

Dear editor and reviewers,

thanks you for your valuable comments, which answer in the following reviewer response document. We identified 21 individual comments which we ordered according to the reviewers. We addressed all comments and revised our manuscript accordingly. We think that due to the reviewers comments, we were able to significantly improve the manuscript.

**Best regards,
the authors**

Reviewer 1

Reviewer Comment: #R1-1
Comment: In the abstract, conversational agents (line 15) should be written in initial caps because they are presented as nouns and are allocated an acronym CAs. Similar also for Personality adaptive conversational agents (line 25), change to initial caps. Make similar corrections in the main text also.
Answer: Thank you for pointing out this aspect which we changed.

Reviewer Comment: #R1-2
Comment: I have been unable to understand the research problem, in the paragraph in line 57, the authors highlight the attributes of PACA, and at the end present a research question 1 asking about the benefits of PACA, which the authors mentioned in the preceding paragraph.
Answer: Thank you for your helpful comment. We have restructured the introduction a bit and mainly pointed out current research in the field of CAs here and then mentioned the concept of a PACA. While there is already research in the field of CAs and mental health, we mainly want to present and show the innovative concept of a PACA. The derived potential benefits are based on the theoretical findings of CAs in the field of mental health care and the innovative approach of a PACA. Thereby we derive our research questions because we want to collect the benefits empirically.

Reviewer Comment: #R1-3
Comment: “PACA automatically infers users’ personality traits and adapts accordingly to their personality by using language that is specific to a particular personality dimension (e.g., extraversion, agreeableness), with the aim to enhance dialogue quality.” “Transferred to “virtual psychotherapy”, PACAs may be able to establish rapport with the patient to enhance interaction quality and mental health support”.

The quoted texts between lines 57 and 65 already present the benefits of PACA, why do the authors ask about the benefits of PACA when the question has been answered by the literature? Kindly clarify

Answer: These things mainly explain the concept of a PACA, which is different from a "traditional" CA, namely the ability to adapt to the personality of the user. Here we also show that CAs are already used (even if only a little) in practice in the field of well-being and mental health and are also studied in research. We then make the assumption of benefits ("PACAs may be able"). Here we conclude from the introduction and derive our research question, namely that there may be benefits, but also caveats.

Thus, the question has not been answered by the literature, but we build on existing studies to derive our specific research question and objective specially for PACAs.

Reviewer Comment: #R1-4

Comment:

Research questions 1 and 2 are the same. Both research questions do not seem to be relevant based on the discussed literature that have provided ample validation about the benefits of PACA. You can, however, decide to keep the research question if the reason will be to validate or negate previous study on PACA, this, the authors must clearly state in their work.

Answer: Thank you for pointing out this error, which was changed. Please see also comment #R1-2, in which we mention that the potential benefits are what we want to investigate because they are derived from research on CAs in mental health care and the technological advancement of a PACA. Especially the benefits of the personality-adaptivity is an aspect we want to investigate as it is essential for mental health care as mentioned ("The domain of mental health care is a highly patient-centered sphere, where a successful conversation is dependent on patients' individual dynamic behavior and the therapist's ability to adapt to the patient's specific needs in order to form a therapeutic relationship [7,8]. Transferred to "virtual psychotherapy", PACAs may be able to establish rapport with the patient to enhance interaction quality and mental health support.")

Reviewer Comment: #R1-5

Comment:

In the methodology, authors should be specific when the study was carried and duration. December 2020 is vague. Was the study conducted during a one month period of December 1-31, 2020?

Answer: Thank you for that comment. We added information about the exact duration of the study, which was carried out December 7-14, 2020.

Reviewer Comment: #R1-6

Comment:

In the results and discussions, you must include few more citations from Scopus/WoS sources. Please consider to add the following citations and references in your academic article. Please also consider to cite the following international studies

Chaveesuk, S., Khalid, B., & Chaiyasoonthorn, W. (2019, August). Emergence of New Business Environment with Big Data and Artificial Intelligence. *Proceedings of the 9th International Conference on Information Communication and Management*. <https://doi.org/10.1145/3357419.3357441>

Chaiyasoonthorn, W., Khalid, B., & Chaveesuk, S. (2019, August). Success of Smart Cities Development with Community's Acceptance of New Technologies. *Proceedings of the 9th International Conference on Information Communication and Management*. <https://doi.org/10.1145/3357419.3357440>

Muangmee, C. (2021). Effects of Facebook advertising on sustainable brand loyalty and growth: case of Thai start-up businesses. *Transnational Corporations Review*, 1–12. <https://doi.org/10.1080/19186444.2021.1986340>

Answer: Thank you for suggesting this work. After careful consideration and reading we only see one paper that fits into our research (the first one). Our paper is not about smart cities nor facebook advertising. We extended the discussion and cited the first paper that you suggested.

Reviewer 2

Reviewer Comment: #R2-1

Comment:

The main motivation of the paper should be polished in the introductory section.

Answer: Thank you for that comment. We polished the motivation of our research in the introduction section and further added argumentations of our focus. We sharpened the research gap and now explain what theorie and related work already presents on CAs in mental health care. We then present our innovative concept of a PACA and argue that a PACA would bring more benefits to mental health care, but also comes with merits and caveats.

Reviewer Comment: #R2-2

Comment:

I would appreciate it, if the authors include in the introductory section, the cons/pros (if any) of the work.

Answer: Thank you for this comment, which we addressed througout the paper. In the introduction, we introduce the possible potentials of PACAs in mental health care and conclude this from current research in CAs and mental health care. We then introduce the innovative concept of a PACA and identify possible pros as well as cons. Here we talk about benefits and potentials, as well as merits and caveats. We have restructured our introduction and elaborated the pros/cons even more. However, after the empirical findings we further elaborate and discuss these pros/cons, because we solely derive/hypothesize these in the introduction.

Reviewer Comment: #R2-3

Comment:

For better presentation, the authors have to include a list of abbreviations, following the journal's style in this regard.

Answer: Thank you for pointing this aspect. We followed the journal's style regarding abbreviations and changed it accordingly.

Reviewer Comment: #R2-4

Comment:

Extending the discussion part is necessary.

Answer: We extended the discussion section following the reviewers comments (Reviewer 1-3) and also separated the discussion and conclusions section. In the discussion we position our contribution to existing research, especially in the field of AI and sustainability (in regard to the MDPI journal Sustainability and the nascent research stream of AI).

Reviewer Comment: #R2-5

Comment:

Move the conclusion part to a new part.

Answer: We separated the discussion and the conclusion section and further extended the conlusion and discussion.

Reviewer Comment: #R2-6**Comment:**

I urge the authors to add some advising info to WHO.

Answer: Thank you for that interesting idea, which we incorporated. In our newly formed conclusion, we advise not only companies that might develop and offer PACAs (commercially), but also provide advise for governments, non-profit organizations and the WHO to look into AI and especially PACAs to adress mental health issues.

Reviewer Comment: #R2-7**Comment:**

Update the review literature with recent relevant work ,preferable, from MDPI journals, also, cite the following seminal textbook: Winston, Patrick Henry. *Artificial intelligence*. Addison-Wesley Longman Publishing Co., Inc., 1992.

Answer: Thank you for pointing this out. We updated the literature and added more recent literature that is relevant to our paper. We also added the seminal textbook you suggested, as it covers relevant information on artificial intelligence.

Reviewer 3

Reviewer Comment: #R3-1**Comment:**

The title of your research is interesting, however, I could barely find any connection to sustainability or the "Digital Innovation and Transformation in Healthcare"! It makes the research somehow irrelevant to this special issue.

Answer: Thank you for the comment. We think that our paper addresses not only a very highly relevant topic (mental health) but also provides a digital innovation to tackle this problem. Our concept of a PACA is a highly innovative idea that leverages novel AI technology and cognitive systems to address a healthcare topic (mental health). Looking at the call for papers, we address several aspects of the description, such as artificial intelligence, health information technology, sustainable healthcare technology and many more. Furthermore we were specifically invited by the editors to submit our extended conference paper. However, we strengthened the link to the special issue even more in the introduction section.

Reviewer Comment: #R3-2**Comment:**

To submit a revised version, please re-write the abstract. Make your abstract attractive to readers (simple sentences without any repetition) and include 2-3 sentences ready to be cited exactly as they are. In 1 paragraph, your abstract should tell the readers why the study is important (maximum 25% of the text), what you did, i.e. your methodology (maximum 25% of the text), and what you found, i.e. main research results and their major implications (50% of the text). This is very important to promote your work because of the growing trend that authors use Google search to find and cite papers based on the abstract (instead of reading the full paper).

Answer: Thank you for the valuable comment, which we incorporated. We revised the abstract according to your suggestions.

Reviewer Comment: #R3-3**Comment:**

Besides, what is the specific research stream you have found on the Sustainability journal that can include your contribution? how does the paper push the research forward? please, be more explicit on this issue.

Answer: Sustainability has several papers on artificial intelligence. Recent papers discuss ethical aspects of AI, management of AI and also AI in the context of sustainability goals. Our paper

pushes this strong research stream further, by highlighting the benefits and potentials of AI in the field on healthcare, especially in mental health care. We already cite Sustainability papers, but further extended our discussion and contributions.

Reviewer Comment: #R3-4

Comment:

The first research question must be "RQ1: What are **the** benefits of PACAs in mental health care?"

Answer: Thank you for pointing out this mistake which we corrected

Reviewer Comment: #R3-5

Comment:

Please add more evidence under the "2.3. Personality-Adaptive Conversational Agents" section. Many recent studies have been overlooked.

Answer: Thank you for pointing out this aspect. It would have been helpful to see what recent studies we have overlooked. We conducted a systematic literature review at the beginning of our research project and added all relevant papers that we found. However, within this revision we further extended our literature search and added additional papers to this section. Since our initial manuscript preparing and the revision, a few more papers have been published. Furthermore, we argue that this section provides a proper overview of how the innovative concept of a PACA works.

Reviewer Comment: #R3-6

Comment:

Please provide more evidence about the interview protocol.

Answer: The study was constructed using a text-based interview (questionnaire) using open questions and closed questions. As described in section 3.1., the questionnaire consisted of open questions that the participants answered using the Limesurvey software (text-based answers). Overall, 60 people participated in the study, producing more than 6865 words of qualitative data which took roughly between 25 and 35 minutes to complete (average 28 minutes). The questions can be seen in Table 1.

Furthermore, as mentioned, the survey asked for closed questions regarding demographics which we also report. The qualitative contributions of our participants were balanced throughout the questions, meaning that every question had a similar response in terms of their length. Participants however had slightly more to say regarding the questions of "Support" and "Trust", and less about "Privacy". However, this is only marginal. We added this information to the paper.

Reviewer Comment: #R3-7

Comment:

It is mentioned that "The survey, developed using the platform Limesurvey (version 3.26.0), was distributed via our private network and the crowdsourcing platform Mechanical Turk (mTurk) and was carried out in December 2020." The role of researchers is marginalised. Why? This could be a major limitation.

Answer: Thank you for this important aspect, which we completely agree. The role of the researcher in this context cannot be underestimated and is mainly characterized by the elaboration of the theoretical basis, the qualitative content analysis and synthesis of the results. However, it was important for us to interview our target group, i.e. users of PACAs. Mental health is important for everyone, no matter if researcher or not, which is why we explicitly aimed for a large sample (which is still manageable to analyse qualitatively) that comes from the researcher's environment but also makes use of crowdsourcing platforms like mTurk. In the end, it is important that these people are as heterogeneous as possible. We added this to our limitations.

Reviewer Comment: #R3-8

Comment:

Please compare your findings with those of the others.

Besides, please highlight the limitations and implications. Do you have any idea about the generalizability of the findings?

Answer: We revised our discussion and conclusion section and now further discuss our findings with existing literature, especially papers on AI and sustainability. With our research, we contribute to this nascent research stream (especially in MDPIs Sustainability) on AI and sustainability.