Lancaster University, University of Bath – Written Evidence (LOL0069)

Summary

This submission addresses four key issues identified by the committee that would be welcomed as part of a written submission. These are:

- How increased reliance on digital technology affects physical and mental health?
- The role and affects digital technology has on social interactions
- The effects of home-working and the digital divide
- The duty of technology companies to protect people's wellbeing and interventions such as limiting technology use

Our submission is also partly in response to recent interactions with the House of Lords COVID-19 Committee Twitter account, requesting that we make a formal submission following a recent scientific publication in December 2020 [1].

Based at the Universities of Bath and Lancaster, our work considers the data that digital technologies collect and how the resulting information can provide insights about individuals and their behaviour. We are equally interested in the impact this technology has on people and society more broadly [2]. Therefore, this submission considers the practical challenges of conducting research that explores how technology, particularly smartphones, impacts people and society. Specifically, the committee may benefit from increased awareness of:

1) What we can speculate about the effects of increased exposure to technology during COVID-19.
2) Weaknesses in existing evidence when drawing conclusions about the effects of general and specific technology use.
3) How research into the impacts of modern technology can be improved in the future.

These issues are discussed in further detail in the following sections:

1. Introduction

1.1 Social distancing during the COVID-19 pandemic has increased society's reliance on digital technology to fulfill occupational and social responsibilities.

1.2 The ubiquity of this technology has also helped support public health initiatives during this time (e.g., via track and trace) [3].

1.3 Given these developments, it is even more important to consider the impacts of technology on physical and mental health.

1.4 Rarely are the impacts of any technology uniform. One might speculate that during the pandemic, technology has provided a buffer to support physical and mental health by reducing the impacts of social isolation and encouraging physical activity. Alternatively, it could have a negative impact as increased use might result in reduced productivity or a greater exposure to online harm (e.g., misinformation). Outcomes will always depend on how people use a given technology [3].

1.5 Absence of use can become even more problematic. For example, vulnerable groups are in danger of disproportionally missing out on routine care as further attempts are made to digitise health services during or following the pandemic.

1.6 Scientific evidence varies tremendously in terms of the methods used to study any given phenomena. Despite pockets of improvements, there remains a lack of high-quality evidence regarding the effects of technology on health and workplace productivity. This continues to effect investigations that aim to understand the impact of our increasing reliance on technology following the pandemic.

2. Recent work concerning technology use and health

2.1 Many studies report that technology is a core topic of interest, but the majority fail to measure interactions with technology directly [3]. Rather than measure use directly, studies rely on surveys or estimates.

2.4 Surveys typically ask people to report how problematic they believe their technology usage to be in daily life. These are a poor measure of technology use but are often incorrectly adopted as a substitute for how someone actually uses technology [4,5].

2.5 The selection of questions used as part of these surveys do not follow strict criteria to ensure they are valid or reliable [3]. Our investigations suggest that, rather than act as a proxy for actual usage, they provide a better measure of how much someone worries about technology, which (as one might expect) correlates with well-being [6].

2.3 Duration estimates of technology use provide a more accurate representation of actual use but are still susceptible to a variety of other biases and remain poor for

measuring specific patterns of behaviour. For example, asking someone how many times they pick up their smartphone each day will produce an inaccurate snapshot of reality [4,5].

2.4 Actual usage in the form of logs from technology directly provides new avenues for researchers who wish to study the impacts of technology but are used infrequently [1].

2.5. Conclusions regarding health consequences change depending on whether technology use is measured via surveys, estimates or actual use from devices and services directly [1].

2.6 Survey instruments generate the largest negative associations between technology use and health (physical and mental). Single estimates show weaker negative relationships [1].

2.7 The relationship between health and time spent using smartphones, for example, drops close to zero when relying on actual usage measured automatically by software [1].

2.8 For a small group of participants, we also had access to time spent on different smartphone apps. Associations between specific apps and health were also close to zero [1].

2.9 Notwithstanding the above, most research linking technology use with negative or positive impacts is correlational. Therefore, it is not possible to establish that technology use was the primary cause of any effect [3].

2.10 Specifically, if technology use and poorer health outcomes have occurred in tandem during the COVID-19 pandemic, correlational research might conclude that increases in technology use causes poor health. Alternatively, any inflation in mental health symptomatology could be due to other factors caused by the pandemic, rather than changes to technology usage patterns.

2.11 Beyond the issues outlined above, research that considers the psychological impacts of technology suffers from a variety of other problems including a lack of theoretical development, identification of mechanisms that underpin impacts, pre-registration of study designs and poor levels of data sharing between other scientists [3].

3. Ongoing and future research

3.1 Technology companies (e.g., Apple and Google) have provided new tools so users can limit their technology use. However, the latest research adopting open science practices suggests that limiting general smartphone screen time is unlikely to have any mental health benefits [1, 7].

3.2 Future research could better establish cause and effect by asking participants to engage in digital abstinences. However, this can be challenging when people are reliant on the very same technology for everyday social interaction and occupational organisation. For example, even without societal changes following the pandemic, most individual and group relationships for adults and children develop and are maintained by switching between online and face to face contexts [3]. This is unlikely to change in the future.

3.3 Limiting the use of specific technologies for short periods of time might be viewed as a more realistic experimental approach [7].

3.4 For many technologies, (inc smartphones, laptops, computers), usage patterns can now be logged using software installed on the device itself. Self-reports of people's experiences or mood etc may also be collected to compliment this data at more frequent intervals. These remain valuable, but self-report should not supersede the collection of actual technology behaviours, if this is the key variable of interest.

3.5 Specific technology interactions alongside psychological processes need to be considered in more detail. The ubiquity and many possibilities provided by modern technology make this difficult [8].

3.6 There are clear differences between 'mindlessly' browsing Facebook or talking to a friend on Zoom. There are also differences within specific technology platforms. For example, browsing Facebook and liking a post that contains dangerous misinformation about COVID-19 would be a mark of online harm, but reporting that information to the authorities would be a positive alternative course of action.

3.7 Our lab has started to develop software systems that allow researchers to use logging applications with different technologies [9]. This allows us to describe different technology interactions before starting to unpick any psychological impacts [8].

3.8 This involves the use of purpose-built apps to capture complex patterns of usage from smartphones. This has shifted from tracking general use (in hours) alongside single smartphone interactions (pickups)

to aligning these metrics with specific apps and notifications. Interactions can then be separated by those that are initiated by a participant themselves (e.g., goal-directed or absent-minded) or after being prompted by a specific event (e.g., notification or external contextual cue) [3].

3.9 A complementary solution involves getting data at a participant level from specific apps or digital services directly, assuming users consent to it being shared.

3.10 Alongside these primarily quantitative approaches, qualitative research will complement these approaches and generate taxonomies of benefits/harms. This will simultaneously support the development of suitable theory [3,10].

3.11 Most of the above requires buy-in from technology companies who either need to enable access to digital systems that allow for the building of software to capture data (e.g., via operating systems/APIs) or provide raw data directly to researchers.

3.12 While data from social media companies or other technology providers can be sensitive, a variety of methods can protect participants' privacy if technology companies were willing to share this with researchers (e.g., via differential privacy). However, this has to be balanced against the need to engage with open science practices to ensure results can be trusted by other scientists [3].

3.13 It is near impossible to understand and evaluate benefits or harms without suitable data and an intricate understanding of the technology [3,8].

3.14 Interdisciplinary research that brings together end users from a variety of backgrounds, industry partners, technology experts and psychologists will be key to improving our current understanding and subsequent mitigation of digital harms [10].

References:

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