

A Family Wellness App: Motivating Children to Manage Wellness of Adults

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ABSTRACT

The pandemic of lifestyle-related chronic diseases has led to an advent of personal health informatics, with the goal of persuading individuals to adopt healthful lifestyles. Such systems implement various motivational affordances to promote ongoing use. Design of such systems focuses in engaging only the beneficiary of information derived from those systems. In this study we explored how one can use gamification to motivate ongoing usage of such systems in the context of intermediated technology use. We studied the effect of gamification in motivating young family members in assisting adults who might be less conversant or intimidated with such a technology. We compared two designs of a mobile wellness application of which one prototype was gamified and the other one was not gamified. Our findings suggest that virtual rewards can enhance usage of such systems through intermediary users. We highlight some of the design implications in order to foster perceived enjoyment in using such a system.

CCS Concepts

•General and reference → General conference proceedings; •Human-centered computing → *Empirical studies in HCI*; •Social and professional topics → User characteristics;

Keywords

HCI4D, intermediated interactions, persuasive technologies, gamification, personal informatics, motivational affordances, health

1. INTRODUCTION

Lifestyle-related diseases are now attracting many players seeking to design low cost and tailored information and communications technology (ICT)- based systems for supporting lifestyle change and disease management[2] with most recent

development focusing in persuasive technologies. A systematic review of 95 studies on persuasive technologies found out that persuasive systems have the capability to persuade because their design include implementation of persuasion stimuli [9].

Persuasive systems include personal informatics which can be used for persuasion of health behaviours. Personal informatics systems are interactive applications that support users to become self-aware of patterns in the behaviours, by providing means to collect personal history, as well as tools for its review or analysis [12, 14]. Persuasion stimuli in a personal informatics rely on their ability to support reflective learning/self-reflection [13]. Reflective learning entails reviewing of collected personal data to learn about oneself and the user always alternates between two phases known as discovery of a behaviour pattern and maintenance of a better behaviour[13]. These phases are usually supported through feedback mechanisms such as bar charts or other affective mechanisms such as gardens that represent steps walked (i.e Ubifit[11]) or Fish growing or shrinking depending to an increase or decrease in the number of steps walked (i.e Fish'nSteps [15]). The aforementioned techniques can further be supplemented with social comparison[18] or competitions with others [5] in some systems.

However utilization of such systems may be constrained to specific demographics such as young or experienced users of technology. For instance , one study evaluated two of the popular fitness apps, Nike+ and RunKeeper, concluded that the two apps are not ready to accommodate older adults needs [1]. In addition, in developing countries there are scenarios of intermediated technology use for users who are inexperienced or intimidated by technology and many of the existing apps are designed to accommodate direct users of technology only [23]. Therefore, in personal health informatics, features that foster ongoing use are targeted towards beneficiaries of the information processed by the app. But in the context of intermediated technology there is an intermediary user who is there to facilitate access of information to beneficiary users hence that facilitation needs to also be motivated to support ongoing use of a personal health informatics.

In our work, we replicate the idea of intermediated technology use into personal health informatics as we believe that it can support users who are less conversant in technology. Instead of just involving an adult beneficiary user in interacting with a personal health informatics, we bring young family members to become part of the interaction

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process and apply gamification to foster ongoing use. One study found out that perceived interest to use gamification decreases with age and this implies that such a gamified system might be more effective if utilized through younger populations[3].

In this study we report on the outcome of using gamification and how different it is in comparison to involving intermediaries without gamification. We also propose approaches that can enhance the impact of gamification in the context of personal health informatics used through intermediary users.

2. RELATED WORK

Zhang et al.[25] suggested a list of motivational affordances that could be implemented in a system in order to foster its usage such as: (1) the system should afford self-identity and autonomy;(2) the system should support provision of challenges/competitions; (3)the system should allow users to relate to each other; etc. The aforementioned motivational affordances must be fulfilled in order to support the three basic psychological needs that are suggested by self-determination theory (SDT) and these are: (1) the need for autonomy; (2)the need for challenges/competitions that are developmentally appropriate; (3) the need to belong to a group [7]. Individuals engage in activities to satisfy the aforementioned psychological needs [8]. The support for the three needs is important for a person to feel intrinsically motivated to perform a certain task.

Personal health informatics have been designed with specific motivational affordances to facilitate the ability of user to understand themselves through their collected personal data and continue to be motivated to engage with their collected personal data with the goal of changing their lifestyles or behaviours. For instance a personal informatics with just a self-monitoring feature can satisfy the need for challenges as users set goal and challenge themselves to attain that goal. Literature in public health also recognizes goal setting as an important part towards change in health behaviours [24]. Other motivation affordances that support competitions and relatedness with others can be implemented to support the process of self-monitoring. But these motivational affordances are usually implemented to motivate a beneficiary user alone hence it is challenging to motivate ongoing use in the context where a beneficiary user has to rely on an intermediary user to interact with his/her personal data. The phenomenon of young people providing support to adults on technological related problems is quite prevalent in both HCI and ICTD literature. Studies have explored factors influencing help-seeking and giving behaviours and have pointed out factors such group orientations towards tasks unfamiliarity with technology, social rapport,reciprocal benefits, the sense of being accountable and many others to play a significant role in mediating help-seeking and help giving behaviors in various contexts.[23, 20, 10, 19]. However the aforementioned literature in intermediated technology use is limited to general use technology and it has not focused on specialized technology such as personal health informatics which has received a lot of attention within HCI community. In our work, we designed a system that allows an intermediary user and a beneficiary user to work together to sustain ongoing use of the system.

In order to engage the two sets of users with the system and foster its ongoing use, we implemented game design el-

ements. The two user worked as a pair to form a team of where any virtual rewards are specifically awarded to a team and not an individual user. Gamification is an idyllic that is used in engaging users with personal informatics or persuasive technology targeting health behaviour change because of its ability to trigger intrinsic experiences. Gamification borrows game design mechanics such as points, leader-boards, badges, etc in non-game contexts. It brings together the motivation pull from video games. The motivation pull behind video games is due to its support for the three construct of self-determination theory [21]. Gamification has been found to have a potential to address motivational mechanisms and thereby fosters motivation [22]. The aforementioned psychological needs can be supported with game design elements. The use of gamification has been studied in tasks such as image annotation[17, 16],crowd reporting[6], data collection [4] etc. and not in intermediated information tasks. The intermediated information task is different from the other tasks as there may be two users collaborating to engage with a user interface with the goal of one user assisting another user with his/her information needs. For the case of personal informatics, motivational affordances need to motivate the two users to work together in engaging with the system. Perceived interest/enjoyment in gamification tends to diminish with increasing in age [3] and this suggests that young people are the perfect choice for intermediaries. We limited selection of intermediary users to family members because in our previous study we observed that familial relationships were the key to the success of such an intervention. Our main research question attempts to understand the effectiveness of gamification in facilitating usage through intermediary users.

3. METHODS

4. FINDINGS

5. DISCUSSION

6. CONCLUSIONS

7. ACKNOWLEDGMENTS

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8. REFERENCES

- [1] Smartphones, smart seniors, but not-so-smart apps: A heuristic evaluation of fitness apps.
- [2] E. Årsand, N. Tatara, G. Hartvigsen, et al. Mobile phone-based self-management tools for type 2 diabetes: the few touch application. *Journal of diabetes science and technology*, 4(2):328–336, March 2010.
- [3] J. V. Bittner and J. Shipper. Motivational effects and age differences of gamification in product advertising. *Journal of consumer marketing*, 31(5):391–400, August 2014.
- [4] J. Cechanowicz, C. Gutwin, B. Brownell, and L. Goodfellow. Effects of gamification on participation and data quality in a real-world market research domain. In *Proceedings of the First International*

Conference on Gameful Design, Research, and Applications, pages 58–65. ACM, 2013.

- [5] R. Comber and A. Thieme. Designing beyond habit: opening space for improved recycling and food waste behaviors through processes of persuasion, social influence and aversive affect.
- [6] D. N. Crowley, J. G. Breslin, P. Corcoran, and K. Young. Gamification of citizen sensing through mobile social reporting. In *Games Innovation Conference (IGIC), 2012 IEEE International*, pages 1–5. IEEE, 2012.
- [7] E. L. Deci and R. M. Ryan. *Intrinsic motivation and self-determination in human behavior*. Springer Science & Business Media, 1985.
- [8] S. Deterding. Situated motivational affordances of game elements: A conceptual model. In *Gamification: Using Game Design Elements in Non-Gaming Contexts, a workshop at CHI*, 2011.
- [9] J. Hamari, J. Koivisto, and T. Pakkanen. Do persuasive technologies persuade?-a review of empirical studies. In *Persuasive Technology*, pages 118–136. Springer, May 2014.
- [10] S. Kiesler, B. Zdaniuk, V. Lundmark, and R. Kraut. Troubles with the internet: The dynamics of help at home. *Human-Computer Interaction*, 15(4):323–351, December 2000.
- [11] P. V. Klasnja, S. Consolvo, D. W. McDonald, J. A. Landay, and W. Pratt. Using mobile & personal sensing technologies to support health behavior change in everyday life: lessons learned. Citeseer, 2009.
- [12] I. Li, A. Dey, J. Forlizzi, K. Höök, and Y. Medynskiy. Personal informatics and hci: design, theory, and social implications. In *CHI’11 Extended Abstracts on Human Factors in Computing Systems*, pages 2417–2420. ACM, 2011.
- [13] I. Li, A. K. Dey, and J. Forlizzi. Understanding my data, myself: supporting self-reflection with ubicomp technologies. In *Proceedings of the 13th international conference on Ubiquitous computing*, pages 405–414. ACM, 2011.
- [14] I. Li, Y. Medynskiy, J. Froehlich, and J. Larsen. Personal informatics in practice: improving quality of life through data. In *CHI’12 Extended Abstracts on Human Factors in Computing Systems*, pages 2799–2802. ACM, 2012.
- [15] J. J. Lin, L. Mamykina, S. Lindtner, G. Delajoux, and H. B. Strub. Fish’s steps: Encouraging physical activity with an interactive computer game. In *UbiComp 2006: Ubiquitous Computing*, pages 261–278. Springer, 2006.
- [16] E. D. Mekler, F. Brühlmann, K. Opwis, and A. N. Tuch. Disassembling gamification: the effects of points and meaning on user motivation and performance. In *CHI’13 extended abstracts on human factors in computing systems*, pages 1137–1142. ACM, 2013.
- [17] E. D. Mekler, F. Brühlmann, K. Opwis, and A. N. Tuch. Do points, levels and leaderboards harm intrinsic motivation?: an empirical analysis of common gamification elements. In *Proceedings of the First International Conference on gameful design, research, and applications*, pages 66–73. ACM, 2013.
- [18] H. Oinas-Kukkonen and M. Harjumaa. Persuasive systems design: Key issues, process model, and system features. *Communications of the Association for Information Systems*, 24(1):485–500, March 2009.
- [19] J. Parikh and K. Ghosh. Understanding and designing for intermediated information tasks in india. *Pervasive Computing, IEEE*, 5(2):32–39, April 2006.
- [20] E. S. Poole, M. Chetty, T. Morgan, R. E. Grinter, and W. K. Edwards. Computer help at home: methods and motivations for informal technical support. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, pages 739–748. ACM, April 2009.
- [21] R. M. Ryan, C. S. Rigby, and A. Przybylski. The motivational pull of video games: A self-determination theory approach. *Motivation and emotion*, 30(4):344–360, 2006.
- [22] M. Sailer, J. Hense, H. Mandl, and M. Klevers. Psychological perspectives on motivation through gamification. *Interaction Design and Architecture(s)*, 19:28–37, 2013.
- [23] N. Sambasivan, E. Cutrell, K. Toyama, and B. Nardi. Intermediated technology use in developing communities. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, pages 2583–2592. ACM, April 2010.
- [24] V. J. Strecher, G. H. Seijts, G. J. Kok, G. P. Latham, R. Glasgow, B. DeVellis, R. M. Meertens, and D. W. Bulger. Goal setting as a strategy for health behavior change. *Health Education & Behavior*, 22(2):190–200, July 1995.
- [25] P. Zhang. Technical opinion motivational affordances: reasons for ict design and use. *Communications of the ACM*, 51(11):145–147, 2008.