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Medicine and Video Games: Between History and Contemporary Perspectives

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Abstract

This article examines the evolving relationship between medicine and video games, highlighting their applications in therapeutic, educational, and historical contexts. While video games were once regarded solely as entertainment, they have increasingly been integrated into healthcare, offering innovative approaches to rehabilitation, mental health management, and medical training. The use of video games in therapy has demonstrated benefits in neurological and psychological rehabilitation, as well as in professional medical education.

Beyond their practical applications, video games provide a unique lens for exploring historical medical practices. Games set in historical periods can depict medical treatments, prosthetic advancements, and public health challenges, offering interactive insights into the evolution of healthcare systems. Titles that emphasize realism, such as *Kingdom Come: Deliverance*, strive for historical accuracy in their portrayal of medical practices, while others integrate fictionalized yet plausible depictions of medical innovations.

Socially, video games have become a platform for raising awareness about health-related issues, including mental health, addiction, and social behaviors. As gaming communities increasingly engage with these topics, video games emerge as tools for fostering public health awareness and promoting behavioral change.

By merging entertainment, education, and medical application, video games present significant potential to influence both medical practice and public perceptions of health. As the industry evolves, its role in shaping future healthcare, medical training, and societal health consciousness is poised to expand, fostering new intersections between technology and medicine.

Keywords: Videogames and Medicine - Videogames and History of Medicine - Prosthesis - History

Introduction

The relationship between medicine and video game development has been extensively explored in scientific literature, which has expanded exponentially in recent years. In fact, a search in the PUBMED database using the keyword “videogames” on December 27, 2024, returned 1,413 citations, with 1,377 of these published between 2012 and 2024. Scientific evidence strongly supports the therapeutic applications of video games across various medical fields. For instance, they have been employed in neurological rehabilitation for patients recovering from acute vascular or traumatic events^{1,2,3} and in managing neurodegenerative diseases such as multiple sclerosis^{4,5}.

In the psychological and psychiatric domains, video games have demonstrated efficacy both in understanding psychological mechanisms and in practical applications for prevention and well-being enhancement^{6,7}. Furthermore, they have been integrated into psychotherapy^{8,9}, particularly when administered by experienced psychotherapists.

Beyond therapy, research has examined different video game categories, available technologies, and their application for specific patient groups, such as hospitalized pediatric patients^{1,10}. In medical education, video games have been analyzed for training healthcare professionals at various levels of expertise and specialization^{11,12}, demonstrating potential benefits in decision-making, motivation, repeated exposure, logistics, and cost efficiency.

Studies have also examined the physiological and psychological effects of video gaming. For instance, energy expenditure has been evaluated in active video games utilizing *Microsoft Kinect*TM compared to sedentary games such as *FIFA 14* or *Call of Duty*¹³. Psychological aspects, including passion and its correlation with both performance and addictive behaviors, have also been explored^{14,15}.

Analyzing the evolving relationship between medicine and video games reveals several key trends. At the turn of the 21st century, research on video game classification was closely linked to concerns about violent content and its potential impact¹⁶. However, subsequent studies have largely failed to establish a direct correlation between video games and violent behavior¹⁷, though some statistically insignificant associations were hypothesized¹⁸.

The discussion remains relevant, and the gaming community continues to debate both the risks and benefits of video games, drawing parallels with past controversies in cinematic representation¹⁹. A notable example is Stanley Kubrick's *A Clockwork Orange*, which sparked intense debate upon its release due to its violent content. Over half a century later, the film has been firmly established in cinematic history, largely dispelling the original controversies.

Beyond the debate on violence, video games have also been employed in violence prevention initiatives, such as combating cyberbullying²⁰. Griffiths²¹ critiqued the limitations of categorizing video games solely based on content, particularly in light of increasing globalization²². Indeed, the rise of the internet and new digital media has significantly transformed the gaming landscape, bringing online gaming to the forefront. Over time, technological advancements and improved infrastructure have facilitated the transition from single-player to multiplayer gaming. This shift is not merely technological but also social, as video games increasingly serve as platforms for community-building and collective engagement²³.

The intricate relationship between medicine and video game production continues to evolve, presenting new challenges for the medical field²⁴.

Video Game Content and Medicine

While the scientific literature on the medical applications of video games is well-established, content analysis of video games from a medical perspective is still developing. A particular subset of video games, known as “Games for Health” (G4H), falls under the broader category of “Serious Games”. These games integrate educational and therapeutic elements and raise questions regarding the role of narrative in relation to gameplay.

Of course, video games must be *played*, and the ludic component cannot be limited. Although gameplay is essential, not all video games rely on storytelling. Titles such as *Tetris* or *Bejeweled* lack narratives, as do many sports games. It is also important to recognize the variability in player characteristics, which is further enhanced by the ability to choose from different types of video games—for example, between story-driven games and fully multiplayer experiences. The debate over the significance of storytelling in *G4H* continues, with some scholars questioning its precise role²⁵. Nevertheless, the immersive potential of narratives is widely recognized²⁶, with increasing interest and demand for greater immersion among players²⁷.

From a content analysis perspective, research on the representation of health and medicine in video games remains scarce. A notable, albeit not recent, study by Brooksby²⁸ analyzed the depiction of health in widely played video games available on Microsoft *Xbox* from a selection of products put on the market around 2004-2005 (i.e., *Fable*, *Far Cry Instincts*, *Grand Theft Auto: San Andreas*, *Half-Life 2*, *Jade Empire*, *Prince*

of *Persia*, *Red Dead Revolver*, *The Sims 2*, *Star Wars: Republic Commando*, *X-Men Legends 2*). Some of these titles are considered to be of great significance in the evolution of video games²⁹.

The study categorized health representations into five domains: mobility, ability, psychology, social, and pain. Depending on the categories, the character's health status was evaluated through different modalities: a decreasing numerical value, decreasing indicator bars, appearance of red spots or flashes on the screen, sound expressions of pain, and inability to carry out specific actions.

Pain was the most frequently represented category, appearing in 72 out of 99 instances. Some games incorporated multiple health categories, such as *Jade Empire* (mobility, ability, pain) and *The Sims 2* (mobility, psychology, social, pain). In the latter, which simulates real life, the presence of the psychology and social categories was indispensable. Yet, nothing was reported regarding potential treatment methods available to the player character for recovering health, highlighting an area for further investigation. In fact, beyond the importance of Brooksby's work, the analysis of the presence of medicine and health in video games merits further consideration.

Advances in hardware and software now allow for more realistic depictions of physical injuries and medical treatments, as seen in the *Far Cry* series, which includes cauterization of superficial wounds and bullet extraction with special pliers.

Cyberpunk 2077 (2020) represents a milestone in integrating medical and surgical realism into a futuristic setting, particularly regarding cybernetic prosthetics. The game's pre-release discussions already highlighted these aspects³⁰. Of particular interest is the theme of bodily integration of robotic parts: we will see how the depiction of prosthetics in video games can also be examined through the lens of history of medicine.

Video Games and the History of Medicine

The intersection of video games and medicine remains an underexplored field in the history of medicine. Research in this perspective is rare, though previous study has recognized the potential of video games as educational tools for the history of medicine³¹. A recent example of the educational application of video games is *Jacopa da Cencelle in viaggio nella città medievale* (accessible at <https://jacopadacencelle.it>). Developed by Sapienza University of Rome in collaboration with the Philmark Group, this project includes both a web platform and a video game designed to illustrate the life of a fictional character, "Jacopa", inspired by a real skeleton from the medieval archaeological site of Cencelle (Italy). The web platform provides an overview of the project, detailing the scientific analyses of the site and skeletal remains, while the video game serves as both an educational tool and an engaging experience. It introduces players to the insights that archaeological and bioarchaeological research can offer about life as a woman in the Middle Ages. The project is the result of an interdisciplinary collabo-

ration among archaeologists, historians of medicine, bioarchaeologists, geneticists, engineers, computer scientists, museum specialists, and communication experts, aiming to provide an accessible and innovative means of disseminating scientific knowledge. Players can navigate the reconstructed medieval city of Cencelle as Jacopa, discovering artifacts and clues about daily life, activities, health, and diet in medieval Italy. This example shows us a powerful aspect of museology³².

Video games can be analyzed from a historical-medical perspective in two broad categories. First, games that strive for historical accuracy in depicting a specific era or series of events, even if narrative elements may deviate from historical facts for storytelling purposes. And second, games not primarily focused on historical reconstruction but containing contextual elements that reflect historical realities.

For the first category, regarding historically accurate games, medical historians may intervene in two aspects, as consultants during game development or as critics, once the game is available, evaluating historical fidelity. This role mirrors historical consultancy in film and television production and critics. Conversely, for the second category, the inherent nature of video games leads to a dualism between historical verisimilitude and accuracy. Even when the emphasis is on historical verisimilitude rather than strict accuracy, it is possible to assess whether medical aspects are realistically and correctly portrayed, historically compatible, and sufficiently contextualized.

Kingdom Come: Deliverance (2018) exemplifies the first category of historical fidelity, depicting early 15th-century Bohemia with a strong commitment to realism³³. The game was released in February 2018 and its sequel, *Kingdom Come: Deliverance II*, in February 2025. Both the original title and the sequel were analyzed for the purpose of this study.

In certain video games, historical accuracy is a fundamental feature actively pursued by developers, albeit with some necessary narrative adjustments. One such example is *Kingdom Come: Deliverance*, which meticulously reconstructs early 15th-century Bohemia, specifically during the period of succession wars and the Hussite Wars³³.

The representation of medicine and health in the game can be examined from multiple perspectives. Given the game's focus on battles and combat, trauma and injuries caused by bladed weapons are depicted with considerable accuracy, including the gradation of their effects. Similarly, the use of bandages as a therapeutic measure is appropriately represented. However, the depiction of medical treatment presents some challenges. While the game correctly integrates herbal medicine (phytotherapy), it also incorporates an alchemical dimension, blending historical medical practices with mystical elements. This choice can be considered appropriate within the broader anthropological context, where popular beliefs and magical traditions played a role in medieval medical practices.

In the game, the protagonist can learn to prepare and use therapeutic potions by interacting with villagers and consulting specific *formularies*. Another well-executed

aspect of medical representation is nutrition and its impact on the character's health. The game accounts for both the adverse effects of consuming spoiled food and the consequences of overeating.

Historical fidelity is also maintained in the depiction of recovery times. Unlike many other video games where healing is instantaneous, *Kingdom Come: Deliverance* extends the duration of the healing process, emphasizing a more realistic approach. Moreover, an implicit educational message is conveyed: maintaining a balanced diet for at least five days grants in-game bonuses, reinforcing the importance of proper nutrition.

While the representation of medical and surgical practices could be further refined, the game's commitment to historical medical accuracy is commendable.

Battlefield V (2018) presents a less obvious but still relevant case for historical-medical analysis. Released in November 2018, the storyline takes place during the Second World War. The game features a female soldier wielding a rifle with a hook-like forearm prosthesis. This depiction sparked considerable debate regarding historical accuracy³⁴.

The depiction of prosthetics in a video game set during World War II is a novel subject that extends beyond mere aesthetic considerations. While the inclusion of such elements may serve to enhance the thematic depth of war narratives through innovative portrayals, it also warrants a thorough historical-medical analysis.

As previously discussed, there is a crucial distinction between historical accuracy and verisimilitude. Since this game operates within the latter framework, it is necessary to evaluate whether the inclusion of prosthetics is historically plausible and whether their representation is both accurate and contextually appropriate.

Before addressing these questions, it is helpful to examine the historical evolution of prosthetics^{35,36}. While prosthetic devices have existed for centuries—primarily in static forms—their technological development accelerated during the late 19th century, particularly following the African colonial wars³⁷. A key figure in this advancement was the Italian physician Giuliano Vanghetti (1861-1940), who conceptualized and developed mechanical prosthetics known as cinematic prostheses, which allowed voluntary movement by the user.

The practical application of these ideas became evident during World War I³⁸, and several surgeons further advanced Vanghetti's innovations. Among them, Augusto Pellegrini (1877-1958) played a significant role³⁹. Pellegrini demonstrated surgical expertise early in his career, particularly in identifying traumatic ossification of the tibial collateral ligament of the knee joint using radiographic techniques^{40,41}. Pellegrini later directed the hospital in Chiari (BS)⁴² and, during World War I, established a specialized unit for cinematic prosthetics, collaborating with Vanghetti^{43,44,45,46,47}. Following the war, Vanghetti and Pellegrini's ideas gained international traction, notably through the work of Argentine surgeon Guillermo Bosch-Arana (1889-1939)^{48,49}.

With this historical context, the representation of prosthetics in the video game may be critically assessed. The most striking feature of the depicted prosthetic is its hook-shaped terminal device. Similar designs are well-documented in post-World War II U.S. military surgical literature⁵⁰, confirming their existence during the wartime period. Additionally, the use of hook prostheses remained prevalent throughout the subsequent decade⁵¹. The work of Burnham, in particular, was visually documented by the renowned medical illustrator Frank Netter (1906-1991)^{52,53}, further validating their historical accuracy.

Another noteworthy aspect of the video game's prosthetic depiction is the shoulder attachment mechanism, which includes straps and tubing-like structures. Although there may be minor artistic liberties in its rendering, similar shoulder-mounted prosthetic designs—featuring plates and tensioning elements—were documented as early as the post-World War I era by Pellegrini^{54,55}. This suggests that the video game's representation aligns with historically plausible prosthetic designs of the time. Thus, despite initial skepticism, *Battlefield V* presents a historically plausible prosthetic design.

Conclusion

The intersection of medicine and video games presents a rich and evolving field with significant educational and therapeutic potential. The integration of video games into medical practice and historical learning is not only a testament to technological advancement but also highlights the expanding role of interdisciplinary collaboration. As the examples discussed in this article demonstrate, video games—particularly those designed as “serious games” or “Games for Health”—have already proven effective in a variety of medical applications, from rehabilitation to medical training, and offer considerable promise in shaping the future of healthcare.

However, it is crucial to further explore the profound potential of video games in medical education, especially within the context of historical medicine. Video games can be more than just an entertainment medium; they can serve as powerful tools for engaging students and practitioners in understanding complex medical histories and historical healthcare practices. The inclusion of historically accurate representations, such as in *Kingdom Come: Deliverance* or *Battlefield V*, and projects like *Jacopa da Cencelle* demonstrate how video games can bring history to life and foster a deeper understanding of both past and present medical knowledge. The narrative and immersive qualities of these games make them particularly suited for exploring the evolution of medical practices, providing users with opportunities to interact with historical contexts in ways that traditional methods cannot.

Looking ahead, the role of augmented reality (AR) and virtual reality (VR) in medical video games should not be overlooked. These technologies hold great promise for simulating medical scenarios and offering hands-on experiences that go beyond what

can be achieved through traditional educational tools. As AR and VR technologies mature, they will likely become integral components in both medical and historical education, enriching the user experience and facilitating a deeper understanding of medical concepts through interactive engagement.

To maximize the potential of video games in these fields, it is essential to continue fostering collaboration between game developers and medical historians. These partnerships will be crucial for ensuring the accuracy and educational value of medical and historical content in video games. In addition, future research should explore the long-term impact of using video games for medical training and historical education, as well as investigate new ways to further integrate interdisciplinary learning into the gaming experience.

Ultimately, video games offer a novel and dynamic approach to education, one that could reshape the way we understand, teach, and interact with medicine and its history⁵⁶. As we continue to explore this intersection, the potential for video games to become a cornerstone in the development of new, interdisciplinary competencies in both healthcare and historical scholarship is vast and exciting.

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