The Effect of Personalizing a Psychotherapy Conversational Agent on Therapeutic Bond and Usage Intentions

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While 33.6% of college students suffer from mental health problems, only 24.6% of these students with symptoms would seek professional help due to their personal attitudes or costs associated with therapy. Psychotherapy chatbots may offer a solution as they are always available, anonymous, and cost-effective. Research has shown that these chatbots can significantly reduce symptoms of anxiety and depression. However, there is a lack of understanding about the personalization preferences of users and the effects of personalization on health outcomes. To investigate this, we developed a personalizable psychotherapy chatbot designed to provide personalized help. In a randomized controlled trial (n= 54), participants were either assigned to a personalizable condition or a non-personalizable control condition. After 1 week of usage, participants had a significantly higher therapeutic bond with the personalized version compared to the baseline. In fact, the therapeutic bond was similar to that between a psychologist and his client. This is a promising result, as a high therapeutic bond has been linked to therapeutic success in psychotherapy. Participants reported that the therapy style, personality, and avatar were the most important personalizable aspects of the chatbot. Participants also liked the chatbot's usage of their name and the transparency about what the chatbot had learned about them. These features are likely important for establishing a strong therapeutic bond with users. However, the ability to personalize the chatbot had no impact on the usage intentions of the participants. This can be explained by the fact that users from both conditions equally reported that the chatbot was able to help them with their mental health. 53 participants also indicated that they would be willing to use a psychotherapy chatbot when integrated with a human therapist. These findings indicate the potential of psychotherapy chatbots and the need for further research on their integration with traditional psychotherapy.

CCS Concepts: • **Information systems** → **Decision support systems**; • **Human-centered computing** → **User studies**; **User models**; • **Computing methodologies** → *Artificial intelligence.*

Additional Key Words and Phrases: affective computing, generative ai, conversational interfaces and assistants, personalization

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1 INTRODUCTION

Symptoms of anxiety and depression are common among college students. A systematic review by Li et al. [22] 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 [22]. The most common obstacles are a preference for wanting to solve the problem on their own, feelings of shame when asking for help, and finding the cost associated with

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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 [33]. This waiting time is an obstacle for people who need urgent care. The lack of mental health care is a significant problem, as having depression during higher education is linked to lower academic performance and poorer functioning later in life for these individuals [14].

Chatbots could be a possible solution, as therapy given by a chatbot removes many of the aforementioned obstacles by being always available, often inexpensive, anonymous, listening without judging, and allowing 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 [10, 12, 17].

In psychotherapy, personalization is important, as it is essential to tailor the treatment to the unique needs of a patient. 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 [18]. Health apps also often suffer from poor user retention, as the number of daily active users is often only 4% [4]. The self-determination theory [29] 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 give 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 the effectiveness of the therapy.

As far as we know, no research has yet investigated the effect of personalizing a psychotherapy chatbot on health outcomes and usage intentions. So the goals of our study are to determine which personalizations users prefer and investigate the effect of those personalizations on usage intentions and therapeutic bond with the chatbot. The therapeutic bond represents the emotional bond with the therapist and agreement on tasks and therapy goals. A higher therapeutic bond has been robustly linked to a higher likelihood of therapeutic success [11, 25]. Allowing users to personalize their chatbot might thus increase the therapeutic bond with the chatbot as it allows the user to create a chatbot they feel more related to, which could increase the emotional bond with the chatbot. Personalization also allows users to tailor the therapy to their specific needs, which could increase agreement on tasks and therapy goals. Lambert and Barley [20] found that factors such as the therapeutic bond, empathy, and warmth contribute 30% of the variance in therapy outcomes, while the specific therapeutic technique itself only contributes 15% which shows that the therapeutic bond is an important predictor of therapeutic success. This leads us to the following research questions:

RQ1: Does personalization of a psychotherapy chatbot lead to a higher therapeutic bond?
RQ2: Does personalization of a psychotherapy chatbot lead to higher usage intentions?
RQ3: Which personalizations of a psychotherapy chatbot do users prefer?

To answer these questions, we have developed a new personalizable psychotherapy chatbot based on ChatGPT. The chatbot is able to learn about the user and gives personal advice on how they can improve their mental health. 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 the personalization preferences regarding a psychotherapy chatbot and the effects of those personalizations on therapeutic bond and usage intentions. This paper also illustrates how ChatGPT can be used in a psychotherapy setting.

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

Chatbot	Method	Results chatbot
Tess [12]	2 weeks chatbot or self-help book	Decrease PHQ-9, GAD-7
Woebot [10]	2 weeks chatbot or self-help book	Decrease PHQ-9, GAD-7
Wysa [17]	2 weeks user observation	Decrease PHQ-9
Mylo [13]	2 weeks chatbot or ELIZA	Decrease DASS-21
Bunji [27]	2 months user observation	Decrease PHQ-2
Xiaonan [23]	16 week chatbot or self-help book	Decrease PHQ-9, GAD-7
Vitalk [8]	30 day app usage	Decrease PHQ-9, GAD-7

2 RELATED WORK

Our study is at the intersection of three research areas: psychotherapy chatbots, chatbot personalization anddigital therapy personalization. We will give an overview of the research in those domains.

2.1 Psychotherapy chatbots

ELIZA was one of the earliest psychotherapy chatbots, providing answers to users' questions to encourage further reflection on their problems [34]. ELIZA demonstrated that meaningful conversations with a computer were possible. However, it is only recently that research regarding the effectiveness of chatbots to help people with their mental health has been done. Fulmer et al. [12] showed that their chatbot Tess was capable of significantly reducing symptoms of anxiety and depression after 2 weeks of interaction, as measured by the GAD-7 and PHQ-9. Fitzpatrick et al. [10] developed Woebot, a chatbot capable of giving a form of cognitive behavioral therapy (CBT). In their research, they recruited 70 participants from a university community who received either their chatbot (Woebot) or a self-help book over a period of two weeks. They found that only the condition in which the chatbot was shown, a reduction in depression symptoms was measured by the PHQ-9. 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 [10, 12, 23]. Cognitive behavioral therapy [8, 10, 23], client-centered psychotherapy [13] as well as combinations of different therapeutic styles [12, 17] have been implemented in a chatbot with positive results. The effects also do not appear to be culturally bound, as both American [12] and Chinese [23] subjects show a reduction in symptoms. However, none of these studies investigated the effect of allowing users to personalize their chatbot. In conventional psychotherapy, it is recognized that selecting an appropriate therapeutic approach for a patient's symptoms and establishing a strong therapist-patient match are essential. Therefore, enabling users to personalize their chatbot allows them to tailor the therapy to their specific needs, potentially increasing the effectiveness of psychotherapy chatbots. Another limitation of the chatbots listed in Table 1 is that they are rule-based with predefined outputs and a restricted number of possible inputs at each turn of the conversation. To allow for more conversational freedom and natural interaction, we use a LLM (ChatGPT) in our chatbot to generate answers.

2.2 Chatbot personalization

A systemic review on ways to personalize a chatbot in a healthcare environment found that the use of personalization was mainly limited to tailoring the content delivered by the chatbot [18]. These personalizations include feedback on

mood states, symptom summaries, current progress towards goals, reminders, and questions on health status. The conversational style of the chatbot was also sometimes personalized to be tailored to the mood of the user. However the systematic review found that not only was the usage of personalizations limited, also the effect of these personalizations was often not directly assessed, leading to a lack of understanding of the impact of personalization in a healthcare context.

In regards to personalizing a psychotherapy chatbot, Kuhlmeier et al. [19] developed prototypes of a personalizable psychotherapy chatbot and interviewed potential end users about their personalization preferences. The results showed that participants would like to personalize the role of the chatbot, as some participants wanted the chatbot to behave as a friend and others as a psychologist. Participants would also like to personalize aspects such as the usage of GIFs by the chatbot, the cosmetics and theme of the app, the name of the chatbot, and the type speed of the messages. An important limitation of this study is that it used a single interaction with a prototype in which the chatbot itself was not implemented. In our study, participants interact with a working prototype for a week, allowing them to experience the impact of their personalizations in a realistic setting, which will potentially lead to more accurate results regarding personalization preferences.

Although the effect of personalizing a psychotherapy chatbot on health outcomes is poorly understood, research has shown that personalizing a chatbot can have positive effects in other settings than psychotherapy. Shumanov et al. [30] 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, users reported higher self-efficacy [24]. Nißen et al. [26] created 4 different personas for their chatbot, each consisting of an avatar, name, conversational style, and a social role. They found that when participants could choose the persona for their chatbot, they had a better relationship with the chatbot compared to using a predefined persona. Personalizing chatbots is also associated with higher satisfaction, engagement, dialogue quality, and a higher likelihood of positive behavior change [18].

In conclusion, previous research has highlighted the positive effects of personalization on aspects such as self-efficacy, relationship with the chatbot, a higher likelihood of behavior change, and engagement. However, personalizable aspects are often limited, and in a psychotherapy context, more research is necessary regarding which aspects of a chatbot are useful to be personalized and what the effect of those personalizations on health outcomes is.

2.3 Personalization of digital psychotherapy

The personalization of digital psychotherapy is a relatively new research area. Birk and Mandryk [6] 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 [5] showed that in the context of a 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. [31] 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 conditions 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 necessary on which aspects besides an avatar could be personalizable. None of these studies made use of

Table 2. Overview of the formative studies to develop the personalizable chatbot prototype used in the final study. Studies are listed in the order in which they took place.

Formative Study	Participants	Purpose
Think-aloud Study 1	10	Testing Usability of Personalization Interface
Think-aloud Study 2	18	Testing Usability of Chatbot
HCI Expert Co-design Session	3	Testing Usability of Final Prototype
Medical Expert Interaction	1	Testing Appropriateness of Chatbot

a chatbot, which makes our study a potentially valuable addition to the research surrounding the personalization of digital therapy.

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 two consecutive think-aloud studies where participants interacted with prototypes of the chatbot and filled out 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. An overview of these formative studies is displayed in Table 2.

The first think-aloud study was intended to assess and extract guidelines for designing personalizable features and comprised of 30 minute sessions with 10 participants (diverse in age and profession, recruited through in-person snowball sampling). Two React web app prototypes were developed: one fully personalizable prototype and one with predefined options. For this study, only the user interface was implemented and not the chatbot itself. Users were asked to personalize both prototypes and interact in a mock conversation. Afterwards, users could rate each personalizable feature on a 1-5 scale, as well as each prototype on the SUS (system usability) scale [3]. We distilled initial guidelines regarding chatbot personalization, such as a preference for emotional conversation styles and a low need for GIF and emoji use, and found the fully personalizable version to have a significantly higher SUS score, hinting at increased perceived usability when having more freedom of choice.

With this feedback, we further developed the fully personalizable prototype and also included the Rasa framework[1] and ChatGPT API to implement the chatbot. To assess conversation quality, a second think-aloud study was held with 18 users (diverse in age and profession, recruited through social media) in which they had to personalize the chatbot, follow a structured self-help exercise, and have a brief conversation with the chatbot about a made-up mental health issue of choice. Users experienced difficulty with the structured self-help exercise itself without sufficient additional help and found messages given by the goal-oriented chatbot to be too lengthy, so we made adaptations accordingly. The prototype had a mean SUS score of 79.71 (7.64 standard deviation) at the end of the second prototype study, which according to Bangor et al. [3] is a good score.

Our third user study involved a co-design session with 3 HCI experts to assess usability and elicit new personalization techniques. The session lasted 1 hour, in which they were asked to interact with the prototype improved after the second

[1]https://rasa.com

think-aloud study and give any relevant feedback. The experts deemed the chatbot application and its interactions very user-friendly, but suggested additional features such as reminder notifications and mood tracking.

Finally, to ensure medical validity of our study, we applied for ethical approval from our university KU Leuven and assessed our final prototype with a medical expert (a clinical psychologist not previously involved in the research) through a semi-structured interview. Given the approval from both the ethical committee and the medical expert, we were able to proceed with the evaluation study.

3.2 Personalizable features

Our chatbot implemented a range of personalizable features, including an avatar creator. This avatar creator allows the user to choose the gender, age, skin color, hairstyle, hair color, facial hair, earrings, and clothes of the chatbot avatar. Avatar personalization is often used in research regarding the personalization of digital therapy and has been linked to increased engagement [5, 6, 31]. Research has also shown that humans prefer conversation partners who look similar to them [2]. Thus, allowing participants to create an avatar resembling themselves may lead to a sense of comfort during interactions, which could have a positive effect on the therapeutic bond.

The findings of Kuhlmeier et al. [19] indicated that users wanted to personalize the role of the psychotherapy chatbot. This inspired us to offer peronalizations regarding the conversational style of the chatbot. The systematic review of Kocaballi et al. [18] revealed that the effect of personalizing the conversational style of a chatbot on health outcomes is poorly understood, which makes it valuable to investigate this aspect. We found the conversational style too general and wanted to make a distinction between the type of content and the manner in which it is delivered. That's why we decided to split up conversational style into therapy style and personality of the chatbot.

For therapy style, users are presented with the choice between a Socratic style, characterized by the use of open-ended questions, and a goal-oriented style, where the chatbot focuses on giving concrete advice. This allows users to tailor the interaction with the chatbot based on a preference for either exploring their thoughts or practical problem-solving.

For chatbot personality, users could select a personality suitable for the nature of their discussions. The options were between a professional personality, where the chatbot is knowledgeable and assertive, a compassionate personality, where the chatbot is kind and understanding or 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 by which the chatbot would address the user in messages, a name for the chatbot, and a theme for the app (black and white, green, blue, or purple). Upon completion of the personalization of the chatbot, users are greeted with a welcome message from the chatbot and are able to engage in conversations. A visual representation of this interface is provided in Figure 1. With the "brain" button at the top right, users can also see and modify a description the chatbot has generated about them. This description serves as the memory of the chatbot and by making adjustments, users can further personalize the dialogue of the chatbot.

The personalizable aspects can thus be grouped into functional personalizations (therapy style, personality, usage of the user's name, modification of a user description the chatbot had generated about them) and cosmetic personalizations (avatar, theme of the app, typing speed, chatbot name).

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 and desktops. The chatbot itself was implemented using Rasa which allowed us to detect whether

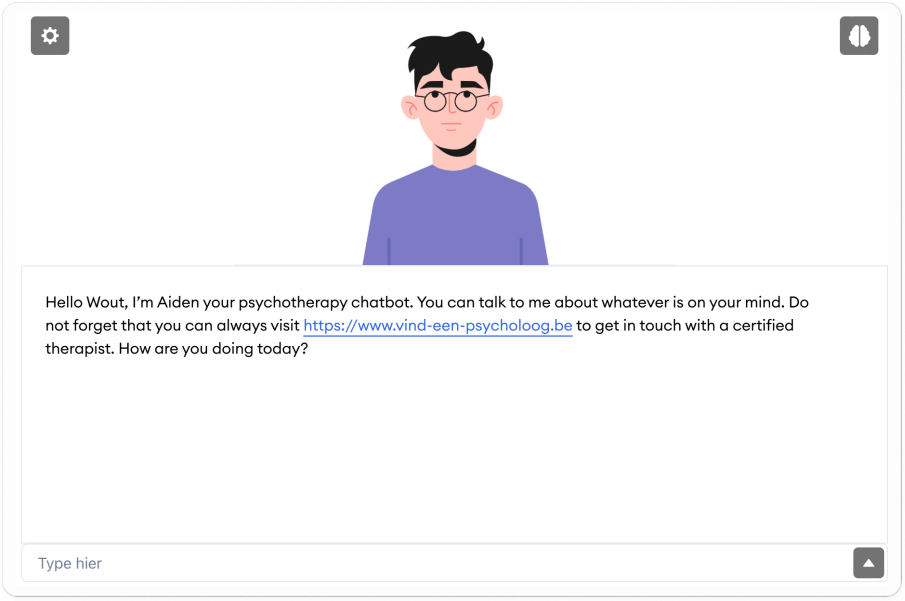

Fig. 1. Chatbot interface, depicting the chatbot avatar (that can be personalized depending on the condition), chat interface, and the 'brain' button in the upper left that leads to the learned traits.

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, it responded with contact information for the suicide hotline or a site that contained contact information of psychologists. Otherwise, our chatbot would run Python code that contained a ChatGPT API call. In this 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 their message. The ChatGPT prompt would also contain a description of the user, which was learned by having ChatGPT summarize the conversation with the user. This description 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. To maintain participant privacy, interactions were stored under an anonymous participant code in our database. We also took proactive measures to prioritize and safeguard user well-being. Recognizing the delicate nature of this field, we integrated a filtering system to identify and appropriately handle sensitive topics, such as self-harm or other urgent matters, which might not be suitable for ChatGPT's API due to its susceptibility to producing inaccurate responses. In instances where such sensitive topics are detected, we fall back on the Rasa framework to safely navigate users towards relevant hotlines or essential information. A sample conversation is given in Appendix B.

4 METHODS

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

4.1 Research design

For the final study, we conducted a longitudinal randomized controlled trial in which participants were either assigned to the control condition (in which all the personalizable features were initialized to random values and could not be modified) or the personalization condition (in which the chatbot was fully personalizable). Participants were asked to have conversations with the chatbot during a period of one week. The conversations should pertain to their own possible mental health concerns (e.g., stressful situations, lack of motivation, trouble falling asleep) as often as they want but for at least three times for several minutes during the week. Additionally, to ensure participants interacted with the chatbot, they received three text message reminders during the week of the study to nudge them to use the chatbot. At the end of the week, the therapeutic bond was measured using the WAV-12 questionnaire, which is a clinically validated Dutch version of the WAI-S [32]. The WAV-12 contains a bond, task, and goal subscale that evaluates three 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 (TAM) [15]. Research has indicated that TAM is able to predict 30 to 40% of the variance in usage and is suitable to predict the use or acceptance of health IT [21]. Participants also had to fill out a questionnaire containing a 5-point Likert scale and open-ended questions to gain insights into the preferences of the participants for the personalizable aspects and their experience with the chatbot. We ensured ethical compliance, particularly concerning privacy and data sensitivity. Our protocol was reviewed and approved by KU Leuven's ethics committee G-2022-5996-R2(MAR).

4.2 Participants

Participants were recruited through a social media post with information about the study and supplemented by in-person outreach. Each participant had a 30-minute introduction via video call, delineating the study's scope and the chatbot's functionality. There were 55 participants at the start of the study, of which 27 were men and 28 were women. All participants were from Belgium and spoke Dutch. The participants were randomly assigned to two 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 personalization condition consisted of 11 male and 17 female participants with a mean age of 24.7 years (6.6 standard deviation). One participant in the personalization 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 in depression and anxiety symptoms, measured with the PHQ-9 and GAD-7 questionnaires, as well as attitudes towards using a chatbot which were measured using the TAM questionnaire.

5 RESULTS

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

5.1 Therapeutic bond

The scores of the participants on the WAV-12 questionnaire at the end of the study are visualized in Figure 2. The mean therapeutic bond score, which ranges from 1 to 5, was 3.182 (0.841 standard deviation) in the control condition

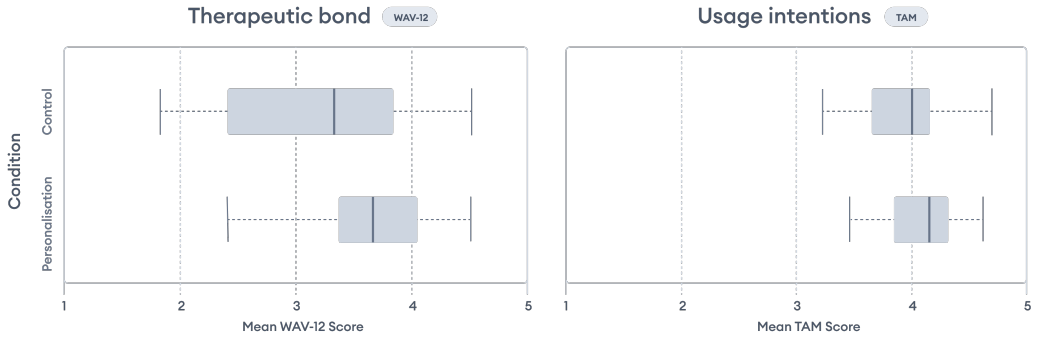

Fig. 2. Answers on the WAV-12 (left) and TAM (right) questionnaire at the end of the evaluation study.

and 3.673 (0.574 standard deviation) in the personalization condition. The scores were normally distributed in both conditions according to a Shapiro-Wilk test, and an unpaired t-test showed that this was a significant difference ($t = -2.519, df = 45.575, p = 0.015$). On the task subscale of the questionnaire (questions 2, 8, 10 and 12), the control condition had a mean score of 3.120 (0.881 standard deviation), while the personalization condition had a mean score of 3.444 (0.883 standard deviation). On the goal subscale (questions 1, 4, 6 and 11) the control condition had a mean score of 3.305 (0.920 standard deviation), while the personalization condition had a mean score of 3.509 (0.712 standard deviation). On the bond subscale (questions 3, 5, 7 and 9) the control condition had a mean score of 3.120 (1.242 standard deviation), while the personalization condition had a mean score of 4.065 (0.713 standard deviation). Although the personalization condition had higher mean scores on all the subscales, only the score on the bond subscale was significantly different according to a Mann-Whitney U test ($W = 204.5, p = 0.005$).

5.2 Usage intentions

The scores on the technology acceptance model questionnaire at the end of the study are visualized in Figure **??**. This gives an indication of the intention 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. Although the personalization condition had higher usage intentions, an unpaired t-test showed that this difference was not significant ($t = -1.285, df = 48.543, p = 0.205$).

5.3 Preferences for personalizable aspects

The responses to the questionnaire measuring how useful participants regarded the different personalization options at the end of the study are shown in Figure 3. An inductive, iterative thematic analysis was performed on the justifications of the scores provided by the participants. We go through the personalizations in order of reported usefulness.

Choosing the chatbot's therapy style. Most users considered the ability to choose the therapy style useful or very useful, with 17 participants mentioning that this allowed the therapy to be tailored to their specific needs. P1 says: "*I like that you can modify the therapy style according to the way you want to treat your problem.*". Six participants indicated that they found being able to choose the therapy style helpful because it allowed 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*

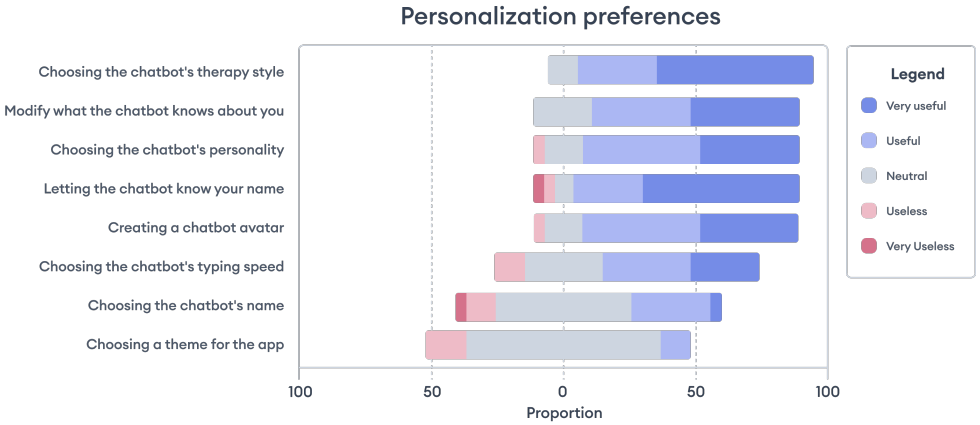

Fig. 3. Answers of participants in the personalization condition on statements about the usefulness of the personalizable aspects.

and have the same expectations.". The goal-oriented therapy style was the most popular, with 68% choosing it over the Socratic style.

Modify what the chatbot knows about you. The feature to modify what the chatbot has learned about the user was perceived as useful by 15 participants, as it provides transparency about what the chatbot knew about them. P16 mentioned: "*This way I get insight into the conclusions on which the chatbot continues to build behind the scenes.*". Additionally, 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. Next, 17 participants indicated that different users would prefer different chatbot personalities, and therefore found the ability to tailor the chatbot's personality useful. Additionally, 5 participants explicitly 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.*". The most popular personality was the compassionate personality (13 participants), followed by the lighthearted personality (9 participants), and the professional personality (6 participants).

Letting the chatbot know your name. A total of 21 participants indicated that the chatbot's usage of the user's name 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. In total, 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 increases how personal the psychotherapy chatbot was perceived, with P23 mentioning: "*It still gives a little more personal touch to the whole chatbot story.*".

Choosing the chatbot's typing speed. Being able to choose the typing speed was useful for 10 participants as they had a preference for the faster typing speed, with P9 mentioning:"*I read fast, so it is good that there is a fast option.*"

Conversely, 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. Only 5 participants indicated that being able to name their chatbot made it more personal and human, with P12 mentioning: "*Makes it more personal, it feels like you're not just talking to a chatbot but to a real person.*". Two 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 considered it less useful. Furthermore, 6 participants indicated that the current themes were too limited and unremarkable. Three 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 the purple theme for tranquillity.*".

6 DISCUSSION

We will now discuss these results to provide an answer to our research questions.

6.1 RQ1: Does personalization of a psychotherapy chatbot lead to a higher therapeutic bond?

The mean therapeutic bond was significantly higher in the personalizable condition compared to the control condition, suggesting that the ability to customize a psychotherapy chatbot enhances the therapeutic bond. This is important as the therapeutic bond has been robustly linked to a higher likelihood of therapeutic success [11, 25] and adherence to therapy [1]. Being able to personalize a psychotherapy chatbot led to higher scores on the task subscale, goal subscale, and bond subscale. However, only the difference on the bond subscale was significant. This may be attributed to the fact that interpersonal similarity between humans tends to drive increased interaction during the initial phases of a relationship [2]. Allowing users to create a chatbot that resembles and communicates similarly to themselves might thus lead to higher scores, especially on questions of the bond subscale concerning the chatbot's likeability and mutual respect.

The higher therapeutic bond might also be attributed to the increased autonomy given to users in the personalization condition. Providing users with more autonomy and extensive chatbot customization options might facilitate agreement on therapy goals, the division of tasks between the user and the chatbot, and a stronger emotional bond. The personalization options also permit users to tailor the chatbot to their specific needs, potentially resulting in a stronger sense of connection and more effective therapy. Future research should consider explicitly measuring perceived levels of autonomy and relatedness since these factors may not only improve intrinsic motivation, as stated by the self-determination theory, but also explain the increase in the therapeutic bond.

The therapeutic bond achieved in our study is comparable to that between a client and a human therapist. In the personalization condition, the mean total score on the WAV-12 questionnaire was 3.673, which is similar to the mean WAV-12 total score of 3.76 from the validation study of the WAV-12 [32]. Additionally, the mean score on the bond subscale of the personalization condition of 4.065 was even higher than the mean score of 3.97 in the WAV-12 study. At first glance, it may seem surprising that a chatbot can establish a therapeutic bond similar to that of a human therapist. However, 13 participants reported that the chatbot was approachable, and they felt they did not have to be ashamed to ask personal questions. It is thus possible that sharing one's problems with a chatbot is easier than with a human therapist due to the anonymity and lack of fear of judgement it provides.

The importance of personalization can also be seen when comparing our study to those of Darcy et al. [9], who examined the therapeutic bond of participants with the non-personalizable psychotherapy chatbot, Woebot. Participants in their study had a mean total score of 3.36 on the WAI-SR questionnaire, which is the English version of our therapeutic bond questionnaire. Our mean therapeutic bond score of 3.67 in the personalization condition surpasses the mean score reported in their study. This suggests that enabling users to personalize their psychotherapy chatbot might be very important, as it can substantially enhance the therapeutic bond.

6.2 RQ2: Does personalization of a psychotherapy chatbot lead to higher usage intentions?

The mean score on the TAM questionnaire was 4.01 in the control condition compared to 4.22 in the personalizable condition. However, this difference was not significant. So personalizing a psychotherapy chatbot did not lead to significantly higher usage intentions in our study. We expected the participants in the personalization condition to show higher usage intentions, as Birk and Mandryck demonstrated in their studies that personalization of an avatar led to higher engagement [5, 6]. However, Birk and Mandryck did not make use of a chatbot, so our study provides evidence that their results might not be directly applicable to psychotherapy chatbot personalization.

Furthermore, considering the self-determination theory, we would expect the personalizable condition to have higher usage intentions as they experienced greater autonomy and could create a chatbot they felt more related to [29]. We think a lack of a significant difference in usage intentions can be explained by the capabilities of ChatGPT, as regardless of the chosen personalizations, our chatbot is able to engage in relevant therapeutic conversations with participants. This is supported by the fact that 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. In both conditions, participants also indicated that the chatbot was able to provide good tips and advice. Additionally, the lack of a significant difference in usage intentions may be attributed to the relatively high TAM scores achieved in both conditions, making it challenging to detect a difference in usage intentions. It is also plausible that the study's duration was not sufficiently long to reveal a divergence in usage intentions between the conditions, as such differences might become more apparent over an extended period.

6.3 RQ3: Which personalizations of a psychotherapy chatbot do users prefer?

In our study, we observed that the majority of personalizable features were considered useful by the participants. Especially the functional personalizations (therapy style, personality, usage of the user's name, modification of user description generated about them) were considered need-to-haves, while cosmetic personalizations (avatar, theme of the app, typing speed, chatbot name) were closer to nice-to-haves. This observation is noteworthy in light of the findings reported by Rieke and Martins [28], which suggested that users are indifferent towards chatbot attributes such as avatars and conversational elements like humor. Our research, however, offers a contrasting perspective, specifically within the domain of psychotherapy chatbots, where these chatbot attributes may hold significant importance. It is also essential to find out which personalizable factors can explain the difference in therapeutic bond between the control and personalization conditions. We believe that the following personalizable factors likely had an influence on the subscales of the WAV-12 questionnaire.

Therapy style. The ability to select the therapy style of the chatbot was highly valued by nearly all participants, with the majority considering it either useful or very useful. We believe that giving users more influence over their therapy has led to higher scores on WAV-12 questions regarding agreement on therapy goals and questions about the

division of tasks between the user and the chatbot. We therefore think that this had an impact on the scores of the task and goal subscales of the WAV-12 questionnaire.

Our research shows that both a Socratic and goal-oriented therapy style might be successful in a psychotherapy chatbot. The psychotherapy chatbots from Table 1 don't allow users to switch between therapy styles. Additionally, these chatbots do not utilize an LLM language model like ChatGPT to generate responses. Instead, they employ scripted exercises based on established therapeutic approaches such as Cognitive-Behavioral Therapy (CBT), along which the chatbot guides the users. While our chatbot facilitates open-ended conversations, it may lack the capability to provide the correct therapeutic exercises. Therefore, a valuable enhancement to our therapy styles could involve integrating proven CBT and mindfulness exercises. These exercises could be organized in a vector database, enabling efficient retrieval by the chatbot when relevant. We believe that combining scripted exercises from older, rule-based chatbots with the unconstrained language generation of a language model like ChatGPT has the potential to be a valuable addition to a psychotherapy chatbot.

Personality. The ability to choose the personality of the chatbot was considered useful or very useful by almost all participants. Participants indicated that this choice enabled them to align the chatbot's personality with their specific needs. We therefore believe that being able to choose a matching personality has probably led to higher scores on the bond subscale of the WAV-12 questionnaire. We think personalization of personality is very important, as it makes the chatbot adaptable for discussing a wide range of topics.

Our study provides evidence that both a professional, compassionate, and lighthearted personality can be useful options to personalize the personality of a psychotherapy chatbot. Hudlicka et al. [16] achieved success in developing a personal coach for teaching mindfulness exercises by utilizing a motivational conversational style. These findings suggest that a motivational personality style could also be an additional personality suitable for a psychotherapy chatbot.

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 allows users to directly influence therapy goals and make them better match their needs. We therefore believe that this contributed to higher scores on the task and goal subscales. Offering transparency about what the chatbot has learned about the user might also increase the trust the user has in the chatbot. This also provided a form of memory for the chatbot, which is essential for an LLM to remember past conversations.

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 chatbot more personal, and that personalizing the chatbot already created an initial connection. We therefore think that avatar personalization played a role in the higher score on the bond subscale of the WAV-12 questionnaire. Birk and Mandryck previously associated avatar personalization with increased engagement, as demonstrated in a breathing exercise for anxiety reduction [7] and an attentional retraining task [5]. In contrast, our study did not observe a direct increase in usage intentions, as assessed by the TAM, suggesting that their findings may not apply to psychotherapy chatbots. However, it's worth noting that the TAM might not be a suitable metric for measuring engagement, and future research should consider alternative metrics such as message and login counts. While Six, S. et al. [31] did not observe a significant reduction in symptoms of depression when personalizing avatars in a mental health app, our own research suggests that avatar personalization may enhance the therapeutic bond, a factor associated with therapeutic success. This strengthened therapeutic bond should, over time, result in a notable reduction in depression symptoms, thus future

studies should include a measure of depression symptoms to see whether these findings of Six, S et al. are generalizable to psychotherapy chatbots.

7 CONCLUSION

To the best of our knowledge, prior to this study, no research had investigated the effect of the personalization of psychotherapy chatbots on health outcomes. This is remarkable, given the inherently personal nature of psychological issues. Our results show that personalizing a psychotherapy chatbot can lead to a significantly higher therapeutic bond with the chatbot, which is an important construct in psychotherapy and has been robustly linked to a higher likelihood of therapeutic success.

This improved therapeutic bond found in our study might be attributed to several factors. Firstly, allowing users to personalize their therapeutic chatbot allows users to create a conversation partner that mirrors their own characteristics and looks, which is also important in human relationships. Furthermore, allowing users to choose a specific therapy style, personality and modify what the chatbot had learned about them grants users greater autonomy by enabling them to tailor the chatbot's dialogue to their specific requirements. Notably, participants in the personalization condition developed a therapeutic bond similar to the bond with a human therapist. This might be explained by the fact that many users reported that they did not feel ashamed asking personal questions to a chatbot. This sense of anonymity and absence of judgment might create a comfortable environment for users to share personal and sensitive information.

Although the difference was not significant, participants with the ability to personalize their chatbot exhibited, on average, higher usage intentions, according to the TAM. The lack of a significant difference could be attributed to both conditions already achieving relatively high TAM scores, making distinctions harder to discern. Additionally, our chatbot, powered by ChatGPT, was able to help users regardless of the chosen personalizations.

The majority of the implemented personalizable features were perceived as useful by the participants. This is important, as previous research suggested that users were indifferent towards chatbot characteristics. The functional personalizable aspects affecting the chatbot's dialogue, such as its therapy style, personality, modifying information the chatbot had learned about the user, and the usage of the user's name were deemed most useful. We suspect that these played a significant role in improving the therapeutic bond. These functional personalizations can be seen as a need-to-haves, while the cosmetic personalizations such as the avatar, changing the typing speed, and a theme for the app can be considered nice-to-haves.

It is remarkable that although none of the participants had prior experience with a psychotherapy chatbot, 41 out of 54 participants reported that the chatbot had positively impacted their mental health at the end of the study, indicating the potential of psychotherapy chatbots as a valuable resource. Furthermore, 53 participants expressed their interest in using a psychotherapy chatbot in conjunction with a human psychologist, emphasizing the importance of integrating both in the future. A personalizable chatbot can serve as an accessible, always-available, and cost-effective initial step for individuals seeking psychological support. Additionally, it can facilitate professionals in maintaining contact with their clients between therapy sessions, potentially improving overall therapeutic outcomes.

8 LIMITATIONS AND FUTURE WORK

This study has limitations, such as the fact that the study participants were direct or indirect contacts of the researcher. Efforts were made to work with indirect contacts as much as possible, using snowball sampling. Still, this introduces a bias in the results. We believe that this is not a problem when comparing the conditions since the participants were randomly assigned, so the bias in both conditions should also be equal. The participants also used the chatbot only for a

week, which is short compared to normal psychotherapy treatment. In this short time period, we found significant results but the effects of the therapeutic bond could possibly change over time. Finally, in our study, the therapeutic bond with the chatbot was measured using the WAV-12 questionnaire. This questionnaire has only been validated in the context of licensed psychologists. However, it served as a sufficient proxy to measure our intended outcomes.

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A ADAPTED 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.

B SAMPLE CONVERSATION

AI therapist: Hello Wout, I am Daniel your personal AI assistant. You can talk to me about anything you are struggling with. Don't forget you can always go to https://www.vind-een-psycholoog.be to reach out to a licensed therapist. How is going today?
Client: Hi, today has been a bit challenging.
AI therapist: I'm sorry to hear that. What specifically made today challenging for you?
Client: Well, work has been really stressful, and I feel like I'm constantly under pressure.
AI therapist: I understand how that can be difficult. What are some specific things at work that are causing you stress and pressure?
Client: It's mainly the constant deadlines and the pressure to perform. I feel like I can never catch a break, and it's taking a toll on my mental well-being.
AI therapist: I can imagine how overwhelming it must be to constantly have deadlines and feel the pressure to perform. Taking care of your mental well-being is important. Have you considered any strategies to manage stress and create a better work-life balance?
Client: Not yet, what can I do?
AI therapist: There are several strategies you can try to manage stress and create a better work-life balance. One approach is to prioritize your tasks and break them down into smaller, more manageable chunks. This can help reduce the feeling of being overwhelmed. Additionally, make sure to take regular breaks throughout the day to recharge and relax. It's also important to set boundaries and establish a clear separation between work and personal life. This might involve creating a designated workspace and sticking to specific work hours. Lastly, engaging in activities that you enjoy outside of work can help you unwind and reduce stress. Is there anything specific you would like to try implementing?
Client: I think I am going to start taking more breaks.
AI therapist: That sounds like a great plan. Taking regular breaks can help refresh your mind and reduce stress. How often do you think you'll take breaks during your workday?
Client: Only once when I eat around 12.
AI therapist: Taking a break during your lunchtime can definitely be beneficial. However, it might also be helpful to take short breaks throughout the day, maybe for a few minutes every hour or so. This can help prevent burnout and keep you more focused and productive. How does that sound to you?
Client: That sounds good, I am going to try to implement it.