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Smoking cessation using mobile phone text messaging is as effective in Maori as non-Maori

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Abstract

Aims To determine whether a smoking cessation service using mobile phone text messaging is as effective for Maori as non-Maori.

Methods A single-blind randomised controlled trial was undertaken with recruitment targeted to maximise the participation of young Maori. The intervention included regular, personalised text messages providing smoking cessation advice, support, and distraction. Maori text messages related to Maori language, support messages (in Maori and English) and information on Maori traditions. Text messaging was free for 1 month. After 6 weeks, the number of messages reduced from 5 per day to 3 per week until the 26-week follow-up.

Results Participants included 355 Maori and 1350 non-Maori. Maori in the intervention group were more likely to report quitting (no smoking in the past week) at 6 weeks (26.1%) than those in the control group (11.2%) RR 2.34, 95% CI: 1.44–3.79. There was no significant difference between the RR for Maori and that for non-Maori (RR: 2.16, 95%CI: 1.72–2.71).

Conclusions A mobile phone-based cessation programme was successful in recruiting young Maori, and was shown to be as effective for Maori as non-Maori at increasing short-term self-reported quit rates. This shows clear potential as a new public health initiative.

Tobacco is the leading single modifiable cause of death for both Maori and non-Maori in New Zealand.[1] In New Zealand, there has been a decline in the prevalence of cigarette smoking since the early 1980s, however no such trend is evident for Maori. Indeed, in 2002, about one in two Maori (49.4%) and one in five non-Maori (21.2%) were smokers.[2]

Significant inequalities exist in that Maori suffer disproportionately (compared to non-Maori) the ill effects associated with tobacco smoking. It is estimated that 29% of the total health loss sustained by Maori males, and 22% by Maori females, would be regained if tobacco consumption were eliminated.[3]

Of particular concern is the fact that although youth smoking prevalence has declined over recent years for non-Maori, this is not so for Maori woman. Young Maori women had particularly high smoking rates in 2002, with 42% of surveyed 14–15 year-olds smoking at least weekly and 34% smoking daily.[2]

Health inequalities are therefore likely to further increase in the future unless effective cessation programmes can be designed that specifically target Maori. To date in New Zealand there has been a relative shortage of age-appropriate cessation programmes aimed at young adults, and the services that are currently available to all are under-

utilised by this group.[4] There is also limited direct evidence of smoking cessation interventions demonstrating efficacy in young people[5] or for Maori.

New smoking cessation interventions for young Maori adults are clearly needed, and mobile phones could provide an important new delivery medium. More than 85% of young New Zealand adults now have a mobile phone (statistics by ethnicity are not available), and text messaging among this age group has rapidly developed into a new communications medium.

Over a million text messages (where up to160 characters of text are sent directly from one mobile phone to another) are sent every day in New Zealand. This could represent a new channel for the delivery of smoking cessation services inexpensively to a large section of the population wherever they are located.

Methods

A large, simple randomised trial of a new smoking cessation service using mobile phone text messaging was performed (STOp smoking by Mobile Phone – STOMP); the overall methodology and results of which are reported in another paper.[6]

This trial was specifically designed to maximise participation by Maori, and to allow for analyses to be performed that had adequate power to report results for Maori and non-Maori.

People were eligible for inclusion provided they met the following criteria: aged 16 years or more, currently smoking cigarettes daily, interested in quitting, able to send and receive text messages, current owner of a Vodafone mobile phone (at the time the trial started Vodafone was the only telephone network where all users could send and receive text messages), English speaking, and able to provide informed consent.

Recruitment was targeted to Maori participants in a variety of ways, with recruitment information being disseminated via: Maori radio station advertising, mailing lists of Maori students attending tertiary institutions, advertisements in a Maori student magazine, hospital staff email lists, faxes to Maori health providers, and via Maori smokefree networks and providers. Non-targeted advertising for the trial (newspapers, websites, magazines, Quitline [http://www.quit.org.nz/]) also mentioned that the researchers were particularly interested in recruiting Maori.

After enrolment participants were randomised to either a control group or to a group that received a support programme. The intervention group received regular, personalised text messages providing smoking cessation advice, support, and distraction. An algorithm was developed to match participant characteristics with a database of over one thousand text messages so that an individualised programme was provided.

Participants self-identifying as Maori also received Maori–specific text messages. A list of approximately 140 texts were developed by the Maori researchers (DB, TR) and students. These related to Maori language (*Lets learn te reo*, words such as *change, courage, challenge, action, goal, strength*), general support messages (in Maori and English), and information on Maori customs and traditions.

A Quit day was negotiated with each participant, and five messages were sent per day for the week leading up to the Quit day, and during the following 4 weeks. On the Quit day, free outgoing text messaging also began, with participants encouraged to tell all their friends and family they were quitting on that day, as a means of distraction and communicating the need for support. Six weeks after randomisation and coinciding approximately with the end of the free text month, the intervention became less intensive, with the number of sent text messages reducing from five a day to three per week until the end of the 26-week follow-up.

Participants allocated to the control group received no smoking-related information. They received one text message a fortnight reminding them that completed follow-up would be rewarded with a free month of text messaging, and giving the study centre contact details. There were no restrictions on the use of other smoking cessation strategies by trial participants— i.e. this trial tested the addition of mobile phone-based services to existing practice.

The main outcome of the trial was the prevalence of current non-smoking (i.e. not smoking in the past week) 6 weeks after randomisation. Secondary outcomes included self-reported non-smoking at 12 and 26 weeks. All baseline and follow-up data were collected by mobile phone or text messaging, and confirmation of informed consent was by text messaging. Participants were informed at the outset of the study that baseline levels of smoking and reports of quitting may be verified, in an attempt to improve the veracity of self-reported data.[7] A random sample of 100 participants who reported quitting at 6 weeks were selected for personal visits to verify quitting with salivary cotinine levels.

Central telephone randomisation was used—with age, sex, number of cigarettes, and stage of change as stratification factors in the minimisation algorithm. Participants were aware of which group they were allocated to, but follow-up methods were identical for all participants, with any follow-up phone calls made by staff who were unaware of the treatment allocation (i.e. single blind).

Data were analysed following a pre-specified analysis plan. Simple chi-squared analyses compared the proportion quit by treatment group, with estimation of relative risks (RRs), 95% confidence intervals (CIs), and two-sided p values. The number of cigarettes smoked and Fagerstrom score (a measure of nicotine dependence[8]) during follow-up were compared with analysis of covariance.

The role of possible baseline effect modifiers and confounders was assessed with standard logistic regression analyses and was to be reported if the estimate of treatment effect on the primary outcome changed by greater than 10%. Participants without follow-up data were assumed to be still smoking in the primary analysis. Secondary analyses were performed assuming that participants with no follow-up data either: had the same smoking status as at last follow-up or, were all non-smoking.

Additional sensitivity analyses assumed that the rate of non-confirmed quitters for the whole trial was the same as for the sample assessed for salivary cotinine. Pre-specified subgroup analyses were planned providing there was a treatment effect of at least three standard deviations in the primary outcome.

Results

The overall results of the STOMP study are presented in a separate paper.[6] We report here for the first time the results of the Maori and non-Maori analyses. Overall, 1705 participants were eligible and were randomised to control or treatment, including 355 (21%) Maori and 1350 (79%) non-Maori participants (Figure 1).

Twenty-seven Maori participants were lost to 6-week follow-up (8%), compared to 4% of non-Maori (missing data were assumed smoking). Follow-up rates at 6 months were lower than at 6 weeks, particularly in the intervention group. Follow-up in Maori participants at 6 months was 55% in the intervention group compared to 69% in the control group (p=0.006); and in non-Maori, 73% compared to 82% in the control group (p=0.0002). Maori in the control and intervention groups were similar with respect to age, gender, income level, and smoking dependence/history (Table 1).

In comparison with non-Maori participants, there were a higher proportion of Maori women and the median age of Maori participants was older. Maori participants were also less likely to have used a nicotine replacement product of any type in the past, although were more likely to have contacted Quitline when compared to non-Maori.

Maori participants in the treatment group were more likely to report having stopped smoking at 6 weeks than those in the control group, with 26.1% quit compared to 11.2% (RR: 2.34, 95% CI: 1.44–3.79) (Table 2). There was no significant difference between the RR for Maori and that for non-Maori (RR: 2.16, 95% CI: 1.72–2.71), that is the intervention was as effective for Maori as for non-Maori.

Figure 1. Flowchart of recruitment and retention of participants by Maori/non-Maori

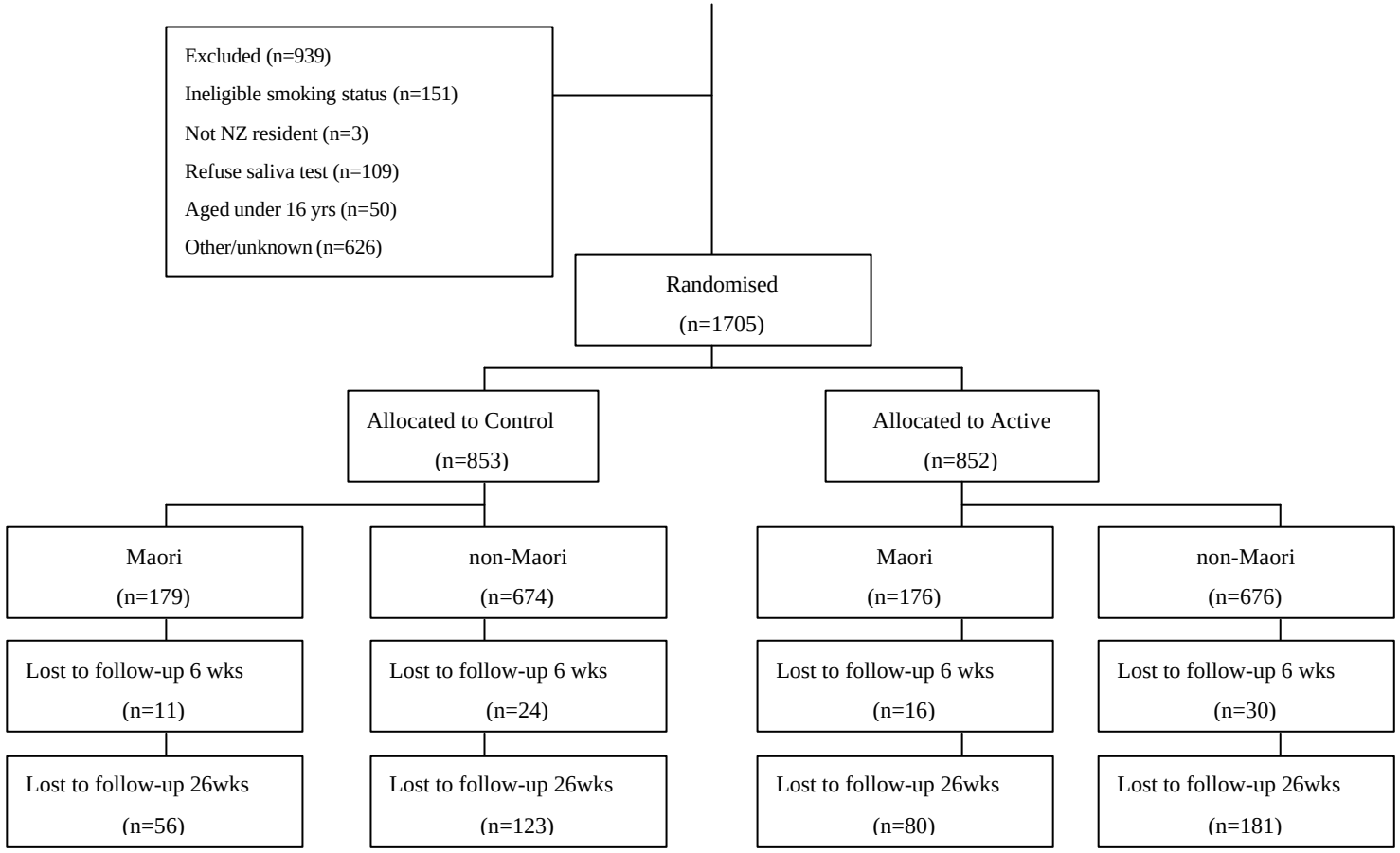

Table 1. Baseline characteristics

Variable	Maori		Non-Maori		Total
	Control	Active	Control	Active	
	N (%)	*N (%)*	*N (%)*	*N (%)*	*N (%)*
Female	131 (73.2)	132 (75.0)	366 (54.3)	368 (54.4)	997 (58.5)
Age: ***Median (IQR)***	25 (20–32)	24 (19–33)	22 (19–28)	21 (19–29)	22 (19–30)
No cigarettes / day: ***Median (IQR)***	15 (10–20)	15 (10–20)	15 (10–20)	15 (10–20)	15 (10–20)
Income level ($)					
<15,000	37 (20.7)	43 (24.4)	178 (24.0)	178 (26.2)	436 (25.6)
15–30,000	78 (43.6)	83 (47.2)	271 (40.2)	281 (41.6)	713 (41.8)
>30,000	63 (35.2)	49 (27.8)	211 (31.3)	207 (30.6)	540 (31.1)
Did not answer	1 (0.6)	1 (0.6)	14 (2.1)	10 (1.5)	26 (1.5)
Fagerstrom Score[8] ***Median (IQR)***	5 (4–7)	5 (4–6)	5 (3–6)	5 (3–6)	5 (3–6)
Roll your own cigarettes	39 (21.8)	42 (23.9)	142 (21.1)	146 (21.6)	369 (21.6)
No times tried to quit: ***Median (IQR)***	2 (1–3)	2 (1–4)	2 (1–4)	2 (1–4)	2 (1–4)
Nicotine replacement product					
Ever	37 (20.7)	46 (26.1)	185 (27.5)	198 (29.3)	466 (27.3)
Current	1 (0.6)	2 (1.1)	8 (1.2)	7 (1.0)	18 (1.1)
Nicobrevin use					
Ever	2 (1.1)	5 (2.8)	23 (3.4)	31 (4.6)	61 (3.6)
Current	0	1 (0.6)	0	0	1 (0.1)
Buproprion use					
Ever	2 (1.1)	3 (1.7)	12 (1.8)	15 (2.2)	32 (1.9)
Current	0	0	0	1 (0.2)	1 (0.1)
Quitline use					
Ever	20 (11.2)	20 (11.4)	66 (9.8)	63 (9.3)	169 (9.9)
Current	1 (0.6)	0	7 (1.0)	4 (0.6)	12 (0.7)
Other quit aids use					
Ever	2 (1.1)	7 (4.0)	31 (4.6)	25 (3.7)	65 (3.8)
Current	0	0	1 (0.1)	3 (0.4)	4 (0.2)
Any quit aid or product in current use	2 (1.1)	3 (1.7)	15 (2.2)	15 (2.2)	35 (2.1)

IQR=interquartile range.

Figure 2. Effect of text message-based smoking cessation programme on smoking cessation at 6 and 26 weeks (by Maori/non-Maori)

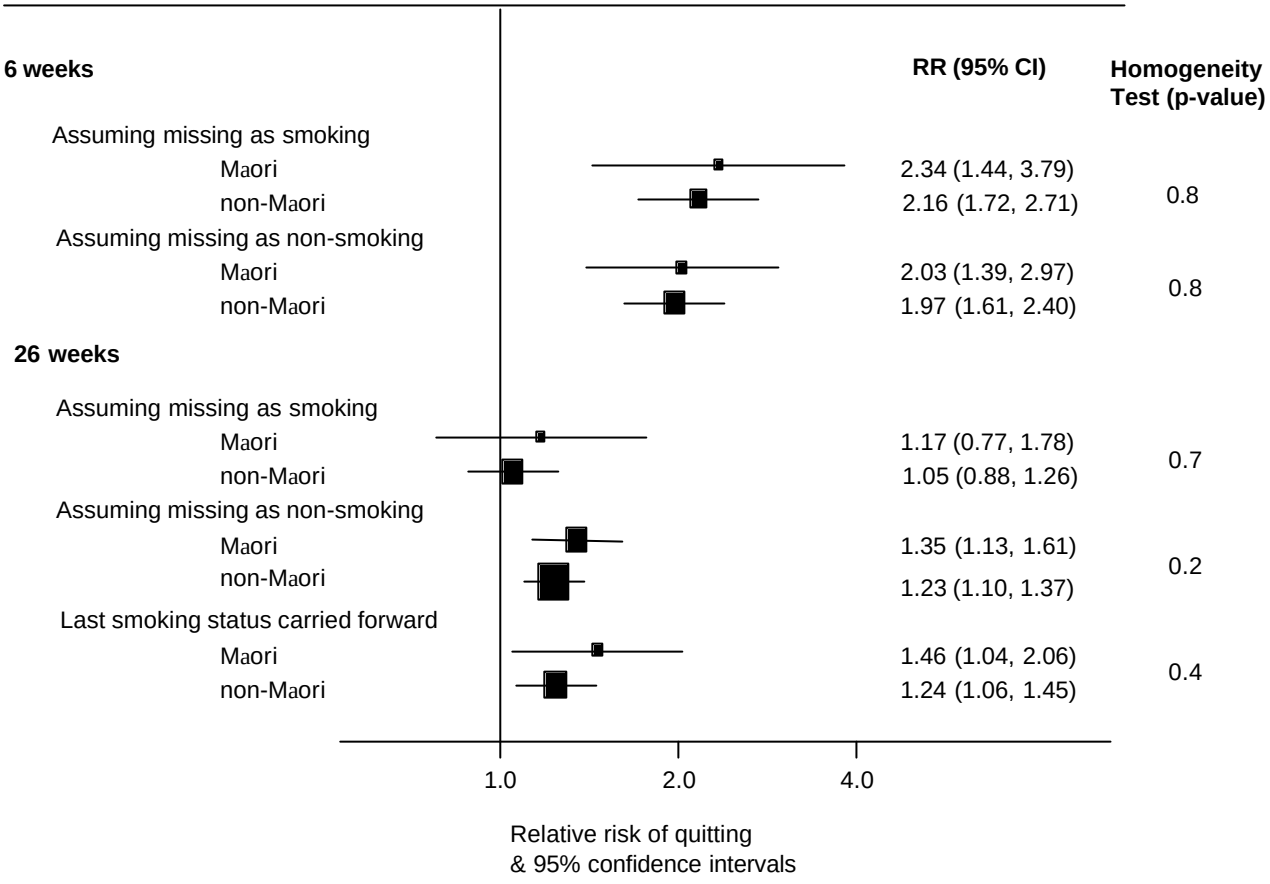

Table 2. Treatment effects on number of participants achieving smoking cessation at 6, 12, and 26 weeks (by Maori/non-Maori)

Variable	Control N (%)	Active N (%)	RR (95%CI)	P value
6 weeks				
-Maori	20 (11.2)	46 (26.1)	2.34 (1.44–3.79)	0.0003
-non-Maori	89 (13.2)	193 (28.6)	2.16 (1.72–2.71)	<0.0001
12 weeks				
-Maori	35 (19.6)	47 (26.7)	1.37 (0.93–2.01)	0.11
-non-Maori	125 (18.5)	200 (29.6)	1.60 (1.31, 1.94)	<0.0001
26 weeks				
-Maori	33 (18.4)	38 (21.6)	1.17 (0.77–1.78)	0.46
-non-Maori	169 (25.1)	178 (26.3)	1.05 (0.88–1.26)	0.60

Assumes all participants with missing smoking status were smoking

Sensitivity analyses were performed to assess the potential impact of missing data from those lost to follow-up, with the pattern of missing data for Maori similar to the overall pattern in the study.[6] Salivary cotinine testing showed no clear evidence of different degrees of over-reporting of quit rates between the overall intervention and control groups, with 18% of those invited (47% of those who undertook the test) congruent with not smoking.[6] The relative risk estimates for the primary outcome were not substantially altered in sensitivity analyses adjusting for missing data (Figure 2) and salivary cotinine verification tests.

Secondary outcomes at 12 and 26 weeks are shown in Table 2. Reported smoking cessation rates remained high at 26 weeks in the intervention group (21.6%) but increased in the control group (18.4%). For all assessments at all follow-up times there was no clear difference in proportional effects for Maori versus non-Maori (p homogeneity ≥0.2 for all comparisons).

Discussion

This is the first randomised controlled trial of smoking cessation where Maori smoking cessation rates are compared to non-Maori. This trial was specifically designed and executed to ensure high Maori participation in the trial and to ensure that the results presented would have adequate meaning for Maori.

Such a methodology is essential to ensure that matters related to indigenous inequalities are addressed in the design and implementation of clinical trials in New Zealand, and furthermore to ensure that new and innovative interventions do reach those in highest need and in particular Maori. If steps are not taken in the design and implementation of clinical trials to ensure responsiveness to Maori there is a risk that such research could in fact increase inequalities, in that interventions may be preferentially taken up by population groups with less need. Such as is seen with the lower proportion of Maori taking up free diabetes checks (35% compared to 51% overall), despite higher prevalence rates.[9]

This manuscript has been written using a kaupapa Maori framework whereby the study analysis was undertaken from a Maori perspective.[10] This is distinct from other methodologies that may ‘minoritise’ Maori with insufficient data quantity or quality to undertake analyses necessary to inform Maori health development. Where appropriate, kaupapa Maori methodology enables disparities to be identified and their elimination prioritised. This is consistent with the Treaty of Waitangi.

Several lessons can be learned from this study. Clinical trials can be designed in such a way as to be successful in reaching both Maori and non-Maori participants. Efforts were made to reach young Maori by targeted recruitment methods in this trial, resulting in 21% of participants at baseline (compared to 14.7% of the general population).[11] Also according to the 2001 New Zealand Census, participants (aged 15–30 years) had a very similar personal income distribution to that for the same age group in the general population.[11]

This trial shows how a modern communications medium, which has been rapidly adopted by young adults, can be used as a means of delivering important health services to young people where current delivery systems are not working. Mobile phones and text messaging are used by a wide range of young people, and have the benefit of being with the person most of the day. ‘

The high Maori participation reflects the acceptability of this intervention for young Maori adults, including its use of Maori *(te reo)* health-related text messages. These messages may be able to be used for future interventions. Indeed, there is potential for other services to use this method of delivering health messages with the advantages of being affordable, personalised, age-appropriate, and not location-dependent. Any such services must continue to adapt as communications technology changes.

The finding that this intervention was as effective for Maori as for non-Maori is important due to higher smoking rates and the ensuing higher rates of smoking related disease in Maori compared to non-Maori. [3] A smoking cessation service that can target and enrol young Maori in this way has the potential to deliver an equal benefit to Maori, or perhaps even to positively impact on inequalities in health status.

Methodological considerations—Limitations of this study include a differential loss to follow-up (overall follow-up rates of 67% in the intervention group and 78% in the control group). This reflects a differential incentive to participate, with the control group receiving their month of free text messaging after the 26-week follow-up. Due to limited resources, the intervention group were not offered this incentive. Also the reported quit rates increased over time in the control group, suggesting that some participants thought their free text month might depend on reporting quitting. Over-reporting of quitting is thought to be more likely in young people[7] and was seen here with salivary cotinine validation in a sample of participants (described in Rodgers et al[6]).

The greater loss to follow-up at 26 weeks in the intervention group also means that the treatment of missing data makes a considerable difference to the result. If all missing data are regarded as smoking (the primary analysis), then disproportionate numbers in the intervention group are classified as smokers and this gives a very conservative estimate of the effect of the intervention (RR close to null). The true effect of this intervention is in fact more likely to be reflected in the greater RR estimate found with assuming the continuation of previous smoking status. As such, analysis with last smoking status value carried forward, or with assuming not smoking, shows significant improvements for Maori and non-Maori remaining at 26 weeks (Figure 2).

These results need to be validated in a larger study with adequate power for Maori and non-Maori and with an adequate follow-up period.

Conclusion—This trial shows that it is possible to reach and recruit young Maori to participate in an innovative smoking cessation intervention. It also shows that a mobile phone-based cessation programme was as successful at increasing self-reported short-term quit rates in Maori as in non-Maori. Smoking prevalence amongst Maori has changed little in recent years, and new methods of cessation for young Maori are clearly needed. Any reductions in smoking prevalence in young Maori would have significant public health benefits, as the earlier a smoker quits smoking the greater the health gain.[12] This intervention clearly has potential as a public health initiative and the results shown here form a good basis for further trials.

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