



PATIENT RETENTION

THE GAMIFIED CLINICAL TRIAL





GAMIFICATION IS A NEW PARADIGM FOR PATIENT ENGAGEMENT

Keeping patients engaged in clinical trials is a major challenge for research

Gamification – the application of game-design elements to non-game situations – has successfully been used to promote task adherence and increase engagement across a diverse range of contexts, including consumer marketing and mobile health. However, there has been limited discussion of its application to clinical trials.

The life sciences industry urgently needs new solutions to increase patient engagement and reduce attrition in clinical research. Just like stakeholders and consumers in other industries, trial participants are tired of being seen as anonymous data points. They demand personalized engagement and a meaningful sense of involvement in the medical research process.

This article explores a new paradigm for patient engagement in clinical research – *the gamified clinical trial*.

The theoretical foundation of gamification

The brain has innate reward feedback pathways, based on neurotransmitters like dopamine, that underlie the formation of habits. Dopamine is released in response to stimuli like food or sex, and is often described in popular culture as a “pleasure molecule”.

Neuroscientists hypothesize that the level of dopamine signaling plays a central role in reward-based learning. When an action results in a reward, it stimulates dopamine signaling and reinforces the repetition of that behavior in the future. When an action fails to result in a reward, it blocks dopamine signaling and suppresses the repetition of that behavior¹.

In this way, reward-based learning can generate automatic patterns of behavior, or habits. This can result in productive outcomes like learning how to catch a ball, as well as pathologies like addiction.

Playing video games has been shown to stimulate dopamine neurons, and games have a powerful ability to capture human attention and generate new patterns of behavior². Games trigger our instinctive reward-learning pathways through particular design elements, for example:

- Points and leaderboards act as virtual rewards, giving players quantifiable feedback for the consequences of their actions.
- Having new “levels” – hidden content that can only be accessed by completing previous challenges – generates unpredictability and discoverability.
- Finally, but perhaps most importantly, making game progression dependent on player decisions creates a sense of meaningful involvement.

Traditional paradigms for encouraging task adherence in health target reflective decision-making processes in the brain – e.g. brochures and counseling appeal to our sense of reason to persuade us to change our behavior. However, the success of these approaches has been limited.

Gamification operates within a newer paradigm, analogous to behavioral economics, that targets automatic decision-making instead. As most day-to-day human actions are habitual rather than reflective, there is a strong theoretical foundation for applying these concepts to the problem of patient retention in clinical trials.³

Gamification in marketing

There are now countless success stories in the application of gamification to consumer marketing and other forms of stakeholder engagement.

In 2014, the gaming company Glu teamed up with lifestyle celebrity Kim Kardashian West to develop a mobile role-playing game called *Kim Kardashian: Hollywood*, where players create a virtual avatar trying to rise to stardom with help from Kim. The app integrates fashion, gaming and celebrity culture to promote Kim Kardashian West's brand and increase engagement with fans. By 2015, the game had 22.8 million downloads and more than \$150 million in revenue, with users spending an average of 26 minutes on the app every day⁴.

In a more serious area, the US Army developed a first-person shooter game called *America's Army* to recruit new soldiers. It has rapidly become their most effective marketing tool since its release in 2002. Using TV advertising, the US Army would have to pay \$5 to \$8 per person, but with *America's Army* they only have to pay 10 cents per person. Three years after it was launched, 1 in 3 newly recruited

soldiers had played *America's Army*⁵.

A particularly successful implementation of consumer gamification at the intersection of health and brand awareness is Nike+, which uses wearable activity trackers and social media to reward running and exercise with “Nike Fuel Points”. By 2014, more than 28 million people were using Nike+ to track their fitness, providing a digital ecosystem of users that constantly engaged with the Nike brand in their daily life.

Gamification in health

There has been an explosion of interest in the application of gamification to health, particularly to promote adherence to demanding treatments and lifestyle changes.

Behavioral adherence and self-management

A notable example is the smartphone app *SuperBetter*, designed to increase psychological resilience in the face of challenging obstacles. *SuperBetter* converts real-life goals (e.g. daily targets for exercise) into a gamified, digital narrative revolving around “battling bad guys” and “completing quests”. A randomized, controlled study conducted with the University of Pennsylvania found that playing *SuperBetter* for 30 days reduces symptoms of anxiety and depression, and increases belief in the ability to achieve goals⁶.

Gamified health applications are being used in a wide range of therapeutic areas, including self-management of diabetes and asthma, chronic pain management, physical therapy for stroke recovery and promoting healthy lifestyle choices. Game-design elements are also being used for neuropsychiatric issues – e.g. inhibiting cognitive decline in the elderly, treating dyslexia, reducing post-traumatic flashbacks and increasing attention span in cognitively impaired children⁷.

Among rheumatoid arthritis patients, a web-based intervention that employs gamification elements like points and leaderboards was found to increase physical activity and encourage healthcare utilization more effectively than other media in a randomized, controlled trial⁸.



GAMIFICATION IS ALREADY TRANSFORMING HEALTH

Medication adherence

Game-design elements have been deployed to promote medication adherence, an issue of particular importance to clinical trials. The website ONESELF was set up to help patients self-manage chronic back pain by providing health information. In 2014, the addition of interactive game-design elements such as a “Virtual Gym”, weekly “Action Plan” and “Quiz Game” was evaluated in a randomized, controlled trial. The addition of gamification significantly improved patient empowerment and reduced medication misuse compared to the old website design⁹.

MoviPill – an app that uses gamification elements such as points and competition to encourage timely self-medication – was found to increase both medication compliance and accuracy of intake time in a pilot study among elderly people¹⁰. And recently American pharmacy giant Walgreens has teamed up with HealthPrize Technologies to promote medication adherence through software solutions that include gamification components.

Despite the perception that game-design elements appeal primarily to younger people, many studies have shown that they can be equally effective among older people. A systematic review of games designed specifically to promote exercise among the elderly found that they lead to improved

quality of life in this population¹¹. Furthermore, a meta-analysis of 54 trials of health games found that they were appealing independently of age or gender¹².

Gamifying clinical trial participation

There is a strong body of evidence to support the effectiveness of gamification in promoting adherence and engagement across a wide range of demographic groups and therapy areas. The time is ripe to extend these concepts to clinical trial participants.

- *Using levels and virtual rewards to gamify trial progress*

Trial participation can often be tedious and repetitive, leading many patients to drop out before completion. Gamification could be used to reduce these feelings of boredom by turning participation into a game-like challenge, creating a sense of narrative progress similar to games like *Super-Better*.

- *Gamifying protocol adherence*

Non-adherence to increasingly complex protocols is a significant source of attrition in clinical research. As discussed above, gamification has already been shown to effectively promote behavioral compliance in disease self-management. Similar design paradigms, optimized for clinical research, could significantly reduce attrition during drug development.

- *Gamifying health literacy*

Properly educating patients about medical science and complex research protocols is a major challenge in the medical research process, and can be a serious ethical issue in trials targeting low-literacy populations. Gamification can play a productive role in this area of clinical research – quiz games can perform automated “teach-back”, a widely used method for ensuring medical comprehension during ethical consent, and reduce the need for direct evaluation by trained nurses¹³.





Conclusion

Gamification is already having a major impact on promoting behavioral adherence in health. Applying these design principles to interfaces for clinical trial participation is a logical next step. In many ways, the process of clinical trial participation already has the features of a game-like challenge – a set of tasks with defined rules and endpoints, with a powerful underlying narrative about improving human health.

By using technology and interaction design to create a more human narrative form around trial participation, gamification has the potential to significantly improve patient engagement in clinical research. Alongside other digital solutions, gamification could help bring about a more patient-centered model for drug development, ultimately benefitting all stakeholders in the life sciences industry.

Citations

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CUSTOMER TESTIMONIALS



Using Trialbee's solution we have been able to reduce our workload in finding patients and matching them to clinical trials. We saved several hours of work per patient. Trialbee's pre-screening of patients is efficient and the direct



We have indeed had a great experience with Trialbee, too good in fact, which is why we'd like to stop today. The sites have a backlog of patients that they can't process fast enough.



ABOUT US

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We partner with pharmaceutical companies and CROs to digitally connect and engage stakeholders across the clinical study chain.

Our aim is to help save lives by accelerating medical research and provide innovative solutions to healthcare challenges.



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