User preferences for a physical activity chatbot connected to an activity tracker and integrated into a social media platform

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Abstract
Performing regular physical activity can be challenging. Integrating chatbots with social media platforms and physical activity sensors can potentially increase physical activity. The objective of this study was to identify design preferences for integrating an activity tracker supported chatbot in a social media platform. Norwegian adults (n=120) responded to an ad-hoc online survey. User preferences included adding a step goal feature that can be renewed every week and communicating with the chatbot once per day. Preferences of all types of potential users for a social media chatbot for physical activity should be explored to produce a well-accepted intervention.

Keywords
Physical activity; social media; chatbot; sensor; behaviour change

1. INTRODUCTION

1.1 Physical activity

Efforts are being made in recent years to encourage regular physical activity among the global population. To that effect, the World Health Organization (WHO) has developed physical activity guidelines and recommendations for individuals of all ages and health status. For adults (age 18-64), these guidelines states that at least 150-300 minutes of moderate physical activity, or at least 75-150 minutes of vigorous physical activity, or a combination of these should be performed each week [1]. Although there is an increase in the promotion of regular physical activity and its benefits, such as improved cognitive function and quality of life, the prevalence of physical inactivity remains high [1, 2]. Like any healthy habit, it is challenging to start and continue doing physical activity on a regular basis [3]. Innovative and engaging solutions may increase motivation to maintain regular physical activity, for instance by using chatbots [4].

1.2 Use of internet, social media, and physical activity tracking in Norway

There is an increasing trend in internet use globally. In Norway, about 99% of the population have access to internet [5]. Similarly, there was an increase in the number of social media users, with about 83.2% of the Norwegian population using social media in 2021 [5]. In 2021, 24% of the Norwegian population had access to a smartwatch [6], while 96% had access to a smartphone in 2020 [7]. In addition to wrist-worn physical activity trackers, smartwatches and smartphones can also be used to track physical activity [8]. Dalene et al. [9] observed that Norwegian adolescents have increased their sedentary time with the availability of smartphones and internet access [9]. Laranjo et al. [10], in a meta-analysis of physical activity interventions, concluded that the use of smartphones is effective in increasing physical activity behaviour.

1.3 Chatbots as digital health interventions

A recent introduction to the healthcare system and digital health interventions is the chatbot, also called conversational agent, an application software that employs simulated text and speech to communicate with individuals. In healthcare, chatbots have been used to promote health information, reproductive health, healthy diet, weight loss, mental health, and physical activity [3, 11, 12].

Both rule-based and artificial intelligence chatbots with or without a social media element have been developed for promoting physical activity [3, 11-14]. It has been suggested that integrating chatbots with social media and sensors might increase their utility and subsequently enhance their ability to motivate users [11].

1.4 User preferences for chatbots or digital physical activity intervention

The integration of chatbots with social media and sensors following a participatory health approach would potentially be more powerful. In a participatory approach, the user becomes the central focus [15], and therefore their opinions and interests are relevant for developing health interventions. Involving users and users' preferences when designing a social media chatbot, aimed at increasing physical activity, could have several advantages, such as increasing the interest, motivation, and engagement of future intervention end-users, and/or raising their awareness of the importance of being physically active [16].

The objective of this study was to determine the design preferences of Norwegian adults for an activity tracker-supported chatbot integrated into a social media platform.

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2 METHOD

We designed an anonymous survey to gain insight into potential users' preferences for the chatbot. To ensure the anonymity of the participants, no direct or indirect personal questions were included in the survey.

2.1 Questionnaire design

Nettskjema [17], an online tool for creating questionnaires was used. Nettskjema is a tool developed by the University of Oslo where security and privacy are ensured when gathering data through online questionnaires. It is available to researchers and students at all universities in Norway through their university license.

We created an *ad-hoc* survey that included questions about physical activity behaviour and social media habits. In general, the survey was designed to get information that would help with the design- and development of a chatbot for physical activity. The link to the survey was posted on the second author's (HS) Facebook page and a Discord page for members at the Department of Computer Science at UiT The Arctic University of Norway. Discord is a social media platform originally created to enhance communication while playing games online [18]. The questionnaire was available for 1235 potential respondents. Questions were written in Norwegian and contained 16 questions. Table 1 lists an English translation of each question in the questionnaire. Data were collected in September 2021.

#	Questions and answer options
1	What is your gender? (*Male, Female, other/do not want to answer*)
2	What is your age? (*10-year age groups*)
3	Which social media platform do you spend most time on, most days? (*Facebook, Messenger, Snapchat, Instagram, WhatsApp, Discord, Slack, Reddit, Other*)
4	Do you use an activity tracker? (*Yes, No*)
5	If yes, which activity tracker brand do you own? (*Garmin, Apple watch, Fitbit, Samsung watch, Samsung Galaxy Fit, Polar Watch, Other*)
6	How often are you physically active for at least 30 minutes during a week? Everything from walking to exercising at the gym. *(<1 time/week, 1-2 times/week, 2-4 times/week, 5-7 times/week, >7 times/week*)
7	Which physical activity do you do most often? (*Walking, Gym, Jogging, Mountaineering, Skiing, Home exercising, Swimming, Other*)
8	Would you consider using a social media chatbot, connected to a physical activity tracker, to motivate you to do physical activity? (*Yes, Maybe, No*)
9	Which language do you prefer to communicate with a chatbot on? (*Norwegian, English, Option to choose between the two, Don't know*)
10	How many times a day do you prefer to communicate with a chatbot about becoming more physically active? *(<1 time, once, 1-2 times, 2-3 times*)
11	When do you prefer to communicate with/receive reminders from a chatbot? (*Morning, before noon, afternoon, night*)
12	Do you prefer the chatbot to initiate the conversation? (*Yes, No, Don't know*)
13	Do you want a function for setting daily step goals (*Yes, No, Don't know*)
14	If you wanted a function for setting daily step goals, how often would you like to set new goals? (*Daily, weekly, monthly, anytime, do not want that function*)
15	Do you want to communicate with the chatbot using free-text or choose between pre-defined questions and answers? (*Free-text, pre-defined questions/answers, want both options*)
16	From which device would you like to use the chatbot? (*PC, Mobile phone, Tablet, Watch*)

Table 1. Questionnaire translated to English. Answer options in parenthesis.

2.2 Statistical analysis

For the general survey participants, descriptive statistics were used to analyse the results for gender and age groups. We used Crosstabulation to analyse the correlation between the following: how often the participants are physically active for at least 30 minutes during a week, and their use of activity trackers; and participants' willingness to use a social media chatbot connected to a physical activity tracker and their use of activity trackers. Further analyses were done on the results of participants who were willing to use a social media chatbot connected to a physical activity tracker. Descriptive statistics were used to analyse the results for these participants' preferences for whether the chatbot initiates the conversation and the mode of communication with the chatbot i.e., using free-text or pre-defined questions and answers. We used Bar charts to illustrate how often these participants are physically active for at least 30 minutes during a week, and the number of times a day these participants prefer to communicate with a chatbot about becoming more physically active. Crosstabulation was used to analyse the correlation between this group of participants' preferences for a step goal feature and how often they prefer to set new goals. All statistical analyses were done using SPSS (version 25; IBM Corp).

3 RESULTS

3.1 Participant characteristics

A total of 120 individuals answered the online survey, of which 58.3% (70/120) identified themselves as male. There were 72 participants aged between 18 and 25 years (60%). Only 3.3% (4/120) of the survey participants were aged between 36 and 45 years. Approximately 6% (7/120) of the participants were aged between 46 and 55 years, and eight participants were aged between 56 and 65 years (6.7%).

3.2 Self-reported physical activity and use of activity tracker

The majority of the survey participants (43.3%; 52/120) did at least 30 minutes of physical activity 2-4 times per week. Thirty participants (25%; 30/120) indicated doing at least 30 minutes of physical activity more than five times per

week. A total of 67 participants among the 120 respondents indicated they use activity trackers (55.8%). Of those who did at least 30 minutes of physical activity 2-4 times a week, 59.6% (31/52) use an activity tracker. Approximately 30% (20/67) of those who did at least 30 minutes of physical activity more than five times a week use an activity tracker (see Table 2).

Physical activity per week ≥30 mins	Activity Tracker Use		
	No	Yes	Total (%)
< once	10	5	15 (12.5)
1-2 times	12	11	23 (19.2)
2-4 times	21	31	52 (43.3)
5-7 times	7	15	22 (18.3)
> 7 times	3	5	8 (6.7)
Total (%)	53 (44)	67 (56)	120 (100)

Table 2. Participants' physical activity per week and use of activity tracker (n=120).

3.3 Willingness to use a social media chatbot integrated with an activity tracker?

A total of 29 participants answered *Yes* to being willing to use a social media chatbot integrated with their activity tracker for motivation to do physical activity (24.2%). 25% (30/120) answered *No* and 50.8% (61/120) answered *Maybe* to the same question. Among the respondents who would like to use a social media chatbot integrated with an activity tracker, 69.0% (20/29) currently used an activity tracker; versus 36.7% (11/30) of those who answered *No*, and 59.0% (36/61) of those who answered *Maybe* (see Table 3). There is a significant association between the use of an activity tracker and the willingness to use a social media chatbot integrated with an activity tracker (Chi-Square = 6.748; p value = 0.034).

Use chatbot connected with activity tracker	Activity Tracker Use		
	No	Yes	Total (%)
Yes	9	20	29 (24.2)
Maybe	25	36	61 (50.8)
No	19	11	30 (25.0)
Total (%)	53 (44)	67 (56)	120 (100)

Table 3. Participants' willingness to use a social media chatbot integrated with an activity tracker (n=120). Chi-Square= 6.748; p-value<0.05

3.4 Respondents interested in a social media chatbot connected to an activity tracker

About 34.5% (10/29) of the participants interested in a social media chatbot connected to an activity tracker indicated doing at least 30 minutes of physical activity 2-4 times per week. Similarly, another 34.5% (10/29) of the same group of participants reported doing at least 30 minutes of physical activity more than 5 times per week (see Figure 1).

More than 50% (15/29) of these participants would prefer to communicate once per day with a chatbot for physical activity. About 10.3% (3/29) of participants would prefer to communicate with a chatbot for physical activity either less than once per day or 2-3 times per day, respectively (see Figure 2).

Most participants (89.7%; 26/29) would prefer the chatbot to start the conversation about becoming more physically active. Two of the 29(6.9%) participants did not know whether or not they would prefer the chatbot to start the conversation, and one person said No.

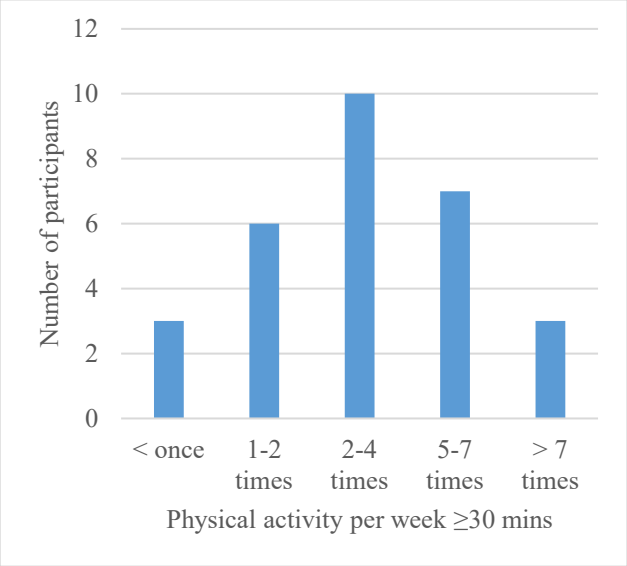

Figure 1. Physical activity per week of participants willing to use a social media chatbot (n=29).

Most participants (55.2%; 16/29) also preferred to use both predefined text and free text to communicate with the chatbot. Among those aged between 18 and 25 years, 68.8% (11/16) would prefer this option to use both predefined and free text. More participants (31.0%; 9/29) preferred to use predefined text than free text (13.8%; 4/29) to communicate with the chatbot.

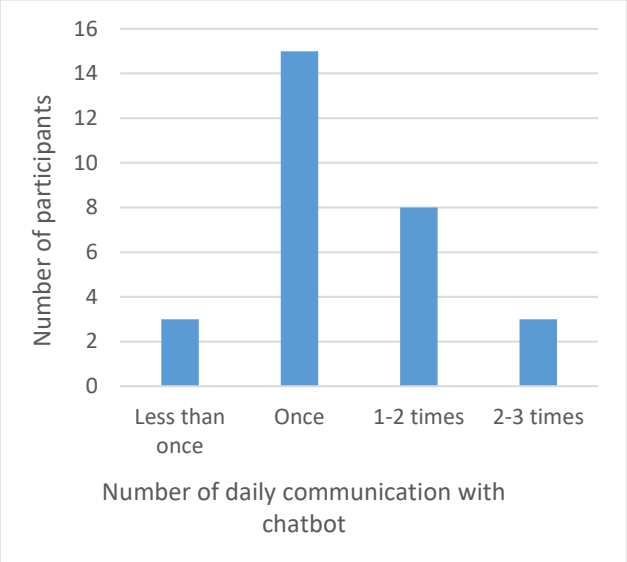

Figure 2. Participants' preferred number of daily communications with a social media chatbot (n=29).

Twenty-six (89.7%) of the 29 participants would prefer to have a step goal feature for the chatbot. Most of these participants (42.3%; 11/26) would prefer to set a step goal

on a weekly basis, followed by 34.6% (9/26) who would prefer to set a step goal on every month (see Table 4).

Frequency of setting new step goal	Step Goal Feature			
	No	Yes	Don't know	Total (%)
Anytime	0	4	0	4 (13.8)
Daily	0	2	0	2 (6.9)
Weekly	0	11	1	12 (41.4)
Monthly	0	9	1	10 (34.5)
No answer	1	0	0	1 (3.4)
Total (%)	1 (3)	26 (90)	2 (7)	29 (100)

Table 4. Participants' preferences for setting step goal (n=29).

4 DISCUSSION

In this study, we aimed to determine the design preferences of Norwegian adults for a chatbot integrated into a social media platform. The majority of the survey participants were young adults aged between 18 and 25 years. About one in three participants did at least 30 minutes of physical activity 2-4 times per week. More than half of the survey participants used an activity tracker and more than half of these do at least 30 minutes of physical activity 2-4 times per week.

Compared to previous chatbot studies addressed in this paper [3, 11-14], the present study focuses on a young Norwegian population, and it includes a bigger sample.

Twenty-nine participants, approximately 24%, and more than half of the total survey participants said *Yes* and *Maybe*, respectively, to using a social media chatbot connected to an activity tracker. The preferences of these 29 participants include 1) communicate with the chatbot once per day 2) the chatbot starts the conversation about physical activity 3) use both predefined and free text to communicate 4) a step goal feature and 5) set a step goal every week.

4.1 Using a social media chatbot connected to an activity tracker

Our findings show that most of the participants who were willing to use a social media chatbot connected to an activity tracker were active individuals who already used an activity tracker. This suggests that such a chatbot would most likely be used by individuals who are already interested in doing physical activity. Increasing physical activity among the general population, especially those with a sedentary lifestyle is the motivation for developing a social media chatbot for physical activity.

More than 40% of the survey participants did not use activity trackers, and about 80% of them said they would either not use the proposed chatbot or maybe use it. Not owning a wearable activity tracker could have been a deterrent to using a social media chatbot integrated with an activity tracker. Potential users may be unwilling to buy a wearable activity tracker. However, activity trackers are often included in phone applications, some of which are available for free. The participants' responses could have been as a result of misunderstanding the use of the word *activity tracker*.

Regardless, digital interventions, especially the ones intended for the promotion of a healthy lifestyle, should be developed in an all-inclusive manner [19]. Users should have the opportunity to customize or tailor these interventions, thereby attracting the interest of the majority of the potential users in the general population.

4.2 Participatory health: User preferences

End users or potential users should be an integral part of the design and development of services and solutions targeting them, including digital health interventions [19, 20]. Taking into account user preferences when designing the social media chatbot will help produce a chatbot that is easily accepted and adopted for long-term use.

Furthermore, it will allow users to actively participate in a decision about their current and/or future health. In our study, survey respondents indicated they preferred the chatbot to start the communication, and they preferred to communicate with it only once per day. Previous research shows that youth are interested in interacting with small talks with chatbots [21]. The human semblance of chatbots, use of emojis and use of colloquial tones that emulate human emotional expressions are also preferred users features that increase their engagement [22].

Our study results also revealed that potential users of a social media chatbot connected to an activity tracker preferred to use both predefined text and free text to communicate. Having the option to use both predefined questions and answers and free text allows the user to choose which mode of communication is most appropriate at a particular time. For example, if the user is walking while communicating with the chatbot, the user might prefer to use predefined questions and answers since it might be the most convenient. Providing users with different ways to use a feature of functionality could be one way to potentially increase their engagement with the social media chatbot.

The participants in our study preferred including a step goal feature in the social media chatbot, which they can set weekly. Since most of the participants use activity trackers, they may be familiar with the concept of goal setting, which is available on most modern activity trackers. Setting goals is a means to personalize and promote physical activity among users of digital health interventions, especially when it can be done using practical and complementary interactive tools [23, 24]. For most people, achieving a set goal may provide motivation and a sense of satisfaction. Achieving set step goals using a social media chatbot could encourage users to be more motivated to increase their physical activity in general.

4.3 Strengths and Limitations

Findings may be somewhat skewed because most respondents were young adults aged between 18 and 25 years. In addition, the survey is likely to mostly have been answered by individuals with knowledge in computer science, due to the background of the second author and the channels used for sharing the survey link. The findings may therefore not be generalizable to the general population.

To the best of our knowledge, our study is the first to explore the preferences of potential users in Norway for a

chatbot connected to an activity tracker and integrated into a social media platform.

5 CONCLUSION

The development of a social media chatbot connected to an activity tracker for increasing physical activity is aimed at individuals with little to no physical active, however, it may be more attractive to active individuals who already use an activity tracker. The results of this survey underscore the importance of exploring user preferences for physical activity digital interventions, including social media chatbots.

By doing so, important issues like exploring the preferences of individuals with sedentary lifestyles for such digital interventions will be highlighted. Preferences of all types of potential users for a social media chatbot for physical activity should be explored to produce a well-accepted intervention.

Further research should explore individuals with sedentary lifestyles' preferences for a social media chatbot connected to an activity tracker for increasing physical activity. In addition, exploring users' preferences for interacting with other users of the social media chatbot could contribute to enriching the experiences of potential users.

6 AUTHOR CONTRIBUTIONS

Conceptualization: DL, HS, EG, and EÅ. Methodology: DL, HS, EG, and EÅ. Data Analysis: DL, HS, EG, EÅ and AH. Article Writing: DL, HS, EG, EÅ and AH. All authors have read and agreed to the published version of the manuscript.

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