



**WHITEPAPER:**  
Patient Engagement

## **Three Ways to Gamify Clinical Trials and Benefit Patient Retention and Recruitment**

Keeping Patients Engaged  
In Clinical Trials Is a Major  
Challenge For Research

 trialbee

# 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 and benefits to clinical trials.

**Gamification – the application of game-design elements to non-game situations**

Keeping patients engaged in clinical trials is a major challenge in research. Lengthy clinical trials with slow-moving signs of condition improvement often lead to frustrated patients, causing non-adherence and early drop-outs. Attrition rates can get as high as 30% for late-phase trials, ultimately leading to difficulties in obtaining reliable and valid study results.

Trial participants demand personalized engagement and a meaningful sense of involvement in the medical research process. As such, the life sciences industry urgently needs novel solutions to increase patient engagement and reduce attrition in clinical research.

In this white paper, we explore the foundation of reward-based learning, and review three ways in which gamification can increase engagement, adherence and retention in clinical trials.

## The Theoretical Foundation of Gamification

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. In this way, reward-based learning can generate automatic patterns of behavior, or habits, resulting in productive outcomes.

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 behavior.<sup>1</sup> 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
- Making game progression dependent on player decisions creates a sense of meaningful involvement

## Gamification In Health

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 children.<sup>2</sup>

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 trial.<sup>3</sup>

A particularly high-profile clinical trial investigated the effect of gamification on promoting physical activity among adults enrolled in the Framingham Heart Study. The results were published in *JAMA Internal Medicine* on November 2017, and demonstrate that gamification can significantly increase physical activity in this population.<sup>4</sup>

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 design.<sup>5</sup>

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 led to improved quality of life in this population.<sup>6</sup> Furthermore, a meta-analysis of 54 trials of health games found that they were appealing independently of age or gender.<sup>7</sup> Finally, Roche’s high-profile acquisition of gamified diabetes management app mySugr in 2017 indicates that Big Pharma sees gamification as a core component of digital health.

## 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. Extending these concepts to clinical trial participants by applying design elements traditionally used in games can evoke a mental state that keeps the patient engaged in the entire clinical trial process.

- **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.

- **Gamifying protocol adherence**

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

### Three Ways to Gamify Clinical Trials:

1. Using Levels and virtual rewards to gamify trial progress
2. Gamifying Protocol Adherence
3. Gamifying Health Literacy

- **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 nurses.<sup>8</sup>

## Conclusion

Gamification is already having a major impact on promoting behavioral adherence in consumer health applications. 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.

For more information or to schedule a demo, email us at [solutions@trialbee.com](mailto:solutions@trialbee.com) or visit us at [trialbee.com](http://trialbee.com).

## Citations

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