

6. Chatbots as a new user interface for providing health information to young people

Marita Bjaaland Skjuve & Petter Bae Brandtzæg

Reaching out to young people with important information and services, such as health services, is more difficult than ever.¹ Efficient information providers targeting young people concerning health issues have been among the first priorities of the public health agenda in Europe over the past few decades. Social Health Bots,² a research project in Norway that started in 2017 and will continue to 2020, is investigating the potential and challenges of chatbots, understood as automated communication software powered by artificial intelligence, as an innovative tool for involving young people in, and informing them about, health issues. We present the opportunities and limitations associated with the adoption of chatbots as a new conversational interface for providing health information to young people.

International studies show that young people increasingly suffer from mental health issues, such as social isolation, anxiety, eating disorders, sexual problems, depression, self-harm and suicidal thoughts.³ The enormous volume of health information and information targeting young people available on the internet is hard not only to locate but also to process effectively and may often overwhelm young people seeking information,⁴ partly due to an increasing misconception about health issues shared online, which can lead to harm. In addition, the communicative infrastructure among traditional information providers may be ill suited for adaptation to the more intense feedback and

Marita Bjaaland Skjuve is a PhD fellow at SINTEF Digital in Oslo.

Petter Bae Brandtzæg, PhD, University of Oslo, Department of Media and Communication, Oslo and chief scientist at SINTEF Digital in Oslo.

dialogue forms in which young people's information needs are enacted and performed.⁵ Consequently, a large group of young people may be "information underserved" or "information poor", some services or information might either not be available or not fit young people's information needs, or the current services might present such a significant barrier that young people fail to access the services that are available.

Therefore, we need to ask, how can we eliminate the current information barriers for young people? How can we ensure that young people access the crucial and verified information available to them? Currently, information providers and services targeting young people seem to lack the innovation potential to adapt to contemporary youth and youth cultures, where Snapchat, Youtube and Facebook dominate. Information services for youths need to develop good and compelling solutions and user interfaces that can support the individualistic networked culture of young people. This networked culture emphasizes the need for new technology and user interfaces specifically tailored to young people's user needs, which may help information providers adapt to young people's immediate and interactive communication practices.

Chatbots as a new user interface

Chatbots may be the answer as a new innovative and interactive way to communicate with young users. Chatbots are humanlike representations of information providers that are increasingly applied within popular private messenger services that young people are already familiar with, such as Facebook Messenger, Kik, Telegram, Viber and Whatsapp. Chatbots work as interactive information partners. Users type questions (i.e. queries) in natural language, and meaningful answers are returned. The chatbot parses the content of the user input (questions such as "Why do I have anxiety?") and links it to a message database with possible responses. Based on our previous work, such chatbot conversations can be perceived as meaningful and trustworthy. Thus, chatbots provide a text-based conversational interface for information, which delivers immediate feedback in a humanlike way.

Chatbots are cost-effective methods for dealing with questions from people in social media ecosystems or as customer service agents in big companies,⁶ such as Google, Amazon and Apple. The recent developments in artificial intelligence and deep learning, coupled with the broad

popular uptake of online digital devices, and the emergence of huge data sets from digital traces and social media conversations, make chatbots a promising supplement to traditional forms of information services.

Therefore, the cost of developing and deploying chatbots is lower than for native apps and traditional and existing information services, and chatbots have the potential to be adopted and used by private- and public-sector entities.

Chatbots and mental health support: Breaking down barriers

The potential benefits of chatbots have made this type of interface an attractive and interesting method of delivering information to youths. But what exactly do young people perceive the benefits to be of using chatbots in a mental health-related context? Does this technology have the potential to eliminate information barriers?

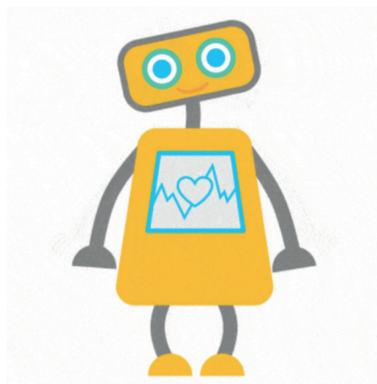
Youths have tended to recognize chatbots as valuable communication partners for several reasons. Young people view chatbots as a more anonymous way of getting health-related information than via Google or telephone services.⁷ Since the chatbot is artificial, it is perceived to be good at keeping secrets and will not share the information with others.⁸ As chatbots belong to the machine world, it might be easier to trust that questions or self-disclosures will not “leak” into the real world.⁹ By securing young people’s anonymity, chatbots can lower the threshold for youths to reach out and get the information they need. Thus, confidentiality and privacy are crucial when deploying chatbots – particularly in a mental health-care setting. Ensuring confidentiality and privacy is necessary to foster trust between young people and chatbots.

Chatbots’ lack of feelings might also make it easier for teens to open up and seek help. Chatbots cannot be offended or exhausted, which can foster an environment where youths feel that they can talk more freely without being judged or making the chatbot tired of listening to them.¹⁰ The use of artificial agents, such as virtual humans, has also been shown to facilitate more information sharing and less self-impression management and fear of self-disclosure,¹¹ which highlights some of the potential benefits of utilizing chatbots in settings where users seek answers or want to disclose sensitive information.

Although the chatbot fundamentally lacks emotions, this does not mean that it should not display empathy or be motivating and sup-

portive in the way it communicates. An artificially intelligent chatbot designed to help people cope with feelings of depression and anxiety is Woebot, which is grounded in cognitive behavioural therapy (CBT). The chatbot receives, according to Woebot Labs, more than two million messages a week and is said to be in use in more than 130 countries. It is a free, accessible tool for mental health care.

Figure 1. Woebot¹²



Hi, I'm Woebot!

I'm ready to listen, 24/7. No couches, no meds, no childhood stuff. Just strategies to improve your mood. And the occasional dorky joke.

SAY HELLO

Alison Darcy, the clinical psychologist at Stanford University who created Woebot, explains: “The Woebot experience doesn’t map onto what we know to be a human-to-computer relationship, and it doesn’t map onto what we know to be a human-to-human relationship either, it seems to be something in the middle.”¹³ This chatbot approach is unique. You are communicating feelings and thoughts about your inner self, but not with a human. This new form of socialization and experience with technology was also exemplified by a participant in one of our studies in Social Health Bots that investigated the reasons for using chatbots: “I use them when I feel bored or rather when I feel

down and have no one else to go to, it just relaxes me in a way. Gives me someone to vent to without getting judged. I know they aren't real, but it feels like they are."¹⁴

With CBT, Woebot supports its users with an array of techniques to help manage users' moods and challenge negative thinking with a positive approach. Woebot's strongest attributes in this regard are the abilities to show empathy and to promote positive self-talk, and the chatbot's fun personality.¹⁵ This chatbot utilizes emojis and phrases such as "I'm sorry you feel lonely",¹⁶ which exemplifies that a chatbot approach to young people can benefit from displaying understanding and emotional expressions. However, it is important that these responses do not display judgment or negative emotions. By utilizing engaging language, the chatbot can become a fun and interactive way to seek help. But most importantly, a chatbot is accessible 24/7, anywhere anytime, through your smartphone.

In addition to offering engaging and confidential conversations, the ability to provide quality-assured information and practical advice has been noted as a benefit by young people. Since the information that forms the knowledge base for the chatbot is not random, the information and advice presented are viewed as trustworthy and of high quality.¹⁷ This point is particularly important due to the existence of false and misleading health advice online. The information environment in social media that young people engage in will probably not improve over the next decade. Being able to discriminate between sources and filter out the information that is of high quality can be time-consuming and difficult. However, a chatbot trained in verified health data can make trusted advice more available to young people.

Limitations in the current chatbot landscape and new areas to explore

Although the benefits of using chatbots for mental health-care purposes among youths are apparent, several limitations exist. On a general note, questions such as "When should we offer a chatbot instead of a human?", "How can we ensure confidentiality and privacy?" and "In which situations will chatbots be a valuable tool?" arise. In general, there are major ethical questions about the use of artificial intelligence and chatbots in mental health care targeting young people.

By attempting to deploy chatbots in a mental health context for young people, we introduce technology that will manage very sensitive topics. As a human is needed to handle difficult situations such as suicide risks and cases where physical and/or psychological abuse is reported, managing the balance between situations where the chatbot can assist and cases where humans are needed remains a challenge that must be solved.

Specifically, the chatbot technology still has a long way to go before it can understand the user properly. Technical issues, such as difficulties processing queries correctly, providing valuable and/or correct answers, and understanding natural language, are frequently reported chatbot problems, including among youth in a health-related context.⁹ We need to combat these issues if chatbots are to take on the role of a communication partner and interact with young adults on sensitive topics.

In addition, in our research project Social Health Bots we are working on how to develop chatbots that facilitate a long-term relationship with the user. How can we design the dialogue so that the user wants to come back and ask more questions?

Privacy is also an important issue that needs to be addressed. The EU has very strict data protection laws, and in 2018, all the Nordic countries implemented the General Data Protection Regulation (GDPR), which aims to safeguard users concerning their privacy. However, privacy is not only about legal requirements; it is also an important part of the user experience. For example, the Woebot service is provided on Facebook Messenger, and several thousand users from around the world chat with Woebot via Messenger. However, many users reported that they were not comfortable sharing intimate and personal data over Facebook's platform, which recently has been under fire for the company's handling of personal data. Woebot is still accessible on Facebook but has also launched a stand-alone Woebot app that requires only a first name to sign up to provide as anonymous a user experience as possible. This approach also avoids any connections between user profiles and the users' interaction with Woebot. In addition, users can ask the Woebot app to delete their user history, as well as remove all conversations. This anonymous approach, which takes privacy into account, may be the most trusted approach when it comes to conversational needs for sensitive and personal issues.

Moreover, chatbots have the potential to be a new way to deliver news. We know that both social media and mobile devices for news con-

tinue to grow. Chatbots are, in this context, part of a new development for news consumption due to the increasing use of messaging services such as Facebook Messenger, Kik, Telegram, Viber and Whatsapp. The BBC and CNN have both recently developed chatbots that deliver news in a conversational style on Facebook Messenger. This way of delivering news may be experienced as more engaging among users, and one study by Yu and colleagues (2018) also demonstrated how chatbots might help combat the effect of disinformation.

Disinformation is perceived a growing problem in society, also in the context of health, and it can be difficult for youth to maneuver in the media landscape and evaluate the trustworthiness of a news story. The study by Yu and Han (2018) is particularly interesting because they revealed how a chatbot for news consumption can help readers to correct their wrong perceptions of a certain topic by utilizing the conversational nature of chatbots.

Conclusion

Designing and developing chatbots as a new interface to provide health information for young people needs a new understanding of new user needs and motivations, as well as privacy. What is needed to develop a successful conversational interface based on chatbots to provide health information is not straightforward. The use of chatbots as conversational user interfaces means a dramatic shift in how we are used to thinking about young users, communication and information. In this paper, we have outlined some of the new needs and challenges posed by the emergent trend of chatbots in the context of young people and mental health information, as well as the new benefits that chatbots deliver.

Notes

1. Brandtzaeg et al. (2016); Crutzen et al. (2011).
2. <https://www.sintef.no/en/projects/socialhealthbots/>
3. Dick & Ferguson (2015).
4. Rao et al. (2017).
5. *ibid.*
6. Reddy (2017); Xu et al. (2017).
7. Crutzen et al. (2011).

Acknowledgements

This work was supported by the Norwegian Research Council and the research project Social Health Bots (Project-No 262848).

8. Kim et al. (2018).
9. ibid.
10. ibid.
11. Lucas et al. (2014).
12. <https://woebot.io/>
13. Brodwin (2018).
14. Brandtzæg & Følstad (2017, p. 387).
15. Fitzpatrick et al. (2017).
16. ibid.
17. Kim et al. (2018).

References

- Brandtzæg, Petter Bae & Følstad, Asbjørn (2017). Why People Use Chatbots. pp. 377-392 in Kompatsiaris Ioannis et al. (eds.) *International Conference on Internet Science Cham*: Springer Nature.
- Brandtzæg, Petter Bae; Haugstveit, Ida Maria; Lüders, Marika & Følstad, Asbjørn (2016). How Should Organizations Adapt to Youth Civic Engagement in Social Media? A Lead User Approach. *Interacting with Computers*, 28(5): 664-679.
- Brodwin, Erin (2018). A Stanford Researcher is Pioneering a Dramatic Shift in How We Treat Depression – And You Can Try Her New Tool Right Now. [Online]. Available at <<http://www.businessinsider.com/stanford-therapy-chatbot-app-depression-anxiety-woebot-2018-1?r=US&IR=T&IR=T>>. [Accessed 18 June, 2018].
- Crutzen, Rik et al. (2011). An Artificially Intelligent Chat Agent that Answers Adolescents' Questions Related to Sex, Drugs and Alcohol: An Exploratory Study. *Journal of Adolescent Health*, 48(5): 514-19.
- Dick, Bruce & Ferguson, B. Jane (2015). Health for the World's Adolescents: A Second Chance in the Second Decade. *Journal of Adolescent Health*, 56(1): 3-6.
- Fitzpatrick, Kathleen Kaara; Darcy, Alison & Vierhile, Molly (2017). 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 Mental Health*, 4(2): e9.
- Kim, Junhan; Kim, Yoojung; Kim, Byungjoon; Yun, Sukyung; Kim, Minjoon; Lee, Joongseek (2018). Can a Machine Tend to Teenagers' Emotional Needs? A Study with Conversational Agents. pp. 1-6 in *Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems*, LBW018. New York: ACM.
- Lucas, Gale M.; Gratch, Jonathan, King; Aisha & Morency, Louis-Philippe. (2014). It's Only a Computer: Virtual Humans Increase Willingness to Disclose. *Computers in Human Behavior*, 37: 94-100.
- Rao, Runqing; Plotnick, Linda & Hiltz, Roxanne (2017). Supporting the Use of Social Media by Emergency Managers: Software Tools to Overcome Information Overload. pp. 304-310. In *Proceedings of the 50th Hawaii International Conference on System Sciences*. Hawaii: HIICS.
- Redy, Trips (2017, October 17). How Chatbots can Help Reduce Customer Service Cost by 30%. *IBM Watson* [Blog]. Available at <https://www.ibm.com/blogs/watson/2017/10/how-chatbots-reduce-customer-service-costs-by-30-percent/>. [Accessed 11 September, 2018].
- Xu, Anbang; Liu, Zhe; Guo, Yufan; Sinha, Vibha & Akkiraju, Rama (2017, May). A New Chatbot for Customer Service on Social Media. (pp. 3506-3510). In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems* ACM.
- Yu, Sanghyeong & Han, Kwang Han (2018, April). Silent Chatbot Agent Amplifies Continued – Influence Effect on Misinformation. In *Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems*. ACM.