HI, CAN I HELP? EXPLORING HOW TO DESIGN A MENTAL HEALTH CHATBOT FOR YOUTHS

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Abstract: *Chatbots represent new opportunities for low-threshold preventive mental health support to youths. To provide needed knowledge regarding how to design chatbots for this purpose, we present an exploratory design study where we designed and evaluated a prototype chatbot to complement the work of school nurses in the school health service. The prototype was designed with particular regard for preventive mental health support. The design process involved school nurses, digital health workers, and youths. Through user insight activities, we identified four types of support to be provided through the chatbot: informational, relational, processual, and referral. We explored these four types of support through concept development and prototyping. These results are discussed as a potential basis for a framework for understanding youths' needs regarding chatbots for preventive mental health support. When discussing the study findings, we point out how the study contributes to theory and practice and suggest avenues for future research.*

Keywords: *chatbot, school health service, conversational design, design science research.*

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INTRODUCTION

Chatbots allow users to access data and services through a conversational interface, where the interaction is conducted in the users' everyday language (Brandtzaeg & Følstad, 2018). The conversational character of chatbots, as well as their availability through messaging platforms, webpages, or dedicated apps, make these a promising supplement to current health-care services. For example, chatbots offer substantial potential for health services in regard for information, preventive support, and early-phase interventions (e.g., Crutzen, Peters, Portugal, Fisser, & Grolleman, 2011; Fitzpatrick, Darcy, & Vierhile, 2017).

One relevant area where chatbots can strengthen preventive mental health is support provided to youths (Fulmer, Joerin, Gentile, Lakerink, & Rauws, 2018), that is, to provide support before the onset of severe mental health issues. Preventive support through a chatbot may be a welcome addition to existing services, as the need for preventive mental health support in this age group outweighs what currently is offered (Waldum-Grevbo & Haugland, 2015). Mental health issues represent a substantial proportion of the disease burden of society (World Health Organization [WHO], 2019). Moreover, half of all cases of mental illness initially appear during youth and thus early intervention is important (Organisation for Economic Cooperation and Development [OECD], 2018).

Chatbots are a potentially efficient and low-threshold means to provide preventive mental health support (Fitzpatrick et al., 2017; Inkster, Sarda, & Subramanian, 2018). If chatbots can provide preventive support on a broad scale, they may be a cost-effective way of reducing the total disease burden in society.

Several chatbots for preventive mental health support already are available, such as Woebot (Fitzpatrick et al., 2017), Tess (Fulmer et al., 2018), and Wysa (Inkster et al., 2018). However, current studies of chatbots for preventive mental health support typically concern their efficacy rather than their design; as a consequence, the knowledge on how to design for such chatbots is limited. Furthermore, additional knowledge is needed on how various approaches to chatbot design may appeal to users and provide needed support. While guidelines exist for the design of chatbots in general (Hall, 2018; Moore & Arar, 2019; Shevat, 2017), none of these address the design of chatbots for health purposes. However, the characteristics of the mental health domain, such as the need to provide support as part of therapy or treatment, make such domain-specific knowledge and guidelines necessary. In particular, knowledge and guidelines should be developed regarding how chatbots can provide preventive mental health support, as well as how to approach conversational design for such chatbots.

To bridge this gap in current knowledge, we conducted an exploratory design study, developing and evaluating a simple prototype chatbot for preventive mental health support. In response to user needs, identified through interviews and focus groups, the prototype offered informational, relational, procedural, and referral support. For example, for informational support, the prototype served as a resource on topics relevant to youth mental health. For procedural support, the prototype offered cognitive therapy psychoeducation.

We developed the prototype as a complement to the current school health service in high schools, which is a useful context for understanding how to provide support to the population of youths in the latter half of their teens (aged 16–18 years). The study followed a design science research approach (Hevner, March, Park, & Ram, 2004), utilizing a user-centered design process in which youths and experts on youth health support—school health nurses and

digital health workers—were involved in the insight,[1] concept development, and evaluation phases of the project. By digital health workers we mean resource personnel at Norwegian platforms that provide online information and support of relevance to youths—including on youth mental health.

The study contributes a basis for a framework for understanding youths' needs of relevance for a chatbot for preventive mental health support and how these needs may be addressed through a chatbot. This is valuable for designers and developers of future chatbot solutions. Furthermore, the study proposes an extension of current principles for conversational design by adding a principle of confirmation. This principle concerns why and how a chatbot should provide confirmatory responses resembling those of a friend, caregiver, or support personnel in response to user messages of emotional importance. Finally, the study contributes youths' responses to the chatbot prototype that instantiate the forms of mental health support and conversational design principle.

The remainder of the paper is structured as follows. First, we present relevant background on youth mental health and approaches to mental health support, as well as on chatbots and conversational design. On this basis, we explicate our research question. The Methods section covers both the study's overall research approach, as well as the applied user-centered design process (International Organization for Standards [ISO], 2010) and the specific data collection methods. In the Results section, we present the user insight, that is, findings regarding potential users' needs, preferences, and characteristics. The presented user insight includes our findings concerning youths' needs for support and the benefit of conversational design in response to the emotional valence of the users' input—as well as the design concepts, prototype, and outcome of the evaluation with users. Finally, we discuss our findings relative to the background, comment on study limitations, and suggest avenues for future work.

BACKGROUND

The Domain: Youths' Mental Health and Preventive Mental Health Support

According to the World Health Organization (WHO, 2013), mental health is understood as a state of well-being where people realize their abilities, cope with normal stressors, work, and contribute to their community. Mental health issues are potential threats to, or breaches in, mental health and encompass *mental disorder*, that is, mental health conditions that meet certain medical diagnostic criteria, and *mental distress*, that is, conditions experienced as burdensome but not meeting diagnostic criteria.

Mental health issues of varying types and degrees represent a substantial part the human disease burden. Worldwide, more than 20% of years lived with a disability is due to mental health conditions, and more than 25% of people will experience some mental disorder in their lifetimes (WHO, 2019). Mental health issues can have strong negative effect on education and career (Nordic Institute for Studies in Innovation, Research and Education [NIFU], 2012). Hence, providing assistance and support to youths experiencing mentally stressful or challenging situations is an important preventive action (Raknes, Finne, & Haugland, 2013). Furthermore, preventive support is key to reducing a society's disease burden (Rose, 1993).

A number of services exist to provide preventive mental health support for youths, both within and beyond the public sector. Within the public sector of many countries, the school health service is mandated to promote mental and physical health, as well as good social and environmental conditions, to all children enrolled (WHO Europe, 2014). At the heart of the school health service are the school health professionals. In Norway, where we conducted the design project presented in this study, this role is populated by school nurses—nurses with specialization in health promotion and preventive work (Norwegian Directorate of Health, 2017). School nurses provide mental health information to individuals and groups, as well as individual dialogue and counseling, and are in a unique position to recognize adolescents who experience difficulties (Glavin & Kvarme, 2003). The school health service provides low-threshold support in minor and moderate situational and relational causes of distress, thereby preventing aggravation and more serious illnesses. However, the school health service has limited resources and may not be able to provide the preventive support needed for all youths (Langaard & Olaisen, 2005; Waldum-Grevbo & Haugland, 2015).

Outside the public sector, several digital services have appeared to support youths' mental health. This includes one-to-many services, such as information websites and community platforms, as well as one-to-one services, such as phone and chat lines where youths can get counseling, therapy, or simply someone to talk with about their problems. Of particular interest in this study is the increasing availability and uptake of automated digital health services, made available through websites or smartphone apps. In particular, burgeoning numbers of automated health services are delivered through smartphone apps, including general services for improved well-being and services targeting common mental disorders such as depression and anxiety (Anthes, 2016). Although empirical support is lacking in regard to the efficacy of most of the available mental health apps, meta-studies of randomized control trials suggest beneficial effects of tested apps for depression (Firth, Torous, Nicholas, Carney, Pratap et al., 2017) and anxiety (Firth, Torous, Nicholas, Carney, Rosenbaum et al., 2017).

Digital health services may be beneficial as they provide easy access to help and information, make use of familiar channels for youths, and may complement more costly services, such as the school health service (Norwegian Directorate of Health, 2018). For example, one popular one-to-many digital health service for youths, the Norwegian Snapchat account *Helsesista* established by a former school nurse, has a daily reach of 40,000 Norwegian youths (Helsesista, 2020). Additionally, as some youths and young adults perceive seeking help for mental health issues as shameful (Solvang & Kilsti, 2000), anonymity on digital health services may make it easier to bring up issues perceived as difficult or stigmatizing (Horgan & Sweeney, 2010; Jensen, 2014; Park, 2018).

Chatbots and Chatbot Design

Within the landscape of available mental health services for youths, chatbots are emerging as a form of service targeting the space between automated smartphone apps and one-to-one chat-line services. Chatbots are software agents providing access to information and services through interaction in the users' natural language. Although some restrict the use of the term chatbot to software for casual conversation only (e.g., Jurafsky & Martin, 2018), we include task-oriented conversational agents in our use of the term because conversational user interfaces increasingly blend task-oriented features and casual conversation. Conversational

user interfaces have been explored since the 1960s (Weizenbaum, 1966), yet interest in chatbots has increased recently due to advances in natural language processing and artificial intelligence, as well as the increased uptake of chat-based messaging platforms (Følstad & Brandtzaeg, 2017). Chatbots have been applied to or explored for a range of areas, such as customer service (Xu Liu, Guo, Sinha, & Akkiraju, 2017), e-commerce (Zarouali, Van den Broeck, Walrave, & Poels, 2018), education (Fryer, Ainley, Thompson, Gibson, & Sherlock, 2017), and work support (Toxtli, Monroy-Hernandez, & Cranshaw, 2018).

In the health domain, chatbots have been used for purposes such as medical diagnostics (Jungmann, Klan, Kuhn, & Jungmann, 2019), medical treatments follow-up (Chaix et al., 2019), healthy behavior change (Perski, Crane, Beard, & Brown, 2019), and preventive mental health support (Fitzpatrick et al. 2017). Research on chatbots in the health domain typically addresses performance (Laranjo et al., 2018) and user acceptance (Laumer, Maier, & Gubler, 2019) rather than the design of health chatbots. In a recent scoping review of the research on mental health chatbots, Abd-alrazaq et al. (2019) characterized health chatbots as a nascent area of research and found that existing studies mainly addressed chatbots for therapy, training, screening, and self-management, typically with rule-based response management.

Chatbots, however, have not yet been taken up on a broad scale among their potential users. In a survey of chatbot uptake, Drift (2018) found that only 15% of consumers in the US had used chatbots to communicate with businesses. A representative Norwegian survey in 2020 found that 85% of youth and young adults in the age group 16 to 26 years did not use chatbots at all (Brandtzaeg & Lüders, 2020). An exception to the relatively low uptake of chatbots is the use of digital assistants such as Amazon Alexa, Google Assistant, and Apple's Siri, which a larger volume of users access regularly (Forrester, 2017).

Given their conversational character, where users interact with the chatbot in a manner resembling chats with persons, chatbots may provide a different approach to digital health services than what is currently possible through a traditional graphical user interface. In the more well-known chatbots for mental health, such as Woebot (Fitzpatrick et al., 2017) and Wysa (Inkster et al., 2018), support is provided through text-based dialogues in natural language and implemented as smartphone apps or through messaging platforms such as Facebook Messenger. The dialogues typically draw on procedures from cognitive behavior therapy (Southam-Gerow & Kendall, 2000), with the aim of helping users challenge any unhelpful thought and behavior patterns and establish coping strategies. The current literature provides little information regarding how users in general, and youths in particular, perceive chatbots as a means for mental health support. A study by Crutzen et al. (2011) suggested that youths find chatbots to be a preferable means of accessing information on sex, drugs, and alcohol. Fitzpatrick et al. (2017) found the satisfaction with an intervention by a chatbot for mental health support to be higher than a control group provided an e-book on the intervention topic.

Key to chatbot interaction design is setting the stage for efficient and enjoyable conversations, so-called conversational design (Google, 2019). A conversational approach to interaction design represents a shift from design of visual layout and interaction mechanisms, such as scrolling and swiping, to viewing conversation as the object of design, whereby principles of how people interact with each other applies (Følstad & Brandtzaeg, 2017). A number of guidelines on general conversational design are available (e.g., Hall, 2018; Moore & Arar, 2019; Shevat, 2017). Key aspects of conversational design include—among others—user onboarding,[2] structuring the conversation, and conversational repair. During onboarding, the chatbot may introduce key features

and set user expectations. The subsequent conversation may be structured in line with flows or actions. A flow or action may be initiated through recognizing a user's intent or decided by the system; these may follow a strict or flexible structure toward a specific goal or for exploring a specific topic. As interpretation errors are prone in any conversation, means of conversational repair by the chatbot is critical to conversational design—for example, by asking the user to repeat, paraphrasing the message, or providing likely paths forward. To reduce the need for conversational repair, the chatbot dialogue may provide users with predefined answer options, but this decreases the flexibility of the system.

Designers of conversational systems often draw on two philosophers of language: Searle and Grice. Searle (1976), in his speech act theory, laid out how a conversational process consists of speech acts, that is, speech is seen as having a performative function through which the user aims to achieve something. Grice (1975) argued that effective conversational communication employs a general cooperative principle. This principle is laid out as four conversational maxims concerning truthfulness, informativeness, relevance, and clarity in communication. Drawing on the work of Robin Lakoff, Hall (2018) detailed a fifth maxim of politeness to the four Gricean maxims. This fifth maxim concerns a conversationalist's need to avoid imposing on, to give options to, and to make the conversational partner feel good.

Little advice is available regarding how to design for health support chatbots. As noted by Kowatsch et al. (2017), it is unclear how chatbots should be designed and framed to provide adequate digital health interventions, though early explorations have been presented on the design of chatbots for purposes such as self-disclosure (van der Lee, Croes, de Wit, & Antheunis, 2019), peer support conversations (Nordberg et al., 2019), and therapy (McAllister et al., 2019). Fitzpatrick et al. (2017), in their study of the efficacy of the mental support chatbot Woebot, provided high-level descriptions of the content, conversational style, and the support process. Their content draws on cognitive behavior therapy, with a conversational style including, among others, empathic responses adapted to the participants' moods. Liu and Sundar (2018) also suggested the benefit of empathic responses in their study of health advice chatbots, as users were found to prefer these to unemotional responses. However, although chatbots' conversational style allows for humanlike interaction with a computer system, the benefits in aiming for chatbots in health care that fully resemble human conversational partners remains unclear. As noted by Powell (2019), the informational quality of the output from artificial intelligence health care support is far more important than whether or not such support is humanlike.

RESEARCH QUESTIONS

Even as the current literature provides general background on the design of chatbots, there is a dearth of knowledge regarding the design of chatbots for preventive mental health support, in terms of both the users' needs that these chatbots should address and the approaches to conversational design. This gap in current knowledge may hamper the development of chatbots for mental health support and the utilization of this potential source of mental health support as a low-threshold supplement for youths.

In response to this gap in knowledge, we explicated the following research question: How to design a chatbot that provides preventive mental health support for youths? Specifically, we aimed to investigate how to design a chatbot that provides preventive support. This benefit is

relevant for a broader swath of the population and, following Rose (1993), may provide an efficient means for lowering the total disease burden associated with mental health.

As part of addressing the overall research question, we pursued two subquestions:

- Which user needs should be addressed by a chatbot that provides mental health support for youths?

- How do youths experience using a chatbot to get mental health support?

The two subquestions guided our research in establishing essential areas of user and context knowledge for designing successful chatbot implementation for the mental health support of youths.

METHODS

In response to the research questions, we set up our study as a design science project. The context of the project was the design of chatbots to complement school nurses in high schools in their provision of preventive health support. The project initially scoped the problem of preventive health support broadly and gradually narrowed this to mental health support to allow for a clear and distinct contribution. Within the project, we conducted a user-centered design process involving youths and experts on health support for youths. The project, hence, generated new knowledge on user needs, chatbot design, and user experience with the chatbot. In the following, we detail the research approach, the design process, participant recruitment, and data collection and analysis.

Research Approach

The study followed a design science research approach, drawing on the work of Hevner et al. (2004). Key to this approach is creating and evaluating artifacts that help solve real-world problems. We aimed to design concepts and a prototype for a chatbot providing preventive mental health support to youths. This type of design challenge is referred to by Gregor and Hevner (2013, p. 347) as "exaptation" that is, a challenge that seeks to extend known solutions (here, chatbots) to new problems (here, preventive mental health support for youths).

The outputs of design science research may be artifacts assessed and justified in terms of the needs they were developed to solve, as well as their contributions to the design knowledge base. We set up our research approach so that the main output was new knowledge concerning the users' needs addressed by a chatbot for preventive mental health support for youths, principles for designing such a chatbot, and insight into how youths experience such a chatbot.

Context

The design project was conducted in the context of the school health service in Norway at the high school level. This is a useful context in which to explore a chatbot for preventive mental health support for youths because the school health service is a service available to all enrolled Norwegian youths.

The school health service is an easily available and low-threshold service where school nurses provide a variety of support (Norwegian Directorate of Health, 2017). However, the school health service may not have the resources needed to follow up with all youths in need

of preventive support (Waldum-Grevbo & Haugland, 2015). Youths may also experience barriers to use the school health service, such as a possible social stigma associated with mental health issues and the need for support (Jensen, 2014).

The Norwegian context also implies that the user group has high access to mobile Internet. Recent data indicates that practically all (99%) of Norwegian youths used a smartphone for private purposes in 2018 (Statistics Norway, 2018).

Design Process

We applied a user-centered design process in the project (ISO, 2010). Fundamental to this process is allowing the users' experiences and needs be the driving force in the design process. Given the context of the project, and the particular character of mental health support for youths, the users involved in the process included school nurses and digital health workers, referred to in this paper as *experts*, as well as youths, all of whom were enrolled in high school. The experts were involved early in the insight and concept development phases; the youths were involved toward the end of the insight and concept development phases as well as in the evaluation phase.

Chatbots have not yet been taken up on a broad scale in the user population (Drift, 2018). Because of this, we saw it as important to present concepts and prototypes to the involved users as early as possible in the design process. We intended to strengthen the users' sense of opportunities and limitations of chatbots, as well as to get early feedback on initial and evolving chatbot ideas and concepts.

We implemented the user-centered design process as consisting of (a) an insight phase to understand the context of use and to detail user needs and requirements, (b) a concept development phase in which chatbot concepts were explored through sketching and user feedback, (c) prototype development to establish a simple prototype chatbot on the basis of the gathered user insight and chatbot concepts, and (d) an evaluation phase gathering user feedback on the prototype. The insight and concept development phases were conducted in parallel so that the involved users provided both relevant knowledge and experience based on their domain knowledge and feedback on the chatbot concepts. Preceding the design process, we conducted a review of relevant background in the form of research literature, practitioner-oriented material such as books and industry reports, and existing services. An initial set of chatbot concepts sketches were developed based on ideas spawned from this background review. The chatbot concept sketches were subsequently refined based on user feedback throughout the concept development phase. Figure 1 provides an overview of the design process. In that it also serves the overall research purpose in the project, we refer to this as a research and design process.

Participant Recruitment and Involvement

The participants included experts (school nurses and digital health workers) and youths. In total 12 experts and 15 youths were involved. Of the experts, seven were school nurses and five were digital health workers (one of the experts held both these roles); all but one was female.

We recruited the school nurses from the school health service of the Oslo municipalities through a research collaboration between the municipalities and the research organization of the second and third authors. The school nurses' work experience from the school health service at
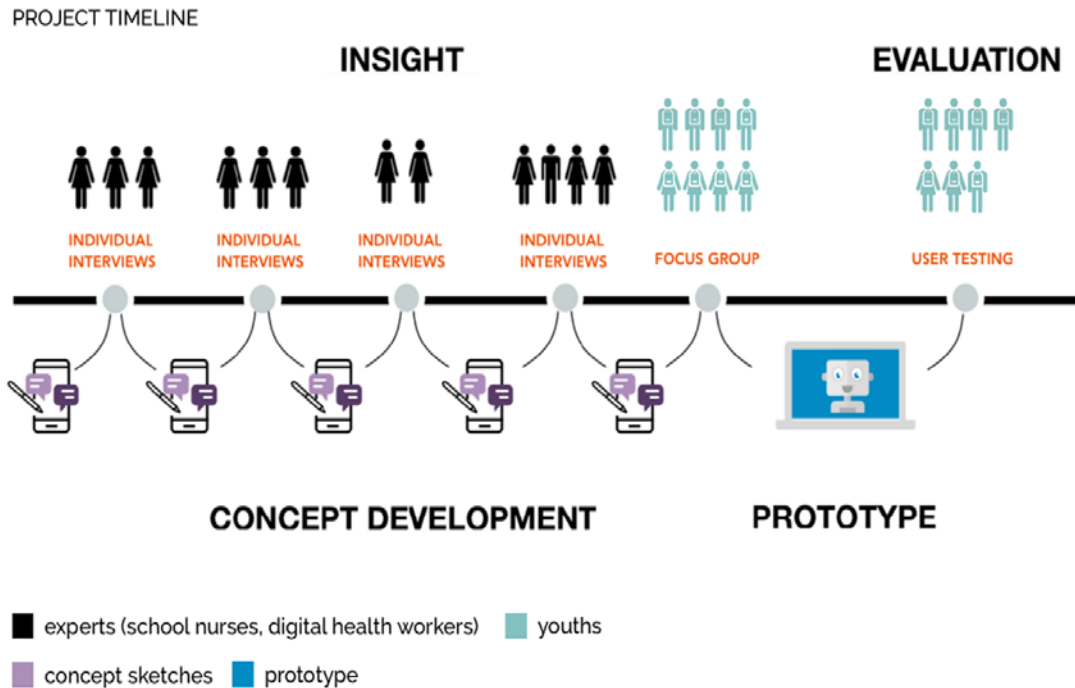
Figure 1. Overview of the research and design process applied in the project, showing number, gender and category of participants for each of the methods for user involvement.

the high school level—working with youths in the age group 16–18 years—ranged from 2 years to more than 20 years, except for one who was an experienced nurse but had only 6 months experience working at the high school level. The digital health workers were representatives of five Norwegian platforms providing online information and support of relevance to youths—including on youth mental health. The digital health workers were involved due to their expertise in online communication with youths, thus supplementing the knowledge represented by the school nurses. The varied backgrounds of the digital health workers included nursing, economics, anthropology, and health economics. The school nurses and the digital health workers were all involved through individual interviews in the parallel insight and concept development phases.

One of the participating school nurses facilitated the recruitment of high school youths into the study by way of several teachers at the school. The youths' ages reflected that of their school cohort. Nine were male; six were female. The youths were recruited through in-class project presentations held by the first author and received gift cards of 200 Norwegian kroner (approximately €20) as an incentive to participate. Participation was voluntary and any student receiving the presentations could register with the first author for participation. Of the 20 students who registered, ten were randomly selected for the focus group at the end of the concept development phase. Eight of these eventually participated (four males, four females). The remaining ten registered students were at a later point invited to participate in the individual user tests. Eventually, seven students participated in these (five males, two females). Given the preventive aim of the chatbot, we recruited the participants without regard for any history of mental health issues.

Data Collection and Analysis

We applied three methods for data collection and user feedback: interviews, focus group, and user testing. All data collection was conducted in Norwegian, a language that all participants mastered. Any user quote included in this report was translated from Norwegian by the first author.

Interviews with Experts

The experts participated through individual interviews lasting approximately 1 hour, audio recorded only. The interviews were semistructured and followed predefined interview guides. Key interview topics in the interviews with school nurses included youth needs during their interactions with the school health service, how school nurses provide information and support to youths, barriers for youths in seeking help from the school health service, youths' use of digital sources for health support, viewpoints on chatbots as a complement to the school health service, and feedback on concept sketches. Key topics in the interviews with digital health workers included how they communicate with youths online, youths' needs with regard to digital health services, benefits and challenges of digital health services, viewpoints on the use of chatbots to complement digital health services, and feedback on concept sketches. In all expert interviews, we presented concepts sketches (Figure 2) for feedback at the end of the interview so as not to interfere with participants responses to the preceding topics.

Focus Group with Youths

Toward the end of the insight and concept development phases, we conducted one focus group with youths, which was audio recorded. The main goal of the focus group was to understand the youths' experiences with available health support and how they currently seek out and access health-related information and help. This forum also allowed the possibility to obtain feedback from youths on the final set of concept sketches of the proposed chatbot and foster a discussion on how digital technology can support current services. The duration of the focus group was 2 hours.

Key topics of discussion were perspectives on the school health service and digital health services, discussion on opportunities and challenges for a chatbot for health purposes, and feedback on the concept sketches. To support the group discussions, we provided participants brainstorming tools to identify and make note of perspectives and viewpoints for discussion (see Figure 3).
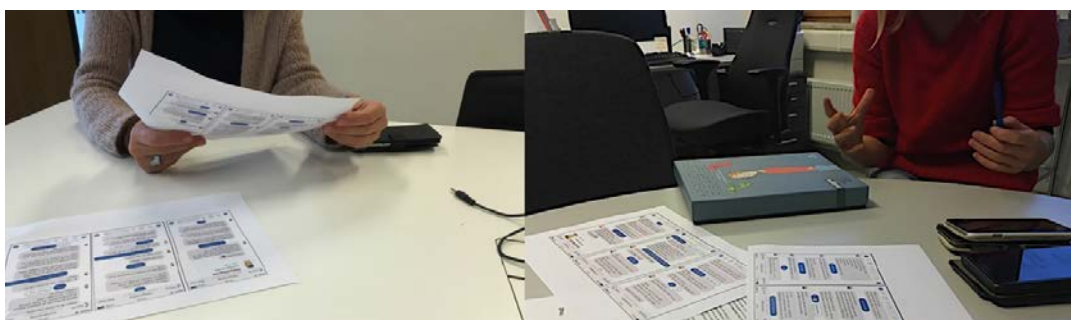

Figure 2. Pictures from expert interviews where participants were presented with concept sketches of a chatbot for support of youth mental health.
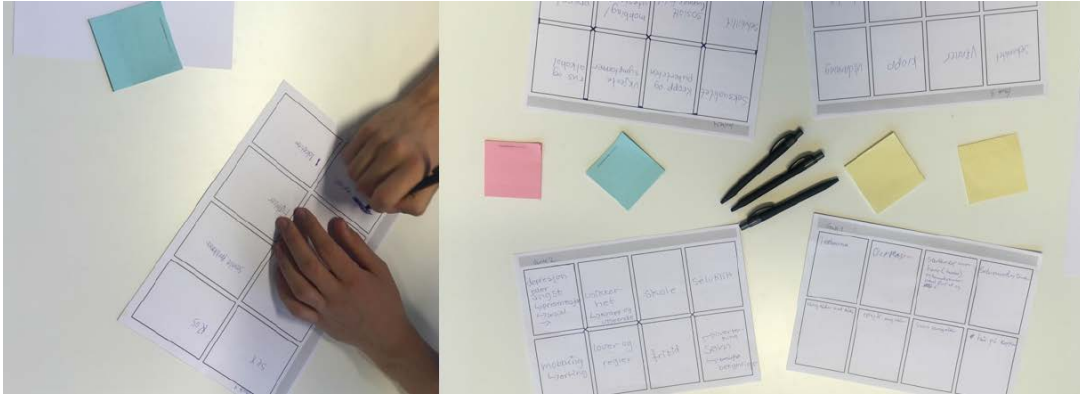
Figure 3. Brainstorming tools used to support discussions in the focus group with youths, allowing the participants to make individual notes prior to plenary discussion.

User Testing

In the final project phase, we employed user testing to investigate how youths experienced the developed prototype of a chatbot for preventive mental health support. The youths participated individually in the user testing. They were presented with two scenarios—one concerning a stressful situation and another concerning loneliness—and selected the one they felt fit best. Both scenarios allowed the user to envision themselves in the respective scenario before using the chatbot. Using these scenarios as starting point was intentional for protecting the privacy of the participants, as it put them in a context that allowed them to empathize while not addressing a situation from their own lives.

Each of the scenarios involved tasks for the users to perform related to all main features of the chatbot prototype (see Figure 4). The users interacted with the prototype on a smartphone and were instructed to think aloud during task completion, applying what Boren and Ramey (2000) referred to as a speech communication protocol for think aloud. Following completion of all tasks associated with the scenario, we conducted an interview. Key topics of this interview were the users' experience, the usability of the prototype, and their thoughts on potential opportunities for a chatbot for health support. Each test session lasted 30–45 minutes, with recording of audio. Also video from the device's screen was recorded; the youth users were not recorded.

Figure 4. Images from the youth user tests of the chatbot prototype. The prototype was accessed on a smartphone.

Analysis

Data from the interviews and focus group were analyzed through a thematic analysis process, following Braun and Clarke (2006). We conducted the analysis inductively, allowing the data to drive the process. We established the initial codes in a systematic fashion across all data sets, and these were used to identify and label data extracts. The codes and associated data extracts were collated into potential themes and subthemes, which then were reviewed and consolidated.

As a result of the analysis, we identified key themes concerning the youths' needs for support—at the informational, relational, processual, and referral level. Additional themes addressed the youths' relations to services for mental health support—whether these are perceived as available, low-threshold, and trusted—and the benefits and challenges of mental health support.

RESULTS

In this Results section, we first present key findings from the insight phase. Following this, we present concepts and prototypes developed in response to the user insight, before presenting evaluation results from the user testing. When presenting participant quotes, we specify the participant's number [1–27] preceded a letter indicating whether the participant was one of the adult experts (A) or one of the youths (Y).

Insight

The interviews and focus group provided insight on three levels. First, on youths' needs for support, second on what constitutes a beneficial relation between youths and the provider of mental health support, and finally on perceptions concerning benefits and challenges with digital mental health support.

Youths' Needs for Support: Implications for a Mental Health Chatbot

The school nurses accentuated the broad variation in the type and severity of issues that impact youths' mental health. They pointed out that youths have questions and needs pertaining to a wide range of issues concerning their mental health, some due to single incidents in the immediate past, others to long-lasting issues. Relevant issues might concern, for example, pressure at school, relational problems and breakups, bullying and harassment, loneliness, or worry regarding symptoms that may be associated with mental disorder, such as anxiety and depression.

> *They are stressed* [and] *live under a lot of pressure ...*[3] *anxiety problems, panic anxiety, sadness ... breakups, mentally ill parents and drugs in the family. Some experience having a poor relationship with their parents and that there are a lot of conflicts. ... Occasionally there are some who have been abused.* [A2]

The school nurses expressed a desire to spend more time with the youths who are more vulnerable and/or who have problems that require more time to support. At the same time, an important part of their work also is to provide support to youths with less severe issues, those that may be alleviated through dialogue or with simple techniques to change thought patterns.

Through the reports of the school nurses, digital health workers, and youths, we identified four needs for support with regard to preventive health support: an informational need, a relational need, a process need, and a need for referrals. All these may be of relevance for a chatbot for preventive mental health support and we detail them below.

Informational need. The school nurses and digital health workers, as well as the youths themselves, reported a substantial informational need concerning mental health. Youths may be worried due to uncertainty regarding their own situation and experiences. For example, they may worry whether their thoughts and emotions are typical and can be expected or whether these are cause for concern.

Hence, objective information of direct relevance to youths' situations and experiences seem key to preventive mental health support. At the same time, the school nurses and digital health workers reported that youths might be confused or misled by information they find online. These comments suggest the need for balanced and validated information as well as the need to help youths filter through and digest information they find through online sources.

> [They] *have used Google and gained so much information and become terrified and almost believe they have cancer, right. So, very often, time is spent on reassuring around such things too.* [A4]

The youths in the focus group reported feeling overwhelmed often by all the information available online. They found searching for information time consuming and search results difficult to understand.

> *I had to scroll through so many different sites, and I ended up not finding an answer to what I was wondering about.* [Y17]

Relational need. The school nurses and digital health workers reported that youths often need to relate to someone beyond their network. Specifically, youths are seeking someone who can acknowledge and understand what they are going through. They need to talk to someone and, importantly, know they have been heard.

> [They] *need someone to share this* [issue] *with, who doesn't do anything more, that is, just listens.* [A11]

These experts also reported that youths seeking support often need to be comforted and to have someone empathize with their experiences. Offering a relationship in which youths experience being heard and understood was reported to potentially alleviate some of youths' mental burden and help in processing issues that are experienced as troublesome.

> *It helps to talk about it, and that they themselves hear their own voice talking about what they feel is scary to say -- it can be of help just that.* [A3]

To provide a basis for good relations, the school nurses and digital health workers reported using conversational techniques such as confirmation and normalization, where they acknowledge and empathize with the situations and experiences of the youths. Yet they also—in cases of distress that are common and expected in the process of growing up—seek to reassure the youths and convey that they are not to fret that their worry or concern is outside what is commonly experienced in adolescence.

Normalization is an important thing in such a conversation with youth because, to them, it is new and can be scary ... But for us who have worked a long time with youths, [we] *know that life goes up and down, and things happen in everyone's life, just in different ways.* [A3]

Processual need. Striving toward youths taking control of their own health, that is, to work toward empowerment in mental health issues, was reported as key to preventive mental health support by the school nurses and digital health workers alike. For them, an important goal of health support systems should be to help the youths help themselves and experience mastery.

It is incredibly important that [youths] *experience mastery ... It's a bit about letting them be in the driver seat and to support them.* [A2]

The path to mental health and well-being may sometimes go through helping the youths themselves to take the steps toward improving their situations. For this purpose, the school nurses and digital health workers reported providing the youths with (a) insight into how thoughts may affect emotional states and (b) self-help techniques for them to apply in changing counter-productive thought patterns.

Instead of feeding them with a solution ... they actually have to think for themselves and think about what might help them. [A2]

One such self-help technique taught by Norwegian school nurses is thought clearing (in Norwegian: *tankerydding*), a technique developed as part of a cognitive therapy psychoeducation program to support youth (Raknes et al., 2013). Here, the aim is to identify situations and thoughts that are associated with various emotional states. In particular, it focuses on thoughts associated with situations and emotional states that are perceived as troublesome and unwanted. The goal manifests in the need for youths to challenge negative thoughts, change perspectives on situations, and thereby change counter-productive thought patterns.

Being aware of our thoughts and what it does with our feelings ... is something we can teach them ... how to do things yourself to get better, because there is a lot you can do yourself. [A7]

Need for referral. School nurses and digital health workers reported that, in situations of severe mental health issues and situations that require more assistance and support than can be provided through their own service, the youths need to be referred to other services. For digital health workers, this may entail the recommendation to contact health service personnel, such as a general practitioner or school nurse, whereas school nurses may refer the youths to specialist services.

Where we see that we are not enough, that we can support them to take -- help them further to get more help. [A7]

Even though a preventive mental health service may provide valuable support to youths with less severe mental health issues, an important aspect of the service is to provide a means of help and support for users with severe mental health issues or who are at risk for harm. In a chatbot solution to complement school nurses, the first step toward such help may be to get in touch with personnel in the school health service.

Thus, through our interviews and focus group, we gained insight into youths' needs for support that served to identify four areas of needs of direct relevance for a chatbot for mental health support. First, we identified a substantial informational need. Lack of information or conflicting information may increase uncertainty and distress, whereas information that can be trusted may help diminish a stressful situation. Second, we determined a need for relational support: Empathy, confirmation, and normalization may comfort and help. Third, processual support is important for empowering youths to engage actively in improving their own situations. Finally, referrals to other services is important in that a proportion of the youths seeking help will have issues that require other or more extensive support than can be provided in a low-threshold preventive service.

Youths' Relations to Services for Mental Health Support

Relations between the user and the health service provider are important for providing support in an efficient manner. The school nurses and digital health workers accentuated three aspects of a preventive health service as particularly important: It should be available, low-threshold, and trusted.

Available. When the school nurses were asked about the most important part of their job, all of them reported on the criticality of being available. The school nurses and the digital health workers spoke of how youths experience events strongly as they happen and stressed the importance of being available when youths experience issues of critical importance to them.

Low-threshold. A low-threshold service implies a reduction in potential barriers for getting the service. Barriers could be associated with a lack of availability; another barrier could be a perceived stigma associated with mental health issues and a need for mental health support. For example, the context of the waiting room outside the school nurse's office was mentioned by the school nurses as potentially increasing the barrier for youths to get in touch, as they might be uncomfortable in being exposed as users of the school health service. The school nurse and the youth participants reported that youths commonly feel shame regarding their issues when in the health clinics and at the school nurses' office.

It is embarrassing to come here ... There are a thousand reasons for young people to be ashamed. [A9]

Trusted. Finally, we identified trust as the foundation of successful support. Allowing trust to build as part of providing preventive health services was seen as critical. For a health service to support youths, the adolescents need to perceive the service as competent and benevolent, as well as willing to help them on their own terms.

I think that you are not getting anywhere with methods if you don't get a trusting relationship with who you're talking to. [A4]

Perceived Benefits and Concerns Regarding Digital Health Services

The school nurses, digital health workers, and youths all noted a range of advantages and concerns regarding digital health services, such as chatbots. Key advantages noted were (a) the

potential of digital health services to provide support on youths' terms, (b) to reach more youths, (c) to strengthen availability, and (d) to provide anonymity. Digital health services may be used anytime and anywhere on the youths' preferred platforms. This may reduce barriers for use and lead to broader reach. In particular, it was noted by the digital health workers that boys are relatively more frequent users of digital health services than of the school health services, something confirmed from other studies (e.g., Norwegian Directorate of Health, 2018). The availability of digital health services implies the opportunity to get support also on evenings, nights, and weekends. Finally, the anonymity provided in digital services was seen as beneficial in lowering the threshold for use. The experts expressed how anonymity could make it less scary for youths asking for help, especially in the case of issues perceived as stigmatizing or which one does not want anybody to know about.

> *They feel anonymous, and that is often the main reason why youths use it. It is because they feel, "Yes, then I'm safe, then they don't know who I am so I can tell my problem and be honest."* [A9]

Key challenges with digital health services concerned resources, privacy, legal aspects, and the need identify individuals with severe issues. Digital health services may represent uncharted territory in terms of institutional responsibilities, and uncertainty exists regarding whether sufficient resources will be available to maintain adequately such services. The issue of privacy also was seen as important, as digital health services imply sharing sensitive data in an online context. Other legal aspects, for example, may entail the documentation requirements of health-care personnel. Finally, our participants noted that digital systems for providing mental health support should include a means to provide assistance to those in need of help beyond what the system may provide.

Concepts and Prototype

On the basis of existing background and in response to the insights provided by the school nurses, digital health workers, and youths, we iteratively developed a set of concept sketches. Then, upon completion of the parallel insight and concept development phases, a simple prototype was developed. By way of the concept sketches, we explored how to address the four types of needs (informational, relational, processual, and referral) identified through the insight phase. The prototype then instantiated and further detailed how to address the four types of needs. Concept sketching was conducted on the Botsociety platform.[4] We developed the prototype on the Dialogflow platform.[5]

To keep focus on the exploring how to address the four types of need rather than, for example, spending resources on training the chatbot to identify all relevant intents, the concepts and prototype was set up as flows through a relatively small number of dialogue trees. For triggering specific flows, we applied intent recognition. Within the flows, users mainly navigated by the use of predefined answer alternatives in addition to making some input through free text. In the following, we present key aspects of the prototype.

Chatbot for Informational Support

The user insight suggested that informational support may be important for preventive mental health support for youths. At the same time, youths reported challenges in navigating and making

sense of online information sources. Furthermore, the information provided to support youths this way needs to correspond closely to what the youths see as their current informational need and to be presented in a manner that is on the youths' own terms.

The design problem involved in informational support regards how to display information in such matter that it is understandable for youths and comfortable for them to process. We explored various levels of detail and complexity for presenting information. A possible solution to the design problem is to provide brief initial responses to the users' questions, an easily accessible entrance to the topic of information, and then expand on this initial information gradually, by offering to adapt and complement the information already provided (see Figure 5). Such gradual adaptation and complementation of informational content requires a structuring of the dialogue so that a topic initiates on a general level and then gradually moves into details where the information provided fits the situation of the user. This way of providing information bears resemblance with how information is provided in, for example, customer service chatbots.

Chatbot for Relational Support

The user insight clearly suggested the need for relational support as part of a digital health service. In dialogues between humans, for example, such support may involve expressing empathy and acknowledgement in response to issues that hold emotional importance for the other party. Such relational support differs markedly from informational support. Whereas informational support provides answers to specific questions, relational support embodies the manner in which the dialogue is conducted, specifically, adapting responses according to the perceived emotional valence the topic of conversation holds for the other party.

The design challenge in providing relational support through a chatbot involves designing for a dialogue where the chatbot responses are adapted to the emotional valence of conversation topic—responses that may be soothing or comforting without the chatbot being framed as an empathic human caregiver. One solution integrated into the prototype design for relational support utilized the techniques of confirmation and normalization. Confirmation concerns acknowledging experiences and issues expressed by users and their assumed emotional valence (see Figure 5). Normalization provides responses that seek to explain or remind the other party of the prevalence of common and/or to-be-expected experiences, for example, feelings of loneliness or stress. In addition to applying these techniques, we intentionally composed the dialogue language to have a comforting tone when responding to users' reports on issues that may be troublesome or stressful.

Chatbot for Processual Support

Processual support is the main offering of several established chatbots for mental health support, such as Woebot and Wysa. In line with the user insight, processual support aims at empowering the users, that is, to enable the users to cope with stressful or counterproductive thoughts and negative emotions. Processual support concerns providing techniques that users can try and potentially take up as part of the way they care for their own mental health.
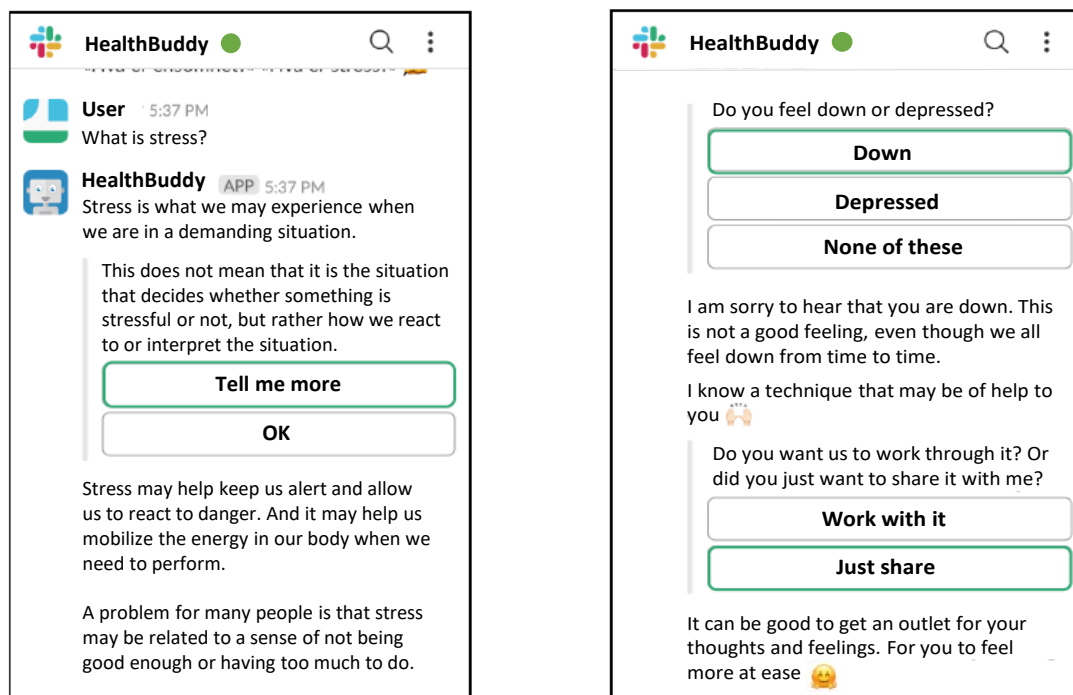
Figure 5. Screenshots from prototype exemplifying informational support (left) and
relational support (right). The texts have been translated from Norwegian.
The green frame indicates that the user selected a predefined response.

The design challenge involved in processual support through a chatbot is to adapt existing techniques for mental health support, techniques that may be developed for use by a health-care professional or for a medium other than a chatbot. Hence, when we designed the chatbot interaction, existing techniques were translated into a structure and phrasing that fit a conversational user interface. In the prototype, the technique of thought clearing was translated to the chatbot context (see Figure 6). The technique was introduced briefly in response to the user expressing a wish to work on thought clearing. Following this introduction, the chatbot led the users through the steps of the technique where they were encouraged to reflect on specific situations, thoughts, and emotions. The chatbot directed the process and encouraged the users to engage in reflection and follow-ups after the completion of the process.

Chatbot for Referral Support

Referral support is needed when the user has issues or concerns that are more severe or are of a nature different from what a chatbot for preventive mental health support may handle. Here, the chatbot would encourage users to seek mental health support from other support services, such as the school health service, the specialist service, or the emergency response services in the case of acute issues. The user insights, however, sensitized us to the possible barriers associated with users seeking support services that are not anonymous, such as those provided by a school nurse or a therapist. For example, some youths may underestimate the severity of the issues they are experiencing, while others may find it stigmatizing to be in need of mental health support.
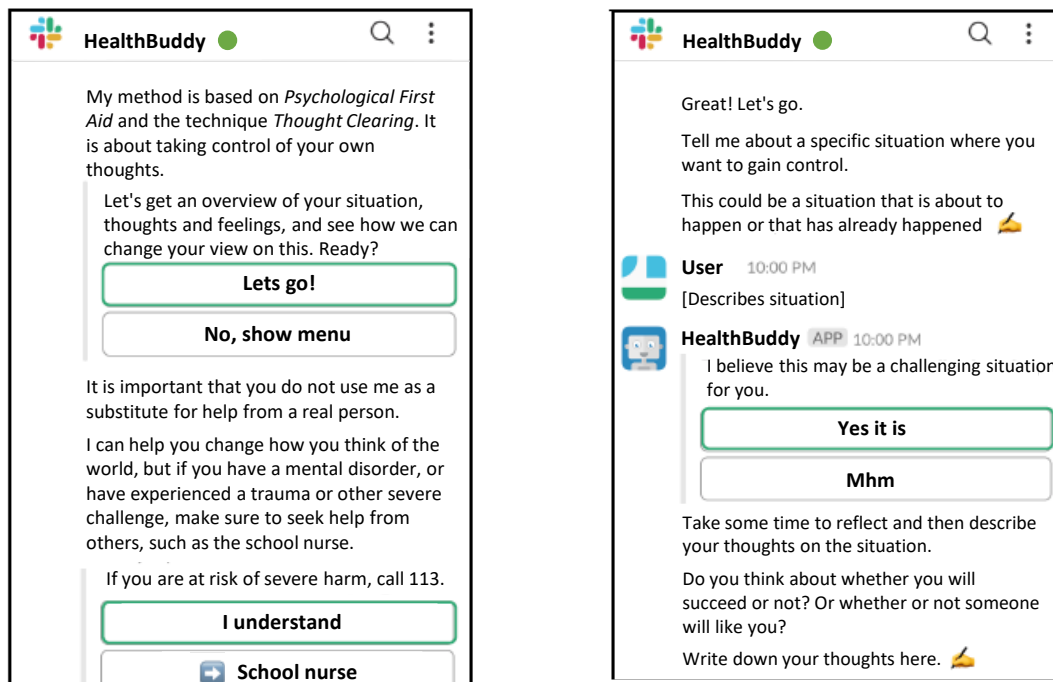
Figure 6. Screenshots from prototype exemplifying processual support. The texts have been translated from Norwegian. The green frame indicates that the user selected a predefined response.

The design challenge for a referral support need, hence, is not just to provide referral advice to users who may benefit from help other than what may be provided through a chatbot for preventive health support. Users may also need to be informed about the various options for support that exists, when such options may be relevant, and how to get in touch. This additional informational content may reduce barriers for contacting other services. In the prototype, the users received information about the school health service (see Figure 7). The chatbot informed about the school health service, in addition to underscoring that the service is an accessible and safe service by providing details relevant for the users' particular school and by explaining the confidentiality in the service.

Chatbot Personality: Reflecting a Safe Space

In addition to the design of the specific types of support provided in the chatbot, we took care to design a chatbot personality that facilitated a constructive relation with its users. This chatbot personality was designed with care to reflect a safe space for youths to speak freely of their feelings. At the same time, we consciously intended to reflect our aim of contributing to youth empowerment. For this purpose, the chatbot prototype dialogues were not set up to accentuate concerns about disease and distress, but rather to encourage youths to take control of their own health and consider how they could improve on situations in which they were unhappy or uncomfortable. Screenshots reflecting the chatbot's personality are presented in Figure 8.

The chatbot personality served as the basis for designing all the chatbot support functions and guided the choice of topics covered, the phrasing of the texts, the prototype name, and the profile
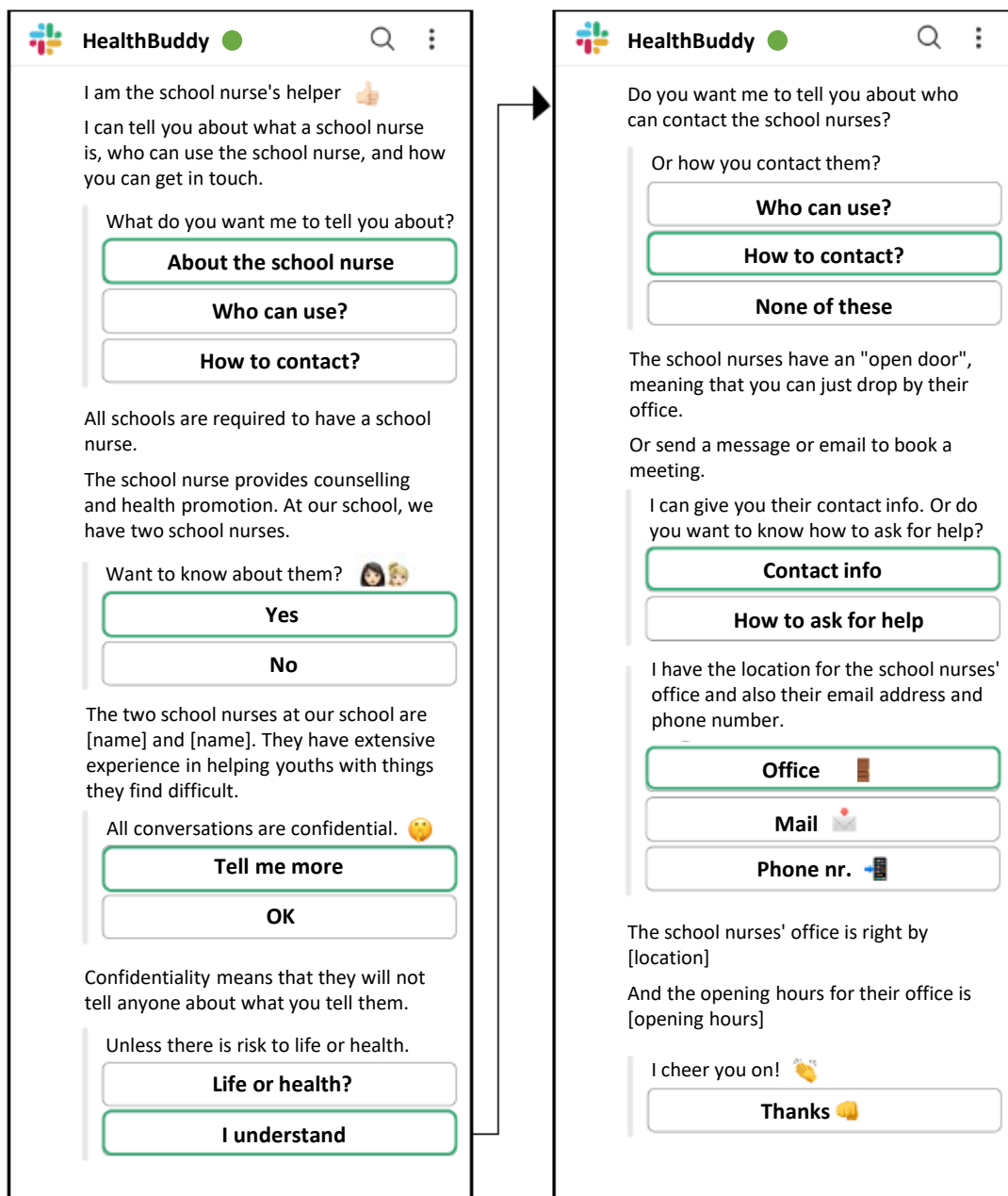
Figure 7. Screenshots from prototype exemplifying referral support. The texts have been translated from Norwegian. The green frame indicates that the user selected a predefined response.

image. Our goal was that the chatbot's personality would be expressed through the dialogue from the onset of the interaction, that is, during onboarding. We explicitly chose words and expressions in the dialogue to communicate on the youths' terms and to reflect an immediate acknowledgement of and interest in the user.
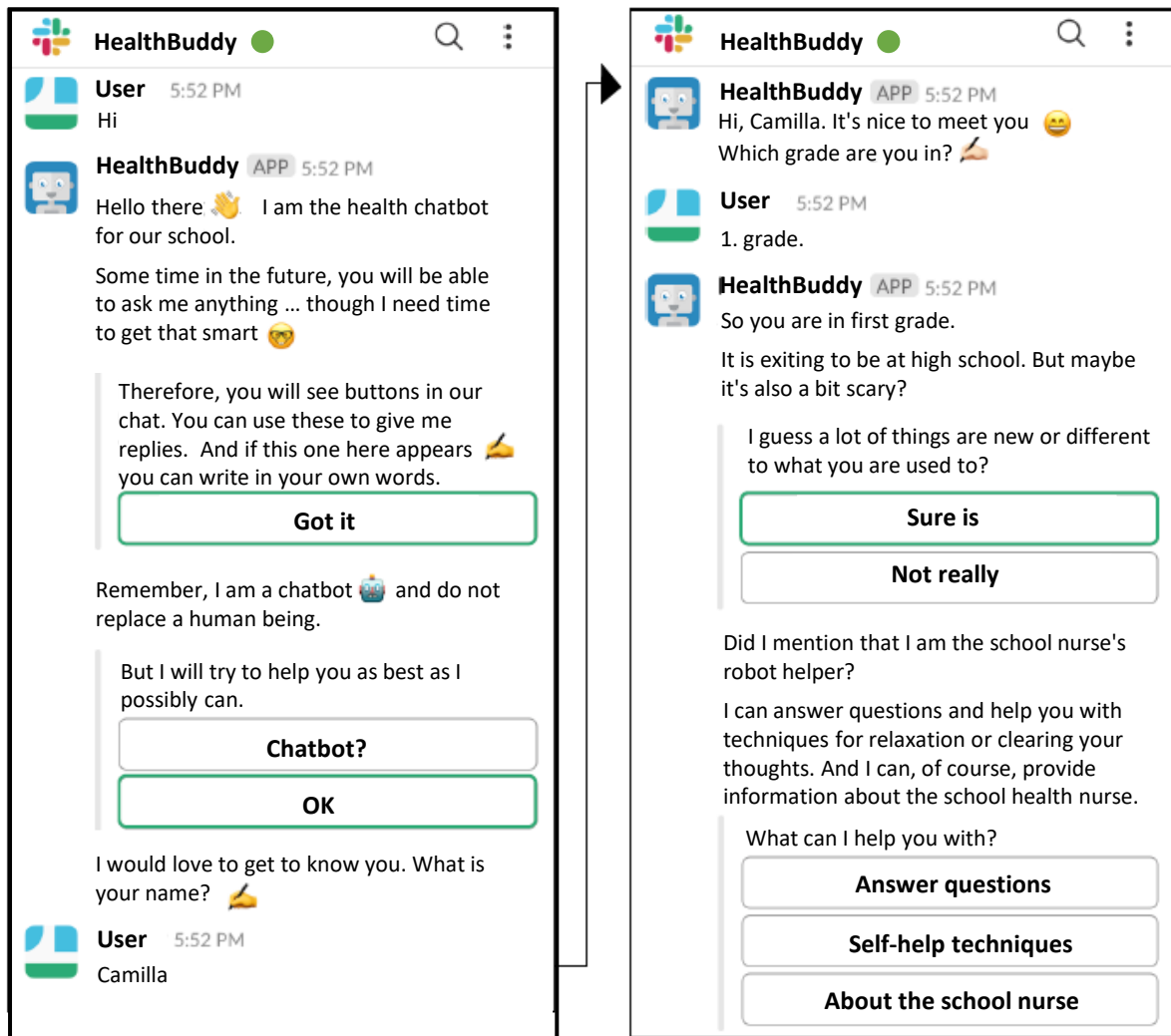
Figure 8. Screenshots from the prototype onboarding, reflecting the chatbot's personality. The texts have been translated from Norwegian. The green frame indicates that the user selected a predefined response.

Evaluation Results

The seven youths participating in the user tests provided feedback on the four types of support provided through the chatbot, as well as their overall experience of the chatbot personality. We present the main findings below.

Feedback on Informational Support

The youths reported that they found it beneficial to receive informational support through a chatbot, and that this may be preferable to getting information through websites or Internet searches. They appreciated the fast and concrete answers from the chatbot.

There are more limited results [in the chatbot], *which I think is good. ...* [When searching] *so many results come up, so I end up clicking on all of them.* [Y27].

The youths also reported that they experienced the information offered by the chatbot as more personal than what Internet searches provided. From an information management perspective, having advice and information presented in a conversational manner enables adaptation of the support to the particular needs of the user. Moreover, the conversational style of the chatbot interaction provided a sense of personal touch.

> *This makes it more personal because you can sit and chat and get more personal answers, while it is more general on the Internet.* [Y24]

Some of the participants noted that they would want the chatbot to be able to respond to a wider range of topics. In addition to information on mental health, participants also expressed interest in information about physical health and somatic issues, as these potentially associate with mental health.

> *There was a period in which I was very stressed, and then my whole body was hurting, so maybe if it could explain what happened or why.* [Y26]

Feedback on Relational Support

The majority of the participants in the user tests explicitly commented that they felt the chatbot was "caring" for them and that they perceived the chatbot as comforting. This sense of the chatbot caring was linked also with the participants' willingness to trust the chatbot. The participants also expressed that they felt they could open up and share their thoughts with the chatbot.

> *When you get that trust that it is going to help you all the way, when you need it, then it is a greater chance that you open up to the bot … It is someone you can talk to without being judged.* [Y23]

The reported acknowledgement of relational support in the chatbot suggests that the use of techniques such as normalization and confirmation may be valuable also in a chatbot context. However, the participants also noted room for improvement. Specifically, some reported a need for more personalized answers and expressed a desire for more targeted support beyond what currently is conveyed.

> *I would have appreciated some more in-depth answers, and not just "It's not good to feel that way," because that's what you get all the time.* [Y22]

Feedback on Processual Support

The participants reported positive dispositions toward a chatbot offering processual support. They felt this could be helpful in a range of situations in their own lives.

> *You realize yourself that this is how you feel, and that could start a bigger reaction that makes you want to change.* [Y27]

Specifically, the user test participants reported a benefit in following a step-by-step process through the descriptions provided by the chatbot. Such a systematic process was seen as helpful, as it made it easier for the user to make practical use of the support from the chatbot.

> *It made it easier to know -- what to say -- it makes it easier to explain how you're feeling.* [Y21]

Adding more features to a refined chatbot could improve the processual support provided in the prototype. All the user test participants reported wanting suggestions or examples on how to improve their situations. Such suggestions and examples may be beneficial, for example, in helping the user to adapt the suggestions from the chatbot to their own context and to find help specifically fitting the user's needs.

More like tips in a way, to what you can do ... if there is a method to use. [Y26]

Feedback on Referral Support

The participants saw the chatbot referring to a school nurse as a valuable option. Several reported that, through this option, the chatbot reduced the stigma associated with a need to seek support from the school nurse.

It made it more open, like "Just stop by" ... I think there will be more people who become aware that these are people you can talk to as well. [Y26]

In addition, the user test participants reported that the information provided about the school nurse made them feel somewhat more familiar with and trusting of the school nurse. Some participants also noted that they perceived the referral to a school nurse as an advice from the chatbot that they might consider.

A recommendation from the bot to us ... it makes me think, yes, it might be nice to try it out. [Y21]

Feedback on the Chatbot Personality

The youths in the user tests reported that the personality exhibited by the chatbot worked well for them. Specifically, the youths reported perceiving the chatbot as empathic and friendly.

You understand that the bot, in its tone, the way it responds, that it actually wants to help you and get you in better shape. [Y21]

The participants reported feeling more comfortable in the conversation because of the personality of the chatbot. They also stated that the use of emojis worked well to accentuate the chatbots' personality and provided them with a sense of talking as if to a human.

The way it—just in a way it speaks like us—gives me the feeling that it is actually one of us … that makes it easier for me to communicate even more with it. [Y23]

DISCUSSION

Although commercially available chatbots for preventive mental health support already exist, little research has documented how to design such chatbots. In this section, we summarize and discuss what we see as the main findings and contributions to research and practice of the presented study.

How to Design a Mental Health Chatbot for Youth

The study has provided new knowledge of relevance for designing a mental health chatbot for youth. Below we discuss the identified need for different forms of support, our findings concerning relevant principles concerning conversational design, and chatbots as a complement to other services.

The Need for Different Forms of Support: Toward a General Framework

Youths are a group of users with highly varying needs for preventive mental health support in terms of the types of issues they experience and the severity of these issues. The presented study has brought new insights regarding youths' needs that may be addressed in a chatbot for such health support. Specifically, the insights concern youths' needs for informational, relational, processual, and referral support.

Existing chatbots for mental health typically focus on processual support (e.g., Fitzpatrick et al., 2017), but examples of relational support are also found in current chatbots, such as Woebot (Fitzpatrick et al., 2017) and Wysa (Inkster et al., 2018). Some, such as Wysa, also provide referral support so that individuals who needs this can seek specialized help. We are not aware, however, of existing literature detailing a coherent framework of youths' needs for support in preventive mental health chatbots. The four identified needs may serve as a basis for such a framework.

We see the four types of support identified in our study as complementary, all of high relevance in a chatbot for preventive mental health support. Specifically, integrating informational support for mental health support may represent a substantial advance in chatbots for this purpose. The importance of information support in our study findings resonates those of Crutzen et al. (2011) in their study of information on sex and use of drugs and alcohol through a chatbot for youths. Here, youths preferred chatbots to online searches for such information. It may seem surprising that additional informational support is needed in a time when information is abundantly available on the Internet. However, in line with the insights from our participants, we point to a need for easily accessible and trustworthy information on mental health in what is perceived as a bewildering mass of information of varying credibility available through online searches. Potentially, a chatbot for mental health support with high quality information provided may serve as such an essential resource.

Conversational Design Principles Revisited

The body of literature on conversational design in general is growing, including textbooks (e.g., Hall, 2018; Shevat, 2017) and industry guidelines (e.g., Google, 2019; IBM, 2019). We have drawn substantially on this literature in the presented study. At the same time, we note the lack of literature on conversational design for the health domain.

We see it as likely that the health domain in general, and mental health domain in particular, poses specific requirements for conversational design. One prominent example of this, seen clearly in the presented study, is the benefit of designing for relational interaction. While much-cited conversational maxims, drawing on the work of Grice (1975), address principles of efficient communication, principles for communication providing relational

support does not have the same prominence in the literature on conversational design. Hall (2018), drawing on the work of Robin Lakoff, added a maxim of politeness, which provides a nonproductivity-oriented aspect to the applied conversational principles. However, there is a surprising lack of explication of the need to acknowledge the user as a conversational partner and the emotional importance and valence of experiences and issues shared by the user.

In the simple chatbot prototype developed in this study, we applied a conformational approach to the design of dialogues in which the emotional valence and importance of statements and shared experiences of the user was acknowledged. This aspect of the conversational design was well received by the participants in the user tests. This finding echoes the experimental study of Liu and Sundar (2018), which suggested users favor expressions of sympathy and empathy in a health advice chatbot rather than strictly informational responses. Commercially available chatbots such as Woebot (Fitzpatrick et al., 2017) also successfully adapt the chatbot responses in response to the predicted emotional valence and importance of what is shared by the user.

In light of the presented findings and previous work (e.g., Fitzpatrick et al., 2017; Liu & Sundar, 2018), we suggest the addition of yet another conversational principle to the oft-cited maxims in the literature: a *principle of confirmation*. This principle concerns the value of adding responses of confirmatory character to acknowledge and adapt the conversation when users share issues, experiences, or opinions to which the user likely associates substantial emotional valence and importance. Adding such confirmation may help the user acknowledge the value in sharing issues of emotional importance; it also may provide the beneficial effect of normalizing, thus reducing any stigma associated with what has been shared. In the presented prototype, when the user shared being sad or feeling down, the chatbot replied with a confirmation, acknowledging the unease of the user and adapted its following conversational content accordingly. We do not suggest that the chatbot should pose as a human, pretending to have empathic responses to users' input, but we hold that acknowledging the value of users sharing something of emotional importance to them may be perceived as productive and comforting when interacting with a chatbot as when interacting with a human.

Chatbots as a Complement to Other Services

Online services typically are embedded in networks of various services and service providers. In such service networks, users access support from different actors in a way that best fits their needs (Tax, McCutcheon, & Wilkinson, 2013). Our findings suggest a benefit in framing a chatbot for mental health support as a service embedded within a service network.

In our study, we designed a chatbot for preventive mental health support that can complement the school health service. The school health service is among the basic health services provided to youths in many countries. At the same time, this service probably cannot reach all youths who would benefit from it due to barriers such as stigma or lack of resources. In this context, a chatbot for mental health support represents a complement to the preventive health support provided by the school health service. At the same time, the chatbot may link back to the school health services in situations where the user needs other or more extensive support than what the chatbot can provide. By embedding the chatbot within a service network consisting of the school health service and other services providing preventive mental health support to youths—such as various digital health services—designers or mental health service personnel can better understand how a chatbot for mental health support may provide value to the youths.

Automated digital health services such as chatbots represent a low-threshold, low-cost, and easily accessible source of preventive mental health support. At the same time, such services depend on being able to refer their users to other sources of help and support when needed. Designing for efficient interaction between automated digital health services such as chatbots and more scarce and cost-intensive health services will be an important future research challenge.

Contributions to the Field

In summary, our findings contribute significantly to the emerging field of human-chatbot interaction design. This study holds the following contributions to theory and practice.

Contributions to Theory

The findings provide important contributions to theory pertaining to chatbots for preventive mental health support for youths. In the following, we accentuate the following two contributions as key.

- **A framework of support needs.** The presented findings have provided insight on youths' needs for support through mental health chatbots. Specifically, the findings explicate youths' needs for informational, relational, procedural, and referral support, and how these may be addressed through a chatbot. The findings may potentially serve as a basis for a framework of support needs in chatbots for mental health.

- **A conversational principle of confirmation.** Our insight and design work show that conversational design in a mental health context may benefit from adding to the Gricean (1975) conversational maxims and Lakoff's (Hall, 2018) maxim of politeness. Specifically, we suggest a principle of confirmation, where users' messages entailing something of substantial emotional valence and importance would be acknowledged through confirmation and in adapting the subsequent responses accordingly.

Contributions to Practice

The findings also contribute insight of relevance to practice. We see the following two insights as key.

- **Chatbots as part of service networks.** In search of support for mental health issues, we found that users may need more than one service provider. Youths, for example, may benefit from a chatbot for preventive mental health support and the school health service, as well as other digital health services and specialist services, if need be. We propose embedding chatbots for mental health support within robust service networks to strengthen the benefit of the chatbots to their users.

- **The need for trustworthy actors as chatbot providers**. Given the potential impact on youths' lives and well-being that a chatbot for preventive mental health support may have, it is important that such a chatbot is provided by actors who may be trusted to provide high quality information and support. In line with our findings, the design of chatbots for mental health needs to be researched continuously thorough assessments of user experience and preventive efficacy.

Limitations and Future Work

We presented a design science research project in which we developed concepts and a prototype for a chatbot for preventive mental health support for youths. The study has contributed new insight into user needs, specifically for youths, and the design of such chatbots. However, our research also has important limitations.

The main limitation of the study is its exploratory character. Based on the study findings, we have proposed the basis for a framework for youths' needs for chatbots for mental health support as well as a potential addition to conversational principles within this domain. However, these proposals should be subjected to future research for refining, validating, and extending the findings. In particular, we foresee studies that empirically test the relative perceived benefit and efficacy of providing the various types of support in a chatbot, for example, in experimental studies and longitudinal studies of chatbot use.

Furthermore, the study is limited as it draws on only one design project conducted within one specific context. We found this particular study context valuable to gain insight into user needs and conversational design for a chatbot for preventive mental health support for youths. However, future research needs to strengthen the findings based on design work in other contexts. In particular, we foresee design projects that explore the use of chatbots for preventive mental health support in other regions and cultures, as well as for other age groups. As such, while contributing to the emerging and needed body of knowledge on how to take advantage of chatbots to provide preventive mental health support for youths, this study also points toward exiting future avenues for research on chatbots and mental health.

IMPLICATIONS FOR THEORY AND APPLICATION

Chatbots may be a useful supplement to health care in general and within the school health service in particular. The present study provides needed knowledge for chatbot developers and health service providers with regard to (a) the support youths need from a chatbot in the school health service and (b) how chatbot conversations may be designed to provide such support.

The proposed framework, detailing different types of support a chatbot could provide, will provide a useful background for chatbot developers and health care service providers when working toward improved chatbot solutions. Likewise, the presented prototypes and proposed principle of confirmation in chatbot conversation design may be valuable background when developing future health care chatbot solutions.

The proposed framework and principle of confirmation in conversational design will also serve as a theoretical basis for future research. As such, the findings are useful to further extending the body of knowledge on human−chatbot interaction.

ENDNOTES

1. By the insight phase, we mean the phase of the design process where user insight is gathered, that is, information on user needs, preferences, and characteristics. This corresponds roughly to the analysis and user requirements phases of the human-centered design process (ISO, 2010) but concerns the

identification of user needs and preferences—rather than specific requirements—to drive a design process suitable for an exploratory design study.

2. User onboarding concerns the process of having a user start engaging with a service such as a chatbot. Onboarding may include, for example, presenting information about the purpose of the chatbot, how to interact with the chatbot, and the main chatbot functionality and features (Shevat, 2017).

3. To avoid confusion in transcriptions of participant quotations, a double en-dash will be used to indicate pauses in spoken comments, whereas ellipses will be used to indicate omitted text.

4. For an overview of the Botsociety platform, see https://botsociety.io/

5. For an overview of the Dialogflow platform see https://dialogflow.com/

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