Exploring Design Opportunities for Improved Self-motivation in Self-tracking and Health Goal Achievement

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Abstract

Self-tracking, an activity that involves monitoring collected data on oneself [1, 2, 3], has become increasingly prevalent in recent years, due to the development of new information technology, as well as the increased affordability and usage of mobile devices [4, 5]. As a result, a rise in users who monitor data for improving their health has been observed, as they have better access to means of monitoring their activities in greater detail [3] through the use of self-tracking health apps (e.g. Apple Health, MyFitnessPal) and wearable devices, such as smart watches and activity trackers (e.g. Fitbit), to collect and examine personal health-related data. However, self-motivation can decrease due to different user circumstances. These include priorities, lifestyles, and habits of the user, as well as other circumstances such as perceived novelty loss, poor user experience, and ambiguous or difficult goals, which affect how users conduct self-tracking in apps and hamper their progress towards achieving health goals. Given the issue decreased self-motivation poses to health goal achievement and health improvement of self-tracking users, we investigated factors that contribute to increasing and maintaining self-motivation while self-tracking for health goals, as well as the potential applications of these factors in health apps.

To understand the habits and challenges of users in self-tracking for health, we conducted interviews with 15 participants who hail from different backgrounds and have experiences in using self-tracking apps related to health. Throughout the interview, participants were asked to share their experiences using self-tracking apps to achieve health goals, including habits developed, considerations made, and challenges faced while self-tracking. The data collected from participants resulted in about eight hours of interview footage from seven sessions on Zoom and eight chat records on Facebook Messenger and Viber. The interview recordings were then transcribed in Philippine languages, namely Filipino, English, and a mix of both. Based on the interview transcripts, we conducted an inductive thematic analysis [6], beginning with open coding to extract potentially relevant quotes and sort them into descriptive codes. The codes were further sorted into themes and sub-themes, which were then refined over multiple iterations.

Our thematic analysis suggests that users value using convenient self-tracking methods, seeing notable progress changes toward a health goal, and gaining more external motivation from trusted confidants. The participants not only preferred more accessible and convenient methods of self-tracking for their health, but they also preferred to see only the health data they find relevant to them, which includes progress changes. This means that they expect readily available options that allow them to further adjust their self-tracking process to see some form of change in their progress or results. Moreover, auxiliary features of health apps were not used by most participants, while external motivation gained through said features such as reward systems, leaderboards, sharing and chat functions have produced minimal or temporary effects on user self-motivation for self-tracking. As an alternative, four participants instead maintained their self-motivation to self-track through social commitments with certain associates they trust.

These findings reveal certain design opportunities, starting with streamlining app features. Allowing users to determine at the beginning of the self-tracking process which data and auxiliary features will be shown clears out irrelevant data from views immediately, and makes users aware of the auxiliary features from the start of using the self-tracking health app. The second design opportunity is reframing progress indicators in data visualizations. While adding options to change color, formats, and layout can be a starting point for providing customization to progress and result views, going beyond these simple

options reveal a potential opportunity in reframing how progress is presented by providing options to (1) customize progress and result views, (2) incorporate user sentiments as part of progress, and (3) self-track episodically. The final design opportunity can be found in connecting users to accountability partners. Forming accountability partners from trusted associates allows the user and the associate to essentially assist each other in monitoring their progress or reinforcing certain habits, which shows promise in aiding the overall maintenance of self-motivation towards achieving a health goal.

As self-tracking for health has become a more common activity, increasing or maintaining users' self-motivation has also become more relevant to successful health goal achievement. Since user priorities from work and academics, as well as confusing or unappealing progress views are among the barriers found to maintaining self-motivation towards self-tracking and health goal achievement, the design opportunities show potential in addressing these issues, which, by extension, may also help users maintain or increase their self-motivation as they work towards their health goal. With this, future directions include implementing the design opportunities into features of self-tracking health apps, as well as conducting usability tests to further improve design implementation. An extension of this needfinding study may also be conducted to gather insights on self-tracking experiences from a larger sample of participants.

Keywords
self-tracking, personal informatics, personal health, motivation, goal-setting

References

[1] E. S. Hidalgo, M. P. Ball, M. Opoix, B. G. Tzovaras, Shared motivations, goals and values in the practice of personal science: a community perspective on self-tracking for empirical knowledge, Palgrave Communications 9 (2022) 1–12. doi:10.1057/s41599-022-01199-.

[2] D.-H. Shin, F. Biocca, Health experience model of personal informatics: The case of a quantified self, Computers in Human Behavior 69 (2017) 62–74. URL: https://www.sciencedirect.com/science/article/pii/S0747563216308391. doi:https://doi.org/10.1016/j.chb.2016.12.019.

[3] D. Lupton, Self-tracking modes: Reflexive self-monitoring and data practices, 2014. doi:10.2139/ssrn.2483549.

[4] Y.-d. Zhang, D.-j. Li, C.-b. Zhang, H.-l. Zhang, Quantified or nonquantified: How quantification affects consumers' motivation in goal pursuit, Journal of Consumer Behaviour 18 (2019) 120–134. doi:https://doi.org/10.1002/cb.1752.

[5] H. Gimpel, M. Niben, R. A. Görlitz, Quantifying the quantified self : A study on the motivation of patients to track their own health, in: Reshaping society through information systems design : 34th International Conference on Information Systems, ICIS 2013 ; Milan,

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Italy, 15 - 18 December 2013. Volume 4, Curran, Red Hook, NY, 2014, pp. 3286–3301. URL: https://aisel.aisnet.org/cgi/viewcontent.cgi?article=1050&context=icis2013.

[6] V. Braun, V. Clarke, Using thematic analysis in psychology, Qualitative Research in Psychology 3 (2006) 77–101. doi:10.1191/1478088706qp063oa.

[7] S. Majid, S. Reeves, G. Figueredo, S. Brown, A. Lang, M. Moore, R. Morriss, The extent of user involvement in the design of self-tracking technology for bipolar disorder: Literature review, JMIR Ment Health 8 (2021) e27991. URL: http://www.ncbi.nlm.nih.gov/pubmed/34931992. doi:10.2196/27991.

[8] C. Prince, Do consumers want to control their personal data? empirical evidence, International Journal of Human-Computer Studies 110 (2018) 21–32. URL: https://www.sciencedirect.com/science/article/pii/S1071581917301416. doi:https://doi.org/10.1016/j.ijhcs.2017.10.003.

[9] S. Consolvo, D. W. McDonald, J. A. Landay, Theory-driven design strategies for technologies that support behavior change in everyday life, in: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, CHI '09, Association for Computing Machinery, New York, NY, USA, 2009, p. 405–414. doi:10.1145/1518701.1518766.

[10] M. Rawolle, O. C. Schultheiss, A. Strasser, H. M. Kehr, The motivating power of visionary images: Effects on motivation, affect, and behavior, Journal of Personality 85 (2017) 769–781. doi:https://doi.org/10.1111/jopy.12285. arXiv:https://onlinelibrary.wiley.com/doi/pdf/10.1111/jopy.12285.

[11] F. C. Lunenburg, Goal-setting theory of motivation, International journal of management, business, and administration 15 (2011) 1–6.

[12] S.-H. Kim, A systematic review on visualizations for self-generated health data for daily activities, International Journal of Environmental Research and Public Health 19 (2022). URL: https://www.mdpi.com/1660-4601/19/18/11166. doi:10.3390/ijerph191811166.

[13] A. Colley, K. Halttu, M. Harjumaa, H. Oinas-Kukkonen, Insights from the design and evaluation of a personal health dashboard, in: 2016 49th Hawaii International Conference on System Sciences (HICSS), 2016, pp. 3483–3492. doi:10.1109/HICSS.2016.435.

[14] E. Eikey, E. Poole, M. Reddy, Information presentation in health apps and devices: The effect of color, distance to goal, weight perception, and interest on users' self-efficacy for accomplishing goals, 2015.

[15] M. Oscarsson, P. Carlbring, G. Andersson, A. Rozental, A large-scale experiment on new year's resolutions: Approach-oriented goals are more successful than avoidance-oriented goals, PLOS ONE 15 (2020) 1–13. doi:10.1371/journal.pone.0234097.

[16] J. Höpfner, N. Keith, Goal missed, self hit: Goal-setting, goal-failure, and their affective, motivational, and behavioral consequences, Frontiers in psychology 12 (2021) 704790. URL: https://europepmc.org/articles/PMC8490751. doi:10.3389/fpsyg.2021.704790.

[17] A. Stamatogiannakis, A. Chattopadhyay, D. Chakravarti, Attainment versus maintenance goals: Perceived difficulty and impact on goal choice, Organizational Behavior and Human Decision Processes 149 (2018) 17–34. URL: https://ideas.repec.org/a/eee/jobhdp/v149y2018icp17-34.html. doi:10.1016/j.obhdp.2018.09.0.

[18] W. Wang, J. Li, G. Sun, X.-a. Zhang, Z. Cheng, Achievement Goal and Life Satisfaction: The Mediating Role of Perception of Successful Agency and the Moderating Role of Emotion Reappraisal, MPRA Paper 72864, University Library of Munich, Germany, 2016. URL:

https://ideas.repec.org/p/pra/mprapa/72864.html.

[19] J. M. Dickson, N. J. Moberly, D. Preece, A. Dodd, C. D. Huntley, Self-regulatory goal motivational processes in sustained new year resolution pursuit and mental wellbeing, International Journal of Environmental Research and Public Health 18 (2021). URL: https://www.mdpi.com/1660-4601/18/6/3084. doi:10.3390/ijerph18063084.

[20] S. R. Heimerdinger, V. B. Hinsz, Failure avoidance motivation in a goal-setting situation, Human Performance 21 (2008) 383–395. doi:10.1080/08959280802347155.

[21] C. Timar-Anton, O. Negru-Subtirica, A. Opre, The development and testing of a mobile self-tracking app to strengthen identity commitments through personal goals, International Journal of Human-Computer Studies 151 (2021) 102642. URL: https://www.sciencedirect.com/science/article/pii/S1071581921000604. doi:https://doi.org/10.1016/j.ijhcs.2021.102642.

[22] G. Villalobos-Zúñiga, M. Cherubini, Apps that motivate: a taxonomy of app features based on self-determination theory, International Journal of Human-Computer Studies 140 (2020) 102449. URL: https://www.sciencedirect.com/science/article/pii/S1071581920300513. doi:https://doi.org/10.1016/j.ijhcs.2020.102449.

[23] M. M. Damink, I. P. Ruijten-Dodoiu, E. Hancı, Unravelling the complex relationship between a user and technology in the activity tracking domain (????).

[24] X. Huang, An Exploration of Self-Tracking Data Visualization Design Strategies that Can Promote College Students' Motivation to Exercise, North Carolina State University, 2021.

[25] S. Asimakopoulos, G. Asimakopoulos, F. Spillers, Motivation and user engagement in fitness tracking: Heuristics for mobile healthcare wearables, Informatics 4 (2017). URL: https://www.mdpi.com/2227-9709/4/1/5. doi:10.3390/informatics4010005.

[26] G. Shin, Y. Feng, M. H. Jarrahi, N. Gafinowitz, Beyond novelty effect: a mixed-methods exploration into the motivation for long-term activity tracker use, JAMIA Open 2 (2018) 62–72. doi:10.1093/jamiaopen/ooy048.

[27] D. Alqahtani, C. Jay, M. Vigo, Spatio-temporal and contextual cues to support reflection in physical activity tracking, International Journal of Human-Computer Studies 165 (2022) 102865. URL: https://www.sciencedirect.com/science/article/pii/S107158192200091X. doi:https://doi.org/10.1016/j.ijhcs.2022.102865.

[28] Z. Liang, B. Ploderer, W. Liu, Y. Nagata, J. Bailey, L. Kulik, Y. Li, Sleepexplorer: a visualization tool to make sense of correlations between personal sleep data and contextual factors, Personal and Ubiquitous Computing 20 (2016) 985–1000. URL: https://eprints.qut.edu.au/222086/. doi:10.1007/s00779-016-0960-6.

[29] I. Li, A. Dey, J. Forlizzi, A stage-based model of personal informatics systems, in: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, CHI '10, Association for Computing Machinery, New York, NY, USA, 2010, p. 557–566. URL: https://doi.org/10.1145/1753326.1753409. doi:10.1145/1753326.1753409.

[30] B. Knowles, A. Smith-Renner, F. Poursabzi-Sangdeh, D. Lu, H. Alabi, Uncertainty in current and future health wearables, Commun. ACM 61 (2018) 62–67. URL: https://doi.org/10.1145/3199201. doi:10.1145/3199201.

[31] S. L. Jones, R. Kelly, Dealing with information overload in multifaceted personal informatics systems, Human–Computer Interaction 33 (2018) 1–48. doi:10.1080/07370024.2017.1302334.

[32] S. Jones, R. Kelly, Sensemaking challenges in personal informatics and self-monitoring systems, in: WISH 2016 Workshop on Interactive Systems in Healthcare, Association for Computing Machinery, USA United States, 2016. ACM SIGCHI Conference on Human Factors in Computing Systems (CHI 2016) ; Conference date: 07-05-2016 Through 12-05-2016.

[33] A. Puussaar, A. K. Clear, P. Wright, Enhancing personal informatics through social sensemaking, in: Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems, CHI '17, Association for Computing Machinery, New York, NY, USA, 2017, p. 6936–6942. doi:10.1145/3025453.3025804.

[34] K. Potapov, V. R. Lee, A. Vasalou, P. Marshall, Youth concerns and responses to self-tracking tools and personal informatics systems, in: Extended Abstracts of the 2019 CHI Conference on Human Factors in Computing Systems, CHI EA '19, Association for Computing Machinery, New York, NY, USA, 2019, p. 1–6. doi:10.1145/3290607.3312886.

[35] R. Fleck, M. Cecchinato, A. Cox, D. Harrison, P. Marshall, J. Na, A. Skatova, Life-swap: how discussions around personal data can motivate desire for change, Personal and Ubiquitous Computing 24 (2020) 669–681. doi:10.1007/s00779-020-01372-9.

[36] R. Tu, P. Hsieh, W. Feng, Walking for fun or for "likes"? the impacts of different gamification orientations of fitness apps on consumers' physical activities, Sport Management Review 22 (2019) 682–693. URL: https://www.sciencedirect.com/science/article/pii/S1441352318302225. doi:https://doi.org/10.1016/j.smr.2018.10.005.

[37] K. Kelley, G. Wolf, A. Carmichael, E. Ramirez, About, 2007. URL: quantifiedself.com/about/.

[38] G. Wolf, Quantified self, 2008. URL: aether.com/quantifiedself/.

[39] A. Rapp, F. Cena, A. Marcengo, Editorial of the special issue on quantified self and personal informatics, Computers 7 (2018). URL: https://www.mdpi.com/2073-431X/7/1/14. doi:10.3390/computers7010014.

[40] S. Fox, M. Duggan, Tracking for health (2013).

[41] S. S. Rabbani, Abi research predicts we'll buy 90 million wearable devices this year, 2014. URL: https://www.androidheadlines.com/2014/02/abi-research-predicts-well-buy-90-million-wearable-devices-year.html.

[42] K. Gabriels, M. Coeckelbergh, 'technologies of the self and other': how self-tracking technologies also shape the other, 2019.

[43] E. K. Choe, N. B. Lee, B. Lee, W. Pratt, J. A. Kientz, Understanding quantified-selfers' practices in collecting and exploring personal data, in: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, CHI '14, Association for Computing Machinery, New York, NY, USA, 2014, p. 1143–1152. doi:10.1145/2556288.2557372.

[44] T. Fritz, E. M. Huang, G. C. Murphy, T. Zimmermann, Persuasive technology in the real world: A study of long-term use of activity sensing devices for fitness, in: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, CHI '14, Association for Computing Machinery, New York, NY, USA, 2014, p. 487–496. doi:10.1145/2556288.2557383.

[45] C. Attig, T. Franke, I track, therefore i walk – exploring the motivational costs of wearing activity trackers in actual users, International Journal of Human-Computer Studies 127 (2019) 211–224. URL: https://www.sciencedirect.com/science/

article/pii/S1071581918301915. doi:https://doi.org/10.1016/j.ijhcs.2018.04.007, strengthening gamification studies: critical challenges and new opportunities.

[46] A. Research, Wearable computing devices, like apple's iwatch, will exceed 485 million annual shipments by 2018, 2013. URL: https://www.abiresearch.com/press/wearable-computing-devices-like-apples-iwatch-will/.

[47] A. Lambert, Bodies, mood and excess: Relationship tracking and the technicity of intimacy, Digital Culture Society 2 (2016) 71–88. doi:doi:10.14361/dcs-2016-0106.

[48] I. Li, A. K. Dey, J. Forlizzi, Understanding my data, myself: supporting self-reflection with ubicomp technologies, Ubiquitous Computing (2011) 405–414.

[49] A. Ayobi, T. Sonne, P. Marshall, A. L. Cox, Flexible and mindful self-tracking: Design implications from paper bullet journals, in: Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems, CHI '18, Association for Computing Machinery, New York, NY, USA, 2018, p. 1–14. doi:10.1145/3173574.3173602.

[50] E. K. Choe, B. Lee, H. Zhu, N. H. Riche, D. Baur, Understanding self-reflection: How people reflect on personal data through visual data exploration, in: Proceedings of the 11th EAI International Conference on Pervasive Computing Technologies for Healthcare, PervasiveHealth '17, Association for Computing Machinery, New York, NY, USA, 2017, p. 173–182. doi:10.1145/3154862.3154881.

[51] A. Rapp, L. Tirabeni, Self-tracking while doing sport: Comfort, motivation, attention and lifestyle of athletes using personal informatics tools, International Journal of Human-Computer Studies 140 (2020) 102434. URL: https://www.sciencedirect.com/science/article/pii/S1071581918303197. doi:https://doi.org/10.1016/j.ijhcs.2020.102434.

[52] J. Rooksby, M. Rost, A. Morrison, M. Chalmers, Personal tracking as lived informatics, in: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, CHI '14, Association for Computing Machinery, New York, NY, USA, 2014, p. 1163–1172. doi:10.1145/2556288.2557039.

[53] Age and sex distribution in the philippine population (2020 census of population and housing), 2022. URL: https://psa.gov.ph/content/age-and-sex-distribution-philippine-population-2020-census-population-and-housing.

[54] R. Ryan, E. Deci, Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being, The American psychologist 55 (2000) 68—78. URL: https://doi.org/10.1037//0003-066x.55.1.68. doi:10.1037//0003-066x.55.1.68.

[55] N. Gorm, I. Shklovski, Episodic use: Practices of care in self-tracking, New Media & Society 21 (2019) 2505–2521. doi:10.1177/1461444819851239.

[56] N. W. Kim, H. Im, N. Henry Riche, A. Wang, K. Gajos, H. Pfister, Dataselfie: Empowering people to design personalized visuals to represent their data, in: Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems, CHI '19, Association for Computing Machinery, New York, NY, USA, 2019, p. 1–12. doi:10.1145/3290605.3300309.

[57] I. Li, A. Dey, J. Forlizzi, A stage-based model of personal informatics systems, in: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, CHI '10, Association for Computing Machinery, New York, NY, USA, 2010, p. 557–566. doi:10.1145/1753326.1753409.

[58] I. Li, A. K. Dey, J. Forlizzi, Understanding my data, myself: supporting self-reflection with

ubicomp technologies, Ubiquitous Computing (2011) 405–414.
[59] J. Jones, P. Tsibolane, J.-P. van Belle, Motivations and challenges related to the use of fitness self-tracking technology, in: S. Papagiannidis, E. Alamanos, S. Gupta, Y. K. Dwivedi, M. Mäntymäki, I. O. Pappas (Eds.), The Role of Digital Technologies in Shaping the Post-Pandemic World, Springer International Publishing, Cham, 2022, pp. 374–387.
[60] C. Kerner, V. A. Goodyear, The motivational impact of wearable healthy lifestyle technologies: A self-determination perspective on fitbits with adolescents, American Journal of Health Education 48 (2017) 287–297. doi:10.1080/19325037.2017.1343161.
[61] P. Bitrián, I. Buil, S. Catalán, Gamification in sport apps: the determinants of users' motivation, European Journal of Management and Business Economics 29 (2020) 365–381.
[62] S. Consolvo, D. W. McDonald, J. A. Landay, Theory-driven design strategies for technologies that support behavior change in everyday life, in: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, CHI '09, Association for Computing Machinery, New York, NY, USA, 2009, p. 405–414. doi:10.1145/1518701.1518766.
[63] M. S. Ioanna Constantiou, Alivelu Mukkamala, M. Trier, Engaging with self-tracking applications: how do users respond to their performance data?, European Journal of Information Systems 32 (2023) 941–961. doi:10.1080/0960085X.2022.2081096.
[64] A. Rapp, M. Tirassa, Know thyself: A theory of the self for personal informatics, Hum.-Comput. Interact. 32 (2017) 335–380. doi:10.1080/07370024.2017.1285704.
[65] R. Kocielnik, L. Xiao, D. Avrahami, G. Hsieh, Reflection companion: A conversational system for engaging users in reflection on physical activity, Proc. ACM Interact. Mob. Wearable Ubiquitous Technol. 2 (2018). doi:10.1145/3214273.
[66] E. A. Edwards, J. Lumsden, C. Rivas, L. Steed, L. A. Edwards, A. Thiyagarajan, R. Sohanpal, H. Caton, C. J. Griffiths, M. R. Munafò, S. Taylor, R. T. Walton, Gamification for health promotion: systematic review of behaviour change techniques in smartphone apps, BMJ Open 6 (2016). URL: https://bmjopen.bmj.com/content/6/10/e012447. doi:10.1136/bmjopen-2016-012447.
[67] R. Gouveia, E. Karapanos, M. Hassenzahl, How do we engage with activity trackers? a longitudinal study of habito, in: Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing, UbiComp '15, Association for Computing Machinery, New York, NY, USA, 2015, p. 1305–1316. doi:10.1145/2750858.2804290.
[68] D. Harrison, P. Marshall, N. Bianchi-Berthouze, J. Bird, Activity tracking: barriers, workarounds and customisation, in: Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing, UbiComp '15, Association for Computing Machinery, New York, NY, USA, 2015, p. 617–621. URL: https://doi.org/10.1145/2750858.2805832. doi:10.1145/2750858.2805832.
[69] A. Jonassen, Designing for couch co-op (n.d.).
[70] J. Yablonski, Laws of UX, " O'Reilly Media, Inc.", 2024.
[71] L. Tableau Software, Tableau, https://www.tableau.com/, 2024.
[72] Trainheroic, https://www.trainheroic.com/, n.d.
[73] A. Inc., ios - health, https://www.apple.com/ios/health/, 2024.
[74] L. Samsung Electronics Co., Samsung health, https://www.samsung.com/global/galaxy/apps/samsung-health/, n.d.
[75] Pinterest, https://www.pinterest.com/, 2024.

[76] T. D. Limited, Moving out 2, https://www.movingout2.com/, 2024.