# Promoting physical activity through the prescription of smartphone apps in primary care: Likely to produce health gains and cost-savings

21 February 2022

Leah Grout, Kendra Telfer, Cristina Cleghorn, Nick Wilson, Anja Mizdrak

Over 40% of NZ adults are insufficiently physically active. In this blog we summarise our recently published modelling work that suggests that the prescription of smartphone apps for physical activity promotion in primary care could benefit health and save millions in health sector costs for NZ. Nevertheless, this type of intervention should ideally occur in

conjunction with societal-wide shifts that support more walking and cycling, as these are likely to generate much larger health gains and cost-savings.

**Introduction**

Inadequate physical activity is a risk factor for coronary heart disease (CHD), diabetes, stroke, and some of cancers [1, 2]. The World Health Organization (WHO) recommends that adults aged 18-64 years should complete at least 150 minutes of moderate-intensity aerobic physical activity, or at least 75 minutes of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic physical activity each week [3]. In NZ, over 40% of adults are estimated to be insufficiently physically active [4]. This contributes to CHD, stroke, and diabetes being among the leading causes of health loss in NZ [5]. Furthermore, these noncommunicable diseases contribute to marked health inequalities, with Māori, Pasifika, and low-income New Zealanders at higher risk for such conditions [5, 6].

In recent years, the use of mobile health (mHealth) tools for increasing physical activity has risen [7, 8], and the widespread use of mobile phones makes mHealth interventions scalable to a broad population [9, 10]. While there are a number of different mHealth tools and services available, smartphone applications (apps) may be a particularly popular approach to increasing physical activity. Smartphone apps are generally considered easy to use and could enhance physical activity interventions through technological features (eg, accelerometers) [9]. Apps have also been shown to be effective at increasing physical activity levels [10, 11], although quality and effectiveness varies between the many available apps [12, 13]. Additionally, physical activity apps tend to be inexpensive or free of charge [10]. For example, the Ministry of Health-supported online Health Navigator app library contains a number of different mHealth apps, including links to free and low-cost physical activity apps [14].

The prescription of physical activity apps during a primary care visit is a feasible intervention in NZ, as some general practitioners (GPs) already “prescribe” exercise as part of a green prescription programme [15]. Such a programme could theoretically include smartphone app prescription. Clinicians and GPs already frequently recommend apps and other online resources during consultations [16], and the Royal NZ College of General Practitioners supports the adoption of such technology [17].

## What does the new NZ modelling show?

Our recent modelling work indicated that the total health impact of the prescription of smartphone apps for physical activity promotion in primary care for those aged 40-79 years was modest, with 430 quality-adjusted life years (QALYs) gained over the remaining lifespan of the population, albeit up to 1750 QALYs if the increase in physical activity was maintained for five years. The modelled improvements in health came with net cost-savings of NZ $2.2 million. The intervention would also provide larger per capita health gains for Māori than for non-Māori if delivered equitably. Therefore, this intervention could assist in reducing health inequalities in NZ if well-implemented.

The prescription of smartphone apps for physical activity promotion in primary care was likely to provide larger health gains and cost-savings for the health system than either a mass-media campaign for physical activity apps [18], a mass-media campaign for weight loss apps [19, 20], or weight loss counseling by nurses in primary care [21] in NZ. However, the intervention was likely to be less effective than a mass media campaign to promote a

smoking cessation app in NZ [22]. It should also be noted that the health gains of these individual-level interventions are substantially lower than upstream societal-wide interventions (eg, tobacco control endgame interventions [23], infrastructure that supports switching driving trips to walking and cycling [24]). Therefore, implementing the prescription of smartphone apps for physical activity promotion in primary care alongside other such interventions may help to maximize health gains.

*Photo by Ketut Subiyanto from **Pexels***

## Potential implications for research and NZ health agencies

These modelling results emphasise the potential health and economic benefits of increasing physical activity. However, questions remain about the best way to implement such an intervention. For example, in this study we assumed that intervention uptake and adherence would be the same across population groups (ie, men and women, Māori and non-Māori), but it is unclear whether currently available apps adequately cater to the needs of diverse population groups. There are also indications that a programme to prescribe smartphone apps for physical activity promotion in primary care would be best administered by practice nurses rather than GPs, as the results indicated that there would be larger cost-savings associated with a scenario in which these nurses were the dominant deliverers of consultation, and the literature suggests that GPs are often particularly time-limited [25]. However, is unclear whether this may impact the effectiveness of the programme. This finding may also have implications for the administration of the ongoing green prescription programme in NZ.

With the widespread use of smartphones, mHealth interventions such as this have large potential for scalability to a broad population [9, 10]. As part of a range of interventions to

address insufficient physical activity, governments should consider investing in the promotion of physical activity smartphone apps, along with additional research to improve app effectiveness and uptake. Nevertheless, such moves should ideally complement the potentially more important infrastructure changes that make walking and cycling easier options in everyday life.

**In summary,** recent modelling showed that the prescription of smartphone apps for physical activity promotion in primary care in NZ yielded modest health gains and was cost-saving to the health care system. Furthermore, the scope for this type of mHealth intervention is expanding with increases in smartphone ownership and the availability of easy-to-use and effective apps. This intervention should be considered by policy-makers in NZ, ideally as part of an overall national strategy to support increased walking and cycling.

* **Author details:** All authors are with the Department of Public Health, University of Otago, Wellington.

## References

1. Wahid, A; Manek, N; Nichols, M; Kelly, P; Foster, C; Webster, P; Kaur, A; Friedemann Smith, C; Wilkins, E; Rayner, M, et al. Quantifying the association between physical activity and cardiovascular disease and diabetes: A systematic review and meta-analysis. J Am Heart Assoc; 2016, 5(9):e002495. DOI: 10.1161/jaha.115.002495
2. Kyu, HH; Bachman, VF; Alexander, LT; Mumford, JE; Afshin, A; Estep, K; Veerman, JL; Delwiche, K; Iannarone, ML; Moyer, ML, et al. Physical activity and risk of breast cancer, colon cancer, diabetes, ischemic heart disease, and ischemic stroke events: Systematic review and dose-response meta-analysis for the global burden of disease study 2013. BMJ; 2016, 354:i3857. DOI: 10.1136/bmj.i3857
3. World Health Organization. 2021. Physical activity URL: https://www.who.int/news-room/fact-sheets/detail/physical-activity
4. World Health Organization. 2018. Global Health Observatory Data Repository: prevalence of insufficient physical activity among adults URL: https://apps.who.int/gho/data/view.main.2463?lang=en
5. Ministry of Health. 2013. Health loss in New Zealand: A report from the New Zealand burden of diseases, injuries and risk factors study, 2006-2016 URL: https://www.moh.govt.nz/notebook/nbbooks.nsf/0/F85C39E4495B9684CC257BD3006F6299/$file/health-loss-in-new-zealand-final.pdf
6. Pylypchuk, R; Wells, S; Kerr, A; Poppe, K; Riddell, T; Harwood, M; Exeter, D; Mehta, S; Grey, C; Wu, BP, et al. Cardiovascular disease risk prediction equations in 400 000 primary care patients in New Zealand: A derivation and validation study. Lancet; 2018, 391(10133):1897-1907. DOI: 10.1016/s0140-6736(18)30664-0
7. Dounavi, K; Tsoumani, O. Mobile health applications in weight management: A systematic literature review. Am J Prev Med; 2019, 56(6):894-903. DOI: 10.1016/j.amepre.2018.12.005
8. Paglialonga, A; Lugo, A; Santoro, E. An overview on the emerging area of identification, characterization, and assessment of health apps. J Biomed Inform; 2018, 83:97-102. DOI: 10.1016/j.jbi.2018.05.017
9. Romeo, A; Edney, S; Plotnikoff, R; Curtis, R; Ryan, J; Sanders, I; Crozier, A; Maher, C. Can smartphone apps increase physical activity? Systematic review and meta-analysis. J Med Internet Res; 2019, 21(3):e12053-e12053. DOI: 10.2196/12053
10. Feter, N; dos Santos, TS; Caputo, EL; da Silva, MC. What is the role of smartphones on physical activity promotion? A systematic review and meta-analysis. Int J Public

Health; 2019, 64(5):679-690. DOI: 10.1007/s00038-019-01210-7
11. Gal, R; May, AM; van Overmeeren, EJ; Simons, M; Monninkhof, EM. The effect of physical activity interventions comprising wearables and smartphone applications on physical activity: A systematic review and meta-analysis. Sports Med Open; 2018, 4(1):42. DOI: 10.1186/s40798-018-0157-9
12. Bondaronek, P; Alkhaldi, G; Slee, A; Hamilton, FL; Murray, E. Quality of publicly available physical activity apps: Review and content analysis. JMIR Mhealth Uhealth; 2018, 6(3):e53-e53. DOI: 10.2196/mhealth.9069
13. Direito, A; Dale, LP; Shields, E; Dobson, R; Whittaker, R; Maddison, R. Do physical activity and dietary smartphone applications incorporate evidence-based behaviour change techniques? BMC Public Health; 2014, 14:646. DOI: 10.1186/1471-2458-14-646
14. Health Navigator New Zealand. 2019. About the health navigator app library URL: https://www.healthnavigator.org.nz/apps/p/people-process/
15. Ministry of Health. 2017. How the green prescription works URL: https://www.health.govt.nz/our-work/preventative-health-wellness/physical-activity/green-prescriptions/how-green-prescription-works
16. Patel, A; Kolt, G; Schofield, G; Keogh, J. General practitioners' views on the role of pedometers in health promotion. Journal of Primary Health Care; 2014, 6(2):152-156. DOI: 10.1071/HC14152
17. The Royal New Zealand College of General Practitioners. 2017. Telehealth and technology-based health services in primary care URL: https://www.nzdoctor.co.nz/sites/default/files/2018-07/2017.09-Telehealth-and-technology-based-health-services-in-primary-care.pdf.
18. Mizdrak, A; Telfer, K; Direito, A; Cobiac, LJ; Blakely, T; Cleghorn, CL; Wilson, N. Health gain, cost impacts, and cost-effectiveness of a mass media campaign to promote smartphone apps for physical activity: Modeling study. JMIR Mhealth Uhealth; 2020, 8(6):e18014. DOI: 10.2196/18014
19. Cleghorn, CL; Wilson, N; Nair, N; Kvizhinadze, G; Nghiem, N; McLeod, M; Blakely, T. Health benefits and cost-effectiveness from promoting smartphone apps for weight loss: Multistate life table modeling. JMIR Mhealth Uhealth; 2019, 7(1):e11118. DOI: 10.2196/11118
20. Jones, AC; Grout, L; Wilson, N; Cleghorn, CL. The cost-effectiveness of a mass media campaign to promote smartphone apps for weight loss: an updated modeling study. JMIR Form Res (in press).
21. Cleghorn, CL; Wilson, N; Nair, N; Kvizhinadze, G; Nghiem, N; McLeod, M; Blakely, T. Health benefits and costs of weight-loss dietary counselling by nurses in primary care: A cost-effectiveness analysis. Public Health Nutr; 2020, 23(1):83-93. DOI: 10.1017/s1368980019002945
22. Nghiem, N; Leung, W; Cleghorn, CL; Blakely, T; Wilson, N. Mass media promotion of a smartphone smoking cessation app: Modelled health and cost-saving impacts. BMC Public Health; 2019, 19(1):283. DOI: 10.1186/s12889-019-6605-8
23. van der Deen, FS; Wilson, N; Cleghorn, CL; Kvizhinadze, G; Cobiac, LJ; Nghiem, N; Blakely, T. Impact of five tobacco endgame strategies on future smoking prevalence, population health and health system costs: Two modelling studies to inform the tobacco endgame. Tob Control; 2018, 27(3):278-286. DOI: 10.1136/tobaccocontrol-2016-053585
24. Mizdrak, A; Blakely, T; Cleghorn, CL; Cobiac, LJ. Potential of active transport to improve health, reduce healthcare costs, and reduce greenhouse gas emissions: A modelling study. PloS One; 2019, 14(7):e0219316. DOI: 10.1371/journal.pone.0219316

25. Patel, A; Schofield, GM; Kolt, GS; Keogh, JWL. General practitioners’ views and experiences of counselling for physical activity through the New Zealand green prescription program

Public Health Expert Briefing (ISSN 2816-1203)

---