User Perception of Wysa as a Mental Well-being Support Tool during the COVID-19 Pandemic

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ABSTRACT

The COVID-19 pandemic has disrupted daily lives globally, causing social isolation that impacted the mental health and well-being of the population, particularly the students. With the shortage of accessible healthcare facilities and resources, the community is turning to technology-based mental healthcare interventions such as telemental health systems, online support groups, self-service web and mobile applications, and chatbots. In this study, we assessed the extent in which the daily interaction with the chatbot Wysa can influence the well-being of students during the COVID-19 pandemic. Students evaluated the usability and effectiveness of Wysa's clinical interventions which include the talk therapy, gratitude journal, self-care practices and mindfulness exercise throughout the duration of the week-long experiment. They provided their perception on the quality of the chatbot's response, affect and human-likeness, and shared attributes that would motivate self-disclosure and openness to communicate with the chatbot. Our findings can shed insights on the effectiveness of mental health apps as a coping mechanism in a time of social isolation and provide suggestions on how such technologies can be improved in order to maximize well-being benefits as well as user satisfaction.

CCS CONCEPTS

• **Human-centered computing** → **Human computer interaction (HCI)**; *User studies*; *Usability testing*; **Interaction paradigms**; *Natural language interfaces.*

KEYWORDS

Conversational interfaces, Mental well-being, Social isolation

ACM Reference Format:
Carlos Miguel Legaspi Jr., Tristan Raphael Pacana, Kyle Loja, Christina Sing, and Ethel Ong. 2022. User Perception of Wysa as a Mental Well-being Support Tool during the COVID-19 Pandemic. In *Asian HCI Symposium'22 (Asian HCI Symposium'22), April 29-May 5, 2022, New Orleans, LA, USA.* ACM, New York, NY, USA, 6 pages. https://doi.org/10.1145/3516492.3559064

Asian HCI Symposium'22, April 29-May 5, 2022, New Orleans, LA, USA

ACM ISBN 978-1-4503-9250-1/22/04…$15.00
https://doi.org/10.1145/3516492.3559064

1 INTRODUCTION

The quarantine restrictions of the COVID-19 pandemic that disrupted physical interactions and caused social isolation have shown prevalent negative impact to the mental health and well-being of the general population [21]. Self-perceived deterioration in stress, depression and anxiety during the early months of the pandemic were reported in [27], with significantly higher rates of substance use, suicidal thoughts, and symptoms of depressive and anxiety disorders [18], and the prevalence of several psychological illnesses globally [29].

Prevention through strengthening people's resilience to psychological ill-being is one mechanism to cope with the rising cases of mental health. The need for effective and accessible coping mechanisms and healthcare support, coupled with the insufficient resources allocated for mental health services, led to recent interest in the use of conversational agents or chatbots [1]. Previous studies have demonstrated the use of chatbots to promote mental health and psychological well-being [4, 14, 15, 25]. Studies have also reported chatbots' ability to reduce loneliness [6, 19], depression and anxiety [7, 11]; to provide social support [3, 26]; and to guide people to care for themselves and their well-being [13, 25].

Among publicly available and free-to-use chatbots, Wysa [11] is relatively propitious given that the conversational agent utilizes Cognitive Behavioral Therapy (CBT). Studies on CBT as a psychotherapy revealed its beneficial effects on symptoms of several psychological disorders [10]. Wysa is more than just a chatbot; as a mental health app, it also includes facilities such as gratitude journaling, self-care practices, mindfulness exercises, and relaxation strategies.

Students are among those who are adversely affected as they continue to adapt to the online learning mode that lacks collaborative peer learning while requiring much independence in self-paced learning. Senior High School (SHS) students experiencing academic distress valued Woebot's lessons and stories as they faced challenges in a new and more competitive learning environment [4]. However, this study was conducted prior to the pandemic. While Wysa itself has shown to be effective in reducing perceived levels of depression [11], its ability to provide accessible support services to help students maintain positive mental well-being remains to be explored. Furthermore, while studies have reported the improvements in mood and symptoms of mental disorders from commercially available mental health and well-being chatbots, few studies include analysis on user's feedback of experience in using a chatbot [6].

In this paper, we investigated SHS students' perception on the quality of Wysa's response, affect, and human-likeness as their mental well-being support partner over a one week period. They also shared attributes that motivated self-disclosure and openness to communicate with the chatbot. Our findings provide insights on the effectiveness of mental health apps as a coping mechanism in a time of social isolation, and provide suggestions on how these technologies can be improved in order to maximize well-being benefits and user satisfaction.

2 RELATED WORK

Social isolation during the COVID-19 pandemic caused a negative impact on people's mental health and well-being [18]. People experiencing loneliness suffer from reductions in feelings of happiness and satisfaction while having a more pessimistic mindset [17]. Chatbots have been proposed as an alternate intervention to provide accessible and individualized support to people in need of someone to talk to [6]. Previous studies have investigated the ability of chatbots to act as companions through adequate mimicry of human-to-human conversation. These artificially intelligent agents are capable of improving mood [30] and reducing feelings of loneliness [19, 20]. A chatbot's ability to model real human interactions and its appropriate use of human-like verbal and non-verbal cues can help build affinity and rapport with its users, leading to better human-bot relationship [2, 23]. Furthermore, people value therapeutic conversational agents whom they perceived as good listeners, can keep secrets, and are non-judgemental [12, 31].

App engagement and experience were analyzed from data provided by geographically dispersed users who engaged in daily conversations with Wysa [11]. Users reported the experience to be helpful and encouraging with improvements on symptoms of depression after using Wysa for two weeks. User reviews suggest four main support that they receive from the companion chatbot Replika [26]. Informational support is attained through Replika's perceived abilities in listening to its users and providing helpful information and advice. Emotional support is afforded to users by allowing them to openly express their thoughts and feelings. Appraisal support is expressed by posing meaningful questions that prompt users to perform introspection, self-exploration, self-reflection, and self-evaluation. The most common type of social support from Replika is companionship which is indicated by its ability to resemble interpersonal behaviors and thus, mimic human communication and also aid in diminishing feelings of loneliness.

Studies with SHS students as participants have also reported findings on the perceived effectiveness of conversational agents. SHS students who used Woebot [4] registered an average of 15.28% reduction in their academic stress after two weeks. The conversation with the chatbot prompted reflection and changed students' perspectives, enabling them to point out distortions in their thoughts. Woebot also helped the students feel that someone is concerned for them by offering companionship and helpful advice. However, the limited input processing abilities of Woebot led to the generation of unnatural and pre-programmed responses that are at times inappropriate and unrelated to the student's input, which may come across as neglect for what they have to say.

Another study among SHS students who used Abot [25] showed improvements in the participants' sleep quality, electronic use, academic performance, social support, and productivity which are factors influencing well-being. Users reported Abot delivering responses that are very personal which gave impressions of conversing with a friend. It also provided tips and guidance to address user concerns while some challenges in Abot's input understanding obstructed the generation of appropriate responses and smooth conversations.

Because of the unstructured nature of the conversations that are built primarily for social interactions, evaluating chatbots remain a subjective exercise [5, 7, 8]. Criteria are based on user perception of usability which include effectiveness in task performance, appropriateness of the generated response, and human-likeness of the interaction [5]. We adapt these criteria in our user evaluation of Wysa.

3 METHOD

Overview of Wysa. Wysa is a free and publicly-accessible conversational chatbot that can be installed in mobile devices. The Wysa icon showing a meditation image appears on initial load to remind users to deeply breathe or to meditate before a session. Users can then choose to *talk* to Wysa; seek help from a human *therapist*; learn *self-care* practices from a library of topics such as stress, sleep; review previous conversations with Wysa through the *journal* which also doubles as a *gratitude journal*; and issue an *SOS* to seek help on relaxation techniques.

Wysa always begins a talk session by asking the user to rate their day on a smile to frown facial scale. This is followed by asking the user to describe their mood. During check-in, Wysa then asks the user to share events that happened, and on each turn, it may ask for further details. Before ending the conversation, Wysa provides options that help the user to plan for the next step, such as "*plan out your day*" and "*reframe your mind*". The provided options are randomly generated and may vary per session.

Participants. Senior High students between 16-19 years old from a private school in Manila, Philippines were recruited through convenience sampling and email invitation, yielding 18 confirmed participants. Following University research ethics protocols, informed consents were administered via Google Forms to protect the students' privacy while giving them the option to voluntarily participate and withdraw from the study at any given time. Students who are minors or below 18 years of age were also required to have their parent or guardian sign an assent form.

Procedure. Of the 18 students who initially accepted the invitation, only 10 partook in the actual trial. They were instructed to individually engage in at least 10 minutes of daily conversations with Wysa for a period of one week. At the end of each daily conversation, the student has to accomplish the *Daily Check-In Form* for monitoring their participation and reason of use. Students are also asked to evaluate Wysa's features and to share their experiences.

A *Wysa Evaluation Form* was also administered at the end of the trial to collect students' feedback and perception of the effectiveness and usability of the chatbot. The criteria for evaluation include the relevance and appropriateness of Wysa's responses, its affect qualities, if it can mimic human attributes, and overall user

Table 1: Wysa Trial Period of Students

Number of Days	Number of Students	Percentage
1-2	1	5.5%
3-4	1	5.5%
5	1	5.5%
6	3	16.7%
7	4	22.2%

satisfaction. Due to privacy guidelines of the Wysa Inc. group, no conversation logs were made available for analysis.

Analysis. The impact of the trials on the students' well-being were determined by comparing the results of the pre- and post-assessment forms that were administered before the start and at the end of the trial. The *Well-being Assessment* aims to assess levels of stress, loneliness and worry using items derived from the *Perceived Stress Scale* [24], *UCLA Loneliness Scale* [22], and *Penn State Worry Questionnaire* [16], respectively.

4 RESULTS

Table 1 shows the progress of the students at the end of the week-long trial. Four students completed seven days of usage, three completed six, one used Wysa for five days. The rest had less than four days of usage.

4.1 Well-Being Assessment

Stress, loneliness, and worry can affect a person's mental well-being. Stress is the human body's normal response to tension or pressure that is affecting us physically and emotionally. Feelings of loneliness can surface due to students' perceived social isolation from their peers; thus, they are in need of people they can talk to or groups they can belong with [9]. Worrying about future events, such as academic workload, household challenges, and health-related concerns, can cause anxiety. Table 2 shows the individual scores of students on their pre- and post-trial well-being assessment.

The amount of stress has the highest reduction value of -8.3. This may be attributed to students' perception of Wysa as someone they can talk and vent to due to the latter's ability to provide advice on coping, relaxing, and looking at situations more positively and practically. Most of Wysa's features can be beneficial in this aspect. On the other hand, to significantly reduce loneliness would require the student to develop some form of bond with Wysa as well as to view it as a friend. Reducing worry requires Wysa to convince the student not to dwell on troubling thoughts and that these negative potentials are not as likely as they may seem. This is mainly evident when the chatbot asks the students to reframe their thoughts.

Table 2: Pre- and Post-Trial Well-being Assessment Scores

ID	Age & Gender	Days	Stress Change	Loneliness Change	Worry Change
S1	17 F	7	-7	-3	-5
S2	17 M	4	-5	7	-6
S3	18 M	5	-9	-19	-7
S4	18 M	1	-8	-17	-10
S5	17 F	7	-13	-2	-8
S6	17 F	6	-12	-4	-4
S7	17 M	7	-10	-8	-8
S8	18 M	6	-15	-13	-1
S9	19 M	6	-6	-6	-3
S10	18 M	7	2	4	-3
Average score			-8.3	-6.1	-5.3

Among the participants, S10, a 7-day user, has noticeably little changes on mental well-being. Feedback from the student suggests that they had experienced burn out in using Wysa for participation purposes due to the repetitiveness of the conversation as shown in their comment on the Talk feature on Day 5:

> "*It was a bit nice to talk given that my days were dull, but the conversation felt too repetitive at this point. Convos always seems to start with around 6 minutes of the same questions.*"

4.2 Daily Check-in

Among the several features, techniques, and facilities available in Wysa, the talk, journaling, self-care, relaxation techniques, reframing thoughts, and SOS were included in the *Daily Check-In Form*. Here, we present our results on the talk, journaling, and relaxation features as these require interaction between Wysa and the students.

Talk. Students, such as S10 on Day 2, reported that Wysa "*stimulated self-reflection on what I wanted in my life in the near and far future*". They also commended Wysa's ability to let them focus on the positive aspects in their lives, as shared by S6 on Day 5: "*It was hard to stay positive, but Wysa made it seem it's as simple as stop thinking negatively.*"

However, there were issues with the responses generated by Wysa that affected the quality of the conversation. On Day 4, students started reporting the repetitiveness of the chatbot's responses: "*Feels like its getting repetitive*" (S8), and "*No new discussion, just everyday routine*" (S7). Its lack of fluidity can make the chatbot respond inappropriately or completely ignore the student's input, as shared by S8 on Day 1:

> *The app wasn't listening at all. I was talking about my exam and it didn't even acknowledge it. I felt worse after talking with Wysa.*

Others noticed Wysa's limitations as an intelligent bot, stating that "*It's hard to talk to an AI, because sometimes it doesn't quite understand my words.*" (S6). Perhaps due to its predefined responses, its novelty wears off after a few days of use when Wysa was described as "*interesting but it could not replicate how a conversation with another person*" (S9).

Journaling. Journals are meant to allow students to review records of their past conversations with Wysa. S7 who used this consistently found it "*interesting to see past messages/interactions*". However, while "*It is good to look back at accomplishments, there is nothing more than that.*" On the other hand, S6 appreciates the use of a journal in showing signs of efforts or improvement, stating on Day 3 that "*It lets me look back to the journey I started. It's only been a few days, but there's a lot that I have done already in Wysa.*" S1 used the journal facility to choose on "*what (self-care) pack I should*

Table 3: Frequency of Daily Use of Wysa's Features

Days	Talk	Journal	Self-Care	Relaxation	Reframing
1-2	17	6	11	8	11
3-4	15	7	7	10	13
5	7	3	2	5	3
6	6	2	3	2	2
7	3	2	3	1	1

do today that could help me", while S3 found the journal's utility as a reflection tool since it "*helped get out of what was in my head*".

Relaxation Techniques. Wysa may sometimes offer relaxation techniques, such as breathing and mindfulness exercises, in the midst of a conversation when it asks the user what they want to do next. Students found these techniques "*made me calm down*" and "*helped me relax*". S6 further shared on Day 5 that:

> *It's one of my favorite features in Wysa, since I'm able to relax myself and recollect my thoughts. Breathing exercises helps me in that way.*

Table 3 shows the frequency of daily use of each of Wysa's features, while Table 4 shows the average rating given by the students. None of the students reported using the SOS facility throughout the trial.

4.3 Chatbot Evaluation

Table 5 shows the average evaluation scores given by the students to Wysa at the end of the trial. The values indicate that students perceived Wysa's overall responses to be moderately relevant, appropriate, and meaningful with an average score of 3.86 out of 5. Positive feedback regarding the *content of responses* are due to the advice or insights that Wysa was able to provide, as shared by S10:

> "*It has certainly helped me reflect more though, it does well in prompting me (and providing me frameworks) to think more about myself, my problems, and my wants and needs.*"

The slightly lower scores of Wysa's *affect qualities* is an indication of its moderate level of friendliness and empathy. S8 admitted that the chatbot was able to act as an alternative to a real companion giving them "*someone to talk to during those 7 days*". This is in contrast to S10 who described the repetitive conversations as more practical and procedural rather than casual like a friend:

> "*It's friendly, definitely feels like an advice giver, but not so much of a companion as it is more of a practical/professional relationship. This has to do with it being not very fluid with its interactions. While I believe this offers good advice, it doesn't feel very casual or human as the conversation is a bit repetitive.*"

Table 4: Students' Rating of Wysa's Features

Days	Talk	Journal	Self-Care	Relaxation	Reframing
1-2	3.59	4.00	4.00	4.63	4.00
3-4	3.87	4.00	4.57	4.20	4.46
5	3.85	4.00	4.50	3.80	5.00
6	4.00	4.00	4.33	4.50	4.00
7	3.67	4.00	4.67	5.00	4.00

Table 5: Evaluation Scores of Wysa

Criteria	< 4 days	4 - 6 days	7 days	Average
Content of Response	4.00	3.53	4.25	3.86
Affect Qualities	5.00	2.99	3.75	3.50
Human-Likeness	3.66	2.13	3.17	2.70
Openness	4.00	4.20	4.25	4.20
Helpfulness	5.00	3.40	4.50	4.00
User Satisfaction	4.00	3.20	4.00	3.60

Among all criteria, *human-likeness* received the lowest average rating of 2.70 by a large margin. This is partially due to complaints regarding the talk feature's repetitiveness and lack of fluidity which are more observable on later days. A rigid conversation flow not only causes difficulty in communicating with Wysa (S6) but can also make the user feel neglected (S8) when the chatbot does not acknowledge the user's input. This made it difficult for S6 to utilize Wysa to cope with their stress and concerns stating that:

> "*It's not necessarily a great tool for me to cope with my mental health problems and stress. More often than not, whenever I talk to Wysa about my problems, it simply brushes it off as if it's not a big deal and that I can easily solve it. Although I would understand why since Wysa is unable to assess the severity of the problem, it still affected my experience with Wysa nonetheless.*"

Previous research shows that a chatbot's ability to resemble real human interaction is correlated with the user's willingness to develop a bond with it [15]. Despite the low scores on human-likeness, students gave a high average score of 4.2 to Wysa's *openness*. As there is less risks of any judgement or negative reactions, S9 found it more comfortable to express themselves to a bot:

> "*I think because I viewed wysa as a tool rather than a person I was able to be more open on things I say/input.*"

This supports the findings reported in [12, 31] where a chatbot is valued for its good listening skill and its non-judgemental behavior.

Wysa's *helpfulness* also fared well with an average rating of 4.00. S9 expressed that it is "*a good tool to use for venting and reflecting things that bring happiness*". Wysa's advice and insights enabled S1 to cope with their concerns:

> "*There were times that I was stressed but Wysa helped me relax and think of the positive things that helped me cope and overcome my stress and worry.*"

S5 shared the same sentiment on Wysa's ability to guide them in learning how to deal with worry:

> "*It was very relieving to converse and tell Wysa about my thoughts and worries for the past days and it providing courses of action to address such worrisome thoughts.*"

However, S6 prefers a chatbot that can tailor its therapy to their specific needs, stating that "*their style of therapy is not quite something I'm looking for*".

5 DISCUSSION

The potential benefit that conversational agents or chatbots can bring to the healthcare sector has been a subject of interest in recent studies. This is heightened by the need to provide accessible intervention and support services to enable the community to manage their own health and practice self-care especially when the available resources are limited. Reports on user experiences in utilizing chatbots as their therapy assistant and mental health companion have been gaining grounds with the rising number of mental health concerns globally. Here, we discussed our findings on students' perception of Wysa as a support tool to manage their mental well-being. We also compare our findings with previous studies where senior high school students are the primary target audience. Lastly, we present design considerations to inform future work on the use of conversational interfaces to provide self-care services.

5.1 User Perception on Wysa

Reduction in all of the students' levels of stress, loneliness, and worry derived from their pre- and post-trial *Well-being Assessment* shows Wysa's potential utility as a support tool in improving one's mental well-being. Students reported the ease with which Wysa can help them in expressing their worry (S3), disrupting negative thoughts (S6), performing relaxation exercises (S6), and reflecting on positive things (S1). These are evidences that correlate with the study of [30] on chatbots' ability in improving a person's mood and emotional state while giving guidance to students on how to care for their well-being [13, 25]. Having someone to talk to and to vent negative emotions is also repeatedly cited by the students as one of the benefits offered by Wysa in reducing their feelings of loneliness. This correlates with the findings reported in the studies of [19, 20].

Despite admitting that they perceive Wysa as an artificial being with low resemblance to the human therapist it is trying to mimic due to its often repetitive responses, the students still openly express their thoughts and feelings to Wysa. This parallels the reports from [12, 31] where therapy chatbots are valued for their perceived abilities in listening while remaining non-judgemental. However, as an intelligent agent, its natural language processing abilities also created challenges in the delivery of a fluid conversation flow that minimizes canned response to reduce feelings of neglect while motivating students to continuously talk with the chatbot. This led students to consider Wysa as nothing more than an advice giver with whom they can establish a professional relationship but not a personal one.

5.2 Conversational Agents for the Mental Well-Being of Students

Two other studies that involve senior high school students were conducted by De Nieva et al. [4] and Sia et al. [25]. While the first study utilized another commercially available chatbot, Woebot, it should be kept in mind that it was conducted prior to the pandemic and focused on the students' academic stress. The students also used Woebot for a period of two weeks, which is the minimum period before any signs of improvement in well-being will become evident [7]. The second study utilized a homegrown chatbot, Abot, that sought to empower students to maintain an optimal well-being through self-care and conscious monitoring of their lifestyle habits [25]. Similar to the current study, the students used Abot for a period of one week.

All studies reported the beneficial effects of using the chatbots that led to a decrease in stress level [4] and an increase in the well-being [25] of the participants. Similar to the findings of Woebot, students appreciated the guidance offered by Wysa that help them reflect on their daily events, find things to be grateful for (*gratitude journal*), and learn new lessons to deal with their problems.

Crucial to an effective man-machine interaction and increased user satisfaction is the chatbots' ability to carry a natural conversation that mimics human-to-human communication. Problems in understanding user inputs that lead to inappropriate responses have been reported as the causes of user disatisfaction in using a chatbot [8]. Wysa's and Woebot's inability to fully grasp the user input in order to formulate an appropriate response are often times perceived as the chatbot ignoring what they have to say, causing users to feel neglected and unimportant.

Users seeking support also appreciate chatbot behaviors that exhibit affect qualities and human-likeness. This is where Wysa has been found to be lacking. Users described conversing with Wysa as practical rather than casual, which is in contrast to Abot's perceived ability to relate its responses to what the users have shared [25] and Woebot's daily check-in feature as indicative of someone who is caring [4]. These should be addressed in Wysa in order to increase user satisfaction and motivate them to talk to the chatbot on a more personal level.

5.3 Design Considerations

Similar to previous studies, our results have shown the potential help that chatbots can offer to those experiencing stress, loneliness and worry due to social isolation. Their ability to engage in natural language conversations, to give guidance, and even to entertain made chatbots a fit for therapy-based tasks. However, to be able to fully carry out their role as a therapist, counselor, peer, companion, and guide, therapy bots such as Wysa must also be "versatile, eloquent, knowledgeable, and possess a certain cultural, social and emotional competence" [28].

To be versatile, the chatbots should be able to personalize their responses to the individual needs of their users based on their specific situation. This requires the ability to understand the context of the user's input, often times shared as a form of narrative and delivered in a series of dialogue turns based on the chatbot's ability to prod and to elicit further details. To be eloquent, they must be able to formulate responses that are non-repetitive. Added features include the chatbots' ability to detect the user's emotion and respond accordingly; to be aware of social norms and culture which may affect the types of lessons and activities utilized in the conversation; and to engage in small talk to establish affinity with the users in order to motivate self-disclosure and build trust. With advanced AI technologies such as intent classification, story event understanding, commonsense reasoning, and emotion detection, some existing chatbots may already be exhibiting one or two of these qualities to a certain extent.

6 CONCLUSION

Chatbots are viable technology-based solutions that offer pre-emptive and accessible healthcare by raising awareness and promoting good practices to help maintain optimal well-being. A positive well-being can prevent feelings of stress, loneliness and worry arising due to social isolation from turning into a serious condition. In this paper, we described our investigation on the perceived utility of a commercially available chatbot, *Wysa*, as a mental well-being support tool for senior high school students. Students appreciate Wysa's ability to let them relax and to focus on the positive aspects in their lives. Results from pre- and post-trial *well-being assessment* scores show a decrease of 8.3, 6.1 and 5.3 in the levels of stress, loneliness, and worry of the students, respectively.

Experiments with a larger population group would be conducted in future work to generate more solid findings and insights on the perceived usability and effectiveness of Wysa. Additional data points, such as the number of messages exchanged with the chatbot, specific features that were used on each day, and scores from taking assessments found in the Wysa app would also be utilized to enrich the findings of our study on how the various facilities of Wysa are supportive of the differing needs of its users.

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