

On the Need for Digital Phenotyping to Obtain Insights into Mental States in the COVID-19 Pandemic

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Highlights

Digital phenotyping provides real-time insight into population mental health in a crisis such as COVID-19.

Digital phenotyping empowers policy makers with population level information to help fight a pandemic like COVID-19.

User privacy and informed consent is paramount in building trust with digital phenotyping.

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Coronavirus Disease 2019 (COVID-19) has caused a worldwide pandemic. Respiratory failure is among the most common causes of death related to COVID-19 (Mehta et al., 2020). Beyond the current debate on developing vaccines and appropriate treatments for COVID-19 (Lurie et al., 2020; Matthay et al., 2020), discussions have emerged on how the pandemic can be successfully controlled by technological means (Mayor, 2020; McCall, 2020). Beyond the widespread recommendations to control the virus by washing hands regularly, wearing respiratory masks, and practicing social distancing (perhaps more appropriately called physical distancing because it is also possible to socially interact virtually; for effects of travel restrictions see (Matthay et al., 2020)), there is interest in using mobile phone data to better understand how COVID-19 spreads in a given population (Oliver et al., 2020).

Various tracking technologies have been proposed, with different levels of privacy issues (Cho et al., 2020; Ienca & Vayena, 2020). Perhaps the least invasive method to track the spread of COVID-19 uses Bluetooth technology, where one's smartphone logs the identity of other smartphone users with whom the person interacted for specific periods of time (Abeler et al., 2020). The data are stored on the smartphone and are only transferred to a server if the user decides to share this information, for example if they learn that they have been infected. This approach is expected to be effective only if a minimum of 60% of a population install such an application (Hurtz, 2020). Current statistics from countries such as Austria (3%) and Singapore (20%) show that typically the minimum threshold is not reached (Rosenbach

et al., 2020), perhaps due to privacy concerns.

Beyond the question of whether smartphone-tracking procedures can adequately minimize the spread of COVID-19 in a population, use of smartphone tracking might have additional benefits in the context of a pandemic. The data derived from smartphones can be used to obtain insights on changes in psychological variables, such as the current mental state of a person, that are induced by a pandemic (Baumeister & Montag, 2019; Dagum, 2018). For instance, smartphone call behavior is robustly associated with extraversion (Montag et al., 2014, 2019). Detecting psychological states and traits from digital traces logged on smartphones and other connected devices is called digital phenotyping (Insel, 2017, 2018). It has shown promise in longitudinally assessing affective states (Messner et al., 2019; Zulueta et al., 2018), including providing insights into affective disorders such as major depression (Saeb et al., 2015, 2017). In principle, app tracking technologies could be used to track the spread of COVID-19 and further assess its adverse effects. For example, such tracking could be used to assess the increase of mental disorders that are a consequence of the effects of the COVID-19 pandemic. This includes the effects of loneliness and social isolation (Armitage & Nellums, 2020), and concerns about job losses and related financial duress (Coibion et al., 2020). At the moment it is difficult to obtain insights into the potential rise of mental disorders related to COVID-19. Social distancing prevents many people from obtaining access to mental health professionals. Digital phenotyping via smartphone tracking tech-

nologies could help reveal those who may benefit from access to health support and services.

Insight into population mental health in the COVID-19 pandemic is relevant to policy makers whose decisions on restricting social interactions, closing economic sectors, and imposing self-quarantine measures, need to reflect the indirect societal costs and health implications of depression and addiction. In this domain, Schimmenti et al. identified four areas, which might be among the causal factors for psychiatric disorders triggered by COVID-19. Here, the authors discuss the components: “(1) fear of the body/fear for the body, (2) fear of significant others/fear for significant others, (3) fear of not knowing/fear of knowing, and (4) fear of taking action/fear of inaction” (Schimmenti et al., 2020, p. 41).

The negative psychological impact of COVID-19, including adverse effects directly attributable to COVID-19 itself, and also indirect effects due to isolation or heightened anxiety/fear from constant media coverage, has already received empirical support in the literature. A nationwide survey from China reported that approximately 35% of the investigated population showed signs of significant psychological distress (Qiu et al., 2020). In Iran it has been reported that fear of COVID-19 correlates with elevated depression and anxiety symptoms (Ahorsu et al., 2020), and in Bangladesh the first case of suicide (of a 36 year old man) due to fear of infection by COVID-19 has been recorded (Mamun & Griffiths, 2020). COVID-19 could result in a higher risk of increased alcohol use disorders over time (Clay & Parker, 2020). In March 2020, Germans bought 12% more beer and 31% more high alcohol-content drinks compared to the same period the year before (Bartel, 2020). Such elevated alcohol consumption could be a consequence of isolation and/or fear of COVID-19. A recent paper also discussed the potential negative consequences of COVID-19 in the area of problematic Internet use, in the context of prolonged screen time sessions that are a result of governmental requests to stay at home (Király et al., 2020).

We need to pay greater attention to the negative mental health and social implications of the COVID-19 crisis and related policies. Population scale digital phenotyping can provide important insights on changes in population mental health and the impact of government policy. We must balance this potential benefit with ethical issues arising from the use of tracking technologies, perhaps the most problematic being privacy violations in the age of surveillance capitalism (Dagum & Montag, 2019; Martinez-Martin et al., 2018; Montag et al., 2020; Zuboff, 2019). Therefore, we stress the importance of protecting personal privacy while developing tracking solutions that can provide authorities with real time information on mental health in large populations during the COVID-19 pandemic.

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Conflict of Interest

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