A Personalized Conversational Agent to Treat Depression in Youth and Young Adults – A Transdisciplinary Design Science Research Project

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Abstract. Depression is a large-scale and consequential problem in youth and young adults. Conversational agents (CAs) can contribute to addressing current barriers to seeking treatment, such as long waiting lists, and reduce the high dropout rates reported for other digital health interventions. However, existing CAs have not considered differences between youth and adults and are primarily designed based on a 'one-size-fits-all' approach that neglects individual symptoms and preferences. Therefore, we propose a theory-driven design for personalized CAs to treat depression in youth and young adults. Based on interviews with patients (i.e., people diagnosed with depression), we derive two design principles to personalize the character of the CA and its therapeutic content. These principles are instantiated in prototypes and evaluated in interviews with experts experienced in delivering psychotherapy and potential nondiagnosed users. Personalization was perceived as crucial for treatment success, and autonomy and transparency emerged as important themes for personalization. We contribute by providing design principles for personalized CAs for mental health that extend previous CA research in the context of mental health.

Keywords: Conversational agent · Mental health · Personalization · Transdisciplinary research

1 Introduction

Depression is one of the most common mental disorders in adolescence and early adulthood. Approximately 5.6% of young people worldwide are affected by depression [1]. The individual and social consequences are enormous. Affected individuals are more likely to exhibit physical impairment and substance abuse, have poorer academic results, and have an elevated risk of suicide [2–4]. Furthermore, depression causes high health

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economic costs [3]. Psychotherapy, delivered by human therapists, is an effective treatment and often the first choice to mitigate the individual and social consequences associated with depression [5, 6]. However, treatment resources are scarce: On average, people seeking help have to wait almost five months to start psychotherapy treatment [7]. In addition, young people experience two additional barriers when seeking treatment: First, they are significantly less likely to use professional support [8] due to feelings of shame, insecurity, and a greater desire to solve problems themselves [8]. Second, weekly in-person sessions with an adult therapist may not match the technology-driven lifestyle of youth and young adults. Although digital health interventions (DHI) are available and effective, studies have shown high dropout rates [5, 9]. Using a conversational agent (CA) may have great potential to tackle this problem. CAs are software systems that mimic human conversational behavior [10]. In contrast to other DHI, CAs can not only realize (1) the specific effects of therapy [11] by delivering therapeutic content, such as providing information on depression and working through exercises but also (2) the common factors of therapy [11], such as the alliance between patient and therapist, because CAs offer an interactive, conversational format that mimics human-delivered therapy [12–14]. By adding the realization of common factors, CAs seem thus promising to increase engagement and reduce dropout rates to match human-delivered therapy and ultimately improve treatment success. CAs in the context of mental health, such as the highly cited [13, 14] and successful commercial apps Woebot (woebothealth.com) and Wysa (wysa.io), provide self-guided therapy based on the principles of cognitive behavioral therapy (CBT), interpersonal therapy (IPT), or dialectical therapy and have shown promising effectiveness in reducing symptoms of depression [13, 14]. Moreover, users of mental health CAs report experiencing relationship building [15] and feelings of social support [16], which supports the argument that mental health CAs can also realize common factors of therapy and may thus be better suited than other DHI to treat mental health problems. Although preliminary evidence shows promising potential for CAs to reduce depressive symptoms, there are several limitations. First, the majority were tested in pilot studies with a focus on adults. However, youth differ from adults in terms of cognitive and emotional development, social relationships, and problem behavior [17]. In addition, neither the development nor the evaluation included participants diagnosed with clinical depression. Thus, the development and evaluation of CAs for youth (13–17 years) and young adults (18–25 years) must consider these aspects. Second, existing CAs are designed primarily based on a 'one-size-fits-all' approach that neglects individual symptoms and preferences [18]. This is particularly important for youth and young adults because they are used to personalizing the content and appearance of digital applications according to their own needs and preferences. Therefore, it is necessary to consider how CAs can be designed in a way that allows for personalization.

Against this backdrop, our research focuses on the question of how to design a personalized CA to treat depression in youth and young adults. To address this research question, we are conducting a comprehensive transdisciplinary design science research (DSR) project [19, 20]. In the first cycle, we first conducted interviews with youth suffering from depression to gain an in-depth understanding of the problem, their needs, and preferences. Based on the interviews, CBT and IPT, and theories of personalization [18, 21], we derived two initial design principles (DPs) for personalized CAs to treat

depression. Next, we instantiated these two initial design principles in four prototypes, which were evaluated in interviews with five experts and five potential users. Our results suggest that personalizing character and content is crucial to designing effective CAs to treat depression. In addition, transparency and agency are the most important aspects to consider when implementing personalization.

2 Related Work

2.1 Conversational Agents for Mental Health

The use of CAs to provide self-help psychotherapy interventions has been explored in several studies [22]. For example, a 2-week use of Woebot, a CA developed based on the theoretical foundations of CBT to work on depression-typical, dysfunctional thoughts or behaviors of depression, significantly reduced symptoms of depression [13]. Symptom reduction was also shown after using Wysa [14]. Recent reviews of mental health CAs reported high user satisfaction, sufficient effectiveness, and safety to conduct research with clinical populations [22]. In summary, CAs seem more suitable than other DHI, as users have reported experiencing social support [16] and a stronger working alliance [15].

2.2 Personalization

In the context of information technology, personalization has been defined as a 'process that changes the functionality, interface, information access, and content, or distinctiveness of a system to increase its relevance to an individual or a category of individuals [12, p. 183]. Users appreciate personalization features because they can improve ease of use, efficiency, and provide users with a feeling of being in control [23]. Our work draws on the frameworks of personalization approaches of Fan and Poole [21] and Kocaballi et al. [18]. Depending on the specific field of research and discipline, personalization is often used synonymously with adaptation, customization, and tailoring [21]. We decided to use the term personalization because it is commonly used in the medical and health literature [17]. Fan and Poole [21] conceptualize personalization along three dimensions: (1) what is personalized, i.e. the elements of the system that are being changed, (2) for whom is the personalization, i.e., the target: individual vs. group, and (3) who is in control of personalization, i.e. the user or the system. Within dimension (3), the authors differentiate between implicit (i.e., executed by the system) and explicit personalization (i.e., executed by the user), Kocaballi et al. [18] extended Fan and Poole's framework with (4) the purpose of personalization. Table 1 below illustrates the dimensions of personalization that serve as the basis for our proposed design.

In their review of personalization features in health CAs, Kocaballi et al. [18] pointed out that several CAs implemented personalization, such as tailoring content or interaction styles to individuals. However, they also identified a lack of investigating personalization within a theoretically grounded and evidence-based framework [18]. In our work, we mainly focus on the dimensions of purpose, elements, and agency.

Table 1. Dimensions of personalization (based on [18, 21])

Dimension	Question	Values (examples)
Purpose	What is the purpose of personalization?	Increased user motivation
Elements	What is personalized?	Content Functionality
Target	To whom is personalized?	Single-User vs. Group of Users
Agency	Who is in control of personalization?	System: implicit/adaptive User: explicit/adaptable Mixed initiative

3 Methodology

Our research project follows DSR approach [19] to solve an important real-world problem and design a personalized conversational agent to treat depression in youth and young adults. We chose this research approach because it allows iterative design [19, 25] and the participation of users and experts in the design and evaluation phases [19]. We conduct a transdisciplinary project due to (1) the focus on a complex problem, (2) the inclusion of an interdisciplinary team consisting of researchers from information systems, clinical psychology, and psychotherapists, and (3) involving societal actors (i.e., patients) as process participants [20]. A transdisciplinary approach is particularly important given that poorly designed mental health interventions can have fatal consequences. The DSR project is based on the well-established approach suggested by Kuechler and Vaishnavi [25] and divided into three design cycles to incrementally improve the functionality and impact of our artifact. In this paper, we report the results of the first design cycle, which focused on understanding the problem space (i.e., treating depression in youth and young adults using CAs) and exploring personalization to improve treatment success (Table 2).

Table 2. Overview of our DSR approach

DSR Project Phases	1. Design Cycle	2. Design Cycle	3. Design Cycle
Awareness of Problem	Interviews with patients	Analysis of Initial Evaluation	Analysis of prior evaluations
Suggestion	Formulation of the initial design principles	Refinement of DPs	Refinement of DPs
Development	Implementation of first prototype	Implementation of a fully functional prototype	Implementation of final software artifact
Evaluation	Interviews with experts and potential users (N=10)	Online experiment with potential users.	Field experiment with patients
Conclusion	Reflection of initial design and evaluation results	Reflection of fully functional prototype and evaluation results	Formulation of nascent design theory

In the problem awareness phase, we reviewed the literature on mental health CAs in clinical psychology and conducted interviews with 15 youth diagnosed with depression, which we analyzed by first creating a coding scheme and then deriving higher-order themes. In the suggestion phase, we drew upon frameworks of personalization approaches [18, 21] as well as CBT and IPT to propose two design principles on how to personalize mental health CAs for the treatment of depression. Subsequently, we instantiated design principles in four different prototypes of text-based mental health CAs (i.e., chatbots) developed with Figma (figma.com) and Botsociety (botsociety.io). These prototypes were evaluated in interviews with five experts, experienced in clinical psychology and psychotherapy, and five potential users. For the evaluation, we selected the technical risk and efficacy strategy [26] due to the sensitive context of depression: We decided to first evaluate the proposed DPs with a group of experts and potential users to get feedback and improve our design before evaluating a fully functional prototype in a more naturalistic setting.

As shown in Table 1, we plan two more design cycles. We will first use the open-source conversational AI framework Rasa to develop a fully functional prototype. Subsequently, we will refine the DPs and improve the prototype based on studies in an online and naturalistic setting.

4 Design Science Research Project

4.1 Problem Awareness

To improve our understanding of the problem space, we first conducted interviews with youth diagnosed with depression. We recruited 15 participants between 14 and 17 years of age, all female, through local clinical psychologists and psychiatrists. The previous experience of the participants with psychotherapy varied. In line with the literature [7], all participants previously struggled to find professional treatment due to long waiting lists. Some participants were frustrated by the lack of interventions to bridge the waiting time. One participant stated: '*[I] signed up for this study, because there were no other forms of treatment when I was on a waiting list. So, [I] wanted to help creating one'*. Another participant expressed her dissatisfaction with a self-help book she had tried. Adding to the literature [8], multiple participants reported feelings of insecurity, stigma, and the desire to solve their problems on their own as barriers to seeking treatment. The participants also identified several advantages of CAs compared to face-to-face psychotherapy. For example, participants mentioned that CAs would be neutral, non-judgmental, and anonymous, which facilitates sharing sensitive information. In addition, they appreciated that they could rely on CAs being continuously available and not limited to a single therapy session per week. In summary, there is evidence that CAs can address some of the issues raised in the introduction, particularly bridging waiting times.

Regarding the design, the participants expressed a wide variety of needs and preferences, revealing the importance of personalization. Some participants desired CAs to be like a friend, that uses similar language. Yet, others wanted the CA to resemble a human therapist due to the distant, professional relationship, which facilitates conversations about sensitive topics. Another frequently mentioned topic was the usage of emojis. While some participants wanted the mental health CA to include emojis (and gifs) in its

messages, others stated that this would look unprofessional and counteract the seriousness of depression. While some preferred to access the CA through instant messaging apps such as WhatsApp, others suggested a standalone app. For a standalone app, the design preferences ranged from a very colorful appearance to a 'professional' black-grey-white appearance, which was associated with professionalism. Yet, current mental health CAs do not accommodate the wide-ranging needs and preferences mentioned by our participants [18]. In addition, our participants explicitly requested personalization features regarding the character and the content: '*I would like to choose a name, change the avatar and select the topics I want to work on*'. One participant wanted the CA to automatically adapt to her therapeutic needs and language style. Taken together, our findings suggest that a 'one-size-fits-all' approach to designing CAs to treat depression may not be able to reach its full potential. Although our interviews revealed potential advantages of CAs compared to human therapists and other interventions, they also emphasized the crucial role of personalization to improve the user experience and subsequently improve therapy outcomes.

4.2 Suggestion

From the interviews, we obtained substantial evidence for the importance of personalization. However, personalization is complex due to its elusive and multifaceted nature and the variety of definitions assigned to it by scholars from different fields (e.g., information systems, health, computer science). To guide our design, we, therefore, drew upon established frameworks of personalization [18, 21] that were introduced in Sect. 2.1. According to these frameworks, the fundamental dimension of personalization is the *element of personalization* (i.e. what is being personalized). In the context of CAs, these elements primarily include the CA's character (i.e., gender, age, social role etc.) and the content (i.e., the content of the messages, knowledge base, etc.) [27]. In the interviews, 8 out of 15 participants expressed the desire to personalize the name, gender, and social role of a CA, suggesting that personalizing the character should represent a major design principle (DP). Therefore, we propose DP1: *To improve treatment outcomes for depressed youth and young adults, provide the conversational agent with the capability to personalize its character to match user needs and preferences because a personalized character helps users to form a stronger relationship with the CA*. The second key element of personalization is the CA's (therapeutic) content. According to the health literature, personalized content improves the use [28] and the perceived helpfulness of DHI [29]. Thus, we propose DP2: *To improve treatment outcomes for depressed youth and young adults, provide the conversational agent with the capability to personalize the therapeutic content to match user needs and preferences because personalized content increases the relevance and efficiency of the CA*. As introduced above, the second dimension of personalization is agency (i.e., who controls the personalization). As our participants expressed their interest in both adaptable CAs, in which they are in control of personalization, and adaptive CAs, in which CAs control personalization, we integrate adaptable, adaptive, and mixed-initiative personalization into our DPs. By instantiating prototypes that demonstrate all these approaches, we aimed to evaluate and prioritize these approaches and then refine the DPs accordingly.

4.3 Development

To instantiate our initial DPs, we developed four prototypes. As the participants' preferences varied substantially, we aimed to explore different elements and degrees of agency of personalization in our prototypes. Based on the evaluation results, we aim to find the most important features and refine the DPs accordingly. The first two prototypes instantiated the personalization of the CA's character (DP1). The first prototype provided the user with the opportunity to personalize the name, gender, typing speed, avatar, and social role. These characteristics were selected based on our findings from the interviews with patients. The second prototype showcased the possibility for the CA to automatically adapt to the users' use of emojis, since the use of emojis emerged as a polarizing element during the interviews (Fig. 1).

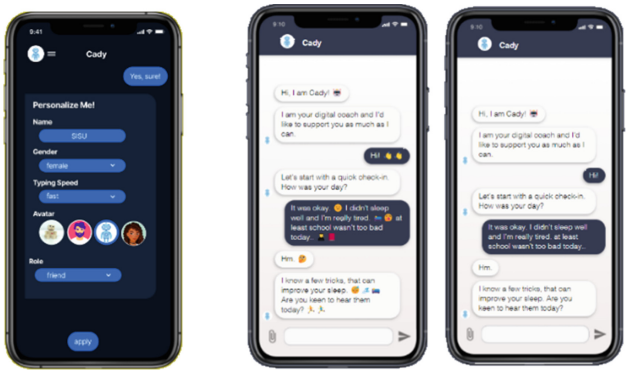

Fig. 1. DP1 – Personalization of character: prototypes 1 (left) and 2 (center and right).

The other two prototypes instantiated the personalization of the content (DP2). In CBT and IPT, content comes in the form of modules (e.g., behavioral activation, sleep hygiene). We instantiated two prototypes that reflect the personalization of these modules in different ways. Prototype three contained the task to respond to items from a depression scale and the relevant modules were selected based on their responses. For instance, the module on sleep improvement is only integrated if a user reports sleep problems. Prototype four instantiated a more flexible version of the second design principle. Here, instead of personalizing the content once in the beginning, a matching module is suggested when users report specific issues on a particular day. For example, CADY suggests the module sleep hygiene if users report sleep problems during daily check-in (Fig. 2).

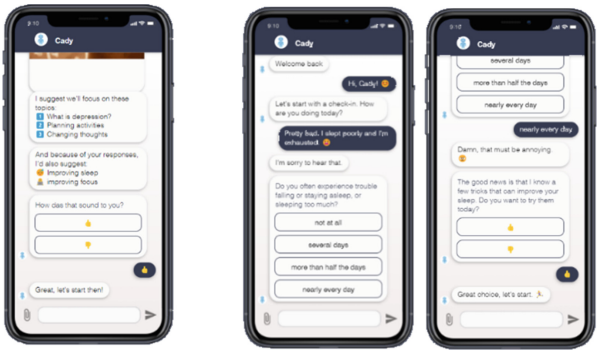

Fig. 2. DP2 – Personalization of content: prototypes 3 (left) and 4 (center and right).

4.4 Evaluation

To evaluate our prototypes, we conducted interviews with five independent experts with experience in delivering psychotherapy (3 female, $M_{age} = 29$) and five potential users (3 female, $M_{age} = 24$). By including experts, our objective was to understand whether our proposed design is consistent with established principles of psychotherapy. We decided to recruit non-diagnosed individuals as potential users to first ensure the safety of the prototypes before including young people diagnosed with depression. In each interview, we first explained the concept of CAs and introduced our research project. Subsequently, we explained the DPs and demonstrated their instantiations. During the presentation and afterwards, participants were asked to evaluate the prototypes and to provide ideas for further personalization. The interviews lasted 40 min on average. All interviews were recorded and transcribed. To analyze the feedback from the participants, we used a bottom-up approach to synthesize the interviews into higher-order themes.

5 Results and Discussion

All participants appreciated the personalization of the CA to suit their own needs and preferences (or those of their clients), providing evidence of the utility of both DPs. Moreover, all participants emphasized personalization as a crucial feature for the success of mental health CAs. In terms of DP1 and prototype 1, every participant supported the idea of personalizing the agent's name, gender, and avatar as a mechanism for relationship building. Especially gender was identified as an important characteristic for users to feel safe and comfortable in case they've had negative experiences regarding one gender in the past. Using a robot or an animal avatar was suggested as an additional gender-neutral and nonhuman version to satisfy users who prefer to talk with a robot instead of a human. The participants also suggested adding age as a variable to choose from. Instead of personalizing each aspect separately, multiple participants suggested combining variations of gender, avatar, age, and social role into 3–4 different characters, from which users can choose. They argued that presenting a few characters instead of each characteristic separately would decrease the variables to choose from, which could otherwise be overwhelming and result in annoyance or dropout. In addition, participants

suggested comprehensive information (e.g., brief introductory videos) about each character, so users can imagine what interacting with them would feel like. In terms of the specific social role, participants expressed interest in a non-human, agender robot, an older therapist-like role and a younger coach-like role. Most experts advised against implementing a friend-like role (like in prototype 1) as they feared that the lack of a professional relationship could endanger the therapeutic process. Therefore, they suggested that one should be able to choose between professional roles that encompass different personality traits: '*For example, I would suggest that social roles differ between warm, understanding, empathic versus rather cool, rational, direct*.' Regarding prototype 2, experts and users generally valued the idea of providing the CA with the agency to adapt to their use of emojis and language more generally, as experts explained that adapting to the clients' language resembles therapist-client relationship building in the context of psychotherapy. In addition, potential users indicated that they regularly adapt the emoji and language use to their friends and that this could improve the human-chatbot relationship. However, some participants were concerned with implementing the feature before it had reached sufficient accuracy. They stated that an insufficient automated adaptation would be worse than a non-adaptive system. Participants also requested the feature to turn off the automated adaption and information on how the CA adapts to them. Instead of automatically regulating emoji and language usage, one participant suggested integrating different language styles and emoji use into the different characters to give users control and counter potential technical limitations.

In terms of DP2, experts and potential users perceived the personalization of the therapeutic content, i.e. the purpose of the personalization, to be crucial for the success of a CA to treat depression and more important than DP1. Regarding prototype 3, experts and potential users liked the idea of personalizing content at the beginning based on responses to a depression scale: '*I think it is important that the agent asks about the symptoms of depression. And it's also important that it's highly structured because most of the time it's very, very difficult for my clients to verbalize their issues*'. One expert suggested an extension of prototype 3: '*In addition to the depression scale, it should be possible for a user to openly state the most pressing issue. If users feel that the agent listens and prioritizes this issue, it will increase their motivation, which is crucial for the treatment success.*'

When evaluating prototypes 3 and 4, a trade-off between flexible personalization and a structured plan emerged. On the one hand, experts and potential users emphasized the need for autonomy, i.e., the ability to flexibly choose or change a module instead of a fixed schedule, and its potential to increase motivation and engagement. On the other hand, experts emphasized the importance of a plan with compulsory modules and a fixed sequence. The fixed sequence was deemed important because some modules can be tiring and difficult but play a crucial role in achieving treatment success and therefore need to be completed. Experts mentioned that a structured plan also provides users with certainty and transparency, which makes CAs more reliable and the treatment goals more visible. However, an inflexible plan, which does not sufficiently integrate individual needs and preferences, could reduce motivation, user engagement, and thus lead to dropout. Consequently, the challenge is a compromise between personalizing therapeutic content flexibly and maintaining a structured program, which one expert

summarized: '*Some content should be fixed, but users should still feel that they can decide for themselves. But not only depending on the momentary mood. If users only choose based on the momentary mood, then there will probably not be much change. You will have to build some feature that makes sure users are also doing the exercises and consume the information no matter what their mood is like.*' A possible solution emerged from combining prototypes 3 and 4: Experts suggested keeping the personalization of the therapy modules in the beginning based on psychometric data and presenting these results as a personalized structured program while being able to deviate when a specific issue (like sleep problems or low energy) arises. However, when deviating, it should be explicitly framed as a deviation from the personalized structured treatment plan. In prototype 4, the CA suggested a module because it recognized sleep problems in the users' text messages during daily check-in. Although participants appreciated that the CA was able to handle an acute problem, experts reiterated that young people often cannot verbally express their problems. Therefore, one expert suggested personalizing the daily check-in: '*Maybe it is helpful to ask 'how are you today' in different ways because there are people who just never know an answer to this question. You could work with something like a thermometer or emojis. So, the agent could first ask 'I would like to know how you are doing, in what way do you want to tell me today?*' and then the user can select a thermometer, choose an emotion from a list, or select to write a text message.'

Based on feedback from our participants, we identified several opportunities to improve the prototypes. While both DPs received positive feedback, the feedback also revealed that the automatic personalization of the character may be less promising than initially expected. Combining this feedback with the technical challenges of making the CA's character adaptive, we have decided to no longer pursue automatic adaptation. Regarding DP1, we will focus on user-controlled personalization of the mental health CA's character and regarding DP2, we will implement explicit personalization and mixed-initiative. This refinement and the suggested improvements for the prototypes serve as the entry point into the second cycle. In general, participants discussed two themes the most: (1) autonomy, i.e., giving user control over personalization features, and (2) transparency, i.e., being transparent about what is being personalized and how it is done.

6 Conclusion

This paper presents insights from our ongoing transdisciplinary DSR project to design a personalized CA to treat depression in youth. Based on interviews with our target group, we corroborated the need to integrate personalization features into the design process. We proposed two DPs to guide the design of a personalized CA and instantiated the DPs in four prototypes. We evaluated the prototypes in interviews with experts and potential users. Overall, the feedback was positive, and the importance of personalization was confirmed. However, participants also expressed concerns about automated personalization performed by a CA since they were sceptical of the technical feasibility and emphasized the loss of control. In general, autonomy and transparency emerged

as important themes guiding the design of personalization efforts. Finally, our participants gave valuable feedback for (1) refining and extending the proposed personalization features and (2) suggesting additional personalization features (e.g. personalized reminders), which we will incorporate into our next DSR cycle. In summary, our results show that personalized mental health CAs are a promising approach to accommodate users' symptoms and preferences. However, to comprehensively evaluate the impact of personalization, more research is needed that compares CAs with and without personalization features. Although our research follows established guidelines for conducting DSR [19, 25], we need to highlight some limitations. First, the samples for the problem awareness and the evaluation interviews were relatively small. In addition, the evaluation interviews included only nondiagnosed individuals. Consequently, for the results to be more comprehensive and generalizable, larger sample sizes are necessary. Second, we used an interactive prototype and brief prototype videos to demonstrate our proposed design. Although we argue that this approach is appropriate for a first DSR cycle, further research based on a fully functional prototype is crucial. Therefore, in our second DSR cycle, we will implement the most important personalization features in a fully functional prototype. Evaluating our DPs again in the second DSR cycle will also contribute to further refining and validating our DPs, which is a crucial next step. With our research presented in this article, we contribute valuable design knowledge that serves as a starting point for future research on the design of personalized mental health CAs.

References

1. Jane Costello, E., Erkanli, A., Angold, A.: Is there an epidemic of child or adolescent depression? J. Child Psychol. Psychiatry **47**, 1263–1271 (2006)
2. Ellsäßer, G.: Unfälle, Gewalt, Selbstverletzung bei Kindern und Jugendlichen 2017. Ergebnisse der amtlichen Statistik zum Verletzungsgeschehen 2014. Fachbericht. (2017)
3. Greiner, W., Batram, M., Witte, J.: Kinder- und Jugendreport 2019. Gesundheitsversorgung von Kindern und Jugendlichen in Deutschland. Schwerpunkt: Ängste und Depressionen bei Schulkindern, in Beiträge zur Gesundheitsökonomie und Versorgungsforschung. Bielefeld und Hamburg (2019)
4. Thapar, A., Collishaw, S., Pine, D.S., Thapar, A.K.: Depression in adolescence. Lancet **379**, 1056–1067 (2012)
5. Oud, M., et al.: Effectiveness of CBT for children and adolescents with depression: a systematic review and meta-regression analysis. Eur. Psychiatry J. Assoc. Eur. Psychiatr. **57**, 33–45 (2019)
6. Cuijpers, P., Noma, H., Karyotaki, E., Vinkers, C.H., Cipriani, A., Furukawa, T.A.: A network meta-analysis of the effects of psychotherapies, pharmacotherapies and their combination in the treatment of adult depression. World Psychiatry **19**, 92–107 (2020)
7. Bundespsychotherapeutenkammer: Ein Jahr nach der Reform der Psychotherapie-Richtlinie (2018)
8. Gulliver, A., Griffiths, K.M., Christensen, H.: Perceived barriers and facilitators to mental health help-seeking in young people: a systematic review. BMC Psychiatry **10**, 113 (2010)
9. Leech, T., Dorstyn, D., Taylor, A., Li, W.: Mental health apps for adolescents and young adults: a systematic review of randomised controlled trials. Child. Youth Serv. Rev. **127**, 106073 (2021)
10. Dale, R.: The return of the chatbots. Nat. Lang. Eng. **22**, 811–817 (2016)

11. Cuijpers, P., Reijnders, M., Huibers, M.J.H.: The role of common factors in psychotherapy outcomes. Annu. Rev. Clin. Psychol. **15**, 207–231 (2019)
12. Ahmad, R., Siemon, D., Gnewuch, U., Robra-Bissantz, S.: Designing personality-adaptive conversational agents for mental health care. Inf. Syst. Front. (2022)
13. Fitzpatrick, K.K., Darcy, A., Vierhile, M.: Delivering cognitive behavior therapy to young adults with symptoms of depression and anxiety using a fully automated conversational agent (Woebot): a randomized controlled trial. JMIR Ment. Health. **4**, e19 (2017)
14. Inkster, B., Sarda, S., Subramanian, V.: An empathy-driven, conversational artificial intelligence agent (Wysa) for digital mental well-being: real-world data evaluation mixed-methods study. JMIR MHealth UHealth. **6**, e12106 (2018)
15. Darcy, A., Daniels, J., Salinger, D., Wicks, P., Robinson, A.: Evidence of human-level bonds established with a digital conversational agent: cross-sectional retrospective observational study. JMIR Form. Res. **5**, e27868 (2021)
16. Brandtzaeg, P., Skjuve, M., Dysthe, K., Følstad, A.: When the social becomes non-human: young people's perception of social support in chatbots social support in chatbots. Presented at the April 3 (2021)
17. Lohaus, A. ed: Entwicklungspsychologie des Jugendalters. Springer-Verlag, Berlin Heidelberg (2018)
18. Kocaballi, A.B., et al.: The personalization of conversational agents in health care: systematic review. J. Med. Internet Res. **21**, e15360 (2019)
19. Bichler, M.: Design science in information systems research. Wirtschaftsinformatik **48**(2), 133–135 (2006). https://doi.org/10.1007/s11576-006-0028-8
20. Lawrence, M.G., Williams, S., Nanz, P., Renn, O.: Characteristics, potentials, and challenges of transdisciplinary research. One Earth. **5**, 44–61 (2022)
21. Fan, H., Poole, M.S.: What is personalization? Perspectives on the design and implementation of personalization in information systems. J. Organ. Comput. Electron. Commer. **16**, 179–202 (2006)
22. Vaidyam, A.N., Linggonegoro, D., Torous, J.: Changes to the psychiatric chatbot landscape: a systematic review of conversational agents in serious mental illness: Changements du paysage psychiatrique des chatbots: une revue systématique des agents conversationnels dans la maladie mentale sérieuse. Can. J. Psychiatry. 0706743720966429 (2020)
23. Blom, J.o, Monk, A.F.: Theory of personalization of appearance: why users personalize their PCs and mobile phones. human–computer interact. 18, 193–228 (2003)
24. Huibers, M.J.H., Lorenzo-Luaces, L., Cuijpers, P., Kazantzis, N.: On the road to personalized psychotherapy: a research agenda based on cognitive behavior therapy for depression. Front. Psychiatry. 11 (2021)
25. Kuechler, B., Vaishnavi, V.: On theory development in design science research: anatomy of a research project. Eur. J. Inf. Syst. **17**, 489–504 (2008)
26. Venable, J., Pries-Heje, J., Baskerville, R.: FEDS: a framework for evaluation in design science research. Eur. J. Inf. Syst. **25**, 77–89 (2016)
27. Diederich, S., Brendel, A., Morana, S., Kolbe, L.: On the design of and interaction with conversational agents: an organizing and assessing review of human-computer interaction research. J. Assoc. Inf. Syst. **23**, 96–138 (2022)
28. Radomski, A.D., et al.: Design and delivery features that may improve the use of internet-based cognitive behavioral therapy for children and adolescents with anxiety: a realist literature synthesis with a persuasive systems design perspective. J. Med. Internet Res. **21**, e11128 (2019)
29. Garrido, S., et al.: Young people's response to six smartphone apps for anxiety and depression: focus group study. JMIR Ment. Health. **6**, e14385 (2019)