

Personalised digital technology for mental health in the armed forces: the potential, the hype and the dangers

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ABSTRACT

The COVID-19 pandemic has resulted in a digital technology revolution which included widespread use in remote healthcare settings, remote working and use of technology to support friends and family to stay in touch. The armed forces have also increased its use of digital technology, but not at the same rate, and it is important that they do not fall behind in the revolution. One area where digital technology could be helpful is the treatment and management of mental health conditions. In a civilian setting, digital technology adoption has been found to be acceptable and feasible yet there is little use in the armed forces. In this personal view, we explore the potential use of personalised digital technology for mental health, the hype surrounding it and the dangers. This paper forms part of the special issue of *BMJ Military Health* dedicated to personalised digital technology for mental health in the armed forces.

INTRODUCTION

The use of digital technology has, in many ways, transformed our lives for the better. It has revolutionised our ability to connect with each other, overcome geographical limitations and provide unparalleled opportunities.^{1 2} Over the last two decades we have seen a significant increase in the use of digital technology for the monitoring, management, intervention and treatment for mental healthcare in a civilian setting; and the emergence of, although limited, use in the armed forces.^{2 3} This has often been coupled with improved reliability of internet services both within the home and via mobile.

There are many benefits to these technologies including the low cost per user (although high development costs), ability for rapid changes and iterative development and, importantly, the ability to avoid stigma associated with help seeking by being

discreet. This final point is a critical issue faced by the armed forces today and is frequently reported as a barrier to accessing support.⁴ But the current use of personalised digital technology falls short in its potential to create and monitor personalised digital biomarkers that combine with new data sources to improve prevention and treatment and support sustained behaviour change. Further, current implementations fail to account for the challenges of maladaptive coping inherent in mental health; for example, social withdrawal or isolation, as the requirement to travel to appointments is removed. There is significant room to improve the utility of personalised digital health technology in the armed forces.

The adoption of digital technology in the armed forces is accelerating rapidly, with a systematic review finding the USA is leading the way.³ Both the serving personnel and the veteran community have benefited from new medical innovations, such as mobile health, telehealth and personalised health.⁵ For those in service, digital technology is often used as a screening platform for health conditions, appointments and assessments. Conversely, for veterans, the technology is being used to treat, manage and monitor mental health, notably conditions such as post-traumatic stress disorder (PTSD)⁶ and alcohol misuse.⁷

The use of technology in the armed forces has often been a reactionary to changes in the healthcare landscape or changes in service provision. For example, over the last 20 years, the armed forces have seen a rapid rise in mental health issues and help seeking.⁴ This has been driven by greater awareness of mental health and increased recognition of maintaining operational readiness of the standing force. To address this rise, there is a clear demand for adaptive personalised solutions that target individual need to improve outcomes both for the individual and the wider armed forces community.

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ACCEPTABILITY AND FEASIBILITY OF DIGITAL TECHNOLOGY

During the COVID-19 pandemic, digital technology brought huge benefits— from unlocking innovation across public services, including remote healthcare, to enabling millions to work remotely, including armed forces personnel, to supporting people to stay in touch with their friends and families. We are amid a digital revolution, and it is important that our armed forces do not fall behind in the revolution.

Since the 1980s, the mantra ‘if you build it, they will come’ has been used to drive development. However, it contravenes a basic business principle, namely one must establish a need for something before making it, and this holds true for technology for health. Where there isn’t a defined need, acceptance of technology from a patient and clinical perspective can be negatively impacted, such as perceived risk, reliability, digital literacy and effectiveness.⁸ However, as technology adoption and screen time increase, evidence has shown acceptability will increase, although not at the same rate.⁹ This is vitally important for military personnel, where some research has indicated technology literacy is lower in armed forces personnel of lower ranks compared with the wider civilian population.¹⁰

Focusing specifically on a mental healthcare setting, digital technology adoption has increasingly been found to be acceptable and feasible.^{2 3 11} However, there is very little evidence of its use in an armed forces setting. Taking account of the literature, we have identified five overarching areas in which digital technology can support the armed forces mental health provision: (1) minimising avoidable service use via signposting to suitable services early, (2) proactive risk analysis, (3) focus on prevention, (4) promoting patient independence and (5) improving patient outcomes (see [figure 1](#) for visual representation). Underpinning each area is the need to focus on the individualised care, placing the patient at the centre of health provision.

While the benefits on the use of digital technology are clear, it is vital that the technology is shown to be acceptable and underpinned by scientific evidence. This applies both to healthcare technologies in a civilian and military setting. For example, a systematic review by Crane and colleagues¹² exploring scientific rigour of popular apps targeting alcohol use

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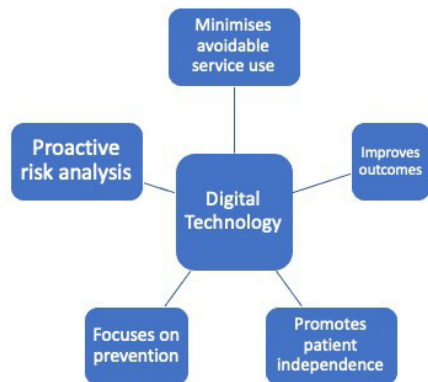


Figure 1 Key areas in which digital technology can support the armed forces.

found that the majority had no evidence base, and made no reference to scientific literature. This is an important lesson for the armed forces community. Technology should not be used for the sake of it, and any technology which is used should be designed and developed following rigorous standards. The UK's Medical Research Council, for example, has developed comprehensive guidance for the development and evaluation of complex health interventions.¹³ These guidelines are designed to support developers, and researchers, to develop interventions which are evidence based and safe for patient use. While these guidelines are not mandatory, they have been used widely in the UK to help support technology development aimed at a healthcare setting.

FOCUS ON THE INDIVIDUAL

Digital technologies are highly effective data collection platforms, and they can record a lot of details about people's lives via self-reported health outcomes, mobile sensors and wearable technology.¹⁴ Healthcare is not a one-size-fits-all approach; it is important that we harness these novel insights to support the individual, and not attempt to treat the group (eg, user age, gender or occupation as a criterion for a certain type of trigger).

Until recently, algorithms were not very good at recognising patterns in data. To address this, over the last 20 years, new techniques have been developed in the machine learning field to allow more effective use of technology for tasks like this. In combination with the development of graphical processing units, machine learning has made significant leaps, offering novel insights from large and complex data sets such as the detection of PTSD in a UK cohort.¹⁵

There is emerging evidence that has shown patient-centred personalised

mental health interventions lead to improved outcomes. This includes the use of personalised context, short message service and push notifications.^{16–18} To improve the effectiveness of the messaging, and outcomes, many messages are based around the principles of behaviour change theory to promote positive changes in behaviour.¹⁹ These messaging types, including behaviour change theory, have been shown to be effective in armed forces samples covering alcohol misuse,²⁰ suicide²¹ and physical activity.²²

Focusing on the individual in isolation, even with digital technology, will not produce materially beneficial results; the compound effect of integrating healthcare across health and social care, including interfacing digital technologies, offers the potential to increase patient satisfaction, quality of care, improved outcomes and better access to services.²³ The armed forces, as a discreet, easily identifiable population, could benefit from interchanged healthcare systems more so than the civilian population. It is also important to recognise organisational and operational changes in the UK Armed Forces, with a shift towards a single person living and creating a more dispersed workforce where digital technology could bridge the isolation divide.

DIGITAL TECHNOLOGY BRINGS NEW DANGERS

Emerging digital health technologies for mental health, such as the use of smartphone apps, web-based platforms and new data-driven analytics, could provide a means to overcome resource limitations and staffing, and reach individuals who are unable or reluctant to access mental healthcare. However, the use of digital technology is not a silver bullet, and should not be considered or seen as a replacement for traditional face-to-face treatment.²⁴ Before we undertake the rapid roll-out of digital technology for mental health in the armed forces, we should reflect on some of the lessons learnt from civilian implementation.

Digital technology is not without issues. As has been discussed in this article, undoubtedly, digital technology has had a positive effect on health and in our daily lives. However, we must recognise that there are negative consequences such as overuse and the impact on mental health, reliance on decisions that arise solely from technology and technology dependence/addiction. It is important that as digital technology for mental health is rolled out across the armed forces, safeguards are

put in place to protect patients, clinicians and stakeholders.

When we consider digital technology, a significant consideration is the cost of development, deployment and maintenance. This is especially apparent in resource-limited settings. Failing to account for the resources required to successfully implement health technologies can lead to optimistic cost-effectiveness estimates, and ultimately negatively impact outcomes.²⁵

The present use of digital technology in mental health is uncertain, unplanned and often deployed in an ad hoc fashion. It is critical that the use and roll-out is thought out and planned. One major barrier to addressing this issue is the wide variability in the maturity of digital healthcare across the armed forces. Although there are pockets of excellence, such as the UK's jHub Medical Innovator and US Health Innovator, it nevertheless lags behind many civilian providers especially in areas of remote care, medication dispensing and patient monitoring.

As we strive to take advantage of digital technology, it is important to recognise the threats posed by foreign actors. Over the last decade, we have seen a significant increase in the number of cyberattacks, and it is vital that we recognise the growth of new attack vectors and placing mitigations in place, especially for technologies which are focused on the armed forces. As we move towards a more digitally connected world, it is important that we seek to build trust in the technology, especially when algorithms are being used to personalise the delivery, give patients control over their data and seek to develop efficacy and scientific evidence for interventions. This is incredibly important where we take interventions that work in a civilian setting and apply them to the armed forces.

CONCLUSIONS

The evidence for digital technology in a mental health setting for the armed forces is persuasive. Although more work is required to develop the scientific evidence base, the benefits far outweigh the dangers. By focusing on the individual, we attempt to address the disorder before it occurs. Technology engages the patient in healthcare decision-making, improves our healthcare systems and ensures our armed forces are supported. Each person has their own health risks, lifestyle choices and goals for their health, and recent advances in the analysis of big data can allow us to better understand the individualised needs

of patients. Therefore, personalising care to the individual is critical for engagement, along with the delivery of holistic support, management and intervention.

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