

## Medical Informatics for COVID-19

Sun. Nov 22, 2020 9:30 AM - 11:00 AM Room E-1 (Congress center 5F - Conference Room 52)

---

### [AP2-E1-1-01] The changing App-etite for mHealth: A time-series analysis pre & post COVID-19

\*Simon Leigh<sup>1</sup>, Rob Daly<sup>1</sup>, Liz Ashall-Payne<sup>1</sup> (1. Organisation for the Review of Care and Health Applications)

Keywords: mHealth, Digital health, COVID-19

The coronavirus (COVID-19) pandemic has delivered a profound shock to the UK. Measures to control the spread of the virus have reached deep into our lives, significantly disrupting factors such as job security, social activity and family life, all of which are essential to healthy lives. The public health workforce and local government have reshaped their work in an effort to contain the infection and protect the most vulnerable. Coupled with a reluctance among patients to expose themselves to unnecessary levels of risk, face-to-face appointments have reduced significantly. Inherently flexible, and accessible, mobile-health (mHealth) solutions have been poised as a possible solution to maintain a continuity of care in the face of mounting unmet clinical needs. It remains uncertain however whether a public appetite for such technologies exists. Utilising a retrospective time-series design, this study analyses web-based searches for health-apps pre and post-COVID-19 lockdown initiation, demonstrating unequivocally that searches for health-apps increased significantly (240%) since lockdown measures were implemented. These increases were consistent and significant across all condition areas, but as high as 3,814% in the case of physiotherapy. As such, it is critical that with high demand for these therapeutics, consumers are directed to safe, trusted and evidence-based technologies; such that any benefits which may be realized, are not overshadowed by the potential dangers of using unsafe and unproven technologies.

# The changing App-etite for mHealth: A time-series analysis pre & post COVID-19

Simon Leigh<sup>a</sup>, Rob Daly<sup>a</sup>, Liz Ashall-Payne<sup>a</sup>

*The Organisation for the Review of Care and Health Applications (ORCHA). Sci-Tech Daresbury, Vanguard House, Keckwick Lane, Daresbury WA4 4AB.*

## Abstract

*The coronavirus (COVID-19) pandemic has delivered a profound shock to the UK. Measures to control the spread of the virus have reached deep into our lives, significantly disrupting factors such as job security, social activity and family life, all of which are essential to healthy lives. The public health workforce and local government have reshaped their work in an effort to contain the infection and protect the most vulnerable. Coupled with a reluctance among patients to expose themselves to unnecessary levels of risk, face-to-face appointments have reduced significantly. Inherently flexible, and accessible, mobile-health (mHealth) solutions have been poised as a possible solution to maintain a continuity of care in the face of mounting unmet clinical needs. It remains uncertain however whether a public appetite for such technologies exists. Utilising a retrospective time-series design, this study analyses web-based searches for health-apps pre and post-COVID-19 lockdown initiation, demonstrating unequivocally that searches for health-apps increased significantly (240%) since lockdown measures were implemented. These increases were consistent and significant across all condition areas, but as high as 3,814% in the case of physiotherapy. As such, it is critical that with high demand for these therapeutics, consumers are directed to safe, trusted and evidence-based technologies; such that any benefits which may be realized, are not overshadowed by the potential dangers of using unsafe and unproven technologies.*

## Keywords

*mHealth, digital health, COVID-19*

## Introduction

The COVID-19 pandemic has disrupted the spectrum of healthcare delivery, leading to the widespread deferral of elective, preventive, and outpatient appointments. In the United States, ambulatory care visits fell by 60% in the early phase of the pandemic<sup>1</sup>, while in the United Kingdom, an estimated 1.5million elective admissions and 2.6million outpatient attendances were lost due to COVID-19<sup>2</sup>. While the full longer-term impact of this drastic reduction in routine care is unclear, short term cracks have begun to emerge. Reduced access to services<sup>3</sup>, restrictions on social contact, and concerns regarding future insecurity, have resulted in significant mental-health sequelae<sup>4</sup>. Given the increasing difficulties in accessing face-to-face care, the potential role of mobile-health (mHealth) has gained traction during the pandemic. These technologies, which

are accessible and fundamentally flexible, may provide an alternative means for the continuity of care in those with unmet clinical needs during the pandemic<sup>5</sup>. What is uncertain however, is how consumer attitudes and demand for mHealth technologies have changed during this period. Utilising data from the World's largest health-app evaluation formulary, provided by the Organisation for the Review of Care and Health Applications (ORCHA); the aim of this study is to determine how demand for mHealth solutions, for various health conditions has changed since COVID-19 lockdown measures were introduced, and whether an appetite for mHealth currently exists?

## Materials & Methods

ORCHA are the World's largest independent reviewer of health-apps, providing a repository of health-apps, assessed using a 300-point scale on the grounds of user experience, clinical assurance and data privacy. To date more than 9,000 health-apps have been reviewed and included on ORCHA's 'app finder' website since 2015, with the organization now covering 50% of NHS trusts<sup>6</sup>. In September 2020, we performed a retrospective time-series analysis of searches for health-apps within ORCHA's 'app finder', split over two periods; before and after the initiation of global COVID-19 lockdown procedures in March 2020. Data were collected in a raw unedited format, with every search term from January 2019 to August 2020 extracted along with frequencies over time.

Each search term used was automatically classified into one of 20 disease areas, each covering a broad range of conditions. The terms used to classify searches into various condition areas were comprised of common condition names, MeSH terms, medications, and anticipated misspellings of all. A complete list of these condition areas is provided in Table 1. Given the differential and imbalanced time periods for data collection (14 months before lockdown measures, and 6 months after), these were standardised by determining the number of searches per month. A two-sample Poisson test was used to test for statistical significance at the conventional 5% level. All data analysis was conducted in Microsoft Office Excel 2013 (Microsoft, Redmond, Washington, USA).

## Results

In total, 90,716 searches were performed by users of ORCHA's 'app finder' between January 2019 and August 2020, with

13,756 mutually exclusive search terms utilized. Considering the period prior to the March COVID-lockdowns (January 2019 to February 2020), 27,235 searches for various health-apps took place, equivalent to 1,945 per month; with health-apps dedicated to mental health, diabetes, and sleep the most searched for over this period. Following the initiation of lockdown proceedings (March 2020 to August 2020), a total of 39,831 searches for health-apps took place, equivalent to 6,639 per month. This was equivalent to a 3.4-fold increase on the rate of health-app searches pre-lockdown ( $p < 0.0001$ ), suggesting a significant increase in the demand for this therapeutic medium, with Table 1 demonstrating a significant increase across all therapeutic areas.

*Table 1 – Health-app searches pre & post lockdown*

Condition	Searches per month (pre)	Searches per month (post)	Increase
COVID	5	208	4457.3%*
Physio	8	299	3814.3%*
MSK	11	357	3105.3%*
Neurology	46	501	996.7%*
Fitness	140	812	480.7%*
Cancer	20	100	396.6%*
Respiratory	72	352	389.8%*
IBS	9	41	343.3%*
Diet/weight loss	174	688	296.2%*
Pain	43	150	245.8%*
Heart	31	104	235.4%*
Pregnancy	44	148	234.7%*
Women's health	10	31	213.3%*
Alcohol	18	50	179.1%*
Mental health	599	1664	177.9%*
Self-harm	22	48	115.3%
Diabetes	257	491	91.0%*
Sleep	256	359	40.2%*
Smoking	130	169	30.3%*

\*Significant increase

## Discussion

This study is the first-of-its-kind to examine real-world demand for health-apps, across various therapeutic areas, and how this has been affected by changes to the delivery of traditional health care services as a result of the COVID-19 pandemic. Using real-world data from a large health-app repository based in the United Kingdom, ORCHA's 'app finder', our findings demonstrate that searches for health-apps increased significantly (240%) following the announcement of COVID-19 lockdown measures. These increases were significant across all condition areas, but none more so than fitness, diet and

weight loss, and mental health, which experienced the largest absolute increases in searches for health-apps.

Measures taken to curtail the spread of COVID-19, including lockdowns, social distancing, quarantine and voluntary self-isolation, while undoubtedly preventing escalating rates of infection, have also undoubtedly led to a demonstrable adverse impact on both mental and physical health.<sup>7</sup> The latter has recently been extensively studied, given the limited access to exercise experienced by many during the initial phases of COVID-containment<sup>8</sup>, while the former has been evidenced in several studies across the globe<sup>3,4,7</sup>. As such, it is perhaps no surprise that searches for health-apps have increased so significantly in these condition areas; concurring with previous analyses demonstrating a clear unmet need for high-quality care during the COVID-19 pandemic.<sup>1,2,3</sup>

## Conclusion

Apps are a novel solution to circumvent barriers to accessing high-quality care, imposed as a result of measures to protect individuals from the spread of coronavirus. The findings of this study suggest an increasing openness to the use of mHealth, with significant increases in the demand for health-apps since lockdown, across all therapeutic areas. However, not all health-apps are equal, and if mHealth is to be a boon, rather than a bane to healthcare systems, it is critical that health-apps which are safe, effective, and evidence-based are separated from the app-haystack. In doing so these apps can be found and put to good use by consumers in need of high-quality care.

## Acknowledgements

## References

1. Mehrotra A, Chernew M, Linetsky D et al. The Impact of the COVID-19 Pandemic on Outpatient Visits: A Rebound Emerges. The Commonwealth Fund. 2020
2. British Medical Association: The hidden impact of COVID-19 on patient care in the NHS in England. July 2020
3. No authors listed. The intersection of COVID-19 and mental health. Lancet Infectious Diseases. 2020.
4. Holmes EA, O'Connor RC, Perry VH, et al. Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. Lancet Psychiatry. 2020; 7: 547-560
5. Banskota S, Healy M, Elizabeth M. 15 Smartphone Apps for Older Adults to Use While in Isolation During the COVID-19 Pandemic. West J Emerg Med. 2020
6. The Organisation for the Review of Care and Health Applications (ORCHA). Appfinder. Available at: <https://appfinder.orch.co.uk/>
7. Luo M, Guo L, Yu M, et al. (2020). The psychological and mental impact of coronavirus disease 2019 (COVID-19) on medical staff and general public - A systematic review and meta-analysis. Psychiatry Res, 291:113190.
8. Zachary Z, Brianna F, Brianna L, et al. Self-quarantine and weight gain related risk factors during the COVID-19 pandemic. Obes Res Clin Pract. 2020; 14(3):210–216.

## Address for correspondence

Simon Leigh. The Organisation for the Review of Care and Health Applications (ORCHA). Sci-Tech Daresbury, Vanguard House, Keckwick Lane, Daresbury WA4 4AB.