

# GAMIFIED APPROACH TO CHANGING HEALTH BEHAVIOURS:

DEVELOPMENT AND EVALUATION OF THE LIVING GREEN AND HEALTHY FOR TEENS (LIGHT) MOBILE INTERVENTION



THE UNIVERSITY  
OF BRITISH COLUMBIA

Louise C. Mâsse, PhD

Professor, School of Population and  
Public Health, UBC

Investigator, BC Children's Hospital  
Research Institute

4480 Oak Street, Rm F508  
Vancouver, BC V6H 3V4

Tel: 604.875.2000 x5563

Fax: 604.875.3569

lmasse@bcchr.ubc.ca

www.bcchr.ca

## Childhood Obesity Foundation

**Janice Macdonald**

Project Director

771A – 2635 Laurel Street  
Robert HN Ho Research Centre  
VGH Hospital Campus  
Vancouver BC V5Z 1M9

(250) 415 -3892

(778) 440-1028

janice@childhoodobesityfoundation.ca

www.childhoodobesityfoundation.ca



# Our team and partners

- **Childhood Obesity Foundation (Created Aim2Be)**: Dr. Tom Warshawski, Jennifer Bradbury, Janice Macdonald, Vanessa Morley, Carley O’Kane (health coach)
- **Ayogo Health Inc (Designed and built Aim2Be)**: Mavis Dixon, Zac Wyotowich, Kelsey Hemphill, Sam Evanuk, Paul Prescod, Darryl Pogue
- **University of British Columbia / BC Children’s Hospital Research Institute (Evaluation lead)**: Dr. Louise C. Mâsse, Dr. Jean-Pierre Chanoine, Jacqueline Koot, Janae Vlaar, Nicole Carbert, Angelica Leon, Camilla Piatkowski, Tomoko McGaughey, Alysha Deslippe
- **Shapedown and BC Children’s Hospital**: Jill McDowell, Arlene Cristall
- **University of Alberta/ Stollery Children’s Hospital (Edmonton)**: Dr. Geoff Ball, Nicole Gehring
- **Alberta Children’s Hospital/ University of Calgary (Calgary)**: Dr. Josephine Ho, Heidi Virtanen
- **McMaster University/ McMaster Children’s Hospital (Hamilton)**: Dr. Katherine Morrison, Elizabeth Gunn
- **SickKids Hospital for Sick Children/ University of Toronto (Toronto)**: Dr. Jill Hamilton, Rebecca Noseworthy
- **Children’s Hospital of Eastern Ontario/ CHEO Research Institute (Ottawa)**: Dr. Annick Buchholz, Charmaine Mohipp



THE UNIVERSITY  
OF BRITISH COLUMBIA



Alberta Children's Hospital



# Funders and Supporters

- Development and evaluation funded by the Public Health Agency of Canada with matched funds from Ayogo Health Inc, Merck Canada, Heart & Stroke, Diabetes Canada, Obesity Canada, Craving Change, David Suzuki Foundation and Pacific Blue Cross.
- CIHR team grant in Bariatric Care with matched funds from Alberta Innovates, Canadian Obesity Network, Women and Children's Health Research Institute (UAlberta) and the Ontario Ministry of Health and Long Term Care provide funds the sub-study examining the predictors of adherence to Aim2Be



Public Health  
Agency of Canada

Agence de la santé  
publique du Canada



**MERCK**



Heart&Stroke™



obesity  
canada



obésité  
canada



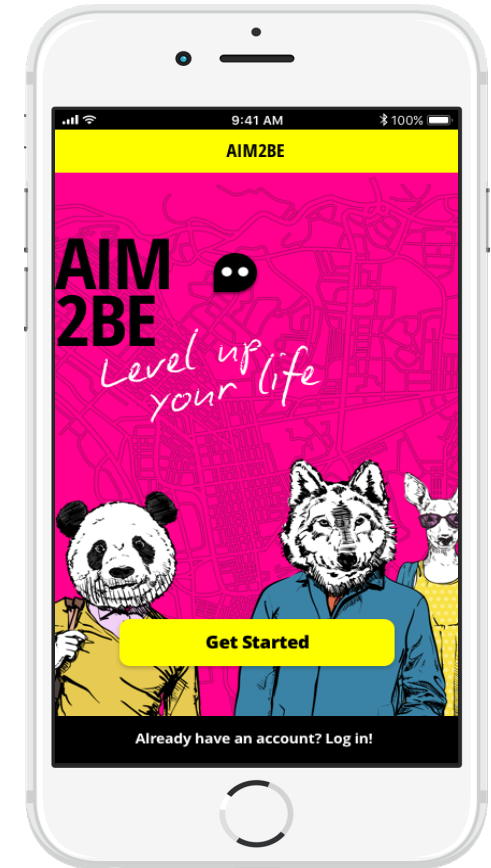
DAVID SUZUKI  
FOUNDATION  
One nature.



CIHR IRSC  
Canadian Institutes of  
Health Research / Instituts de recherche  
en santé du Canada

# Overview of talk?

- Introduce the LiGHT intervention and Aim2Be app
- Review the science of behaviour change to understand what mediators “gamified” interventions should include
- Discuss how Aim2Be conceptual framework aligns with the science
- Discuss how Aim2Be is/will be evaluated
- Provide of quick demo of Aim2Be

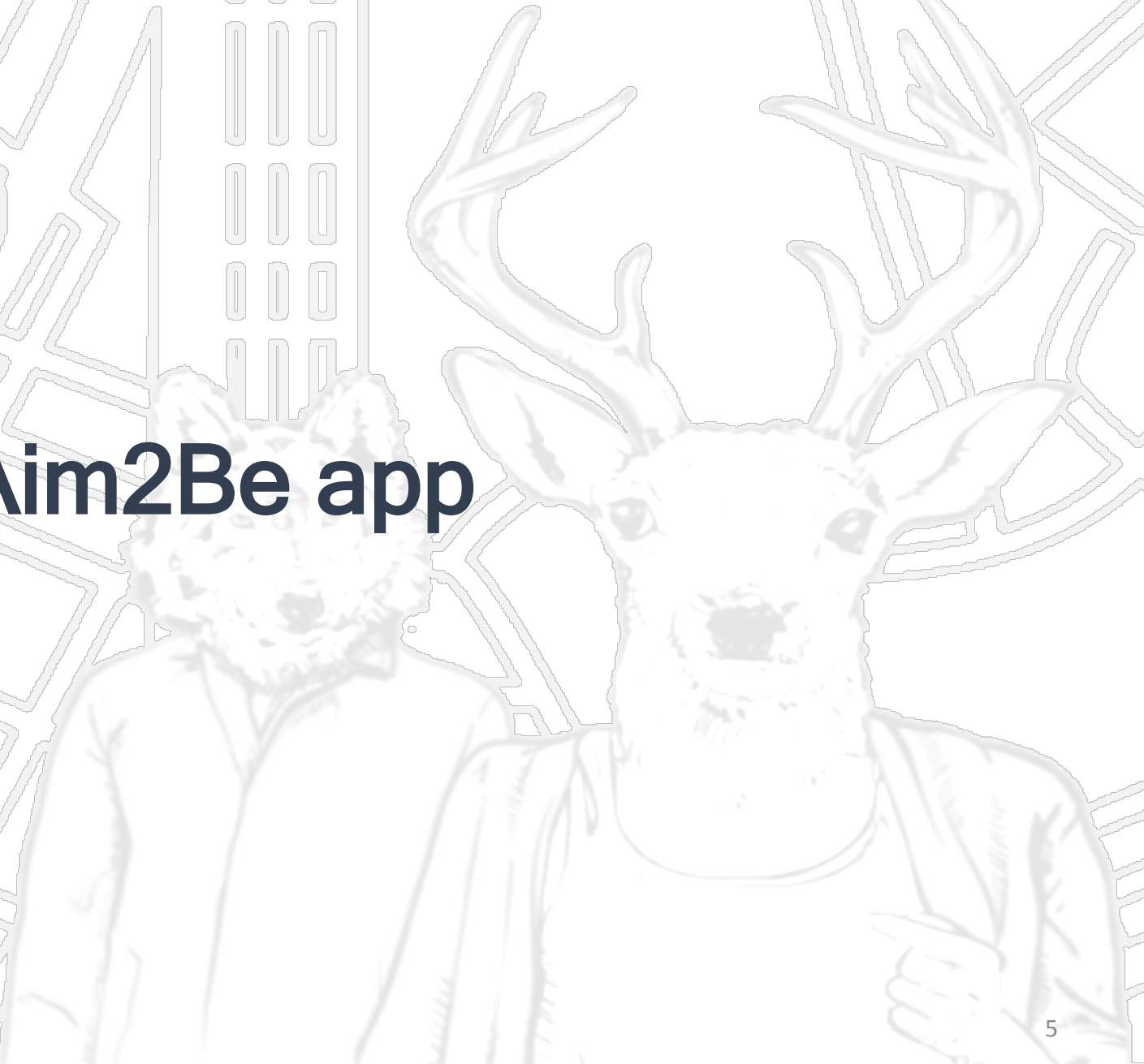




**AIM2BE**



# Overview of Aim2Be app



# What is Aim2Be?

- A gamified lifestyle management app for children, youth and their families (10-17 years)
- Initiate sustainable behaviour change in 4 primary areas:
  - Healthy eating
  - Active living
  - Screen time
  - Sleep
- Emphasizes:
  - Healthy body image
  - Strong self-esteem
  - Living green and economically
- It's development is:
  - Scientifically informed
  - Informed by users' input & usability testing (teens & parent)
  - Aligned with existing best practice (i.e. integrates the curriculum of the CANPWR pediatric management program), clinical guidelines, Canadian health recommendations)



# Development partners

## Development and formative evaluation



Content  
Health coach



Gamification  
Programming



Scientific input  
Evaluation

**Expert reviewers:** Expert panel of dietitians, physical activity experts, psychologists, and academics

# Designed for and by Canadian youth

## **LiGHT v1 - (2011-2012)** (Jogova et al 2013 CDA)

- Focus groups (3 teens / 3 parents)
- Interviews (9 teens / 9 parents)
- Prototype testing (20 teens)

## **LiGHT v2 -> Aim2Be (2017-2021)**

- v2.1 Focus groups / Prototype testing / Interviews (24 teens / 12 parents)
- v2.1 Field testing (4 months) InSights West webpanel ~300 families (ongoing)
- v2.2 Prototype testing / interviews (12 teens / 12 parents) Nov 2018



**Input and formative evaluation in more than 300 teens and parents**

# What we heard from youth...

- About half **would use** a health app
- Need to **account for time constraints** - Competing demands on their time (school, friends, family & gaming)
- **Personal relationships and their future** is what they are concerned about
- Information that is **tailored** is more appealing to them
- Some older youth do **not want to work** alongside their parents
- Want a **social wall that is private and safe**
- **Presented 3 designs** - preferred animal avatar “absolutely love this, oooooo, does not look like a health app, love animals, unique and stylish”
- **Presented 4 versions of the content** - straightforward, friendly but not too buddy-buddy, positive and relatable, detailed, and non-judgemental

# What we heard from parents...

- **Comprehensive features & resources** (one-stop shop):
  - Set goals, track progress, self-monitor, prompted to take action
  - Resources and guide to support parents
- **Social support** (Live Coach or parents)
- **Tailoring to familial needs** and individual concerns
- **Facilitating parent - teens interactions**
  - making sure their participation is in synch with their teens
  - Help with conversation starters
- **Supporting the parents** in making healthy choice



A black and white photograph of four people having a picnic outdoors. They are sitting on a blanket on the ground, surrounded by food containers and a picnic basket. The background shows a rocky hillside with sparse vegetation. The text "Science of Behaviour change" is overlaid in the center of the image.

# Science of Behaviour change



# Treatment of obesity in youth

- In-person family-based multidisciplinary interventions (diet, physical activity, behavioural strategies)



Short term efficacy  
(weight / zBMI)

- mHealth (apps ± SMS/phone or SMS ± phone), typically used with 11-17 yrs although some have included 9-10



Evidence is  
emerging

- **Effective interventions emphasize self-regulatory skills (e.g., goal setting, planning, self-monitoring)**
- **mHealth app features facilitate self-regulatory skills**

# Maintenance is the real problem



# Maintenance of TxT effects in youth

- All interventions (in-person, SMS, phone counseling ) focus on self-regulatory processes to support intrinsic motivation (Self-determination Theory)

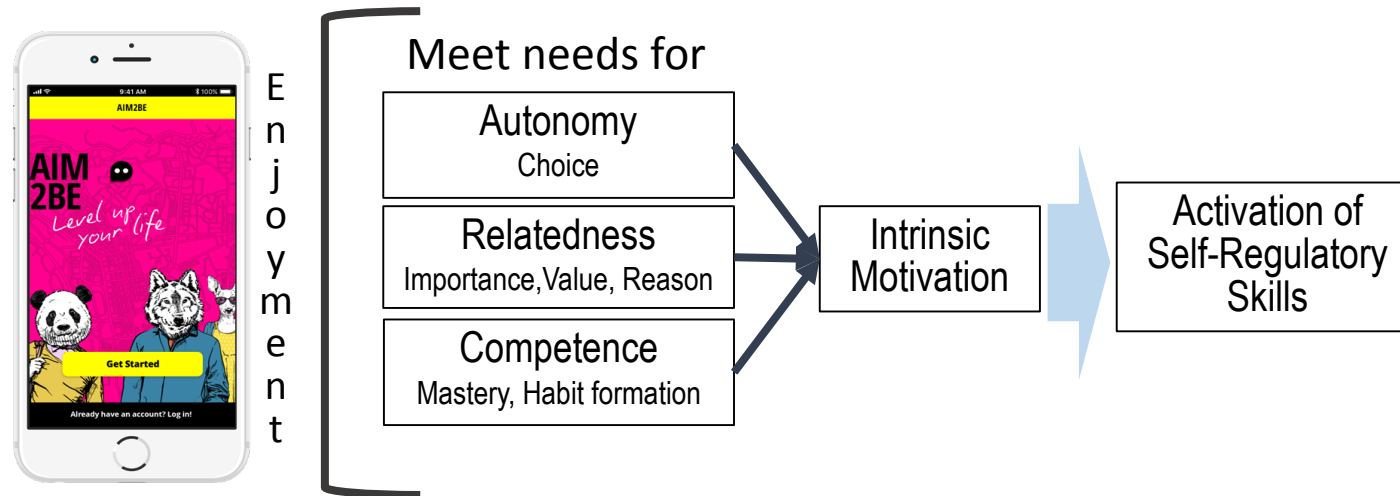


Efficacious at sustaining the weight loss

- Profile of successful weight loss maintainers:
  - High self-efficacy
  - High intrinsic motive to be active
  - High self-management skills regarding food intake
  - Receive peer / parental support
  - Positive parent-child relationship

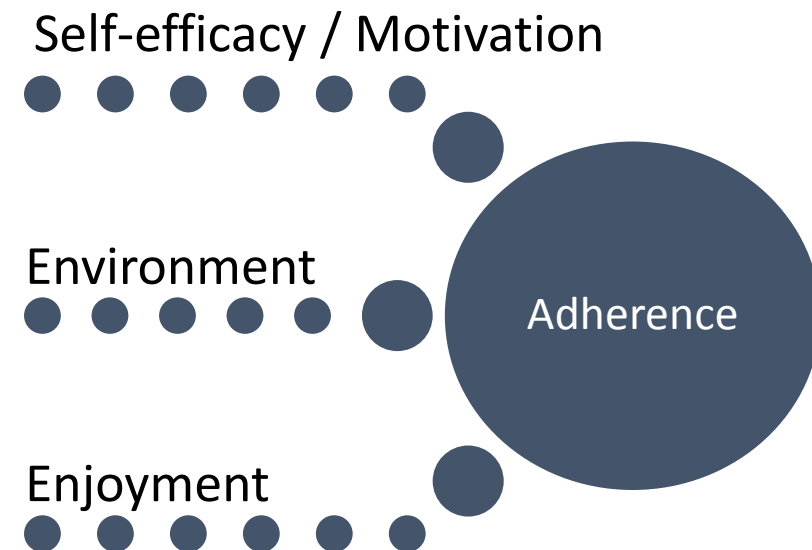
# Science behind gamification

- Gamifications means designing for enjoyment and motivation
- Experience should meet 3 psychological needs → intrinsic motivation:



# Overview of essential elements

- Behaviour Change Techniques or features that:
  - Enhance self-efficacy (e.g., graded tasks)
  - Support intrinsic motivation and activate self-regulatory skills (e.g, goal setting, problem solving, review of behavioural goal, self-monitoring, & feedback)
- Provide environmental support
  - Family-based (emotional, physical & environmental support)
  - Peer support
- Add features that make the experience enjoyable and meet basics psychological needs





# **Aim2Be Conceptual Framework**

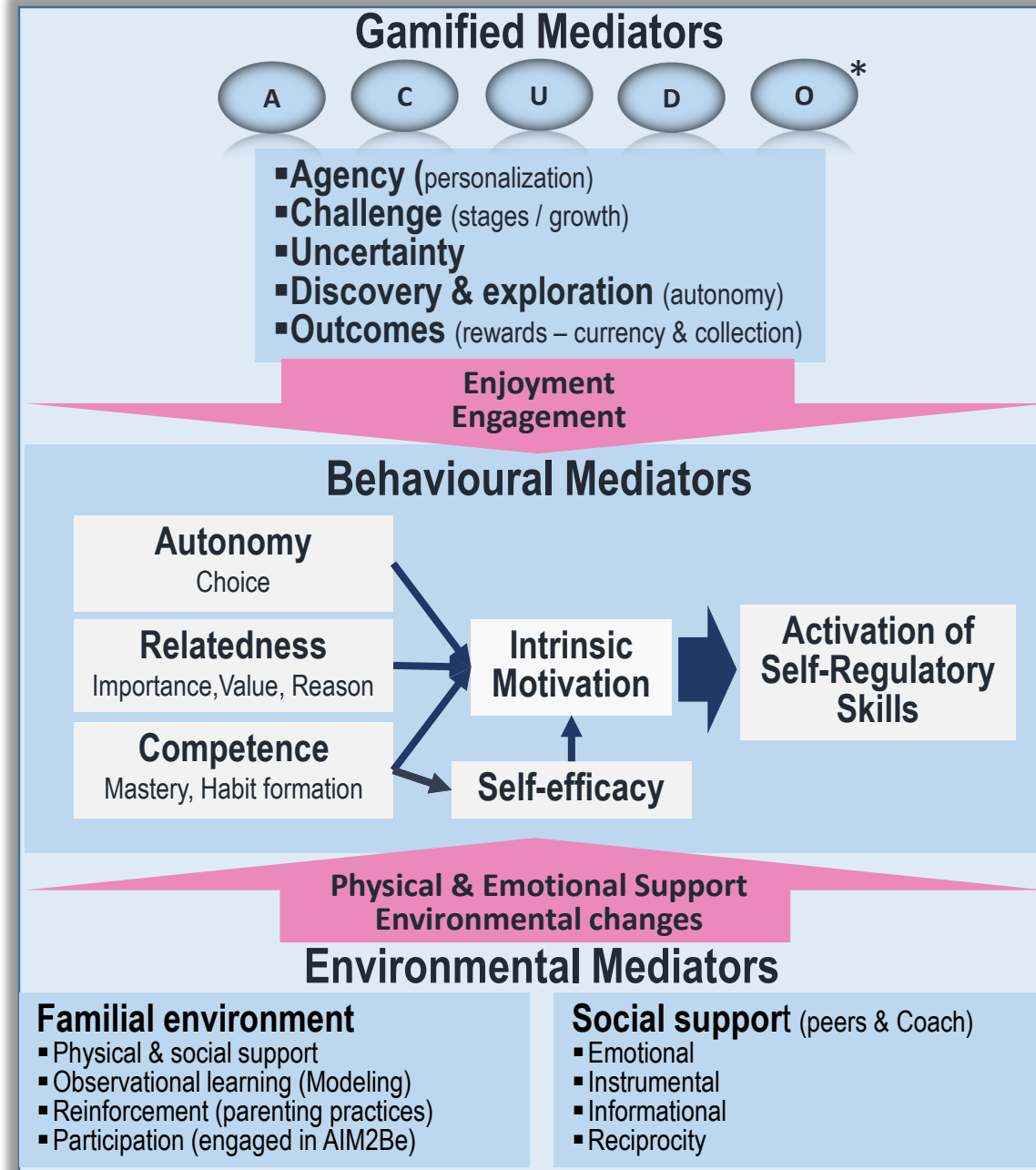
# PROGRAM

- Onboarding identity quiz
- Daily bonus / Quick wins
- Quizzes / Straw polls
- Interactive stories
- Currencies (Collections & stories)

- Aims – Stages – Tasks
- Map views (self-monitoring, goal setting, & feedback)
- Articles knowledge centre

- Social wall
- Virtual / Live Coach
- Companion Parent Aim2Be app

# MEDIATORS



# OUTCOMES

- Behavioural**
- Fruits & Vegetables intake
  - SSBs intake
  - Dietary quality
  - Physical activity
  - Screen time

- Metabolic**
- Healthy body weight



# PROGRAM

- Onboarding identity quiz
- Daily bonus / Quick wins
- Quizzes / Straw polls
- Interactive stories
- Currencies (Collections & stories)

- Aims – Stages – Tasks
- Map views (self-monitoring, goal setting, & feedback)
- Articles knowledge centre

- Social wall
- Virtual / Live Coach
- Companion Parent Aim2Be app

# MEDIATORS

## Gamified Mediators



- **Agency** (personalization)
- **Challenge** (stages / growth)
- **Uncertainty**
- **Discovery & exploration** (autonomy)
- **Outcomes** (rewards – currency & collection)

Enjoyment  
Engagement

## Behavioural Mediators

**Autonomy**  
Choice

**Relatedness**  
Importance, Value, Reason

**Competence**  
Mastery, Habit formation



**Intrinsic Motivation**

**Self-efficacy**

**Activation of Self-Regulatory Skills**

Physical & Emotional Support  
Environmental changes

### Familial environment

- Physical & social support
- Observational learning (Modeling)
- Reinforcement (parenting practices)
- Participation (engaged in AIM2Be)

### Social support (peers & Coach)

- Emotional
- Instrumental
- Informational
- Reciprocity

# OUTCOMES

- Behavioural**
- Fruits & Vegetables intake
  - SSBs intake
  - Dietary quality
  - Physical activity
  - Screen time

- Metabolic**
- Healthy body weight

# PROGRAM

- Onboarding identity quiz
- Daily bonus / Quick wins
- Quizzes / Straw polls
- Interactive stories
- Currencies (Collections & stories)

- Aims – Stages – Tasks
- Map views (self-monitoring, goal setting, & feedback)
- Articles knowledge centre

- Social wall
- Virtual / Live Coach
- Companion Parent Aim2Be app

# MEDIATORS

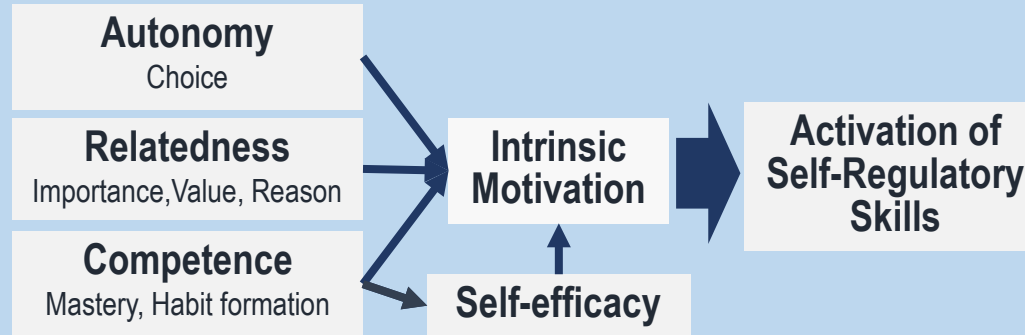
## Gamified Mediators



- **Agency** (personalization)
- **Challenge** (stages / growth)
- **Uncertainty**
- **Discovery & exploration** (autonomy)
- **Outcomes** (rewards – currency & collection)

Enjoyment  
Engagement

## Behavioural Mediators



Physical & Emotional Support  
Environmental changes

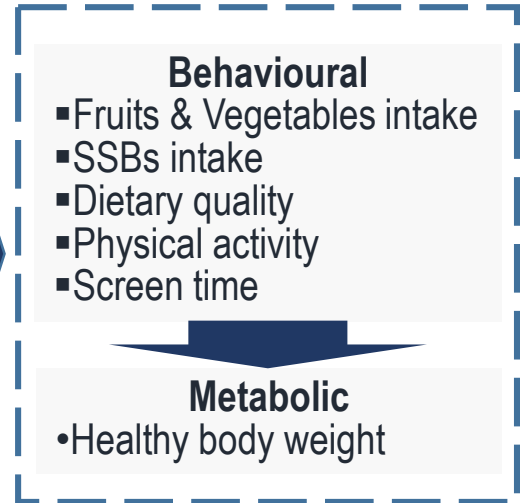
### Familial environment

- Physical & social support
- Observational learning (Modeling)
- Reinforcement (parenting practices)
- Participation (engaged in AIM2Be)

### Social support (peers & Coach)

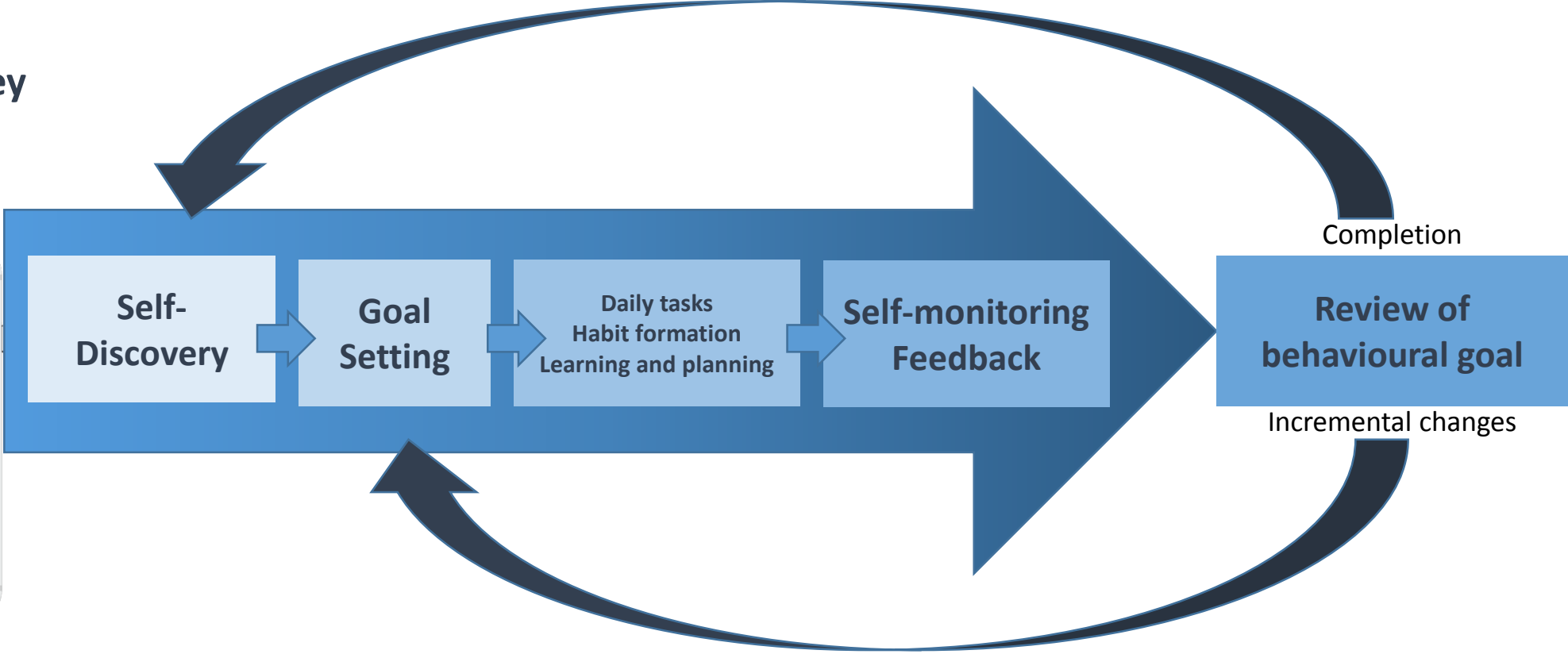
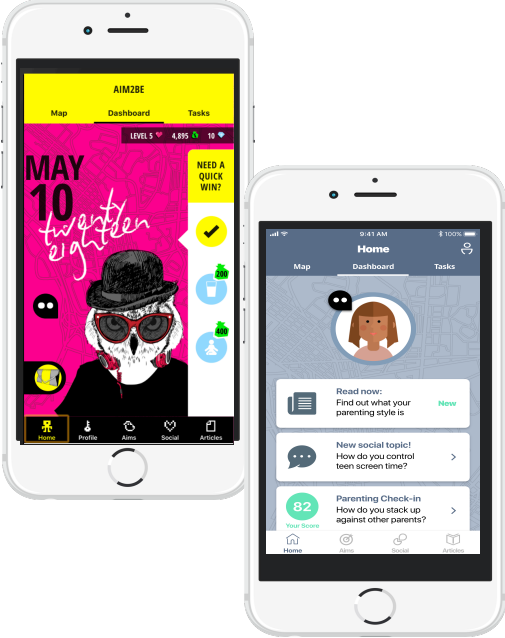
- Emotional
- Instrumental
- Informational
- Reciprocity

# OUTCOMES



# Activation of Self-Regulatory Skills

Self-guided journey



# PROGRAM

- Onboarding identity quiz
- Daily bonus / Quick wins
- Quizzes / Straw polls
- Interactive stories
- Currencies (Collections & stories)

- Aims – Stages – Tasks
- Map views (self-monitoring, goal setting, & feedback)
- Articles knowledge centre

- Social wall
- Virtual / Live Coach
- Companion Parent Aim2Be app

# MEDIATORS

## Gamified Mediators



- **Agency** (personalization)
- **Challenge** (stages / growth)
- **Uncertainty**
- **Discovery & exploration** (autonomy)
- **Outcomes** (rewards – currency & collection)

Enjoyment  
Engagement

## Behavioural Mediators

### Autonomy

Choice

### Relatedness

Importance, Value, Reason

### Competence

Mastery, Habit formation

Intrinsic  
Motivation

Self-efficacy

Activation of  
Self-Regulatory  
Skills

Physical & Emotional Support  
Environmental changes

### Familial environment

- Physical & social support
- Observational learning (Modeling)
- Reinforcement (parenting practices)
- Participation (engaged in AIM2Be)

### Social support (peers & Coach)

- Emotional
- Instrumental
- Informational
- Reciprocity

# OUTCOMES

## Behavioural

- Fruits & Vegetables intake
- SSBs intake
- Dietary quality
- Physical activity
- Screen time

## Metabolic

- Healthy body weight

# PROGRAM

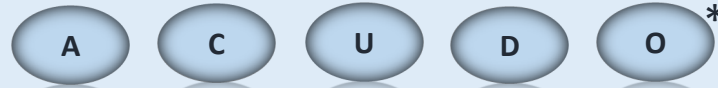
- Onboarding identity quiz
- Daily bonus / Quick wins
- Quizzes / Straw polls
- Interactive stories
- Currencies (Collections & stories)

- Aims – Stages – Tasks
- Map views (self-monitoring, goal setting, & feedback)
- Articles knowledge centre

- Social wall
- Virtual / Live Coach
- Companion Parent Aim2Be app

# MEDIATORS

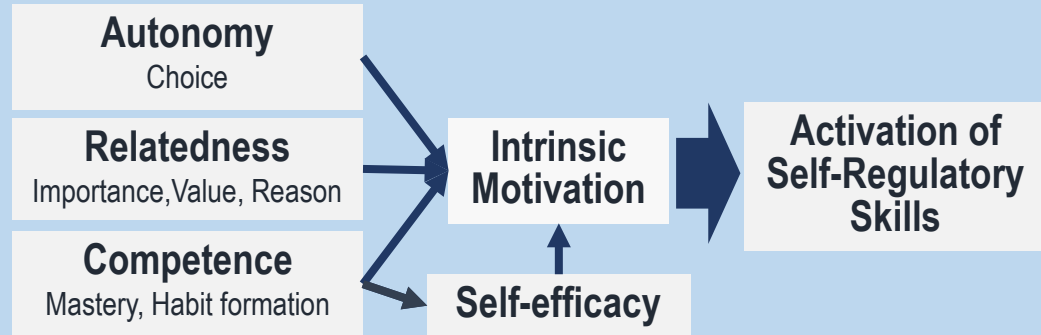
## Gamified Mediators



- **Agency** (personalization)
- **Challenge** (stages / growth)
- **Uncertainty**
- **Discovery & exploration** (autonomy)
- **Outcomes** (rewards – currency & collection)

Enjoyment  
Engagement

## Behavioural Mediators



Physical & Emotional Support  
Environmental changes

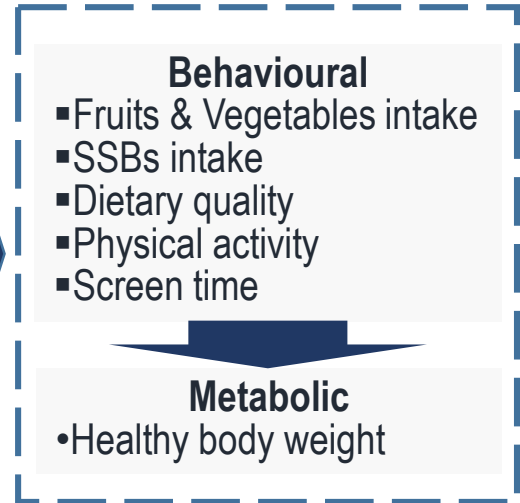
### Familial environment

- Physical & social support
- Observational learning (Modeling)
- Reinforcement (parenting practices)
- Participation (engaged in AIM2Be)

### Social support (peers & Coach)

- Emotional
- Instrumental
- Informational
- Reciprocity

# OUTCOMES



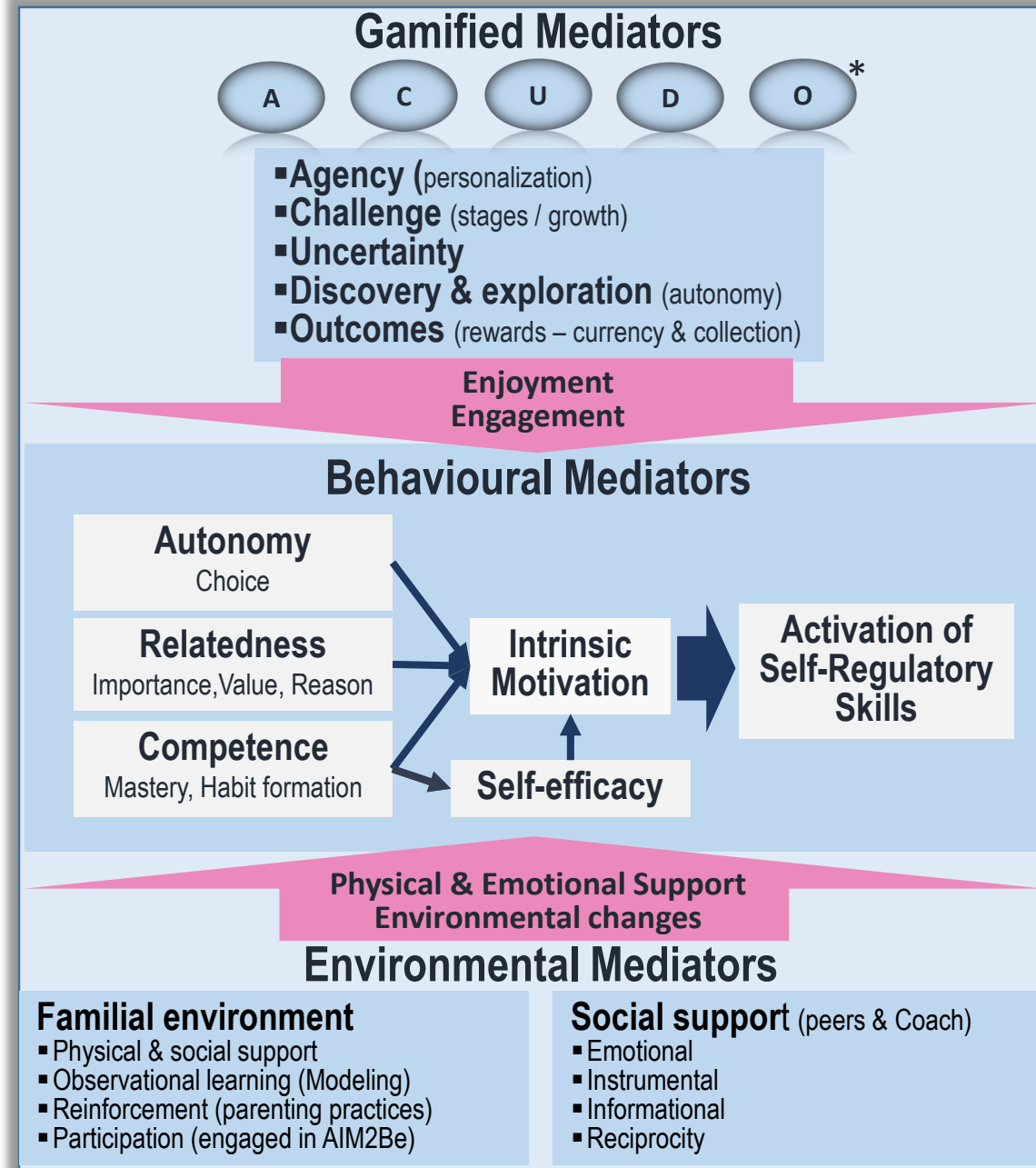
# PROGRAM

- Onboarding identity quiz
- Daily bonus / Quick wins
- Quizzes / Straw polls
- Interactive stories
- Currencies (Collections & stories)

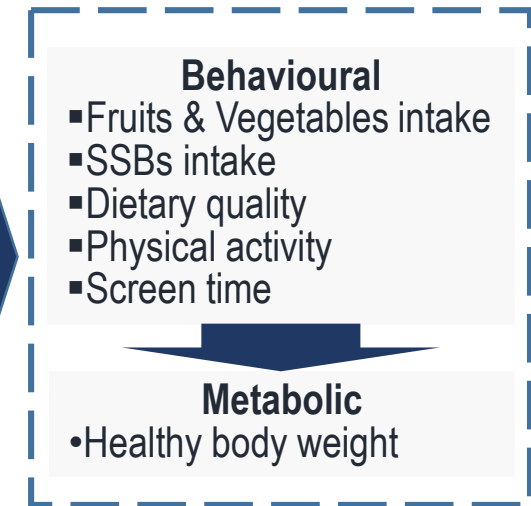
- Aims – Stages – Tasks
- Map views (self-monitoring, goal setting, & feedback)
- Articles knowledge centre

- Social wall
- Virtual / Live Coach
- Companion Parent Aim2Be app

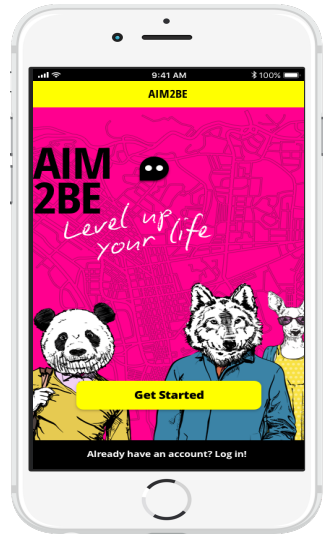
# MEDIATORS



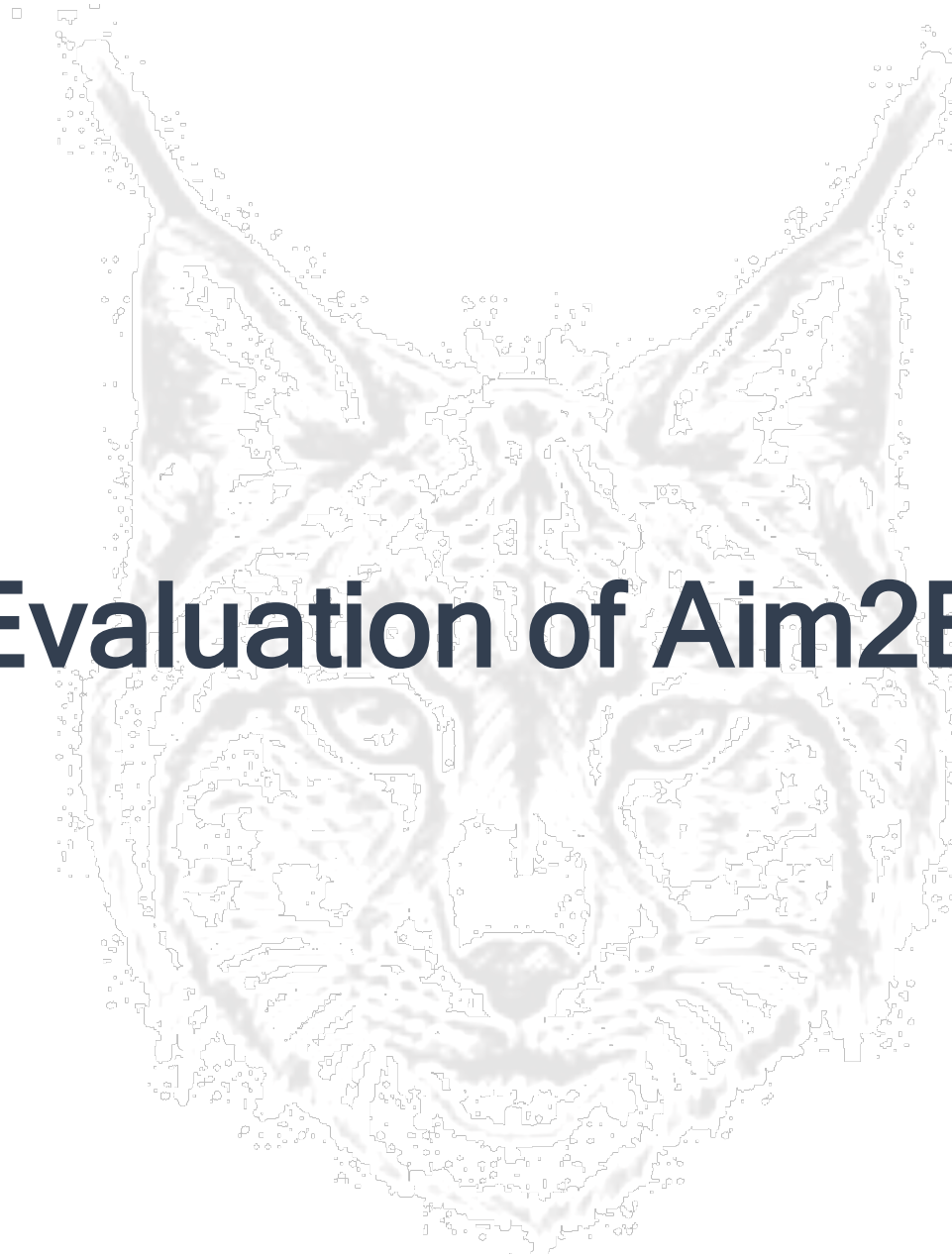
# OUTCOMES



\* ACUDO framework developed by Ayogo Health Inc



# Evaluation of Aim2Be

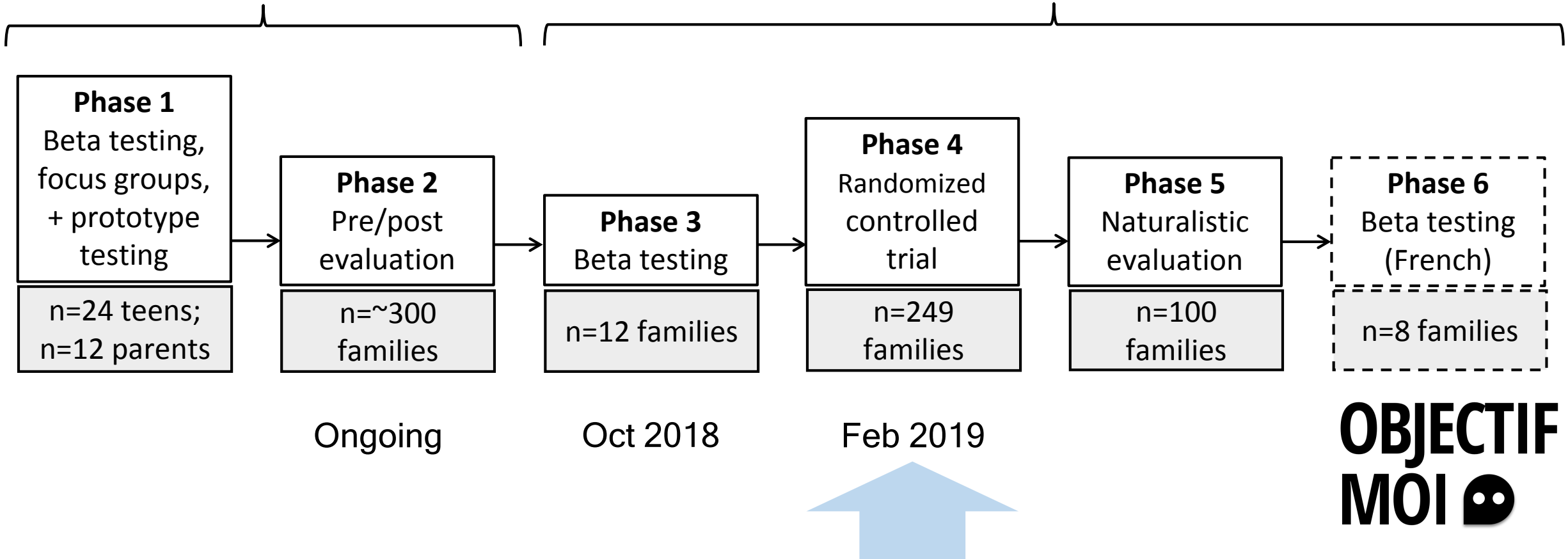




# Aim2Be evaluation

## Evaluation of Aim2Be v2.1

## Evaluation of Aim2Be v2.2



# RCT partners



Content  
Health coach



Gamification  
Programming



Coordinating  
Centre



University of British  
Columbia, Vancouver  
**Dr. Louise C. Masse**

★ University of Alberta, Edmonton  
**Dr. Geoff Ball**

★ Alberta Children's Hospital, Calgary  
**Dr. Josephine Ho**

★ SickKids, Toronto  
**Dr. Jill Hamilton**

CHEO, Ottawa

★ **Dr. Annick Buchholz**

★ McMaster, Hamilton

**Dr. Katherine Morrison**

Shapedown BC at the BC Children's Hospital – Jill McDowell  
Stollery Children's Hospital in Edmonton – Nicole Gehring  
Alberta Children's Hospital – Heidi Virtanen  
McMaster Children's Hospital in Hamilton – Elizabeth Gunn  
SickKids Hospital for Sick Children in Toronto – Rebecca Noseworthy  
Children's Hospital of Eastern Ontario in Ottawa – Charmain Mohipp

# Aim2Be: RCT (N=249)

Condition 1: (N=83)

Baseline

Measurement

Condition 2: (N=83)

Measurement

Condition 3: (N=83)

Measurement

Intervention



Live Coach



Virtual Coach

4 & 8-month

Measurement

Measurement

Measurement



Virtual Coach

# Aim2Be evaluation

## MAIN OBJECTIVES

### Knowledge of Canadian Recommendations

- Nutrition
- Physical activity
- Screen time

### Behavioural outcomes

- Fruits & Vegetables intake
- SSBs intake
- Dietary quality
- Physical activity
- Screen time

### Metabolic outcomes

- zBMI

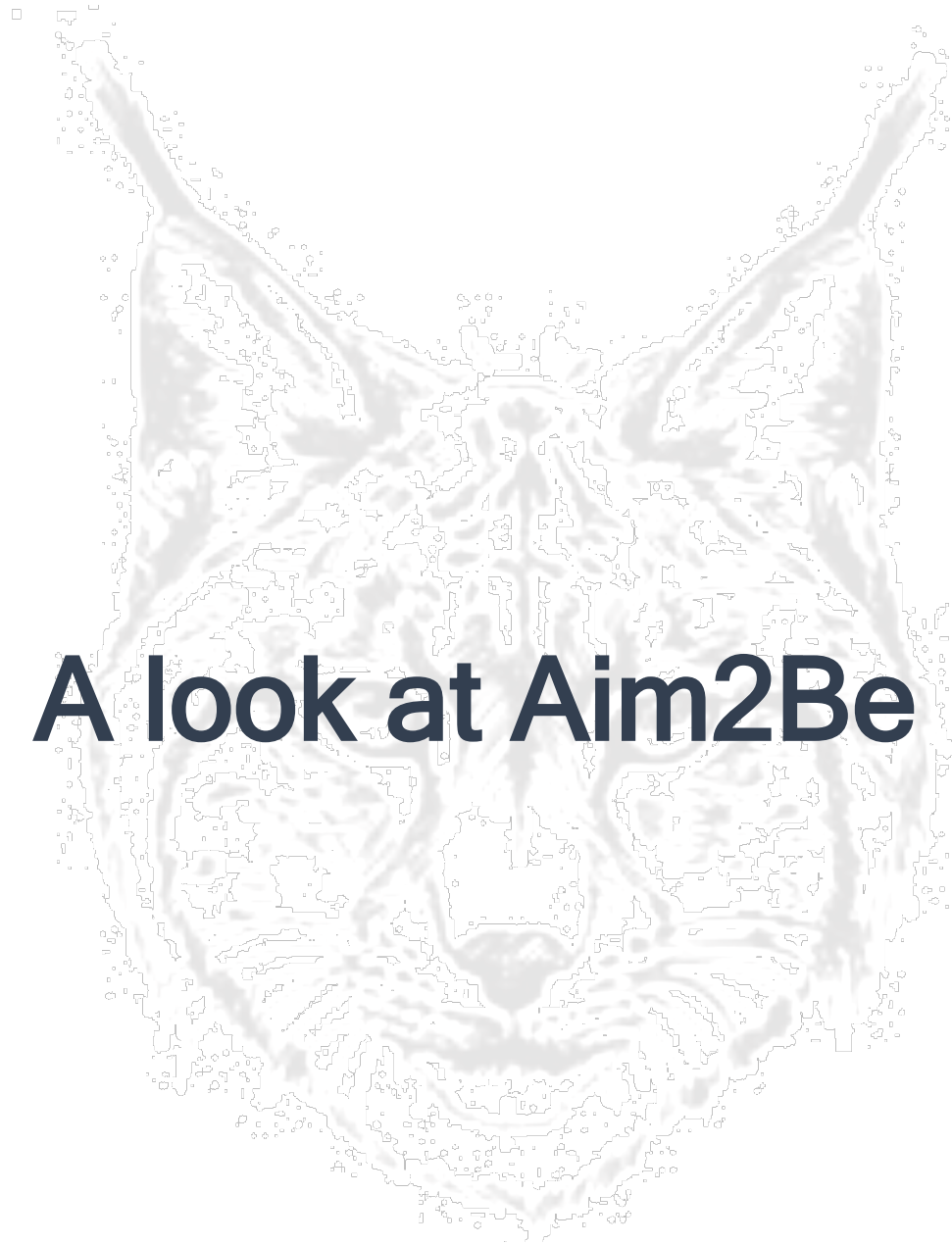
### OTHER

- Test whether Live Coaching moderate the effect of the intervention
- Examine the individual and household predictors of adherence

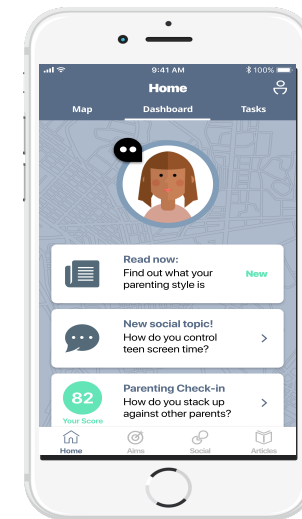
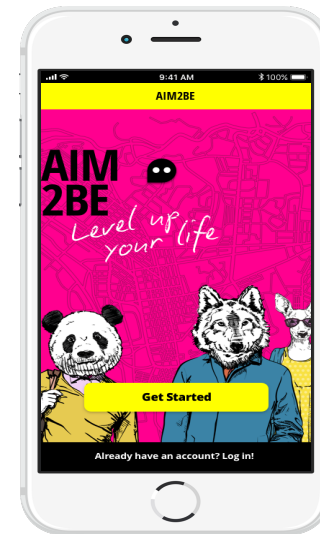
## SECONDARY OBJECTIVES

## MEASUREMENT TOOLS

- Physical activity (fitbit + fitabase)
- 3-24hr dietary recalls (WEBQ)
- Measured height / weight (BMI)
- Questionnaires administered via RedCap
- Both teens and parents will be measured

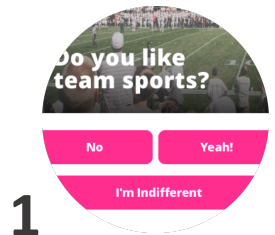


# A look at Aim2Be



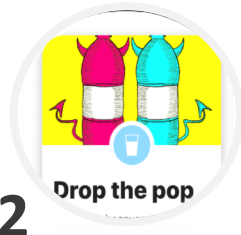


# Aim2Be at a glance



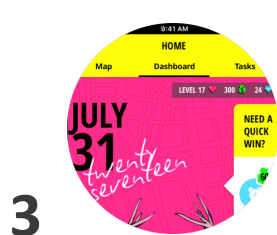
1 Onboarding

Personalizes the user experience



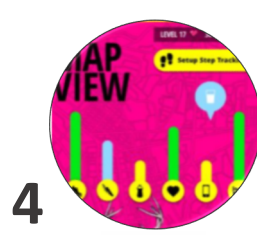
2 Aims Store

Selection of individualized Aims



3 Tasks

Aim aligned tasks help user progress in small, incremental steps



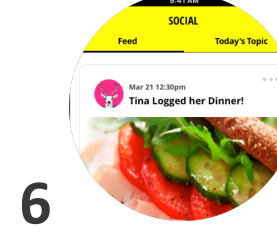
4 Map

Goal setting, self-monitoring, feedback, & review of behavioural goal



5 Articles

Information gateway supports the user to achieve their Aims



6 Social Wall

A social exchange platform supports users



7 Aimbot

A live coach and Aimbot, assist users to achieve their Aims

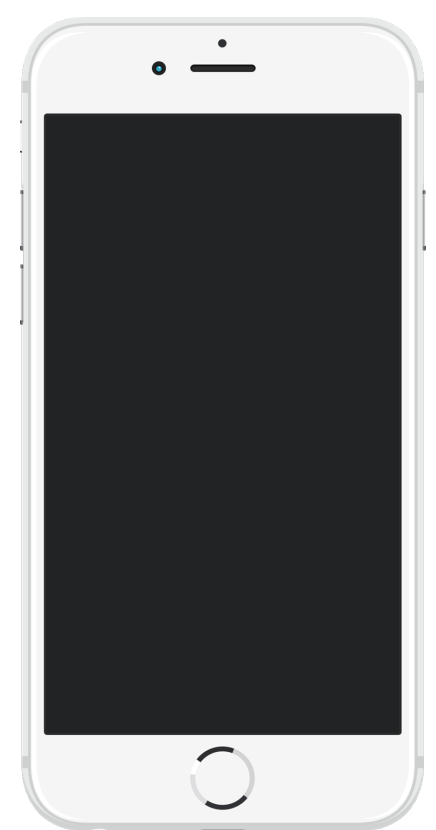
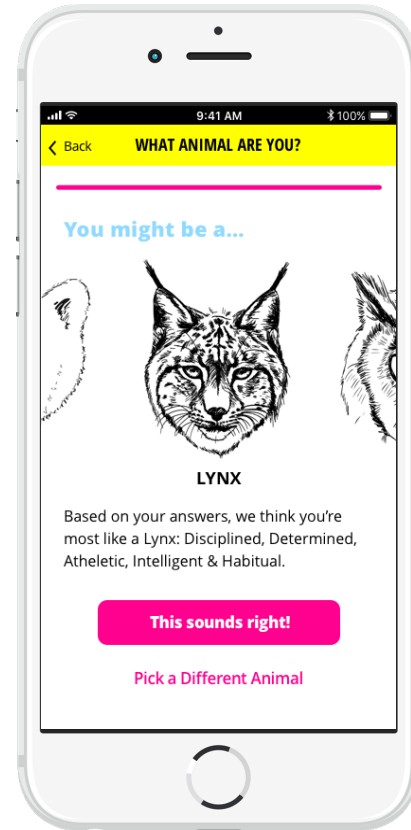
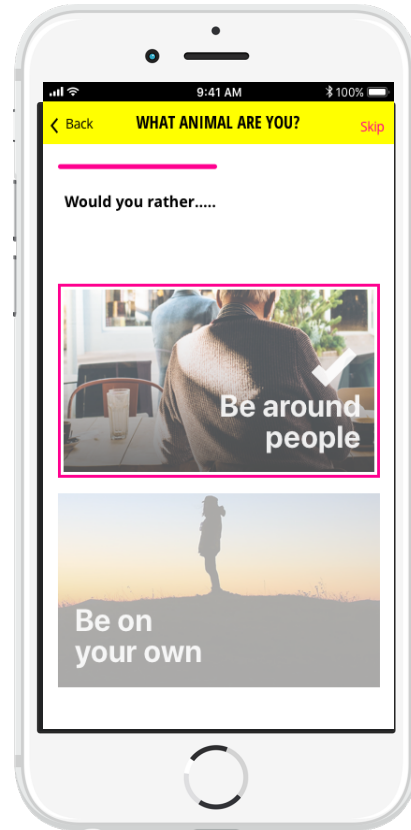
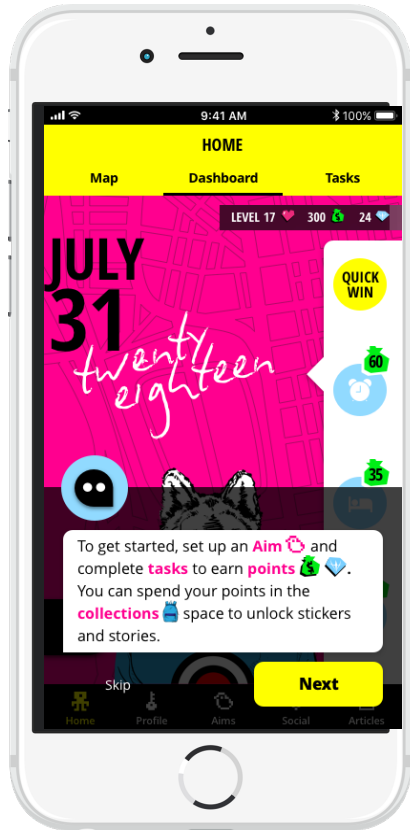
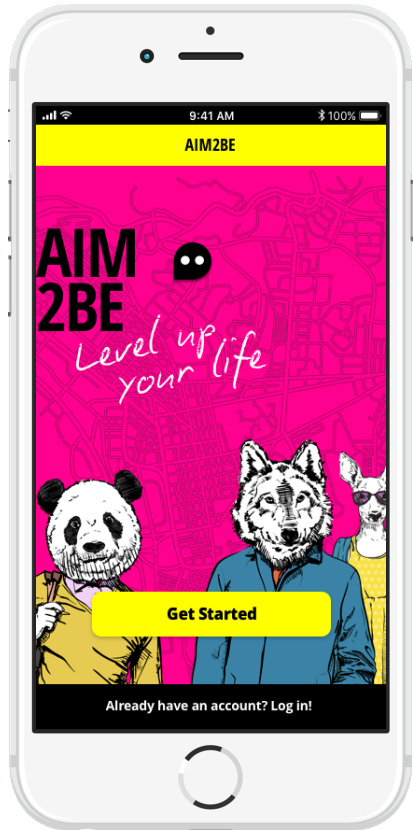


8 Stories

'Choose your own adventure' stories support improved decision making and facilitate understanding



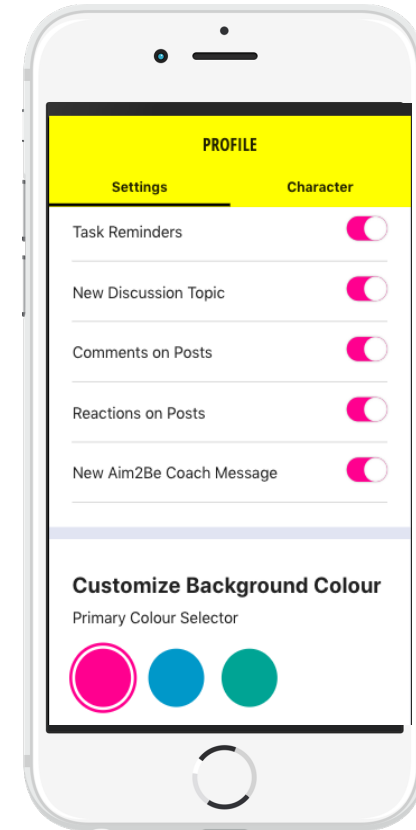
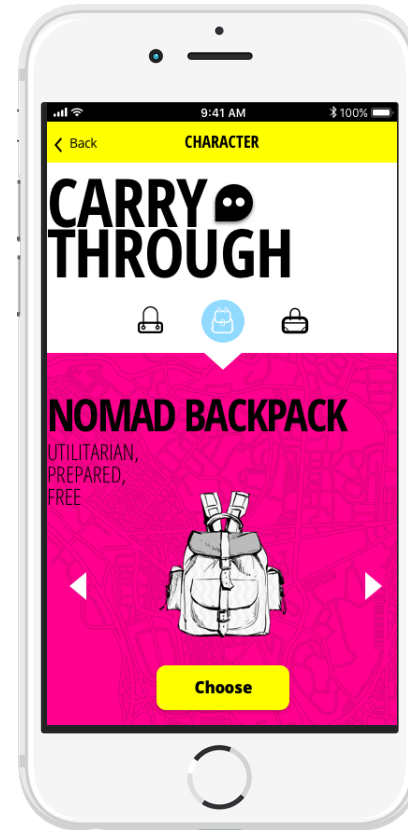
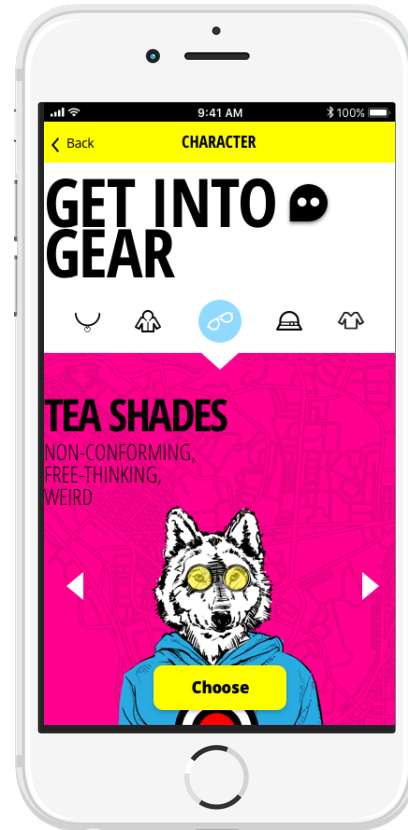
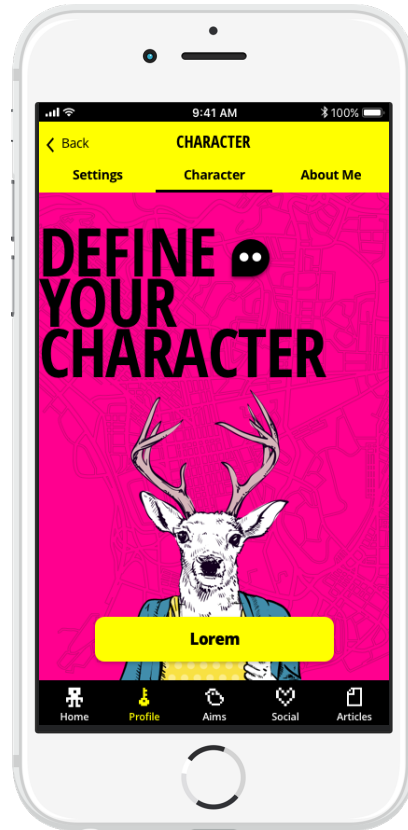
# Onboarding





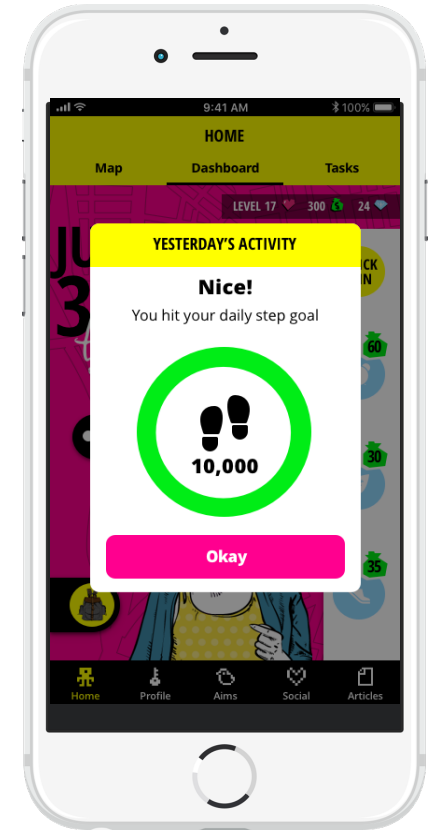
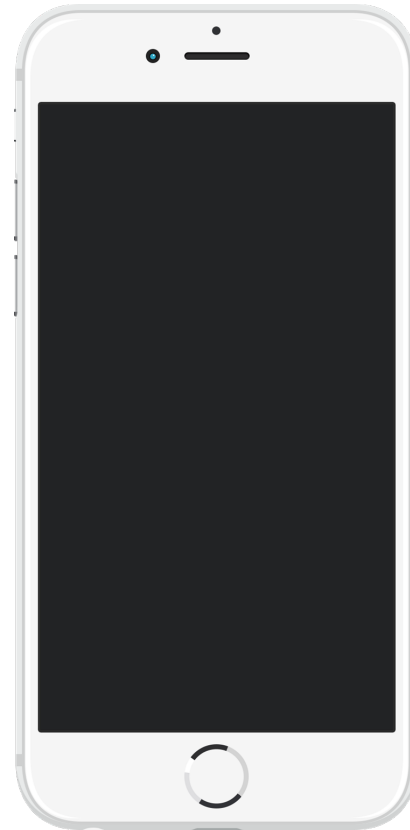
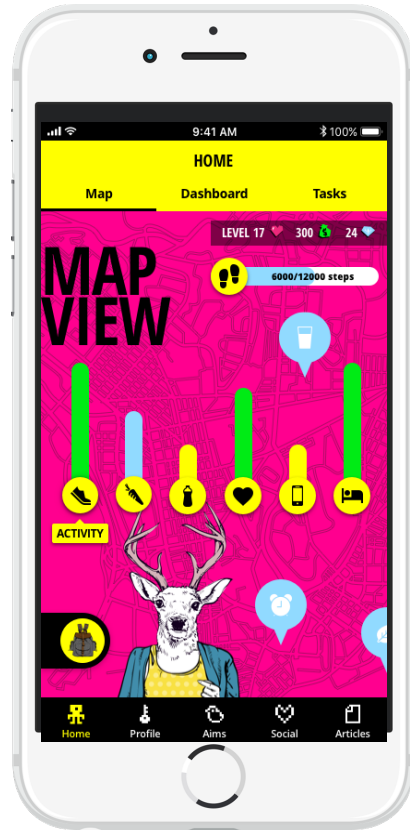
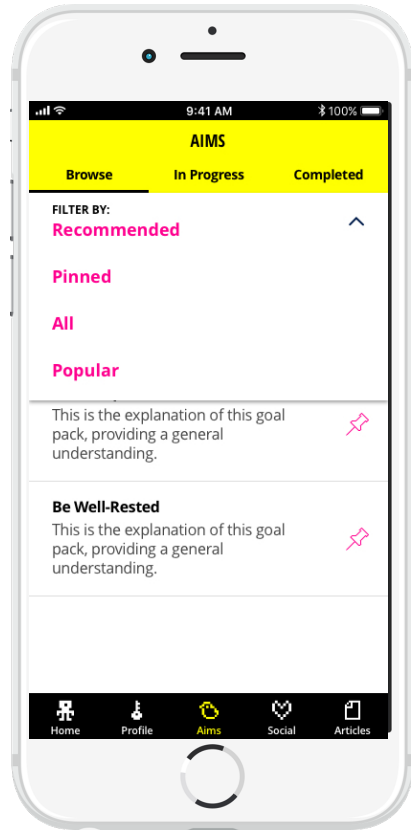
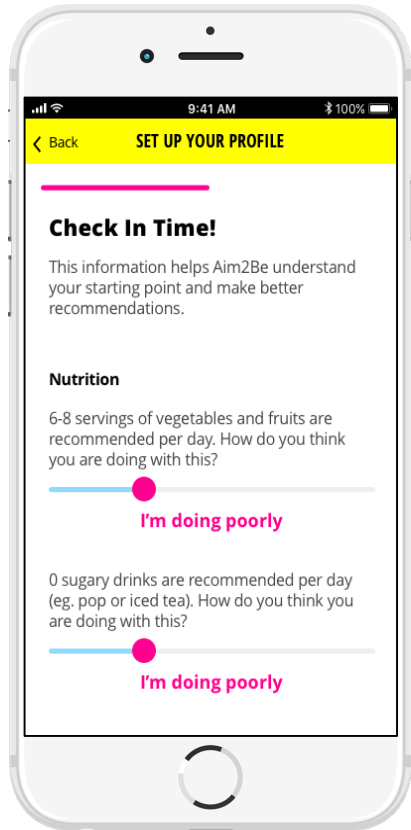


# Customizable avatar, notifications, background



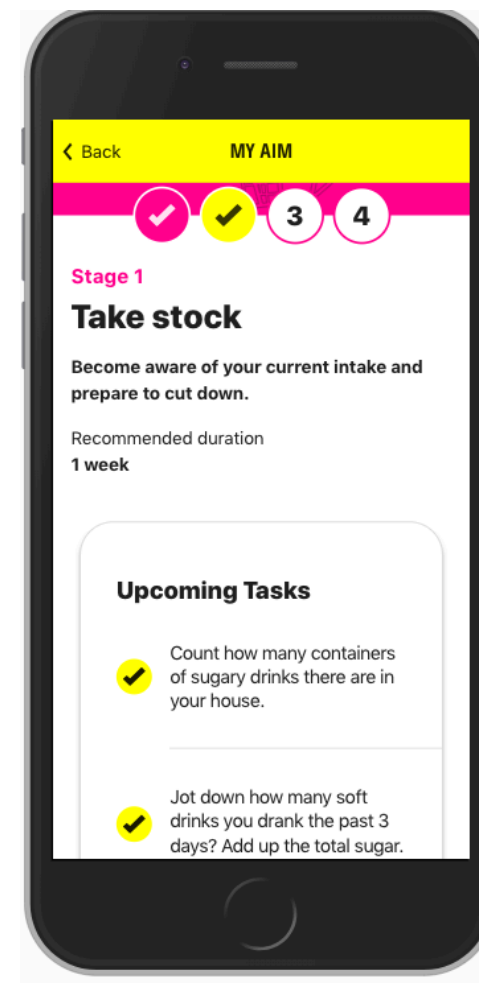
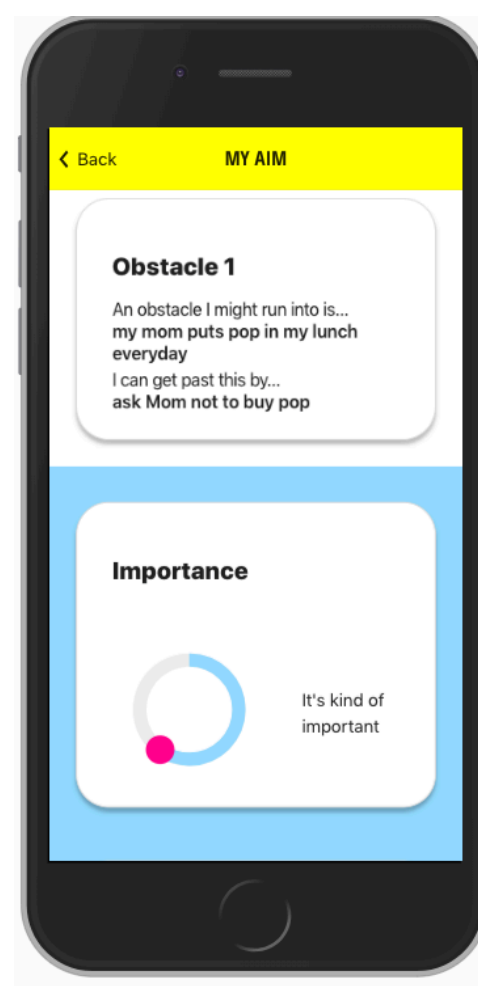
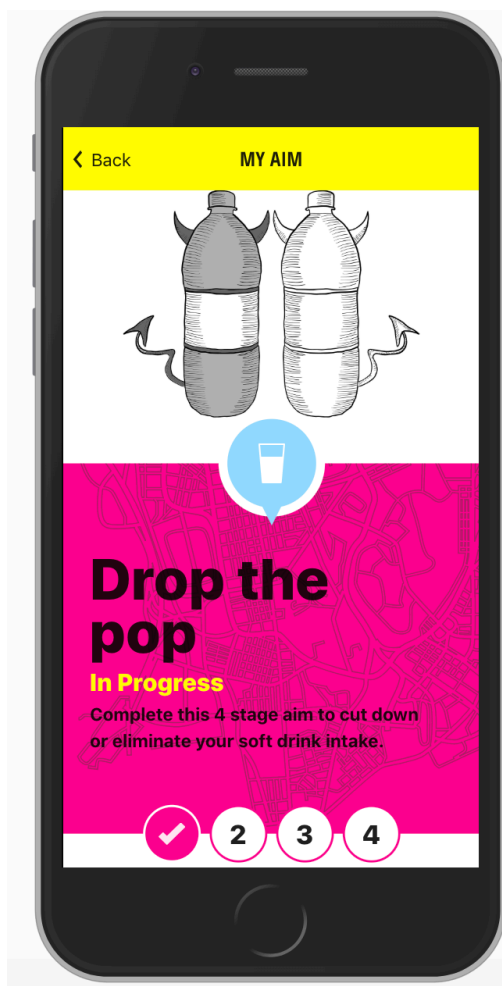
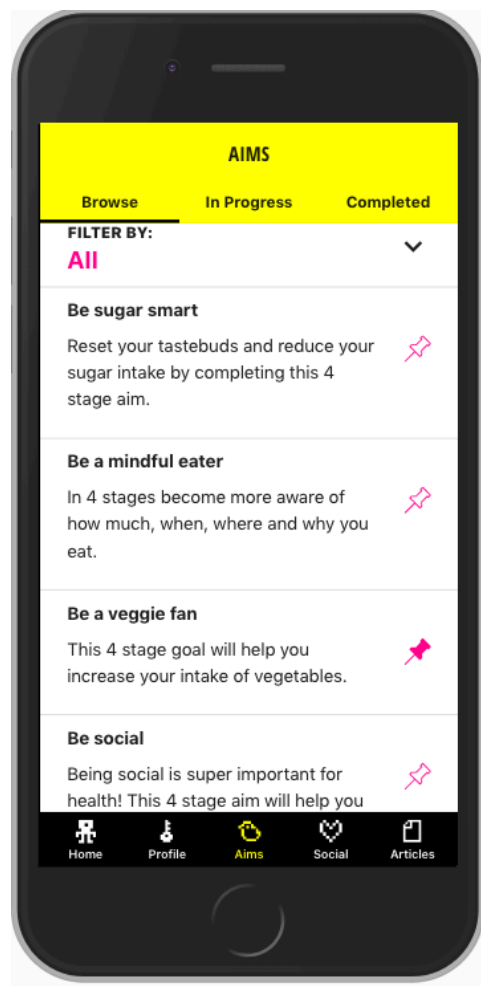


# Health Behaviour Monitoring



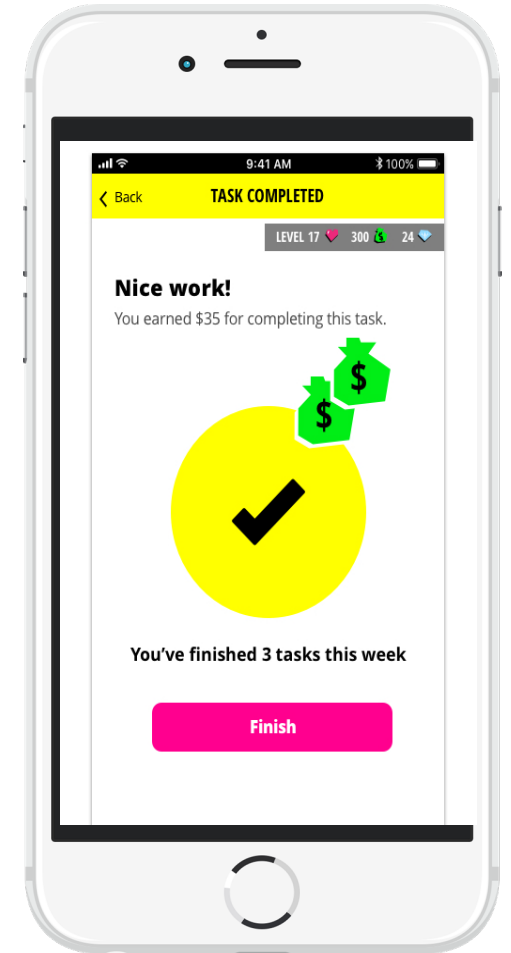
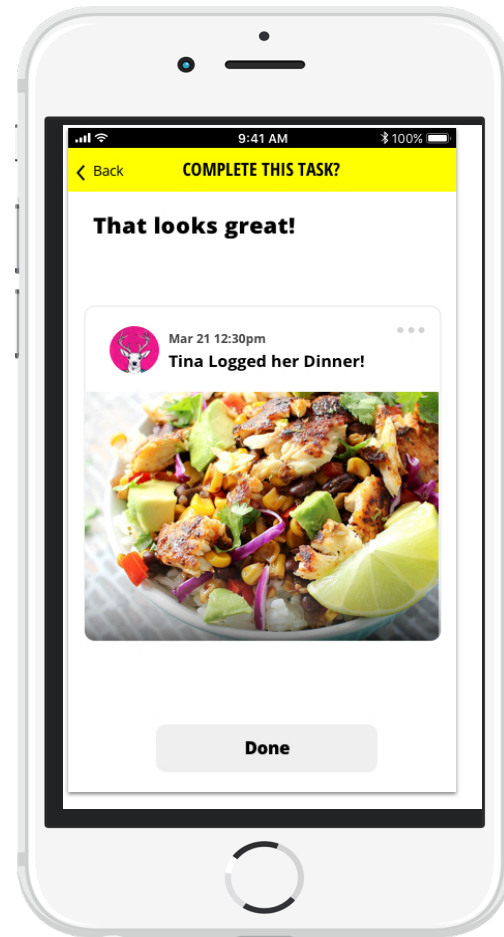
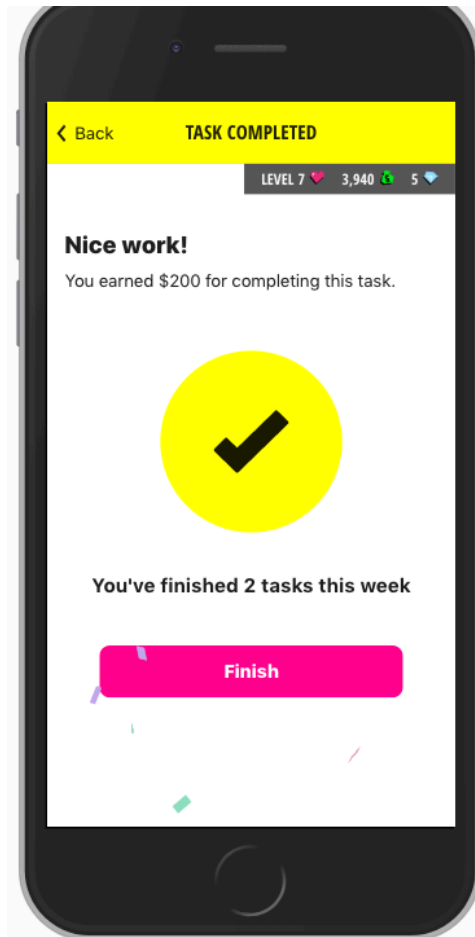
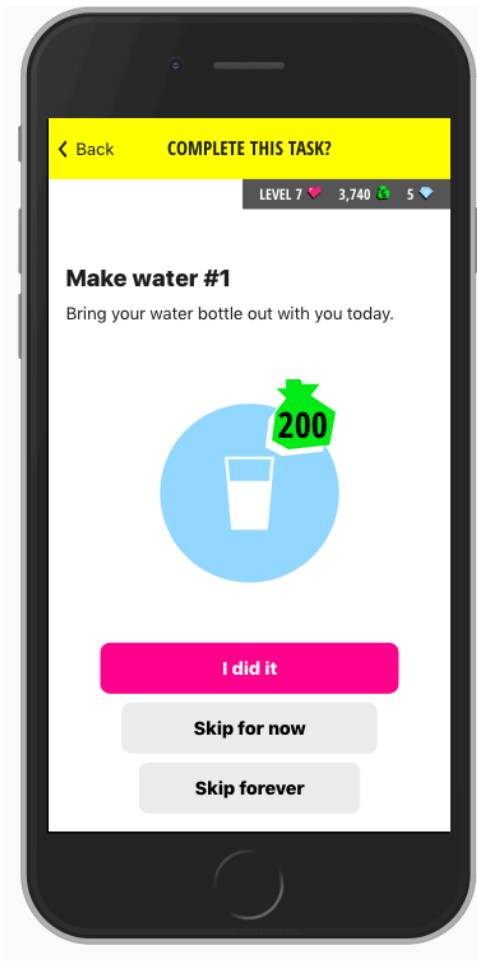


# Aims to choose from



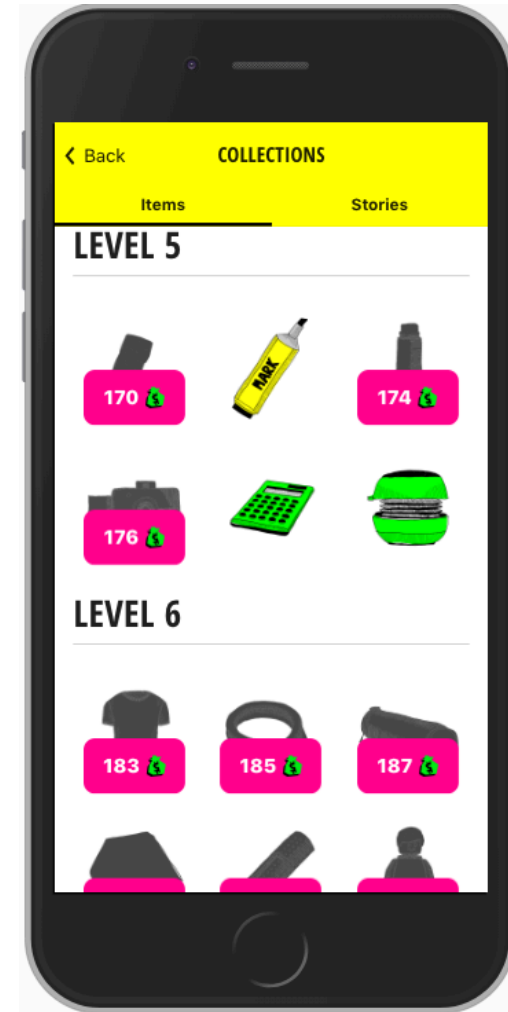
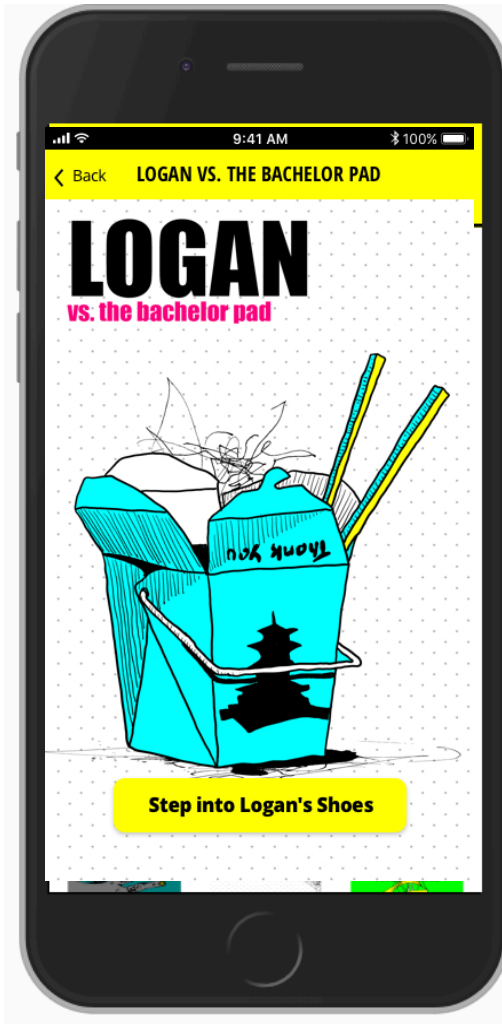
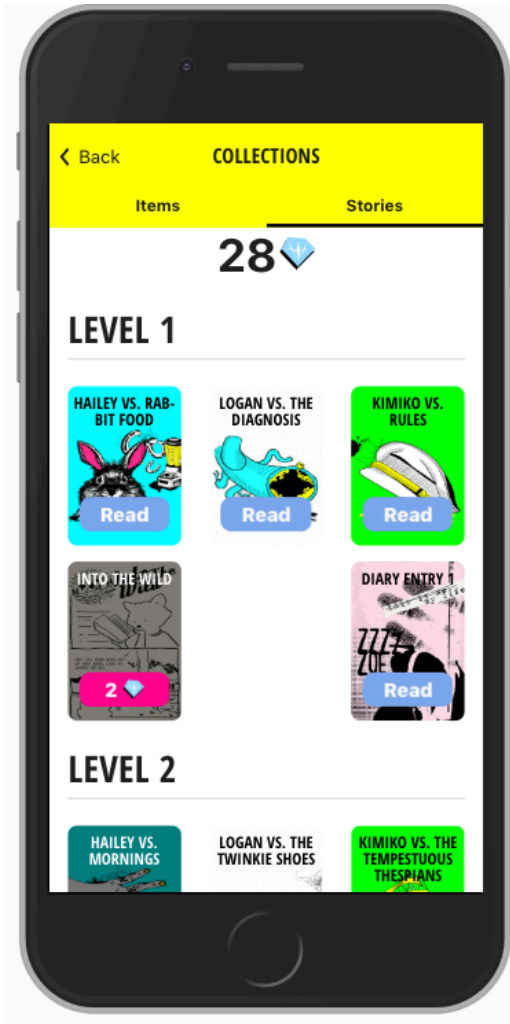


# Complete a task and earn \$\$



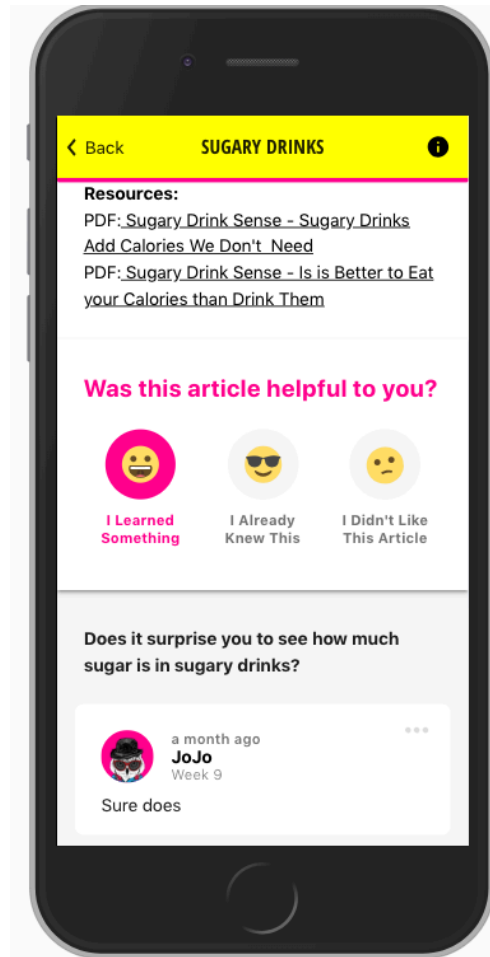
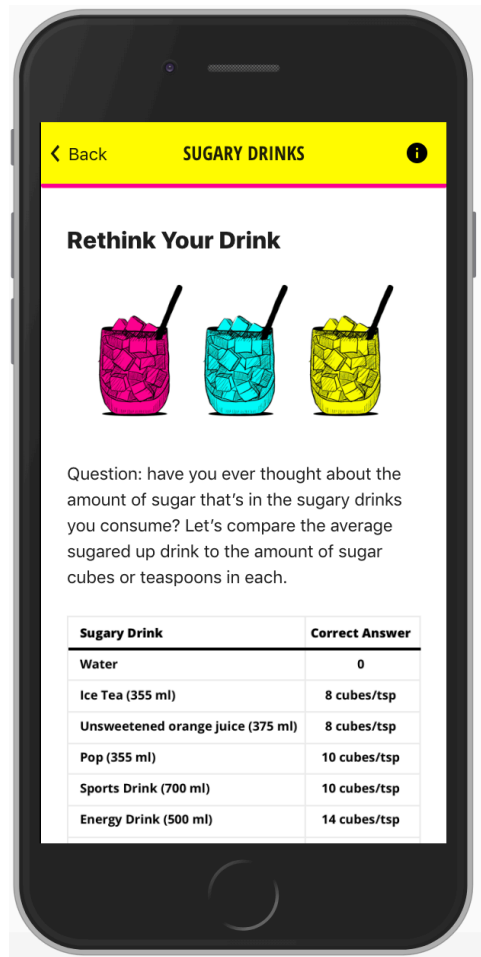


# Use \$\$ to unlock Stories or Stickers





# Articles to read and reflect on; Quizzes to complete and earn \$\$

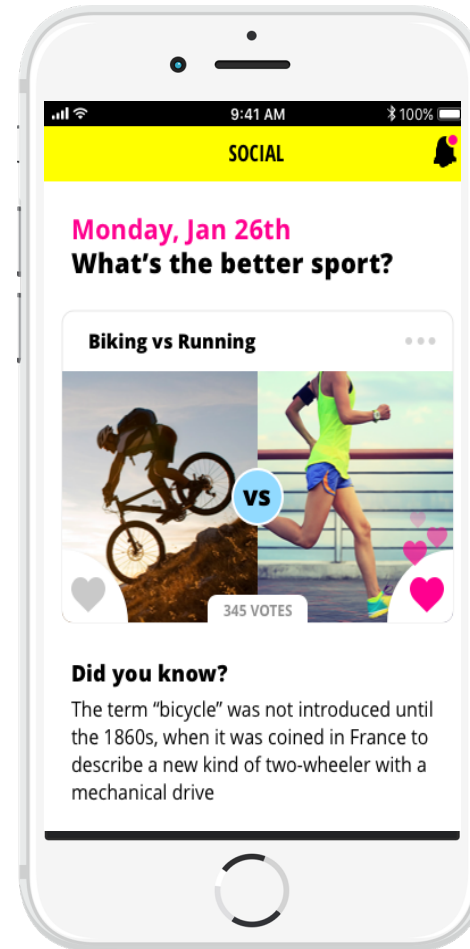
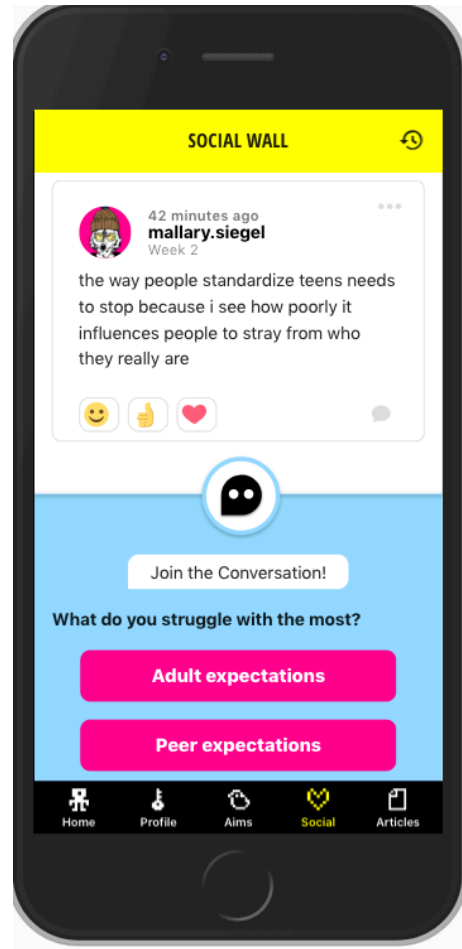
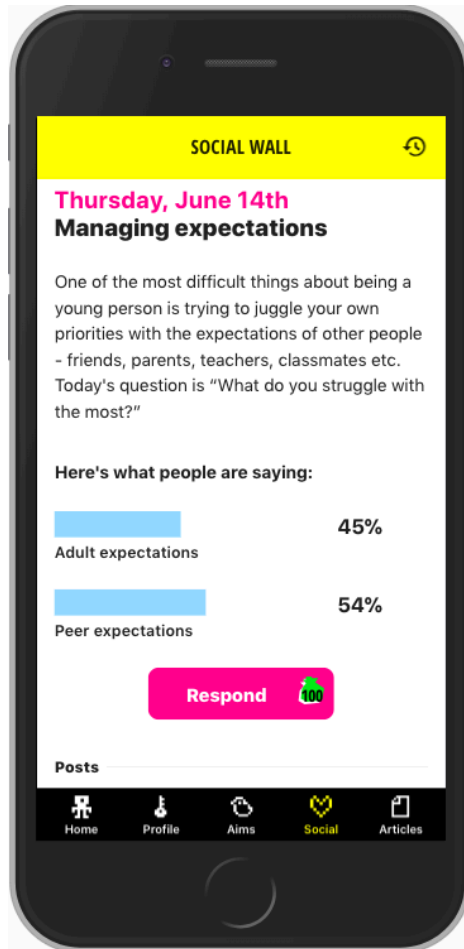


Articles written and reviewed by dietitians, physical activity experts, psychologists and academics.





# Social Wall – Post Photos



# Stay tuned for results and availability of Aim2Be

## Visit Exhibit for Aim2Be teen and parent app demos

# AIM 2BE



TEEN APP

PARENT APP

Login



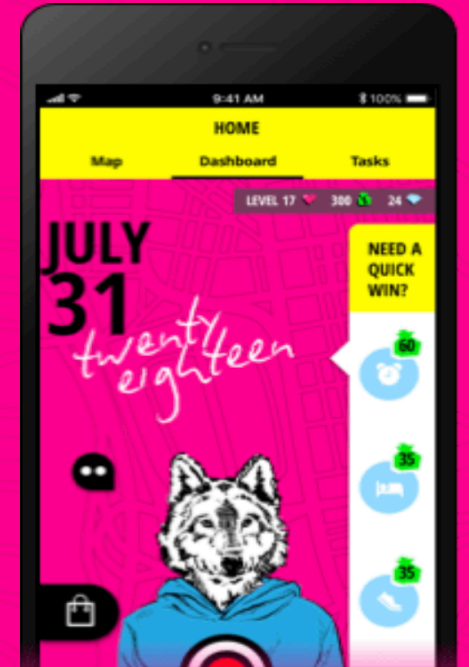
*Level up your life*

Aim2Be is designed for and by Canadian youth who don't love how their health is shaping up; who want to make a change. It's engaging, trustworthy, gamified and social.

Download on the  
App Store

GET IT ON  
Google Play

\* Aim2Be is currently only available to families who are part of a research study. Full release expected by 2020.



Visit <https://aim2be.ca/>



# Thank You

**Louise C. Mâsse, PhD**  
Professor  
University of British Columbia  
[lmasse@bcchr.ubc.ca](mailto:lmasse@bcchr.ubc.ca)

**Janice Macdonald, RD, MEd**  
Director, LiGHT  
Childhood Obesity Foundation  
[Janice@childhoodobesityfoundation.ca](mailto:Janice@childhoodobesityfoundation.ca)