



Gamifying medication adherence: retrospective analysis of a mobile application utilising gamification and incentives to improve adherence

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INTRODUCTION

Though many strategies to improve medication adherence have found to be effective¹, the impact of these interventions have failed to take hold in the real world and decrease over time.² Even when patients are aware of the risks and consequences of diseases, few engage persistently in interventions to improve health outcomes.³⁻⁵ Cognitive biases resulting in irrational and unhealthy behaviour may be a key contributor to patient engagement in medication adherence strategies. Incentive-based gamification allows a method to combat cognitive biases and improve patient engagement with internal motivation created through external incentives.⁶ With games and mobile apps already a part of everyday life, interventions to improve health behaviours such as medication adherence can be conveniently implemented.⁷

AIM

The objective of this study was to analyse the impact of an already implemented mobile app utilising multiple components including gamification, incentives, reminders, education, and a social-community on medication adherence rates in adults with any condition.

METHODS

Retrospective observational study. Implementation adherence of users using a mobile app, Perx, was evaluated. Available in Australia, Perx uses multiple components to improve medication adherence including:

- medication dosage reminders,
- a gamification-based points system,
- education delivered through “fun facts,”
- incentive vouchers based on points earned or randomly with a correct dose,
- a social-community through a leader board and chat forum.

Users from the Perx database were identified between October 2018 and May 2019. Users were included in the analysis if they used the Perx app for a 6 month time period and if they appeared to use the intervention for 30% or more of the time period defined by the number of days active on the app. Doses were recorded by Mobile Direct Observation of Therapy (mDOT) with a timestamp. Adherence implementation rates were calculated using doses taken over total doses scheduled per 30-day period. A timing adherence sub-analysis was assessed with doses taken at the correct time (+/- one hour) over total doses scheduled per 30-day period. Users were excluded from the timing adherence sub-analysis if timestamps were not available for the entire time period.

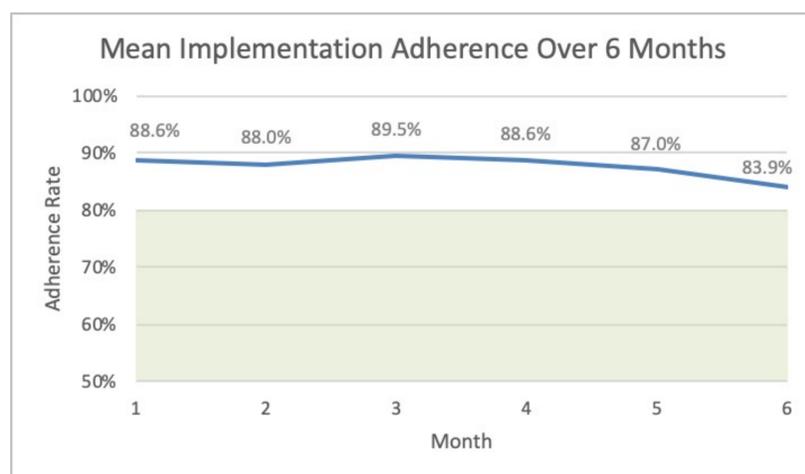
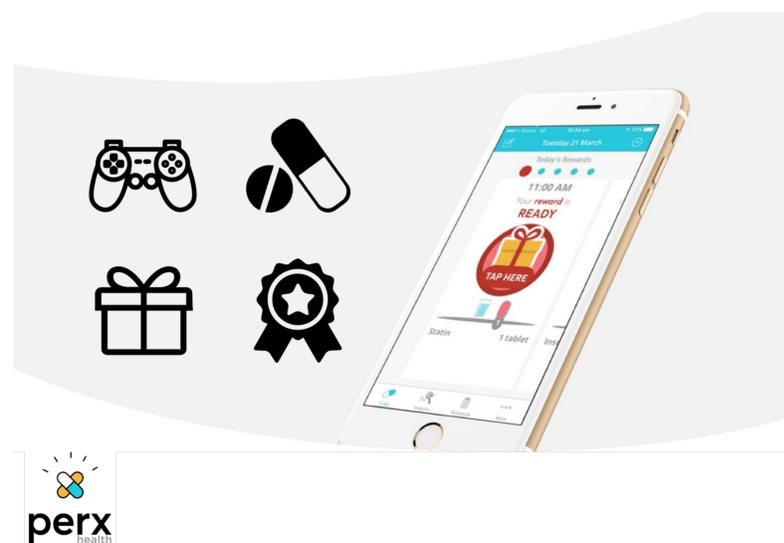


Figure 1. Mean implementation adherence rates of the included 130 users displayed across six months. Adherence was presented as a percentage out of 100. Shaded area below 80% indicates less than optimal adherence based on the literature.

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RESULTS

- The database contained de-identified data of 2,969 users using the Perx app in Australia.
- A total of 130 users met the inclusion criteria and were included in the 6-month analysis from October 2018 to May 2019.
- The distribution of users according to gender was 27.7% male (n=36) and 67.7% female (n=88) (the rest undisclosed). Average age was 45.8 years (SD: 17.2). The most common medications prescribed were rosuvastatin, cholecalciferol (vitamin D3) and atorvastatin with the mean number of medications per patient being 4.3 (SD: 3.1).
- Total adherence across the 6-month time period averaged at 87.6% (SD 16.9%). A small decreasing trend was seen from Month 4 (89.5%) to Month 6 (83.9%) (P=.06). (Figure 1)
- For the timing adherence sub-analysis, 111 of the 130 users had dosing timestamp data available and were included in the 6-month analysis.
- Adherence averaged 68.5% (SD 29.1) for the timing adherence sub-analysis. A small decreasing trend was seen from Month 1 (68.4%) to Month 6 (64.3%) (P=.08).

CONCLUSIONS

Retrospective analysis of a mobile app integrating gamification, education, reminders, social-community and incentive-based components demonstrated an effective intervention to improve medication adherence. Extrinsic monetary motivators, such as shopping vouchers, combined with fundamental gamification techniques such as a points-based system may be a key contributor to promote intrinsic motivation and habit-based behaviour that can incite long-term health behaviour change. Future research should evaluate the long-term impact of gamification and incentive-based interventions on medication adherence and clinical outcomes in addition to looking at users' and stakeholders' perceptions of these interventions.

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