Mobile Sensing Apps and Self-management of Mental Health during the COVID-19 Pandemic – an Online Survey

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Abstract

Background: In light of the COVID-19 pandemic, people had to adapt their daily life routines to the public health measures in place, which is likely to have resulted in a lack of social contacts in person, physical activity or sleep. Such changes can have a significant impact on mental health. Mobile sensing apps can passively record the daily life routines of people making them aware of maladaptive behavioral adjustments to the pandemic.

Objective: This study aimed to explore the views of people on mobile sensing apps passively recording behaviors and their potential to increase awareness and helpfulness for self-managing mental health during the pandemic.

Methods: We conducted an anonymous online survey including people with and without mental disorders asking them to rate the helpfulness of mobile sensing apps for the self-management of mental health during the COVID-19 pandemic. The survey took place in May, 2020.

Results: The majority of participants particularly those with a mental disorder (72%) perceived mobile sensing apps as very or extremely helpful for managing their mental health by becoming aware of maladaptive behaviors. The perceived helpfulness of mobile sensing apps was further higher among people experiencing a stronger impact of COVID-19 ($??=?0.24$; 95% CI, 0.16-0.33; $P?<?.001$), having a better understanding of technology ($??=?0.17$; 95% CI, 0.08-0.25; $P?<?.001$), and a higher education ($??=?0.1$; 95% CI, 0.02-0.19; $P?=?.02$).

Conclusions: The findings highlight the potential of mobile sensing apps to assist in mental health care during the pandemic.

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Abstract

Background: In light of the COVID-19 pandemic, people had to adapt their daily life routines to the public health measures in place, which is likely to have resulted in a lack of social contacts in person, physical activity or sleep. Such changes can have a significant impact on mental health. Mobile sensing apps can passively record the daily life routines of people making them aware of maladaptive behavioral adjustments to the pandemic.

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Conclusions: The findings highlight the potential of mobile sensing apps to assist in mental health care during the pandemic.

Keywords: Mobile sensing; COVID-19; helpfulness; mental health

Introduction

The novel coronavirus causing COVID-19 is currently affecting over 213 countries as of June 23rd

2020 [1]. In the absence of vaccines and antivirals, the remarkable speed and global spread of the coronavirus could currently only be reduced by rigorous implementation of traditional public health measures [2], such as quarantine and physical distancing. People had to adapt their daily life routines to the public health measures in place, which is likely to have resulted in a lack of social contacts in person, physical activity or sleep. All these factors are known to have a significant impact on mental health especially among vulnerable populations, such as patients already suffering from a mental disorder. Preliminary health reports describe adverse effects of the pandemic and its countermeasures on a range of aspects of mental health, including higher rates of anxiety, depression, abuse and self-harm [3].

The recent proliferation of mobile sensing apps offers novel opportunities to monitor people's behavior, and might thus hold great promises for the self-management of mental health during the COVID-19 pandemic. This might be especially important, given the fact that many of the health services and social infrastructures that normally bolster against mental health problems during emergencies have disappeared [4]. Through their passively recorded mobile sensing data people could gain insights in maladaptive behaviors that they exhibit by adjusting to the pandemic. In example, from global positioning system (GPS), accelerometer and phone usage data people could infer whether they are socially isolated, sleeping poorly, physically inactive or not leaving their homes [5]. Such self-monitoring can increase the self-awareness of people and motivate them to engage in health-promoting behavior, which might be especially important in a scenario in which access to other health services is more limited. To be able to make the best use of mobile sensing apps in limiting the adverse consequences of the pandemic on mental health it is important to understand the views of potential users. We thus aimed to explore, if mobile sensing apps are perceived as helpful tools by people with and without mental disorders for self-managing their mental health during the COVID-19 pandemic by increasing awareness for potential maladaptive

behaviors.

Method

Recruitment

We conducted an anonymous online survey in May, 2020 recruiting participants via Amazon's Mechanical Turk (AMT) to ensure a large and diverse audience [6]. Importantly, AMT has become an increasingly accepted way of collecting responses from diverse participants [7]. Participants provided information on basic demographics and their mental health history. In addition, we asked participants to rate the perceived helpfulness of mobile sensing apps, the health impact of COVID-19, and their technology knowledge on a 5-point Likert scale ranging from "1 = not at all" to "5 =extremely". All participants provided fully informed consent. The survey sample included 474 participants aged over 18 after filtering out incomplete responses and incorrect responses to attention-determining questions.

Statistical Analysis

For the analysis, we ran a linear model with perceived helpfulness of mobile sensing apps as the outcome of interest and age, sex, education, mental health history, health impact of COVID-19, and technology knowledge as independent predictors. Additionally, we explored potential mediating effects using the Sobel test [8]. SPSS, version 25 was used for all data analyses and the criterion *P* value was set at $P < .05$. The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. All procedures were approved by the research ethics board at Dalhousie University. The study is further General Data Protection Regulation (GDPR) compliant.

Results

In this study, 235 of our 474 participants were aged 25 to 34 (50%), 170 of participants were female (36%), and 148 had a history of a mental disorder (31%). The majority of our participants (312 / 66%) perceived mobile sensing apps as "very" or "extremely" helpful for managing mental health during the COVID-19 pandemic. 106 out of the 148 participants with a history of a mental disorder experienced mobile sensing as "very" or "extremely" helpful (72%), whereas only 206 out of 326 participants without a history of a mental disorder (63%) did so (see Fig 1). This difference was significant controlling for age, sex, education and technology knowledge ($\beta = 0.12$; 95% CI, 0.03-0.21; $P = 0.01$), but fell short of statistical significance after adjusting for perceived health impact of COVID-19 ($\beta = 0.08$; 95% CI, -0.01-0.17; $P = 0.06$). Specifically, participants with a history of a mental disorder experienced a higher health impact of COVID-19 ($\beta = 0.14$; 95% CI, 0.05-0.23; $P = 0.002$), which mediated the effect of a history of a mental disorder on perceived helpfulness (Sobel test, $P = 0.01$). Moreover, participants who experienced a stronger health impact of COVID-19 ($\beta = 0.24$; 95% CI, 0.16-0.33; $P < .001$), were more knowledgeable in technology ($\beta = 0.17$; 95% CI, 0.08-0.25; $P < .001$), and those who had a higher education rated mobile sensing apps as more helpful ($\beta = 0.1$; 95% CI, 0.02-0.19; $P = .02$); while there were no differences observed by age or gender.

Discussion

Principal Results

Our findings indicate that mobile sensing apps that passively track the daily life behaviors of people and making them aware of maladaptive changes are perceived as very helpful tools for the self-management of mental health during the COVID-19 pandemic. People with and without mental disorders considered mobile sensing apps as helpful for their self-management of mental health during the pandemic. But given that people with mental disorders experience a higher health impact of COVID-19, mobile sensing app are perceived as particularly helpful by this group. Interestingly, people who experienced a strong impact of COVID-19 on their health rated the helpfulness of such app particularly high. Results also indicate that by improving users' knowledge of technology the acceptance and usability of mobile sensing apps for mental health care could be increased.

Limitations

A considerable limitation of our survey is that our sample, though well-stratified and diverse, was not random, people who have an interest in mobile sensing technologies might have been more likely to take part in this online survey. The figures might further be slightly biased by social desirability. However, we assume that such effects should only have been minimal given the anonymity of participants in the survey. Nevertheless, our data suggest that a substantial number of people perceive mobile sensing apps as helpful tools for managing their mental health during the pandemic-related lockdown.

Conclusions

Most importantly, the results indicate that the usage of mobile sensing app could have the potential to directly reduce the demand on the mental health care system during the COVID-19 pandemic by promoting better self-management. Both people with and without mental disorders experience mobile sensing apps as helpful to self-manage their mental health during the pandemic, although people with a mental disorder experience such apps as especially useful. By making users aware of maladaptive changes in their behaviors mobile sensing app can assist and motivate people to take better care of their mental health preventing novel onsets or a worsening of mental disorders. The remote empowerment of people in their mental health care has to be considered especially valuable as standard ways of delivering care have been severely comprised during the COVID-19 pandemic.

Figure 1

Perceived Helpfulness Ratings of Mobile Sensing Apps during the Pandemic.

Author Contributions

BS, RO, LW, and SM designed the study; BS and RO recruited the participants; BS, KB, and SM conducted the analyses; BS, KB and SM wrote the manuscript; AB, LW and PM assisted in the clinical presentation; and all authors critically revised the manuscript.

Author Contributions

None.

Abbreviations

GPS Global Positioning System

GDPR General Data Protection Regulation

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Supplementary Files

Figures

Perceived Helpfulness Ratings of Mobile Sensing Apps during the Pandemic.