



# The Role of Digital Health in Managing Chronic Pain

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## ABSTRACT

Chronic pain, which affects almost a billion people worldwide, is a major health concern that places a large cost strain on healthcare systems. Traditional pain management strategies frequently fall short, demanding novel alternatives. Telemedicine, mobile health applications, and remote monitoring tools are all examples of digital health technologies that show promise for chronic pain management. This study examines the present issues in chronic pain treatment, the importance of digital health treatments, and the efficacy of evidence-based methods including cognitive behavioural therapy (CBT) and machine learning for personalised care. Patients suffering from chronic pain now have new hope thanks to digital health solutions that allow for patient self-management, real-time monitoring, and enhanced access to care. Through evaluating clinical trials and research findings, this review sheds light on the future potential and opportunities for incorporating digital health technologies into chronic pain care.

**Keywords:** Chronic Pain, Digital Health, Telemedicine, Cognitive Behavioral Therapy (CBT), Remote Monitoring.

## INTRODUCTION

Chronic pain is often defined as pain that has persisted for three months or longer or past the normal time for tissue healing and can therefore be considered to be present in a variety of conditions and diagnoses. Examples of some chronic pain types include neuropathic pain, osteopathic pain, inflammatory pain, fibromyalgia, and irritable bowel syndrome [1]. Estimates show that around a billion people around the world suffer from chronic pain, which is regarded as being the leading cause of disability globally. Chronic pain affects more people than either heart disease or depression, conditions for which governments and funders invest heavily in research and intervention. With the rising costs of healthcare interventions and services, chronic pain represents a significant economic burden to healthcare systems. In the United States, chronic pain is estimated to cost between \$560 and \$635 billion per year, while the total cost in Europe is estimated to be over €300 billion. Since the initial treatment of chronic pain has not been successful for most, new strategies are needed to improve future efforts. One area of interest is the use of technologies, or digital health, to prevent and manage chronic pain [2].

## DEFINITION AND PREVALENCE OF CHRONIC PAIN

Chronic pain is a type of pain that persists for a prolonged duration and is characterized by its origins from various underlying factors. This discomfort may arise from nociceptive pain, which typically stems from tissue injury, or neuropathic pain, which arises due to issues within the somatosensory system. Notably, chronic pain frequently emerges as a secondary complication accompanying other health conditions. Current estimates indicate that a staggering 50 million individuals within the European Union alone endure the effects of chronic pain, highlighting its significant impact on society. The presence of chronic pain imposes a substantial burden on healthcare systems and subsequently leads to a decline in both the overall well-being and quality of life experienced by those affected. Additionally, the intersection of the ongoing pandemic and the constantly increasing aging population further compounds the challenge, particularly within low-resource settings. It is essential to recognize that chronic pain frequently suffers from stigma and marginalization, underscoring the importance of addressing this issue with compassion and understanding [3].

### **CURRENT CHALLENGES IN CHRONIC PAIN MANAGEMENT**

Chronic pain affects 20% of adults globally, posing a significant and widespread health challenge. To address this, understanding the complex nature of chronic pain is crucial. Unfortunately, most patients cannot be cured entirely, leading to dissatisfaction with current pain management techniques. Medication often has adverse effects, adding to their burden. Innovative methods that effectively manage chronic pain and alleviate its burdensome nature are needed. Research is needed to fully comprehend the neuroplastic changes underlying chronic pain, allowing for targeted interventions [4]. Chronic pain patients need more effective healthcare delivery. Chronic pain services play a crucial role in addressing their complex needs. Digital health and telehealth improve care for these patients. Apps and health portals empower patients to manage their condition. Telehealth connects patients with healthcare professionals remotely. Remote health monitoring allows for timely interventions. These tools also improve clinic processes for healthcare professionals. Advancing digital health and telehealth can revolutionize care for chronic pain patients [5].

### **BARRIERS TO EFFECTIVE TREATMENT**

Chronic pain includes various conditions like low back pain, migraine, and abdominal pain, and is among the top 10 most disabling global conditions. It is often difficult to treat, comorbid with other health issues and leads to lifestyle changes and increased healthcare costs. Understanding its development and maintenance is currently lacking. Clinical guidelines recommend a range of treatments, but their effectiveness is limited due to access and adherence barriers. These barriers can be classified as patient, treatment, or health system-related. Patient barriers include perception, knowledge, acceptability, exacerbation, and motivation. Access barriers include financial, logistical, and personal issues, and waiting times impact decision-making. Barriers are more significant in countries with out-of-pocket payment systems. [6].

### **DIGITAL HEALTH TECHNOLOGIES IN CHRONIC PAIN MANAGEMENT**

Chronic pain is a complex and multifaceted condition that significantly impacts patients' quality of life and places a burden on healthcare systems. Multiple disciplines have focused on discovering novel treatments for chronic pain. However, innovative treatment strategies still need to be developed. Chronic pain is often accompanied by psychological symptoms such as anxiety and depression. Psychological therapies such as cognitive behavioral therapy have proven effective in treating the co-morbid psychopathology of chronic pain. This therapy addresses patients' maladaptive beliefs, emotions, and behaviors related to chronic pain. It encourages patients to manage their pain through education, re-evaluating thoughts about pain, and adopting adaptive coping strategies. This therapy can be delivered via conventional face-to-face treatment by trained therapists or through digital health technologies, reducing access barriers and treatment costs [7]. Digital health technologies incorporate emerging technologies into people's health and healthcare systems, potentially improving chronic pain treatment. They provide alternative treatments and increase accessibility, allowing for new ways to treat chronic pain. Machine learning enables personalized treatments, while self-management interventions enhance patients' skills. This review will explore digital health technologies for self-management and monitoring of chronic pain, comparing them to usual care and other interventions. It will also discuss potential moderators of treatment effects and introduce monitoring technologies for early warnings [8].

### **OVERVIEW OF DIGITAL HEALTH TECHNOLOGIES**

Technology has changed how people live, think, and experience the world. These advancements have made a significant impact on healthcare. Digital technology, including ubiquitous computing, mobile technology, and the Internet, has given rise to digital health. This includes new healthcare technologies like services, apps, platforms, devices, and approaches that utilize digital technology to improve health systems and outcomes. Various terms have been used to describe this phenomenon, such as telehealth, mHealth, and mobile health. There is no consensus on a single definition for digital health, but it generally refers to technologies that use electronic and digital means to improve health outcomes, service delivery, research, and education. This can also include capturing the digital body through mobile devices and social networking sites. Digital health technology spans the entire spectrum of health systems, from prevention to treatment and consumer-related health influences [9].

### **EVIDENCE-BASED PRACTICES IN DIGITAL HEALTH FOR CHRONIC PAIN**

Digital health revolutionized healthcare, allowing for patient-managed chronic condition care. Internet-based behavioral health education and support are now accessible to many patients. An Internet intervention for chronic pain management can reduce prevalence, cost, and negative health outcomes. Digital health benefits those with sleep, pain, and substance use disorders. A study on adults with chronic pain explored an online management program's feasibility, acceptability, and effects. The intervention effectively reduced the need for opioids and side effects. Client-centered, evidence-based approaches using

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the Internet are crucial in enhancing chronic pain coping [10]. A randomized trial assessed the effectiveness of an internet-delivered Chronic Pain Self-Management Program. Participants in this program experienced significant improvements in pain interference and depression. The program has the potential to improve chronic pain and related health outcomes in older adults. Internet-based cognitive-behavioral therapies are increasingly popular and effective in helping chronic pain patients manage their condition. This study examined whether a digital health approach could help patients with chronic pain as well as issues related to prescription opioids, including pain, psychosocial difficulties, somatic complaints, and stress. The results suggest that providing online materials with evidence-based content may improve psychosocial and pain outcomes, although to a lesser extent than the internet-delivered program [11].

#### **CLINICAL STUDIES AND RESEARCH FINDINGS**

Various digital health interventions have shown efficacy in chronic pain management. Reviews indicate that mobile health apps delivering acceptance and commitment therapy have a significant effect on pain reduction. Smartphone apps and mobile-based interventions are effective in improving pain levels and quality of life, but more research is needed. Internet-based psychological treatment also shows promise, but the quality of trials is a concern. A mobile app for chronic pain self-management is being developed, collecting data from wearable devices to provide personalized services and prompts. The app aims to identify patterns that predict pain and improve pain management techniques. It recognizes limitations in accessibility and aims to reach diverse populations. The research also aims to provide tools and knowledge for implementing similar approaches in other chronic diseases [12].

#### **FUTURE DIRECTIONS AND OPPORTUNITIES IN DIGITAL HEALTH FOR CHRONIC PAIN**

Recent advances in technology and informatics have created hope for addressing the challenges of managing and treating chronic pain. Improved access to care, ongoing monitoring and feedback, patient engagement and empowerment, and better data for research and quality improvement are some of the potential benefits of using digital tools. This chapter examines the new tools that are being developed, highlights a few promising applications, and concludes with a look forward to opportunities and challenges on this path. For several decades, there has been a growing recognition of a "pain epidemic" in the world. Although overall rates of hospitalization, emergency room visits, and prescriptions have decreased since 2012, this has not been matched by an equivalent decline in deaths, addiction, and other societal harms. With billions of dollars in unmet needs, and up to 50 million Americans suffering from chronic pain from injury, disease, or other causes, there is a massive opportunity for improvement in service delivery. Recent advances in computer science, technology, machines, tools, and devices used to research, design, build, and especially program and control digital, computational, and robotic systems have created hope to address unmet pain care needs. The widespread adoption of mobile phones, voice assistants, and wearable technologies is having a profound impact at work, at home, and socially, and has changed people's expectations for what is possible with technology. Digital health refers to transformative applications of computing and information technology to support health or improve the delivery and management of health services. Digital health tools now include telehealth, patient portals, electronic health records, the cloud, health informatics, mobile health apps, sensor technologies, and conversational agents, like chatbots. This chapter starts by examining various digital health tools that are being developed, including apps, sensors, and machines. Likely desired characteristics of these systems are outlined, and some of the ongoing research and development is highlighted, especially technologies that promote problems using passive smartphone sensors without requiring input from patients. Illustrative digital health technologies are being developed and tested as part of ongoing research, including an app that scans voice recordings for distress [13].

#### **CONCLUSION**

Digital health technologies present a transformative opportunity to improve the management of chronic pain, providing patients with tools for self-management, remote monitoring, and access to evidence-based therapies. As healthcare systems grapple with the rising costs and inefficacies of traditional pain management, digital solutions offer a scalable and patient-centered approach. Emerging innovations like machine learning and mobile health apps show potential for personalized care and better pain management outcomes. The widespread adoption of these technologies could revolutionize chronic pain treatment by enhancing patient empowerment, reducing healthcare costs, and improving overall quality of life. Continued research and development are necessary to fully harness the benefits of digital health and address challenges such as accessibility, adherence, and integration into existing healthcare infrastructures.

#### **REFERENCES**

1. Nieminen LK, Pyysalo LM, Kankaanpää MJ. Prognostic factors for pain chronicity in low back pain: a systematic review. *Pain reports*. 2021 Jan 1;6(1):e919.

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<https://rijournals.com/public-health-and-pharmacy/>

2. Cohen SP, Vase L, Hooten WM. Chronic pain: an update on the burden, best practices, and new advances. *The Lancet*. 2021 May 29;397(10289):2082-97.
3. Guido D, Leonardi M, Mellor-Marsá B, Moneta MV, Sanchez-Niubo A, Tyrovolas S, Giné-Vázquez I, Haro JM, Chatterji S, Bobak M, Ayuso-Mateos JL. Pain rates in general population for the period 1991–2015 and 10-years prediction: results from a multi-continent age-period-cohort analysis. *The journal of headache and pain*. 2020 Dec;21:1-1. [springer.com](https://www.springer.com)
4. Clauw DJ, Häuser W, Cohen SP, Fitzcharles MA. Considering the potential for an increase in chronic pain after the COVID-19 pandemic. *Pain*. 2020 Aug 1;161(8):1694-7.
5. Ahmed Kamal M, Ismail Z, Shehata IM, Djirar S, Talbot NC, Ahmadzadeh S, Shekoohi S, Cornett EM, Fox CJ, Kaye AD. Telemedicine, E-health, and multi-agent systems for chronic pain management. *Clinics and Practice*. 2023 Mar 21;13(2):470-82. [mdpi.com](https://www.mdpi.com)
6. Zajacova A, Grol-Prokopczyk H, Zimmer Z. Pain trends among American adults, 2002–2018: patterns, disparities, and correlates. *Demography*. 2021 Apr 1;58(2):711-38.
7. Solomon DH, Rudin RS. Digital health technologies: opportunities and challenges in rheumatology. *Nature Reviews Rheumatology*. 2020 Sep;16(9):525-35.
8. Mbunge E, Muchemwa B, Batani J. Sensors and healthcare 5.0: transformative shift in virtual care through emerging digital health technologies. *Global Health Journal*. 2021 Dec 1;5(4):169-77.
9. Benis A, Tamburis O, Chronaki C, Moen A. One digital health: a unified framework for future health ecosystems. *Journal of Medical Internet Research*. 2021 Feb 5;23(2):e22189. [jmir.org](https://www.jmir.org)
10. Varsi C, Ledel Solem IK, Eide H, Børøund E, Kristjansdottir OB, Haldal K, Waxenberg LB, Weiss KE, Schreurs KM, Morrison EJ, Stubhaug A. Health care providers' experiences of pain management and attitudes towards digitally supported self-management interventions for chronic pain: a qualitative study. *BMC health services research*. 2021 Dec;21:1-6.
11. Nes LS, Børøund E, Varsi C, Eide H, Waxenberg LB, Weiss KE, Morrison EJ, Støle HS, Kristjansdottir ÓB, Bostrom K, Strand EB. Living well with chronic pain: a 12-month randomized controlled trial revealing impact from the digital pain self-management program EPIO. *Pain Reports*. 2024 Aug 1;9(4):e1174. [lww.com](https://www.lww.com)
12. Hauser-Ulrich S, Künzli H, Meier-Peterhans D, Kowatsch T. A smartphone-based health care chatbot to promote self-management of chronic pain (SELMA): pilot randomized controlled trial. *JMIR mHealth and uHealth*. 2020 Apr 3;8(4):e15806. [jmir.org](https://www.jmir.org)
13. Lo J, Chan L, Flynn S. A systematic review of the incidence, prevalence, costs, and activity and work limitations of amputation, osteoarthritis, rheumatoid arthritis, back pain, multiple sclerosis, spinal cord injury, stroke, and traumatic brain injury in the United States: a 2019 update. *Archives of physical medicine and rehabilitation*. 2021 Jan 1;102(1):115-31.

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