Smartphone Apps to IMprove FITness and Increase Physical Activity Among Young People: The AIMFIT RCT

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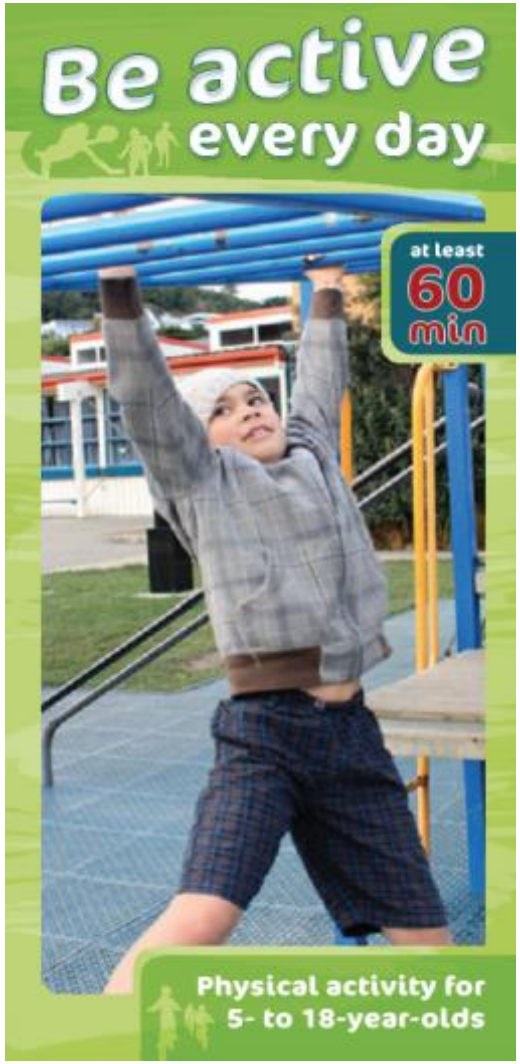
Outline

- Background
- Content Analysis of Apps
- AIMFIT study
- Discussion

PA guidelines



Ministry of Health, & Health Promotion Agency. (2010). Be Active Everyday: Physical Activity for 5- to 18-year-olds.

Proportion not achieving PA guidelines

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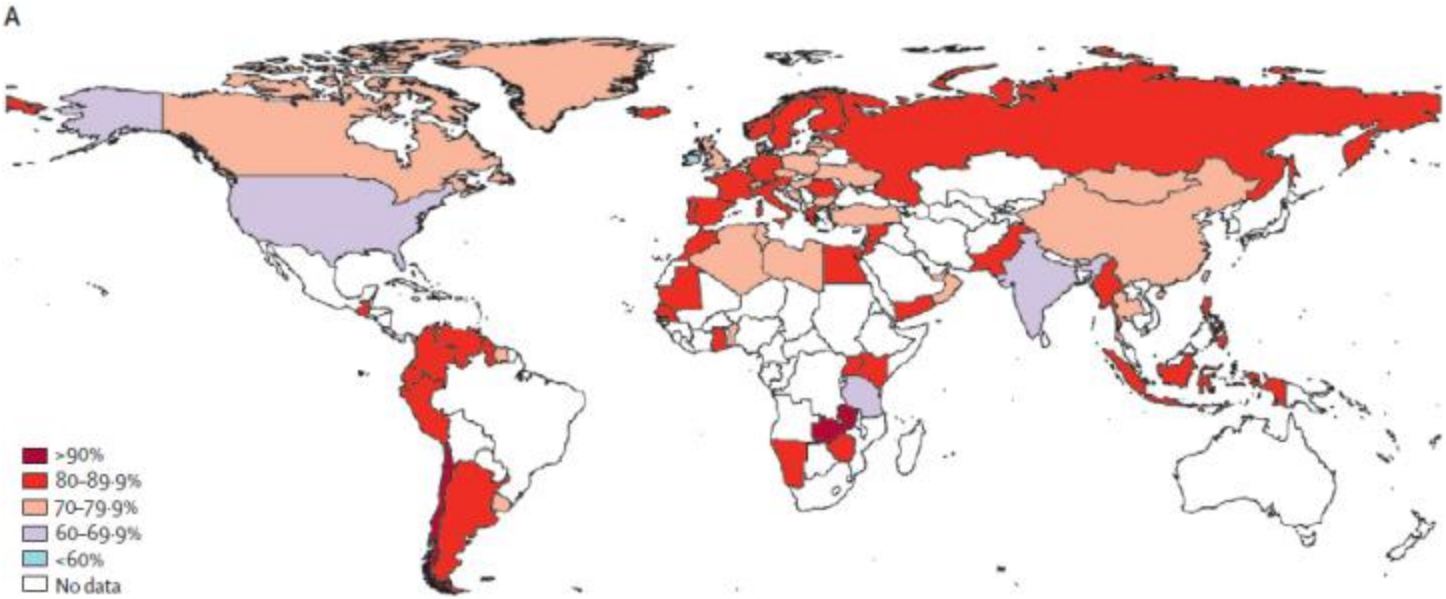

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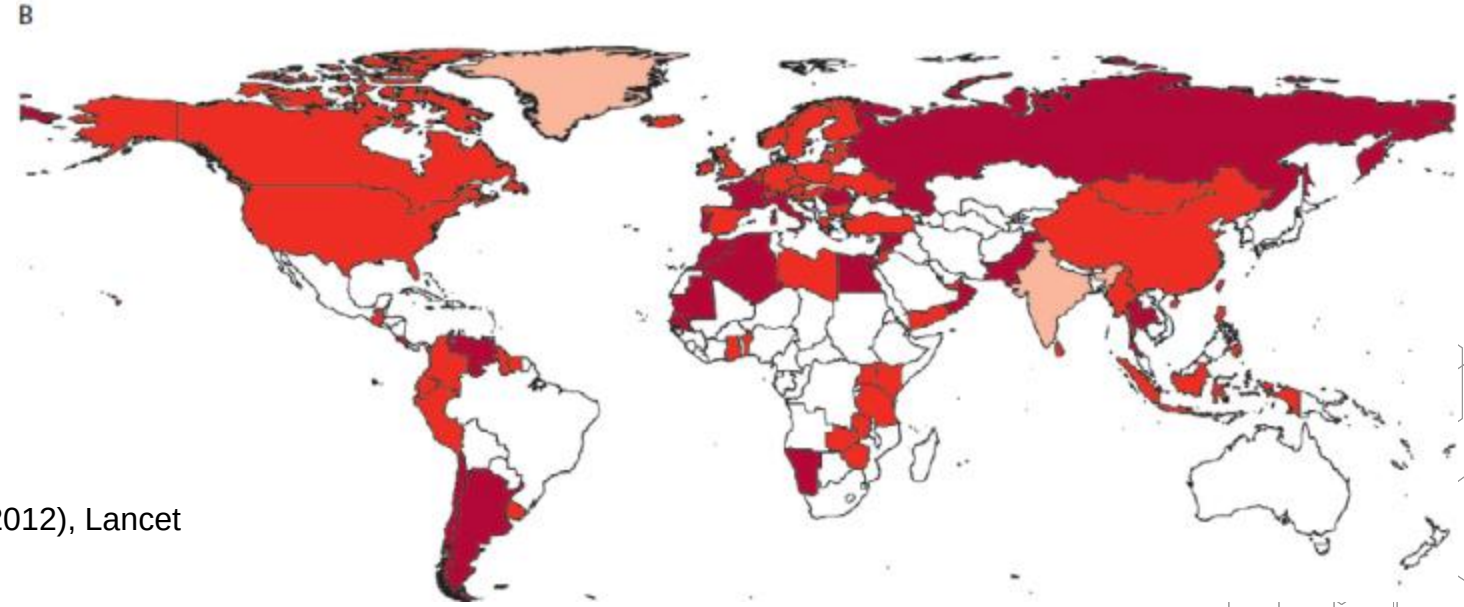

Hallal PC et al. (2012), Lancet

MVPA in NZ young people

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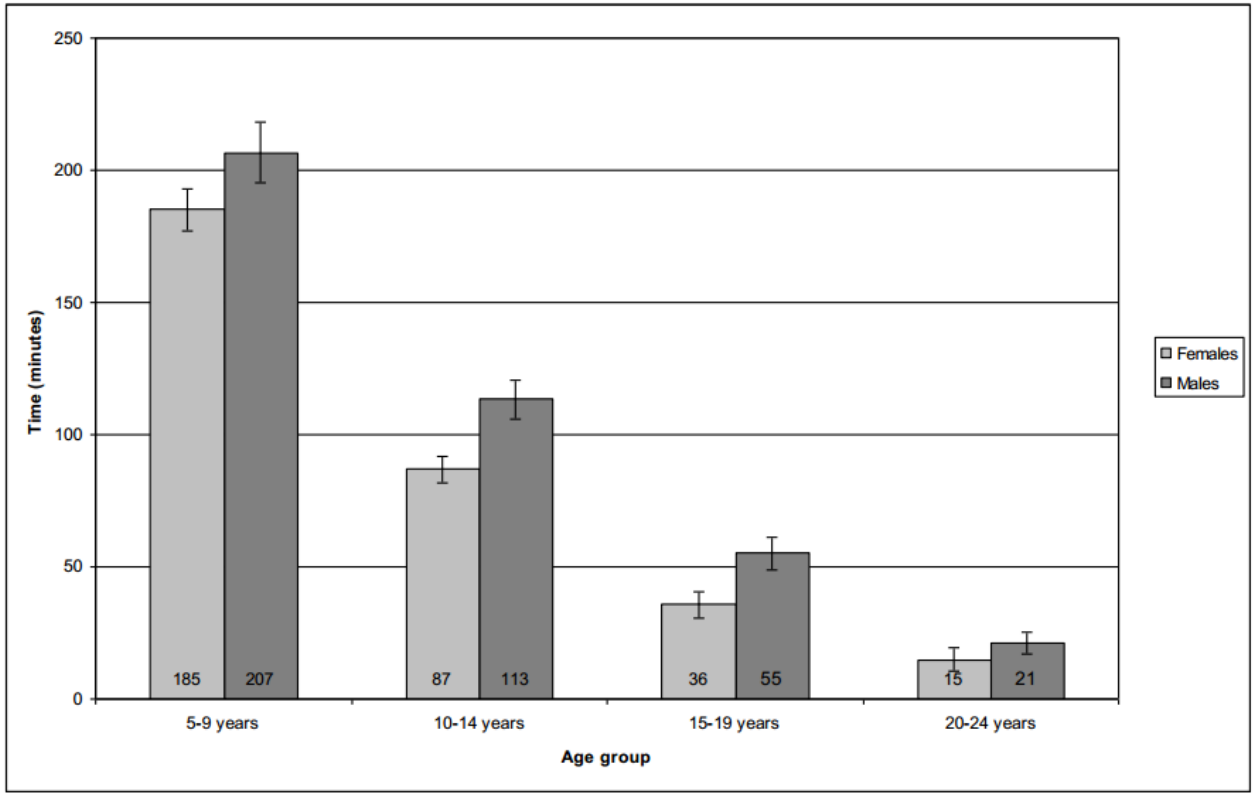
Figure 29: Time spent (min/day) in moderate- to vigorous-intensity physical activity in children and young people, by age group and gender



Clinical Trials Research Unit, & Synovate. (2010)

MVPA from ages 9-15 years

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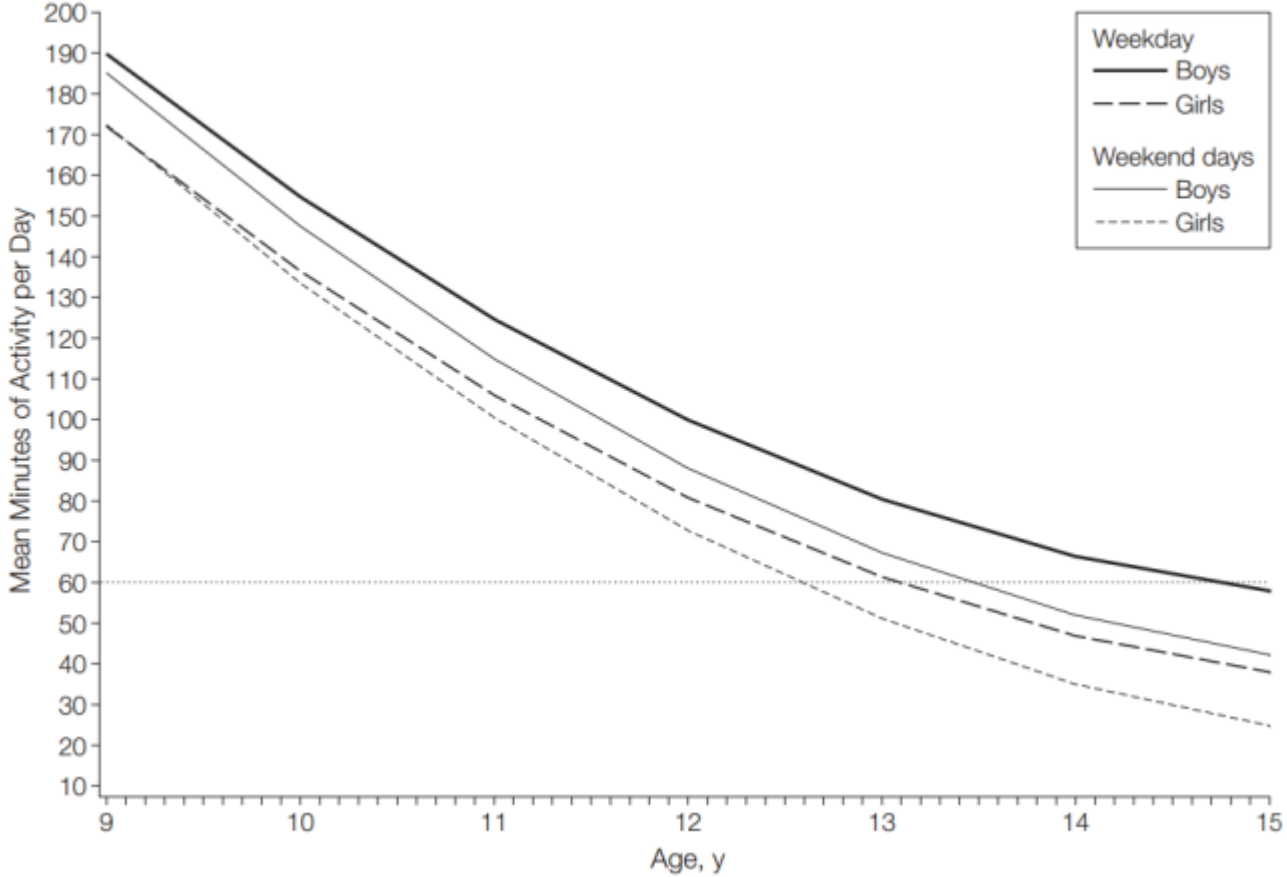
Figure 3. Average Weekday and Weekend Minutes of MVPA by Sex



Nader, P. R. et al (2008). *JAMA*

Effectiveness of PA interventions

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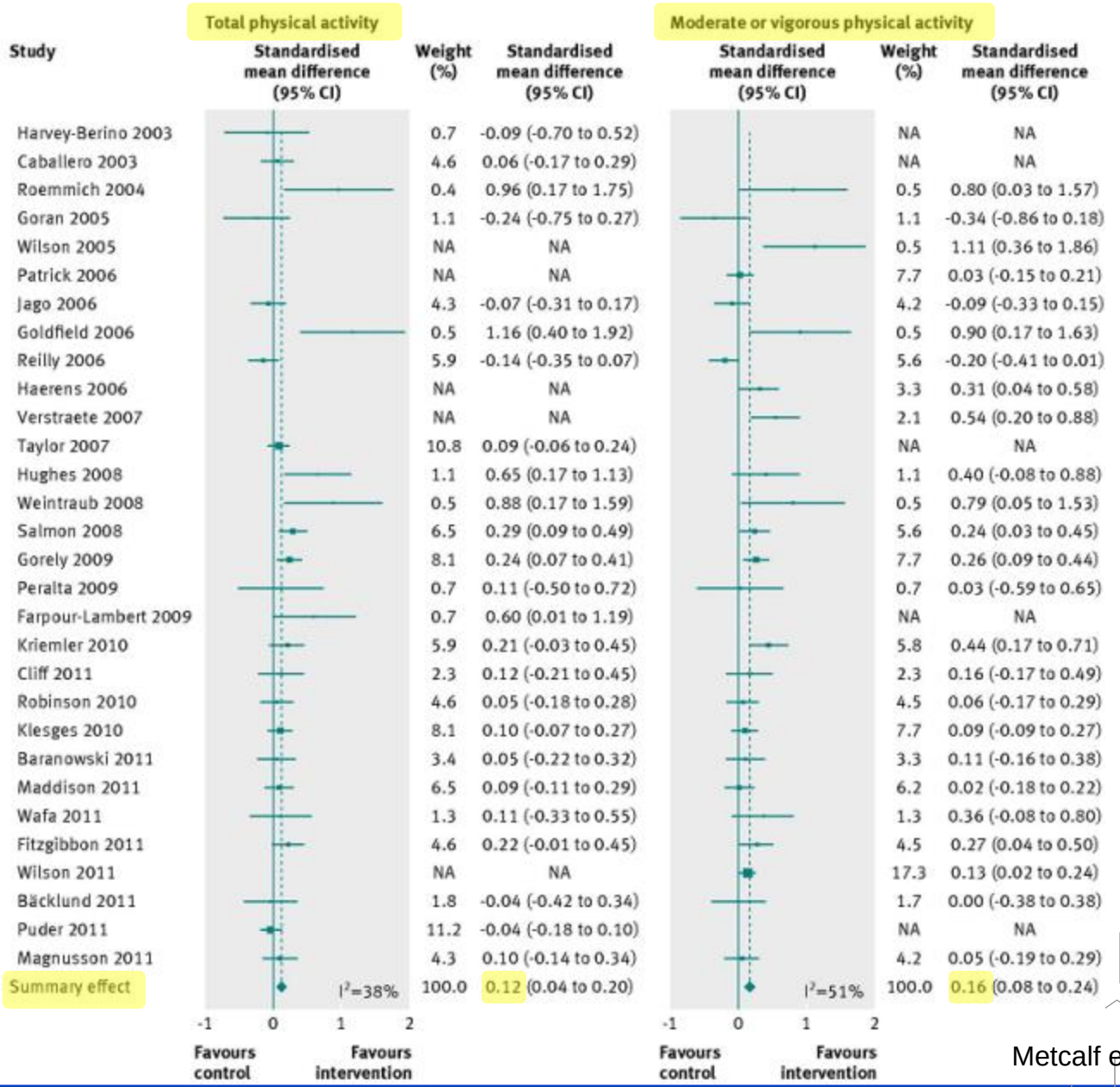

Metcalf et al (2012), BMJ

Advantages of mHealth

- Widely used
- Behavioural data collected in real time -> feedback
- Lowered participant burden
- Tailored / individualized on a large scale
- Track / self monitoring
- Adaptive interventions
- Engaging
- Process evaluation information
- Social networks

Tate, E. B. et al (2013). Transl Behav Med

Widely used – U.S. data

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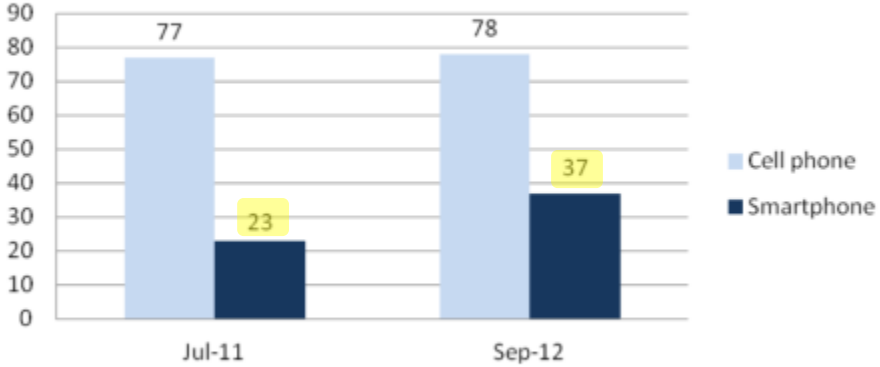
Teen Cell Phone and Smartphone Ownership

% of all teens ages 12-17



Source: Pew Internet Teens and Privacy Management Survey, July 26-September 30, 2012. N=802 parents of teens ages 12-17 and 802 teens ages 12-17. Margin of error is +/- 4.5 percentage points.

Teen Cell Phone and Smartphone Ownership Demographics

% of teens in each demographic group

		Own a Cell Phone (any kind)	Own a Smartphone
All teens, ages 12-17 (n=802)		78%	37%
Teen Gender			
a	Boys(n=405)	77	36
b	Girls (n=397)	78	38
Age of Teen			
a	12-13 (n=246)	68	23
b	14-17 (n=556)	83[a]	44[a]
Teen Gender and Age			
a	Boys, 12-13 (n=122)	65	20
b	Boys, 14-17 (n=283)	83[ac]	43[ac]
c	Girls, 12-13 (n=124)	71	26
d	Girls, 14-17 (n=273)	82[a]	44[ac]
Parent Race/ethnicity			
a	White, Non-Hispanic (n=542)	81[c]	35
b	Black, Non-Hispanic (n=122)	72	40
c	Hispanic (n=92)	64	43
Parent Education			
a	Less Than High School/High school grad (n=244)	71	35
b	Some College (n=192)	79	35
c	College + (n=363)	87[ab]	41
Parent Household Income			
a	Less than $30,000/yr (n=154)	69	39[b]
b	$30,000-$49,999 (n=155)	74	24
c	$50,000-$74,999 (n=110)	81	38
d	$75,000+ (n=335)	86[ab]	43[b]
Urbanity			
a	Urban (n=278)	76	42[c]
b	Suburban (n=410)	81	39[c]
c	Rural (n=101)	73	19

Madden, M. et al (2013). Pew Research Center's Internet & American Life Project.

NZ data – Digital divides?

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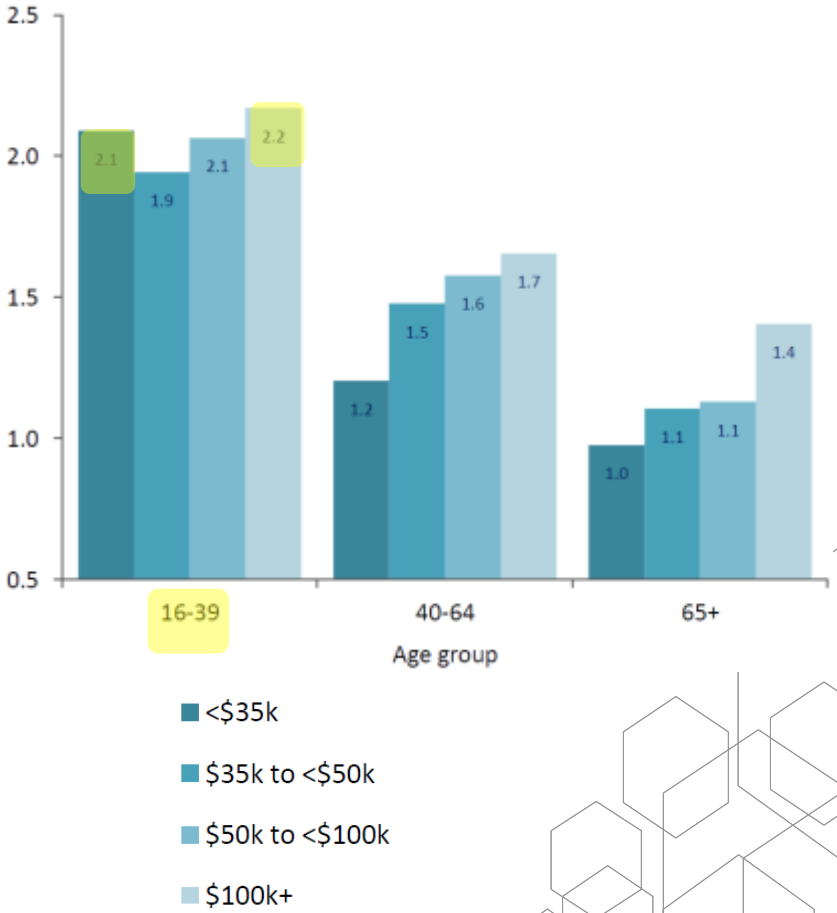
% Users by year and household income

Usage Index by age and household income



Crothers C. et al (2014). Internet trends in New Zealand 2007-2013.
Crothers C. et al (2013). The Internet in New Zealand 2013.

NZ data – Digital divides?

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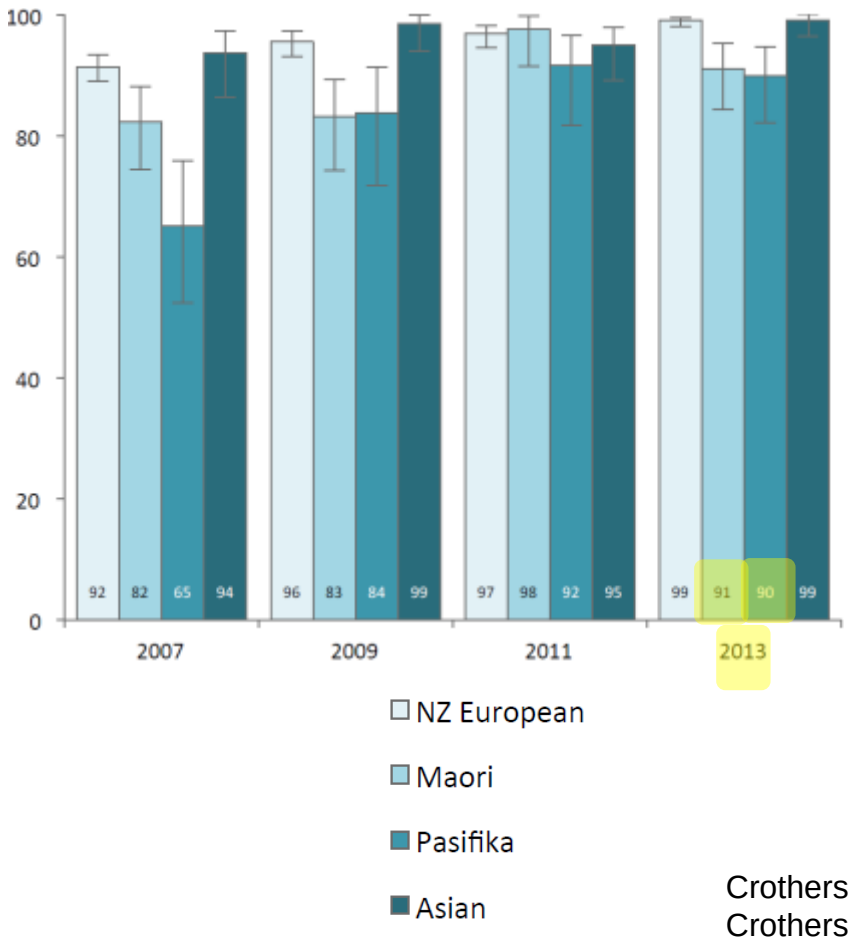
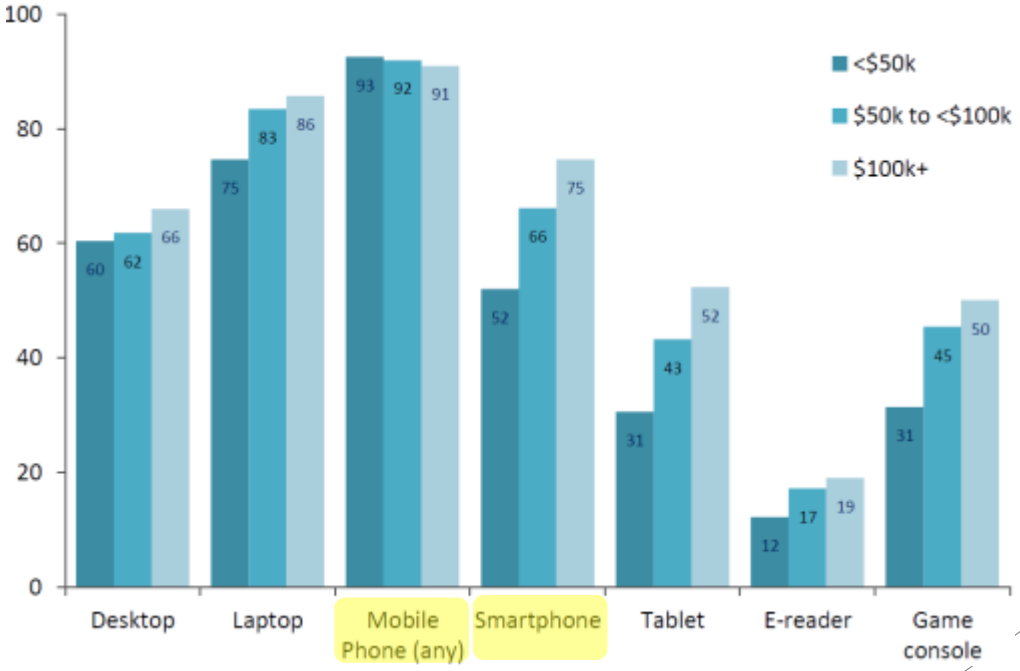
% Internet user in 16-49 age group



% With access to device in their household



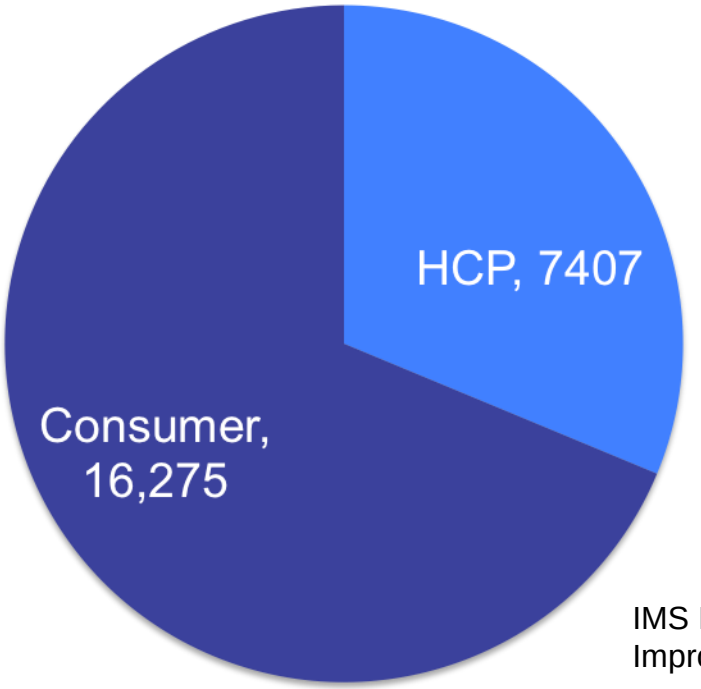
Crothers C. et al (2014). Internet trends in New Zealand 2007-2013.
Crothers C. et al (2013). The Internet in New Zealand 2013.

Proliferation of mobile apps

43,682 “Health & Fitness” apps

23,682 genuine healthcare related

20,007 mis-categorized “loosely healthcare related”



IMS Institute for Healthcare Informatics. (2013). Patient Apps for Improved Healthcare: From Novelty to Mainstream

Content Analysis of Apps

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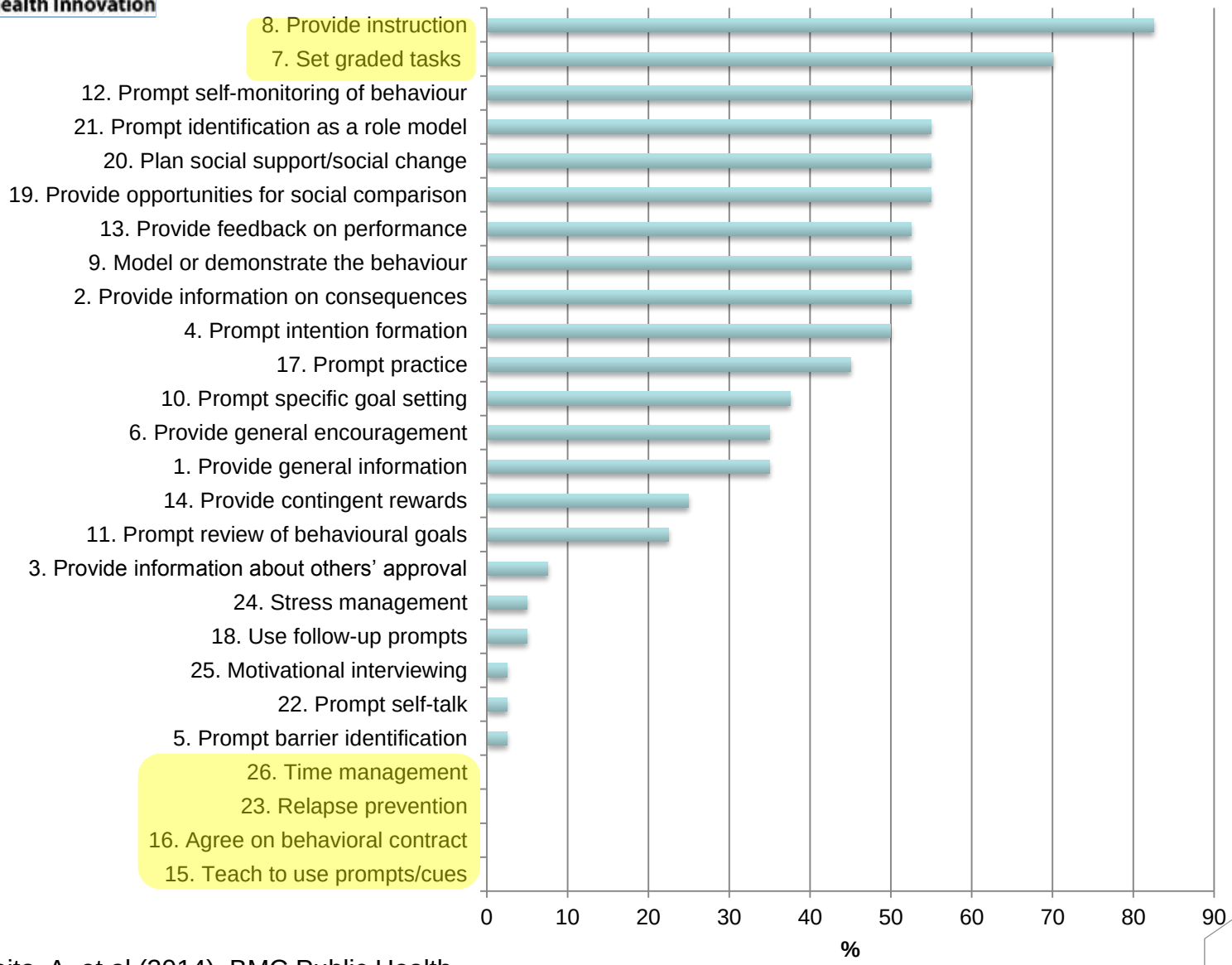
BCTs in PA and dietary apps



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What about effectiveness?

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REVIEWARTICLE PEDIATRICOBESITY doi:10.1111/ijpo.12002

Prevention and treatment of pediatric obesity using mobile and wireless technologies: a systematic review

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Summary

Mobile health (mHealth) is a relatively nascent field, with a variety of technologies being explored and developed. Because of the explosive growth in this field, it is of interest to examine the design, development and efficacy of various interventions as research becomes available. This systematic review examines current use of mHealth technologies in the prevention or treatment of pediatric obesity to catalogue the types of technologies utilized and the impact of mHealth to improve obesity-related outcomes in youth. Of the 4021 articles that were identified, 41 articles met inclusion criteria. Seventeen intervention studies incorporated mHealth as the primary or supplementary treatment. The remaining articles were in the beginning stages of research development and most often described moderate-to-high usability, feasibility and acceptability. Although few effects were observed on outcomes such as body mass index, increases in physical activity, self-reported breakfast and fruit and vegetable consumption, adherence to treatment, and self-monitoring were observed. Findings from this review suggest that mHealth approaches are feasible and acceptable tools in the prevention and treatment of pediatric obesity. The large heterogeneity in research designs highlights the need for more agile scientific processes that can keep up with the speed of technology development.

Keywords: MHealth, mobile health, obesity, pediatric obesity.

Abbreviations: apps, applications; BMI, body mass index; FV, fruit and vegetable; GPS, global positioning satellite system; mHealth, mobile health; PA, physical activity; PDA, personal digital assistant; RCT, randomized controlled

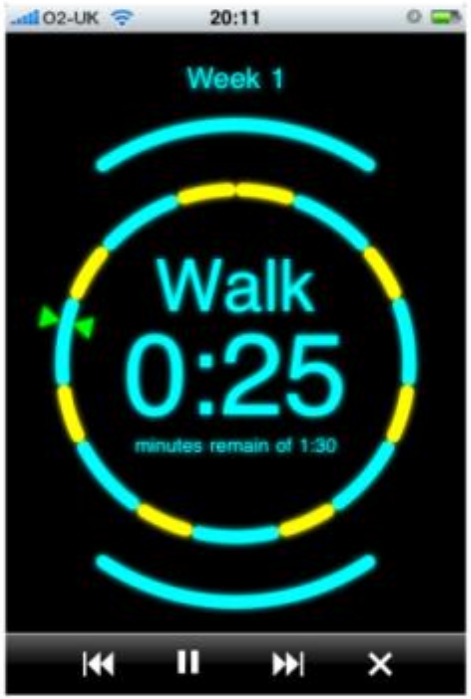
REVIEWARTICLE

“In search of a few good apps”

- Rather than developing new apps…
- Important to determine whether commercially available apps are effective

Apps for IMproving FITness

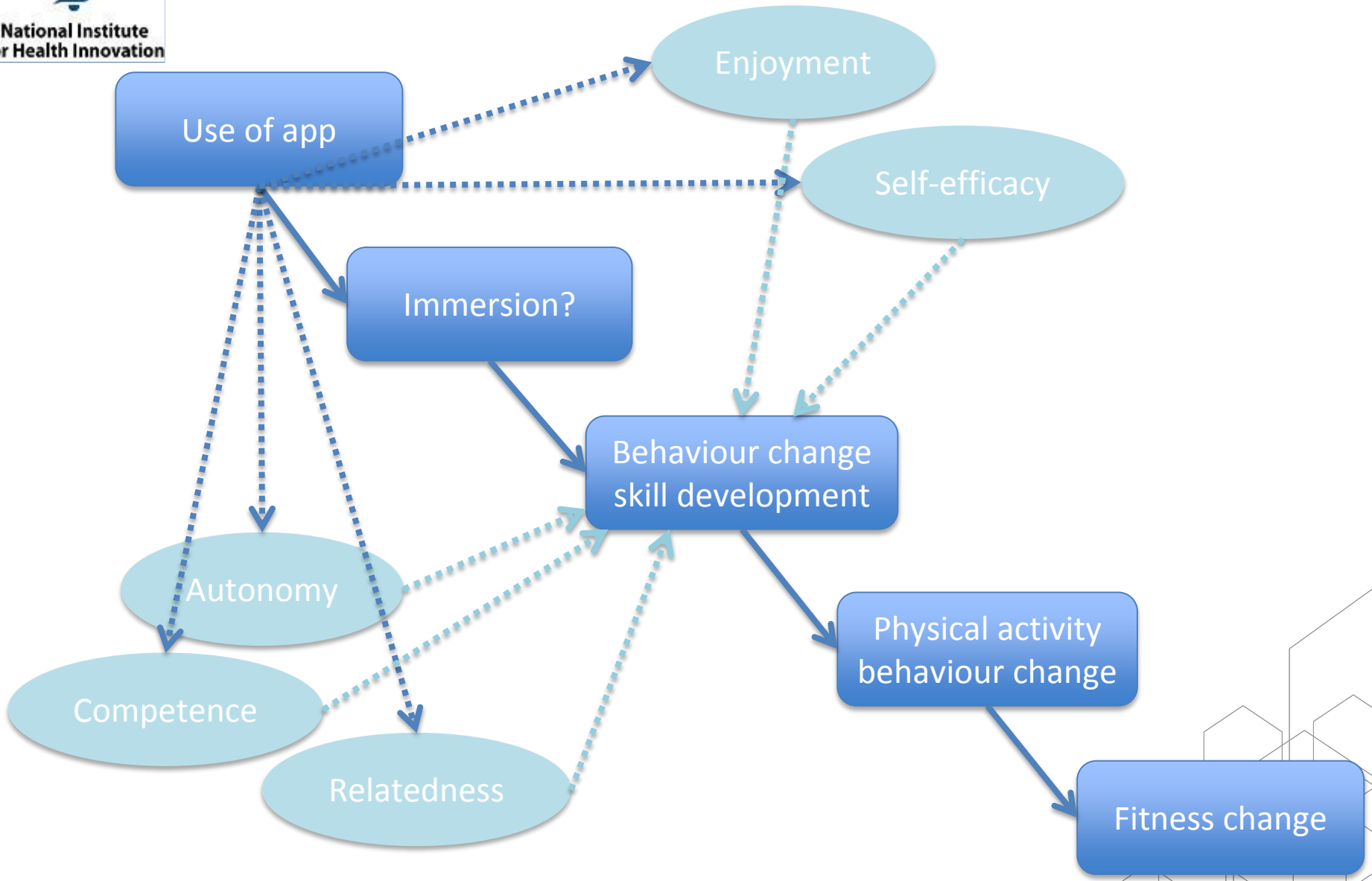
- Effects of two smartphone/iPod apps on physical activity and cardiorespiratory fitness



Eligibility criteria

- 14-17 years;
- Own an iPod touch® (running iOS 6.0 or later) or a smartphone (iPhone® running iOS 6.0 or Android® 2.2 and up);
- Not meeting the NZ PA guidelines;
- Able to perform PA;

Conceptual model



Apps for IMproving FITness

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Baseline Assessment

- Consent/assent form collected
- PAQA
- PACES
- PNSES
- PASES
- Height and weight
- 1 mile/1.6 km run/walk test
- Accelerometer delivered

Randomisation N=51

Immersive App Intervention

8 week training program and immersing story

Non immersive App Intervention

8 week training program only

Usual activities

8 Week Assessment

- PAQA
- PACES
- PNSES
- PASES
- Acceptability and usability questionnaire
- Adverse events
- Height and weight
- 1 mile/1.6 km run/walk test
- Accelerometer delivered

Apps for IMproving FITness

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Randomisation N=51

Immersive App Intervention

8 week training program and immersing story

Non immersive App Intervention

8 week training program only

Usual activities

Available on the App Store

Google play

Non-immersive VS immersive

- Identical training program but:
- Non-immersive
  - More prescriptive
  - No storyline or characters

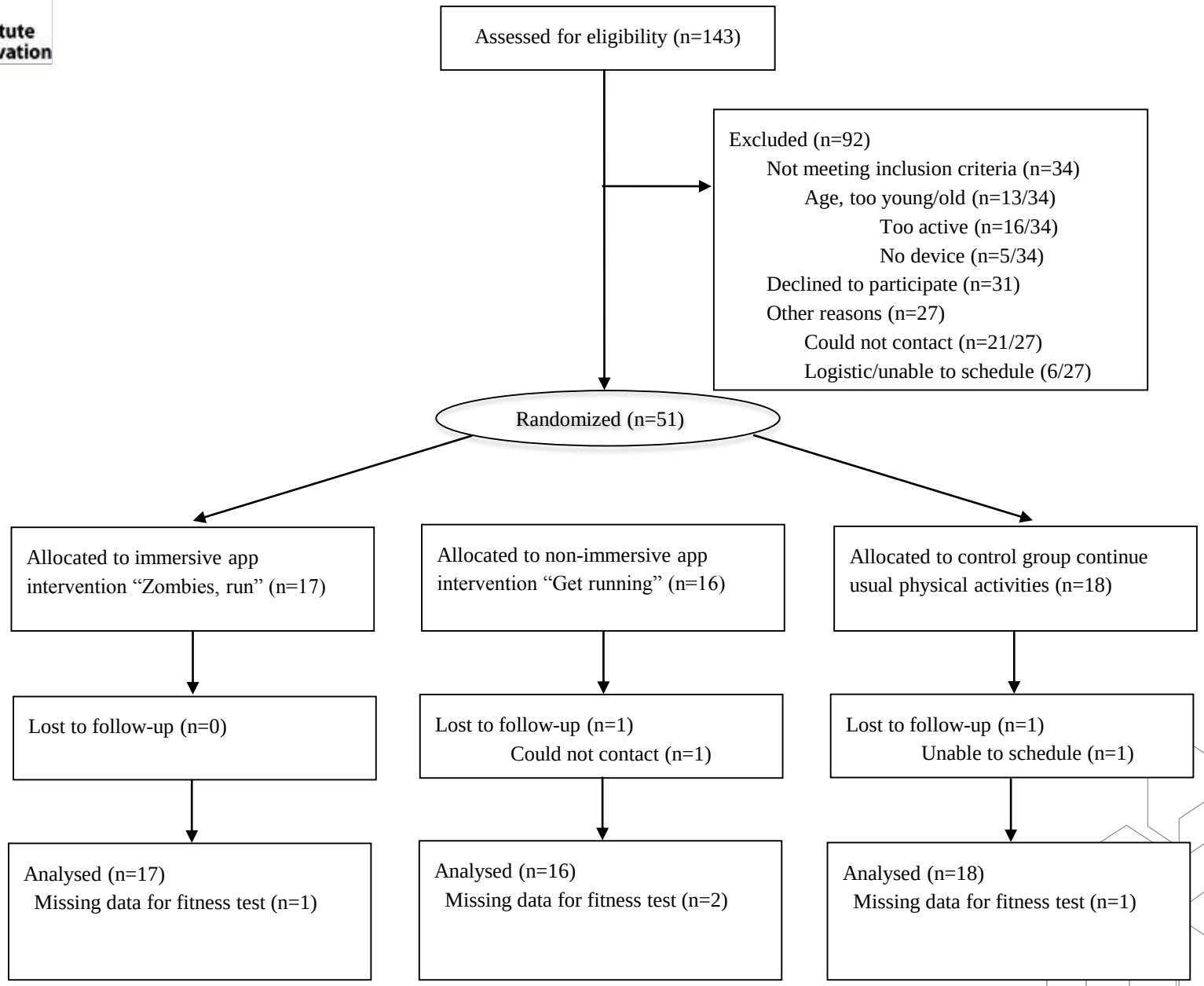
- Immersive
  - Fun and engaging
  - Storyline with characters

Baranowski, T. et. al (2008). *Am J Prev Med*

Zombies, Run! 5K Training

Get Running! Couch to 5k

Flow diagram of participants



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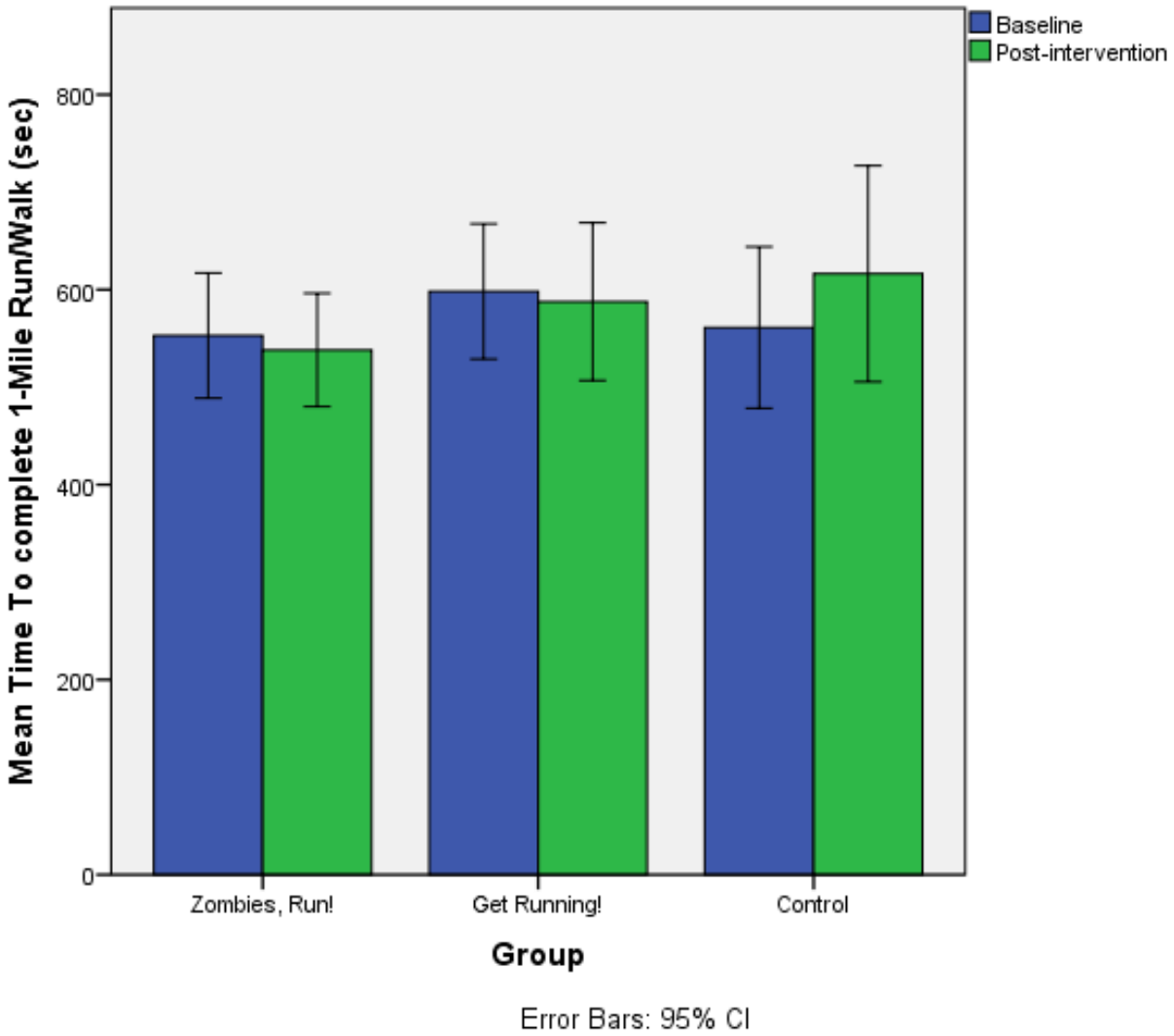
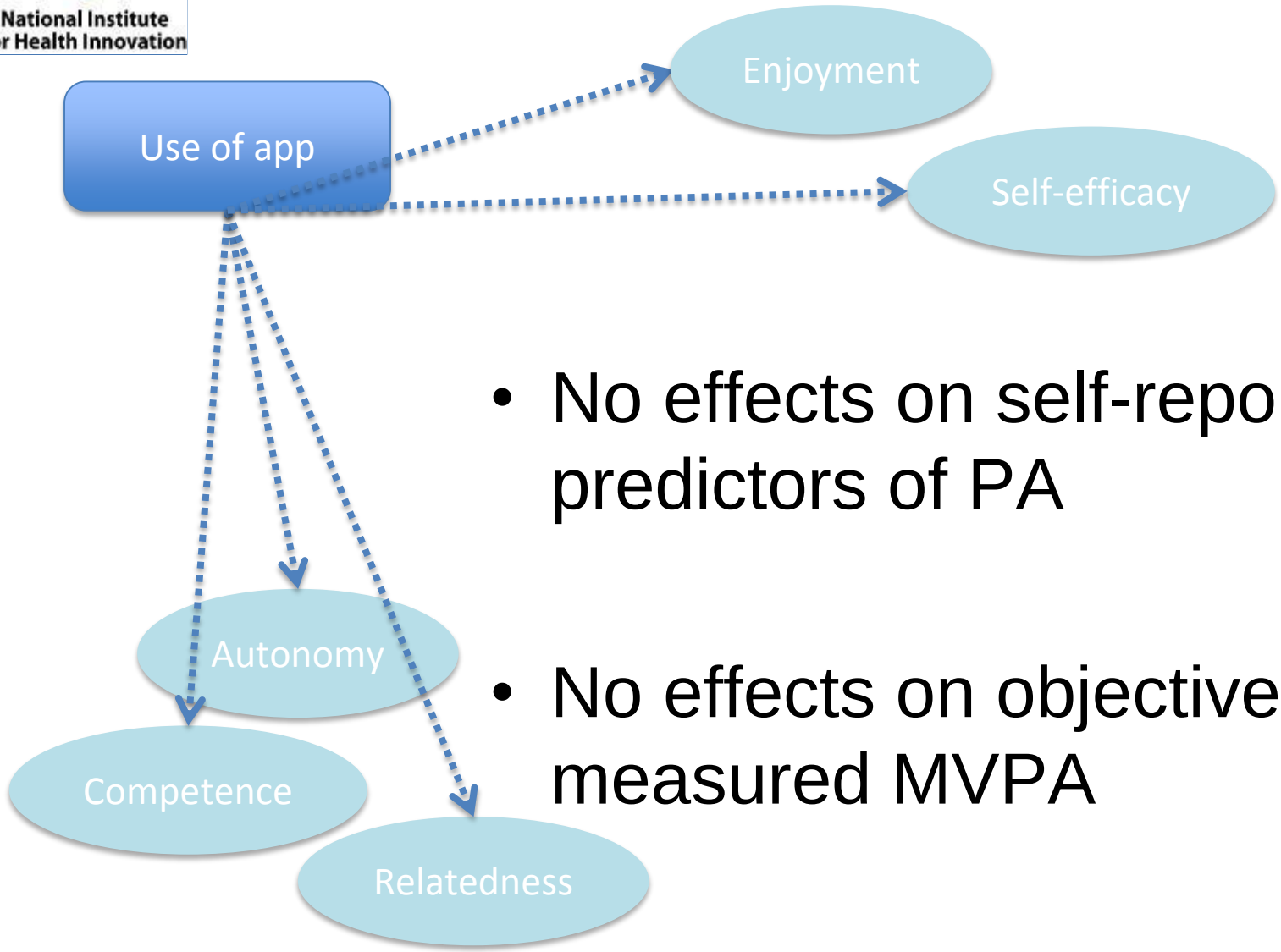
Baseline characteristics

	"Zombies, run" n = 17	"Get running" n = 16	Control n =18	Total N = 51
Age, mean (SD), years	15.78 (1.11)	15.69 (1.04)	15.55 (1.32)	15.67 (1.15)
Sex, *n* (%)				
Male	8 (47.1)	6 (37.5)	8 (44.4)	22 (43.1)
Female	9 (52.9)	10 (62.5)	10 (55.6)	29 (56.9)
Ethnicity, *n* (%)				
Maori	3 (17.6)	0 (0)	0 (0)	3 (5.9)
NZ European	9 (52.9)	9 (56.3)	13 (72.2)	31 (60.8)
Pacific	4 (23.5)	3 (18.8)	4 (22.2)	11 (21.6)
Asian	0 (0)	3 (18.8)	1 (5.6)	4 (7.8)
Other	1 (5.9)	1 (6.3)	0 (0)	2 (3.9)
Device, *n* (%)				
iPhone	8 (47.1)	6 (37.5)	11 (61.1)	25 (49.0)
Android	5 (29.4)	7 (43.8)	5 (27.8)	17 (33.3)
iPod Touch	4 (23.5)	3 (18.8)	2 (11.1)	9 (17.6)

Primary Outcome

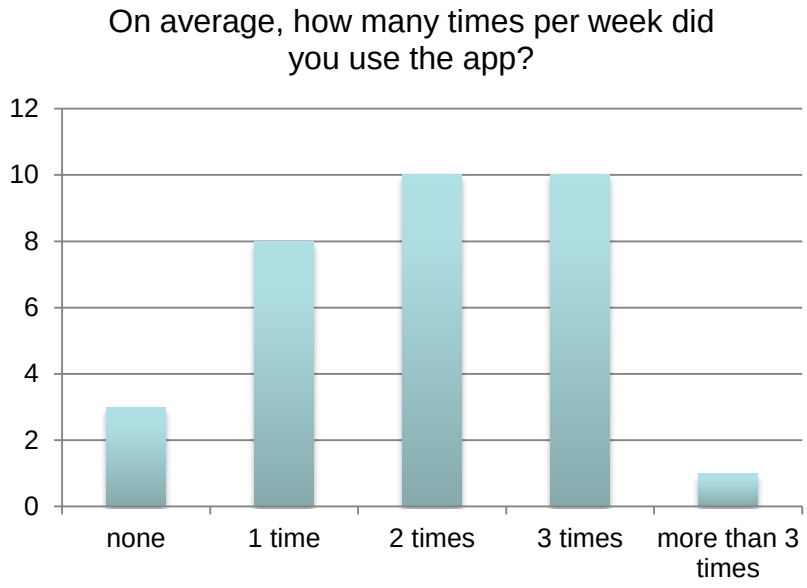


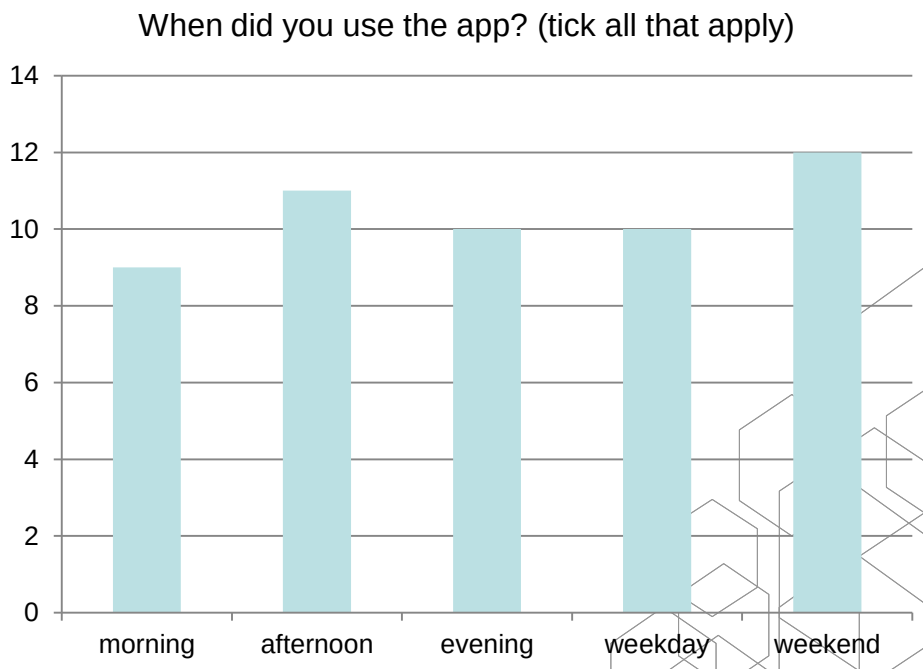
Secondary Outcomes



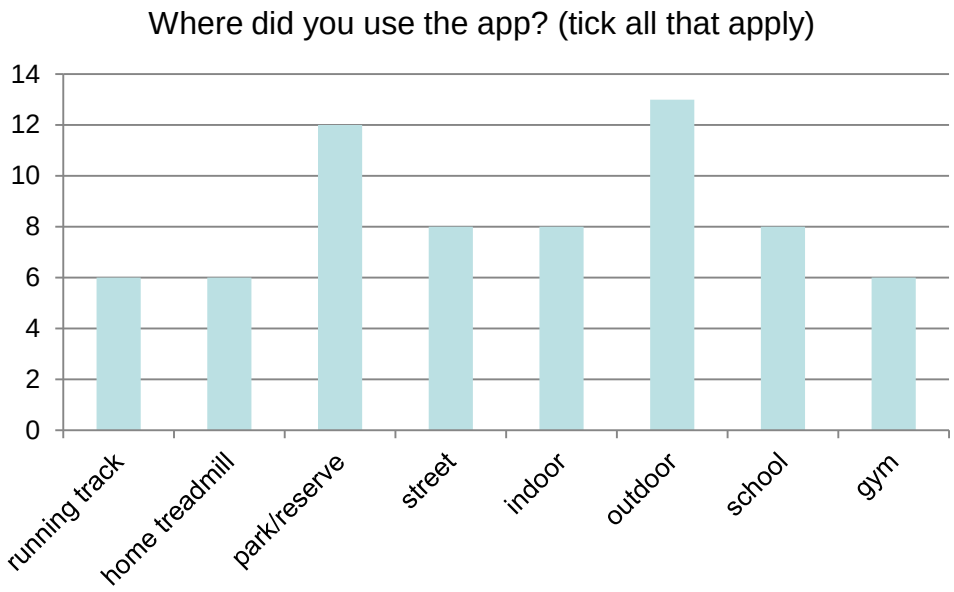
- No effects on self-reported predictors of PA
- No effects on objectively measured MVPA

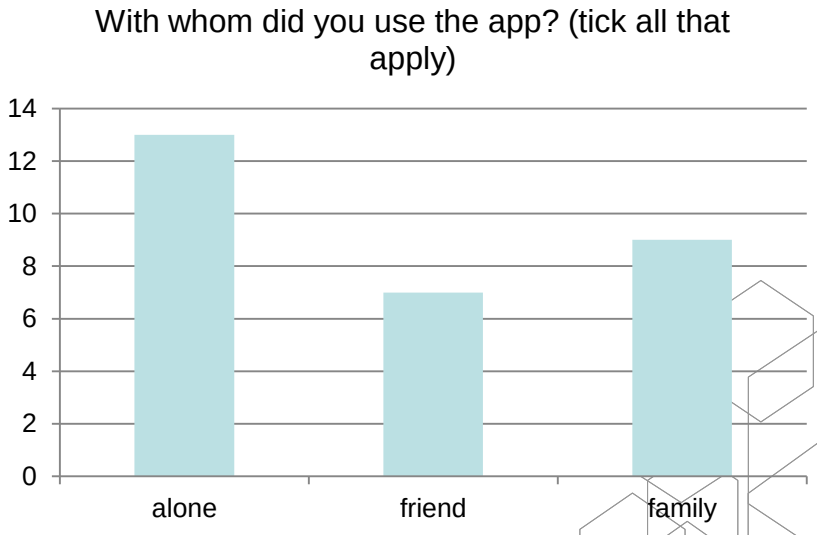
Secondary Outcomes





Usability & acceptability





Usability & acceptability

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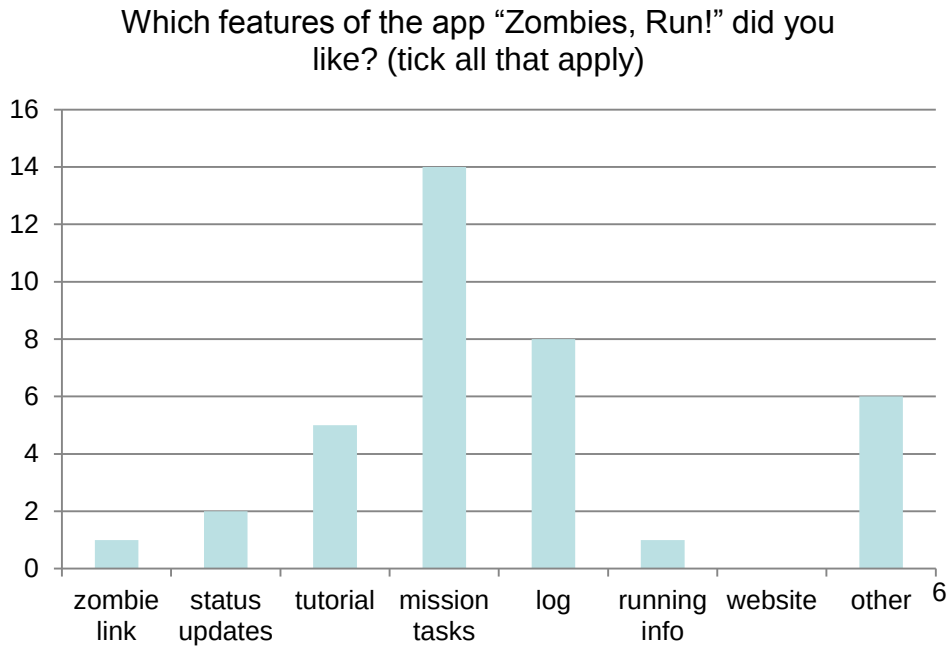
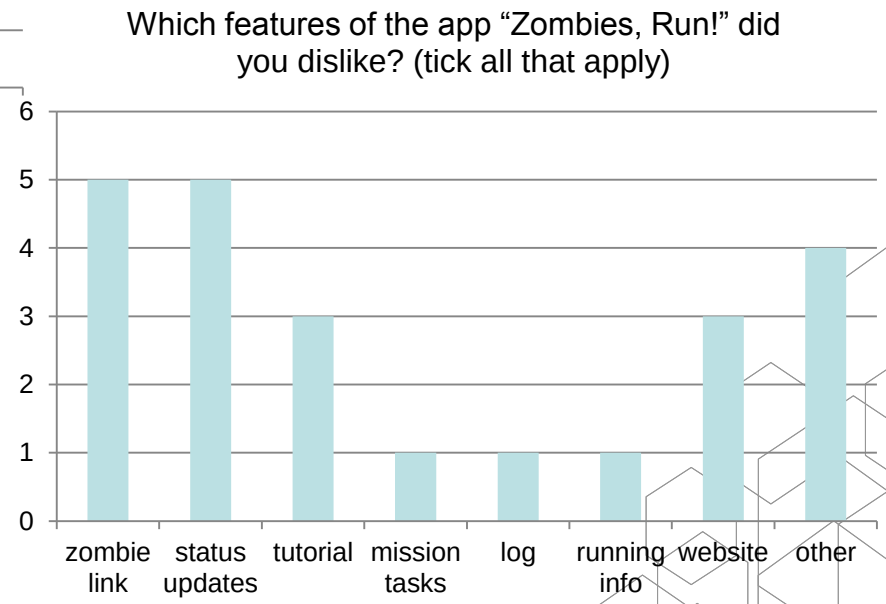
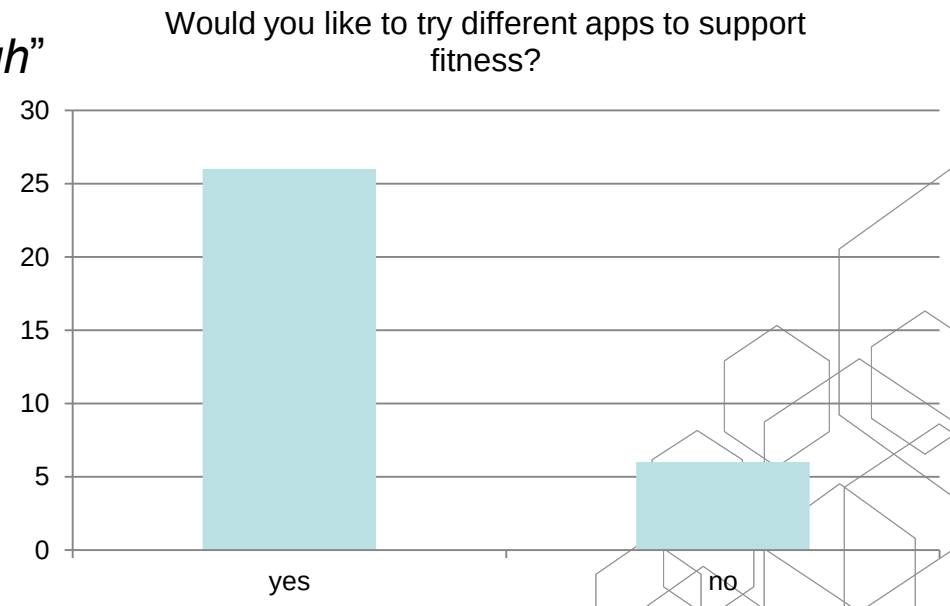




Usability & acceptability

- Will you continue to use the app?
  - "*It will help me to build my fitness*"
  - "*Because I can improve how far I run*"
  - *"A fun way to get fit "*
  - *"Because it is an enjoyable alternative to exercise*

  - "*Not enough time*"
  - "*I didn't find the app engaging enough*"
  - *"Using the app became too tedious*"



Discussion

- 1st RCT comparing immersive VS non-immersive apps
- Compared to usual care, no major improvements
- Design + features of the immersive app received more positive feedback (and no dropout)

Discussion

- Pragmatic approach
- Literature behind consumer technology life cycles

- Unlikely to be a stand alone
  - Could be used as part of a multi-component intervention

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Thank you

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