Development and evaluation of a chatbot to reduce sedentary behavior among university students

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Key words: sedentary behavior, university students, chatbot, conversational agent

Background

Results of several studies published in recent years suggest that sedentary behavior is an independent risk factor for health, even with adequate levels of physical activity. As study-related activities usually involve sitting for long periods of time, university students (US) are a particularly vulnerable group. Instant messaging services are used by the vast majority of US, suggesting chatbots – programs capable of autonomously interacting with humans through natural language – are a promising tool to efficiently reach this target group. Therefore, the aim of this study was to develop a chatbot and then evaluate its acceptability and effectiveness in reducing sedentary behavior among US.

Methods

The chatbot "Aliza" was developed in a human-centered design process. Subsequently, Aliza was evaluated in a pretest-posttest quasi-experimental pilot study involving German US. Subjects interacted with Aliza, deployed on Slack Messenger, for two weeks. Each day, they were offered to schedule activity breaks. Aliza then reminded subjects of breaks and sent them exercise challenges or videos. Acceptability was measured including usability, perceived enjoyment, and attitudes toward using a chatbot. To evaluate effectiveness in terms of behavior change, daily activity breaks and sitting time were assessed at baseline and during the first and second week of intervention. In addition, subjective effects of the activity breaks on physical, mental, and cognitive condition were examined.

Results

Thirty-eight subjects participated in the study. Usability was rated with a mean score of 79.74 ± 9.20 out of 100. Perceived enjoyment of interacting with Aliza reached a mean score of 22.66 ± 3.90 out of 28. Attitudes toward using a chatbot did not change significantly between pre- and posttest ($p = .865$), scoring 24 out of 28 in both. Mean number of activity breaks per day did not significantly change ($p = .811$). Mean sitting time significantly decreased from baseline compared to the first ($p = .027$) and second ($p = .003$) week of intervention. Most subjects reported a relaxation of muscles, as well as an increase in concentration, motivation, vigilance, and well-being.

Discussion

The high acceptability underlines the potential of chatbots in promoting health among US. Post-hoc subgroup analysis indicates that the lack of significant change in average daily activity breaks may be due to high baseline values in a few subjects. The significant decrease in sitting time suggests that chatbots can effectively be used in reducing sedentary behavior in US. The results of this pilot study should be validated with a larger scale randomized controlled trial to obtain more solid results.