed that the most important personalizable aspects of a psychotherapy chatbot are the therapy style, personality and avatar of the chatbot. It is also important that the chatbot uses the user's name in messages and provides transparency about what the chatbot has learned about the user.

CCS Concepts: • **Computing methodologies** → **Artificial intelligence**; • **Applied computing** → **Life and medical sciences**; • **Human-centered computing** → **Human computer interaction (HCI)**.

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1 INTRODUCTION

Symptoms of anxiety and depression are common among college students. A systematic review by Li et al. [16] revealed that 33.6% of college students report symptoms of depression or anxiety. However, only 24.6% of these students with symptoms would seek professional help for an emotional problem [16]. The most common obstacles are a preference for wanting to solve the problem on their own, feelings of shame in asking for help and finding the cost associated with therapy too high. In addition to personal attitudes, the waiting time in Flanders for mental health care from registration to first direct care activity averaged 51 days for adults (age 18-59) in 2021. [26].

Chatbots could be a possible solution, as therapy given by a chatbot would remove many of these obstacles. Psychotherapy chatbots are always available, often inexpensive, anonymous, listen without judging and allow users to treat their mental health by themselves. Research has also shown that chatbots can be effective in lowering self-reported anxiety and depression symptoms [8, 10, 13].

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However there is a lack of research on the relationship between personalizing chatbots in a health care context and health outcomes such as treatment adherence or therapy outcomes [14]. Health apps also often suffer from poor user retention as the number of daily active users is only 4% [3]. The self-determination theory [22] states that the motivation to use a product depends on to what extent that product fulfills the basic needs of autonomy, relatedness and competence. Being able to personalize the chatbot could increase relatedness and also gives the user more autonomy over their therapy. Therefore, allowing users to personalize their psychotherapy chatbot might be a solution to increase both user engagement and effectiveness of the therapy.

As far as we know no research has yet investigated the effect of personalizing a psychotherapy chatbot on a health outcomes and usage intentions. The goals of the study are to determine which personalizations users prefer and investigate the effect of those personalizations on usage intentions and therapeutic alliance with the chatbot. This therapeutic alliance represents the emotional bond with the therapist and agreement on tasks and therapy goals, which has been robustly linked to a higher likelihood of therapeutic success [9, 19]. Lambert and Barley [15] also showed that factors such as the therapeutic alliance, empathy and warmth contribute 30% of the variance on therapy outcomes while the specific therapeutic technique itself only contributes 15%. For our research we have developed a new personalizable psychotherapy chatbot which makes use of ChatGPT. The chatbot is able to learn about the user and gives personal advice on how they can handle their mental health problems. The personalizable aspects included the avatar, therapy style and personality of the chatbot. Users could also name the chatbot, specify how the chatbot should call them, choose a typing speed for the messages of the chatbot, choose a theme for the app and modify what the chatbot had learned about them. The contributions of our research are a better understanding of which aspects of a psychotherapy chatbot users prefer to personalize and that personalization has a positive effect on therapeutic alliance and usage intentions. We also believe this is the first time a chatbot using ChatGPT has been researched in a psychotherapy setting.

2 RELATED WORK

Our study is at the intersection of 3 research areas: psychotherapy chatbots, personalization of chatbots and personalization of digital therapy. We will give an overview of the related research in those domains.

2.1 Psychotherapy chatbots

An overview of research concerning the effectiveness of psychotherapy chatbots is provided in Table 1. In summary, chatbots are able to reduce self-reported symptoms of anxiety and depression and are potentially a more effective therapeutic approach than self-help books [8, 10, 17]. Both cognitive behavioral therapy [6, 8, 17], client-centered psychotherapy [11] and combinations of different therapeutic styles [10, 13] have been implemented in a chatbot with positive results. The effects also do not appear to be culturally bound as both American [10] and Chinese [17] subjects show a reduction in symptoms.

2.2 Chatbot personalization

Research has shown that personalizing a chatbot can have positive effects. Shumanov et al. [23] found that when their salesman chatbot's personality matched the personality of the user, more products were sold and that there was higher engagement with the chatbot. Another study found that when a health-advice providing chatbot used the user's name and age in messages that users reported a higher self-efficacy [18]. Nißen et al. [20] created 4 different personas for their chatbot, each consisting of an avatar, a name, conversational style and a social role. They found that when

Table 1. Overview research effectiveness psychotherapy chatbots. PHQ-9 measures symptoms of depression, GAD-7 symptoms of anxiety disorder, DAS-21 measures anxiety and depression.

Chatbot	Method	Results chatbot
Tess [10]	2 weeks chatbot or self-help book	Decrease PHQ-9, GAD-7
Woebot [8]	2 weeks chatbot or self-help book	Decrease PHQ-9, GAD-7
Wysa [13]	2 weeks user observation	Decrease PHQ-9
Mylo [11]	2 weeks chatbot or ELIZA	Decrease DASS-21
Bunji [21]	2 months user observation	Decrease PHQ-2
Xiaonan [17]	16 week chatbot or self-help book	Decrease PHQ-9, GAD-7
Vitalk [6]	30 day app usage	Decrease PHQ-9, GAD-7

participants could choose the persona for their chatbot the participants had a better relationship with the chatbot compared to when they were forced to use a particular persona. A systematic review on ways to personalize chatbots in a healthcare environment [14] found that personalization is associated with higher satisfaction, engagement, dialogue quality and likelihood of positive behavior change. In conclusion, previous research has highlighted the positive effects of personalization on aspects such as self-efficacy, relationship with the chatbot, likelihood of behaviour change and engagement. However, personalizable aspects are often limited to providing feedback on the user's mood, daily health reports and recommendations.

2.3 Personalization of digital psychotherapy

The study of personalization of digital psychotherapy is a relatively new research area. Birk and Mandryk [5] showed that participants who could personalize their avatar showed greater engagement with a digital attentional retraining task compared to participants who were forced to use an avatar. In another study, Birk and Mandryk [4] showed that in the context of breathing exercise app to remedy anxiety, participants who could personalize their avatar had a higher login rate and a lower likelihood of dropping out of the study. Six, S. et al. [24] investigated the effect of personalizing an avatar and whether the avatar used their name in a mental health app meant to reduce depressive symptoms. They found that depressive symptoms measured by the PHQ-8 were significantly reduced but that no difference between the personalization and control condition was found. The researchers suggest that these findings could possibly be explained by the fact that participants did not identify with their avatar because they offered a limited range of personalization options for the avatar. Thus, there is a need for further research on the effects of personalization of digital psychotherapy interventions, both on therapeutic outcomes, engagement and usage intentions. Also more research is also necessary on which aspects besides an avatar could be personalizable. None of these studies made use of a chatbot, which provides a different way of providing therapy and has many possible personalizable aspects besides an avatar.

3 IMPLEMENTATION

For the purpose of our study a new personalizable psychotherapy chatbot was developed. We will now describe the development and personalizable features of our chatbot.

3.1 Development

Our personalizable psychotherapy chatbot was developed through an iterative user-centered process. We organized 2 consecutive think-aloud studies where participants interacted with prototypes of the chatbot and filled in questionnaires about their preferences for possible personalizable features. At the end of each think-aloud study the chatbot was improved by fixing problems users encountered and implementing personalizable features users preferred. The prototype had a mean system usability score of 79.71 at the end of the second prototype study (18 participants) which according to Bangor et al. [2] is a good score. Also a co-design session with 3 human-computer-interaction researchers took place which allowed them to evaluate the usability of the chatbot. Finally the chatbot was presented to a clinical psychologist to assess the quality of the therapeutic dialogue provided by the chatbot before conducting our final study.

3.2 Personalizable features

The personalizable aspects of our chatbot included an avatar creator which would allow the user to choose the gender, age, skin color, hairstyle, hair color, facial hair, earrings and clothes of the chatbot avatar. Users could also choose between a socratic and goal oriented therapy style. In the socratic therapy style the chatbot would focus on using open ended questions while the goal oriented therapy style focused on giving concrete advice. Users also had to choose the personality of the chatbot. The possibilities were between a professional personality where the chatbot is knowledgeable and assertive, a compassionate personality where the chatbot is understanding and a lighthearted personality where the chatbot is cheerful and uses humor. Users also had to specify a typing speed for the messages of the chatbot, a name which influenced how the chatbot would call the user in the messages and a theme for the app (black and white, green, blue or purple). After personalizing every aspect the user is greeted with a welcome message by the chatbot and could send messages. This screen is shown in Figure 1. With the “brain” button users could also see and modify a description the chatbot had generated about them. This description acts as the memory of the chatbot so by modifying this users could personalize their therapy.

3.3 Technical aspects

The front-end of the chatbot was programmed in React. The interface was designed so that the chatbot was usable on both smartphones as well as desktops. The chatbot itself was implemented using the Rasa¹ which allowed us to detect intents whether the user was talking about suicide, asking for a psychologist, talking about his emotions or describing a problem. When the chatbot detected that the user was talking about self-harm or asked for a psychologist the chatbot responded with contact information for the suicide hotline or a site which contained contact information of psychologists. Otherwise our chatbot would run python code which contained a ChatGPT API call. In this ChatGPT API call ChatGPT was prompted to pretend to be a psychologist with the personality and therapy style chosen by the user and asked to answer the message of the user. The ChatGPT prompt would also contain a description of the user which was learned by having ChatGPT create summaries of the conversation with the user. This summary was visible and editable by the user through the “brain” button in Figure 1. The chatbot was accessible through a website and optimized for both mobile and larger screens.

¹<https://rasa.com>

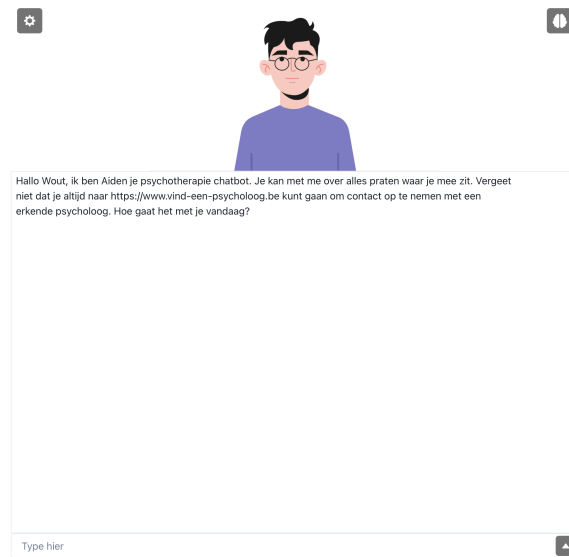


Fig. 1. Chatbot chat screen

4 METHODS

In this section we will explain the design of our final study. This final study uses the chatbot which was iteratively developed over the previous studies. We also give an overview of the of the participant recruitment process and demographics.

4.1 Research design

For the final study a longitudinal randomized controlled trial took place which used the chatbot. The participants were either assigned to a control condition in which all the personalizable features were initialized to random values and could not be modified, or a personalization condition in which the user was free to personalize their chatbot. Participants were asked to talk to the chatbot for 1 week about possible mental health concerns (e.g. stressful situations, lack of motivation, trouble with falling asleep) at least 3 times for several minutes. At the end of the week, the therapeutic alliance was measured using the WAV-12 questionnaire which is a clinically validated Dutch version of the WAI-S [25]. The WAV-12 contains a bond, tasks and goal subscale which evaluate 3 key elements of the therapeutic relationship: the emotional bond between the client and therapist, the degree of agreement on therapy goals, and agreement on tasks for the client and therapist. This questionnaire was modified to survey the bond with the chatbot rather than a therapist. This questionnaire is listed in Appendix A. The intentions to keep using the chatbot were measured with a technology acceptance model questionnaire [12]. Participants also had to fill in questionnaire containing a 5 point likert scale and open-ended questions to gain insights in the preferences of the participants for the personalizable aspects and their experience with the chatbot.

4.2 Participants

Participants were recruited through a social media post with information about the study and a request to contact the researcher. There were 55 participants at the start of the study of which 27 men and 28 women. All participants were from Belgium and spoke Dutch. The participants were randomly assigned into 2 conditions. The control condition in which users could not personalize the chatbot consisted of 16 male and 11 female participants with a mean age of 27.5 years (8.9 standard deviation). The personalisation condition consisted of 11 male and 17 female participants with a mean age of 24.7 years (6.6 standard deviation). 1 participant of the personalisation condition dropped out because they experienced technical problems while using the chatbot. At the start of the study there were no significant differences between the conditions both on depression and anxiety symptoms which were measured with a PHQ-9 and GAD-7 questionnaires as well as attitudes towards using a chatbot which was measured using a technology acceptance model questionnaire.

5 RESULTS

We will first report the therapeutic alliance of the users at the end of the study followed by their preferences for the different personalizable aspects and their intentions to use the chatbot.

5.1 Therapeutic alliance

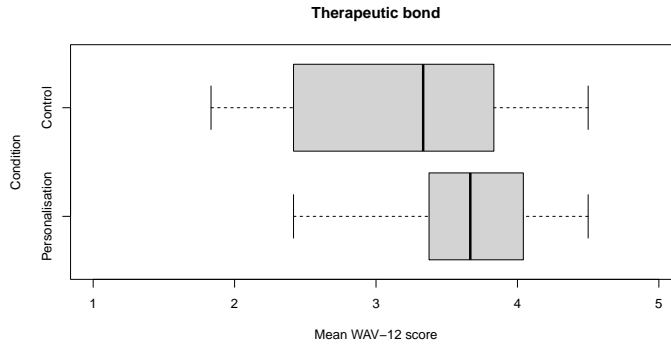


Fig. 2. Answers on the WAV-12 questionnaire at the end of the study.

The scores of the participants on the WAV-12 questionnaire at the end of the the study are visualized in Figure 2. The mean therapeutic alliance score, which ranges from 1 to 5, was 3.182 in the control condition and 3.673 in the personalization condition. The scores on both conditions were normally distributed according to a Shapiro-Wilk test and an unpaired t-test showed that this was a significant difference ($t = -2.519, df = 45.575, p = 0.0153$). On the task subscale of the questionnaire (questions 2, 8, 10, 12), the control condition had a mean score of 3.120 while the personalization condition had a mean score of 3.444. On the goal subscale (questions 1, 4, 6, 11) the control condition had a mean score of 3.305 while the personalization condition had a mean score of 3.509. On the bond subscale (questions 3, 5, 7, 9) the control condition had a mean score of 3.120 while the personalization condition had a mean score of 4.065. Although the personalization condition had higher mean scores on all the subscales, only the score on the bond subscale was found to be significant according to a Mann-Whitney U test ($W = 204.5, p = 0.005$).

5.2 Usage intentions

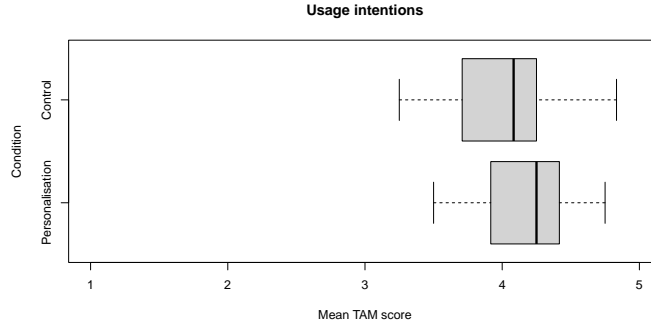


Fig. 3. Answers on the technology acceptance model questionnaire at the end of the study.

The scores on the technology acceptance model questionnaire at the end of the study are visualized in Figure 3. This gives an indication of the intentions to continue using the chatbot after the study has concluded. The mean score of the participants was 4.049 in the control condition and 4.188 in the personalization condition. The scores of both conditions were normally distributed according to a Shapiro-Wilk test. However an unpaired t-test showed that this difference was not significant ($t = -1.2846$, $df = 48.543$, $p = 0.205$).

5.3 Personalizable aspects preferences

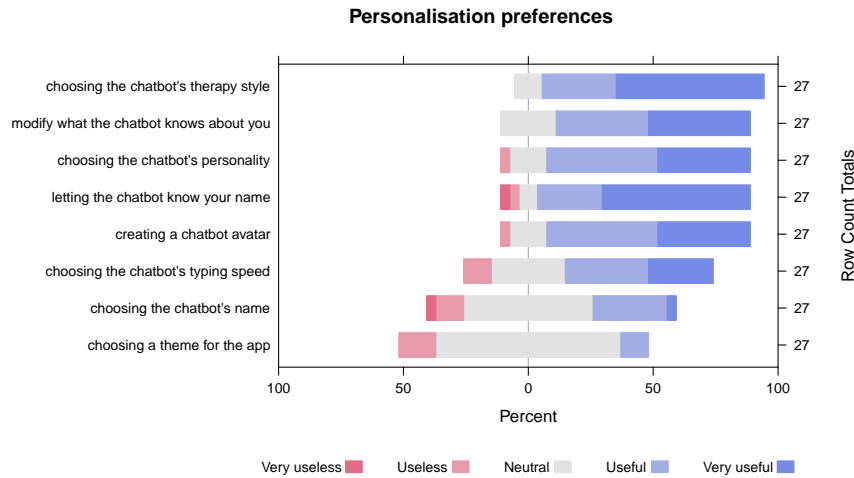


Fig. 4. Answers of participants in the personalization condition on statements about the usefulness of the personalizable aspects.

The responses to the questionnaire which measured how useful the personalizations were is shown in Figure 4. An inductive, iterative thematic analysis was performed on the justifications of the scores provided by the participants.

Choosing the chatbot’s therapy style. Most users considered this useful or very useful. 17 participants said this allowed the therapy to be tailored to their specific needs, with P1 mentioning: *“I like that you can modify the therapy style according to the way you want to treat your problem.”*. 6 participants indicated that they found being able to choose the therapy style helpful because it allows the psychotherapy chatbot to meet their expectations, P13 mentioned: *“This is a good way to make sure you are on the same page with your therapist and have the same expectations.”*.

Modify what the chatbot knows about you. 15 participants indicated that they found this useful because it provides transparency about what the chatbot knew about them, P16 mentioned: *“This way I get insight into the conclusions on which it continues to build behind the scenes.”*. 7 participants felt it was important to get direct control over the chatbot, with P11 mentioning: *“I found it useful when the chatbot had interpreted something wrong because I could then correct it.”*.

Choosing the chatbot’s personality. 17 participants indicated that different people would prefer a different personality and therefore they found this useful to be able to choose. 5 participants reported feeling more comfortable by being able to set the chatbot’s personality, with P4 mentioning: *“Since I was able to choose how the chatbot should interact with me I felt more comfortable.”*.

Letting the chatbot know your name. 21 participants indicated that the chatbot’s use of names in messages made conversations more personal. Users appreciated that they were sometimes addressed by name, with P15 mentioning: *“This way the conversation feels more personal, you don’t feel like a number.”*.

Creating a chatbot avatar. 15 participants indicated that creating an avatar was helpful in making them feel comfortable while using the chatbot, with P14 mentioning: *“I found it useful because it allows you to create an avatar that you feel comfortable with.”*. 6 participants indicated that being able to choose and customize the avatar yourself makes the psychotherapy chatbot more personal, with P23 mentioning: *“It still gives a little more personal touch to whole chatbot story.”*.

Choosing the chatbot’s typing speed. 10 participants indicated that being able to choose the typing speed was useful because they had a preference for the fast typing speed, with P9 mentioning: *“I read fast, so it is good that there is a fast option.”* 6 participants found it helpful to be able to choose the slow typing speed, with P21 mentioning: *“Too fast is unnatural, a slow typing speed is more like a human being.”*.

Choosing the chatbot’s name. 5 participants indicated that being able to name their chatbot made it more personal and human, with P12 mentioning: *“Makes it more personal, that you’re not just talking to a chatbot but a little more to someone.”*. 2 participants indicated that being able to self-select the name of the chatbot was helpful in avoiding bad memories that may be associated with a particular name.

Choosing a theme for the app. 8 participants indicated that being able to choose a theme had little impact on their interactions with the chatbot and therefore consider it less useful. 6 participants indicated that the current themes were too limited and unremarkable. 3 participants indicated that having a theme provided an appropriate atmosphere and allowed certain characteristics of the chatbot to complement itself, with P24 mentioning: *“I prefer purple theme for tranquility.”*.

6 DISCUSSION

We will now discuss the increased therapeutic alliance of the personalization condition and try to link it to the personalization preferences of the participants. We will also provide insights into the usage intentions of the participants and limitations of our study.

6.1 Therapeutic Alliance

The mean therapeutic alliance of participants in the personalization condition is significantly higher than the mean therapeutic alliance of participants in the control condition. This is important because the therapeutic alliance has been robustly linked to a higher likelihood of therapeutic success [9, 19] and adherence to therapy [1]. Being able to personalize a psychotherapy chatbot leads to higher scores on both the task subscale, goal subscale and bond subscale. However, only the difference on the bond subscale is significant.

The therapeutic alliance achieved in this study is also similar to that of between a client and a human therapist. The mean total score on the WAV-12 questionnaire of the personalization condition is 3.673, which is comparable to the mean WAV-12 total score of 3.76 found in the study in which the WAV-12 questionnaire was validated [25]. The bond subscale even has a higher mean score of 4.065 than the mean score of 3.97 found in the WAV-12 study. At first glance, this may seem strange, but 13 participants reported that they found the chatbot accessible and felt they did not have to be ashamed to ask personal questions. It could therefore be possible that explaining your problems is easier to a psychotherapy chatbot than a therapist.

It is worthwhile to note that when compared to the research of Darcy et al. [7] around the therapeutic bond with the psychotherapy chatbot Woebot. The participants had a mean total score of 3.36 on the WAI-SR questionnaire. This is the English version of our therapeutic alliance questionnaire. Our mean therapeutic alliance score of 3.673 in the personalization condition thus exceeds the mean score found in their study. This gives an indication that being able to personalize can have a significant impact on the therapeutic alliance with the chatbot.

6.2 Personalizable aspects

It is important to know which personalizable aspects can explain the difference in therapeutic alliance between the control and personalization condition. We believe the personalizable aspects specified below to have had an impact on the subscales of the WAV-12 questionnaire.

Therapy style. Being able to choose the therapy style of the chatbot was considered a useful or very useful aspect by almost all participants. We believe that giving users more influence in their therapy has led to higher scores on WAV-12 questions regarding the agreement on therapy goals and questions that deal with the division of tasks between the chatbot and user to achieve these goals. We therefore think that this had an impact on the scores on the task and goal subscales of our questionnaire.

Personality. Being able to choose the personality of the chatbot was considered useful or very useful by almost all participants. Participants indicated that being able to choose, ensures that the personality can then be matched to their specific needs. We therefore think that being able to choose a matching personality probably has led to higher scores on the bond subscale of our questionnaire.

Modify what the chatbot knows about you. Participants also found it useful to see what the chatbot knew about them and modify it. This personalization option provides the opportunity to directly influence therapy goals and make

them better match what the person wants. We therefore believe that this contributed to higher scores on the task and goal subscales.

Letting the chatbot know your name. Most participants also found it useful that the chatbot sometimes used their name in the messages. This provided a more personalized experience, according to participants. We think this led to a higher score on the bond subscale.

Creating a chatbot avatar. Most participants found it useful to be able to personalize the chatbot’s avatar. Participants indicated that this made them feel more comfortable using the chatbot, that it made the psychotherapy chatbot more personal and that personalizing the chatbot already created an initial connection with the chatbot. We therefore think that the avatar personalization played a role in the higher score on the bond subscale of the WAV-12 questionnaire.

6.3 Usage intentions

The mean score on the technology acceptance model questionnaire was 4.01 in the control condition and 4.22 in the personalization condition. However this difference was not significant. We think this is because regardless of which settings, the chatbot was able to have relevant conversations with the participants. In both conditions, participants indicated that the chatbot was able to provide good tips and advice. Participants also found it helpful that the chatbot was able to link back to previous conversations and that the chatbot was accessible and reachable. Moreover, 21 participants from the control condition and 20 participants from the personalization condition indicated that the chatbot had helped them in some way with their mental health.

6.4 Limitations

This study has limitations such as that the study participants were direct or indirect contacts of the researcher. Efforts were made to work with indirect contacts as much as possible where they were acquaintances of acquaintances of the researcher. Still, this introduces a bias in the results. We do think that this is not a problem when comparing the conditions since the participants were randomly assigned so the bias in both condition should also be equal. The participants used the chatbot only for a week which is short compared to normal psychotherapy treatment. On this short time period we found significant results but the effects of the therapeutic alliance could possibly change over time. In our study the therapeutic alliance with the chatbot was measured using the WAV-12 questionnaire. This questionnaire has only been validated in context with a licensed psychologist. However, it served as a sufficient proxy to measure our intended outcomes.

7 CONCLUSION

To our knowledge, prior to this study, no study has examined the effect of personalization on a psychotherapy chatbot. This is strange considering psychological problems are often very personal and often require a good match with the psychologist. This study shows that personalizing a psychotherapy chatbot can lead to a significantly higher therapeutic alliance with the psychotherapy chatbot, which is an important construct from psychotherapy and has been robustly linked to a higher likelihood of therapeutic success. The most useful personalizable aspects found are those that have an impact on the chatbot’s dialogue, such as the therapy style and personality of the chatbot. Being able to customize what the chatbot has learned about the user, using the user’s name in messages and being able to customize an avatar are also believed to have a significant impact on this therapeutic connection. Although the difference is not significant, participants who could personalize their chatbot on average had a higher technology acceptance model score and there

were a greater percentage of participants from this condition who would like to use the current chatbot both now and in the future. No participant had previously used a psychotherapy chatbot, but in both conditions participants' experiences were positive. 49 out of 54 participants reported that the chatbot had helped them in some way with their mental health. This is remarkable and shows the potential of a psychotherapy chatbot. Moreover, 53 participants indicated that they would like to use a psychotherapy chatbot in conjunction with a psychologist. Thus, being able to integrate both is important in the future. A personalizable chatbot can serve as an accessible, always available, low-cost first step for psychological help as well as a way for professionals to follow up with their clients in between therapy sessions.

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A ADAPATED WAV-12 QUESTIONNAIRE

All statements had be answered with either:

Seldom Sometimes Fairly Often Very Often Always

- (1) As a result of these sessions, I am clearer as to how I might be able to change.
- (2) What I am doing in these sessions with the chatbot gives me new ways of looking at my problem.
- (3) I believe that my chatbot likes me.
- (4) My chatbot and I collaborate on setting goals for my therapy.
- (5) My chatbot and I respect each other.
- (6) My chatbot and I are working towards mutually agreed-upon goals.
- (7) I feel that my chatbot appreciates me.
- (8) My chatbot and I agree on what is important for me to work on.
- (9) I feel my chatbot cares about me even when I do things that he/she does not approve of.
- (10) I feel that the things I do with the chatbot will help me to accomplish the changes that I want.
- (11) The chatbot and I have established a good understanding of the kind of changes that would be good for me.
- (12) I believe the way we are working with my problem is correct.