



Toward Enhancing Engagement in mHealth Apps: Balancing Health and Entertainment with AI-Driven Level Structures and Dark Game Design Patterns

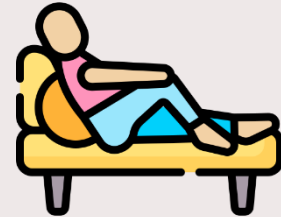
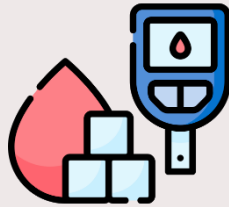
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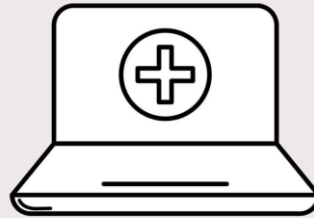


Up to ~70% of deaths are linked to lifestyle diseases



World Health Organization: Noncommunicable diseases (ncds) - fact sheet. [https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases\(2023\)](https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases(2023)), accessed on April 22, 2024

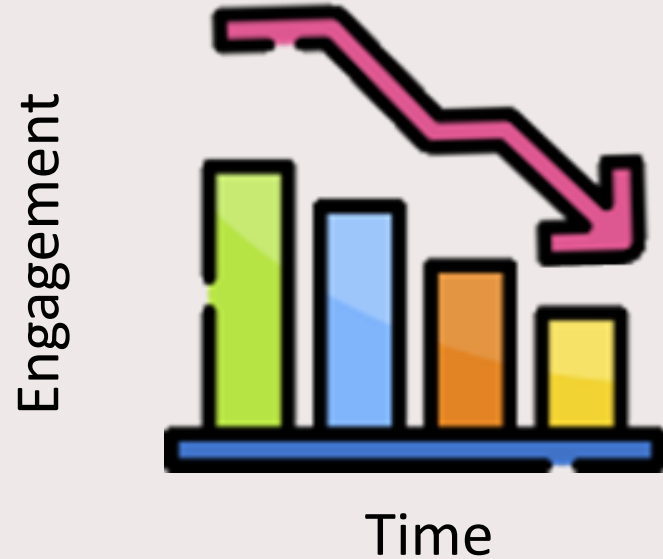
Digital Interventions are scalable way to promot behavior change



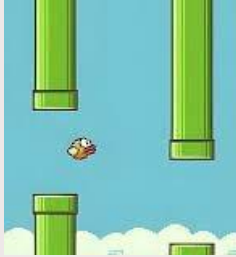
User engagement in mHealth applications drops overtime



Engagement



Engaging (mobile) games make use of Dark Game Design patterns

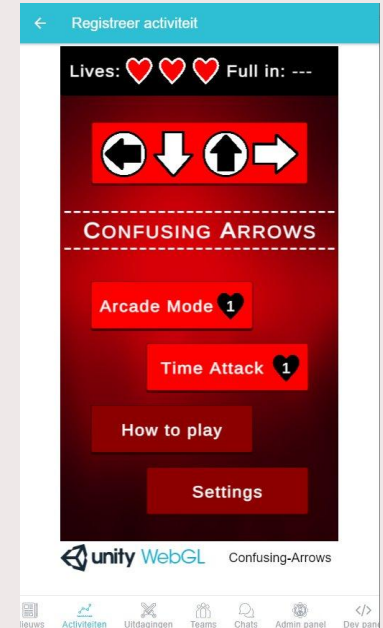
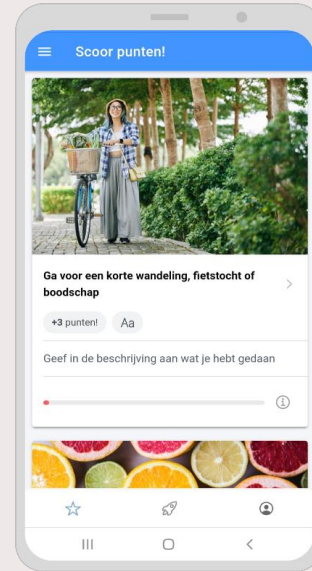


Pay 2 Win



Paywall

Current Implementation of Mini-games and “healthy” Dark Patterns



APLES interface seen by the designer

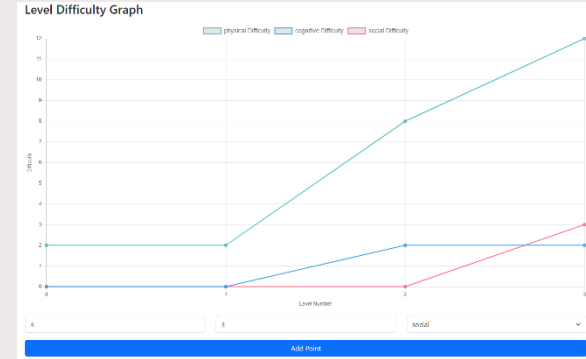
APLES Activity Manager

Activity Difficulty Type Frequency Current Cost

Cost Increase Steps Steps Aggregate

[Add Activity](#)

Activity	Difficulty	Type	Frequency	Current Cost	Cost Increase	Steps	Steps Aggregate	Actions
Put_on_your_walking_shoes_and_take_a_picture_of_them	2	physical	1	0	1			Update Delete
Take_a_15-minute_walk_without_stopping	2	physical	1	0	1			Update Delete
Take_between_1500_and_2500_steps	6	physical	1	0	1	1500.0		Update Delete
Take_100_steps	1	physical	1	0	1	100.0		Update Delete



Level settings (optional)

Use this level as the start of the level structure

Target points: (empty)

Evaluate failure interval (since start of participation):

Next level when target is met on time:

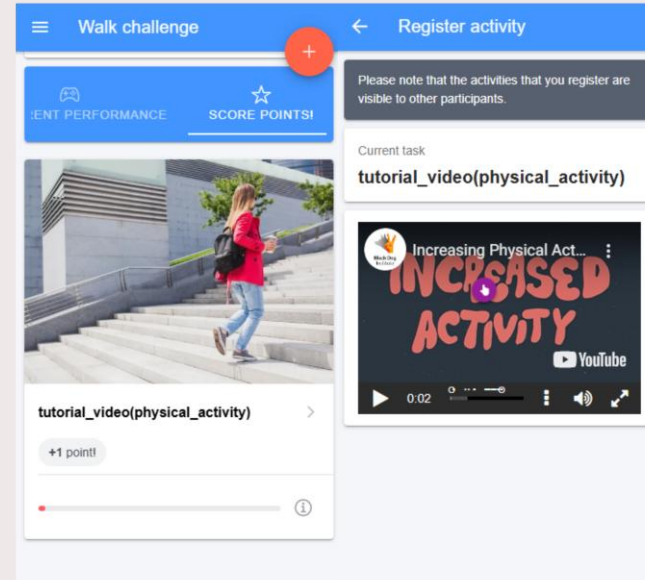
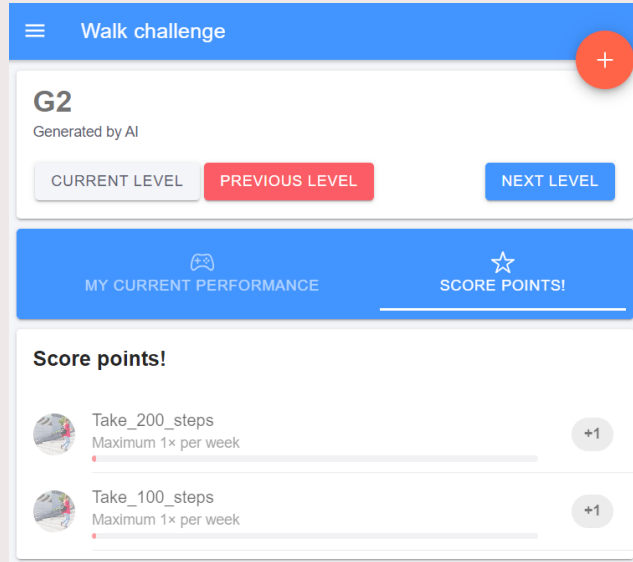
Next level when target is not met on time:

Tasks

[+ Add task](#)

- Engage_with_others to get 100 steps +4 [-](#) [+](#)
- Take_200_steps to get 100 steps +1 [-](#) [+](#)
- Take_a_35-minute_walk_without_stopping to get 100 steps +6 [-](#) [+](#)

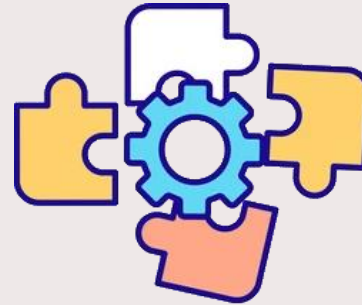
mHealth application as seen by the user of the health intervention



Future work will dive into more types of designer configurations



Temporal



Complexity

Questions?



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