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Title: Are we delaying the inevitable? Maintaining lifestyle changes six months after the ‘Get Healthy, Stay Healthy’ extended contact intervention

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Abstract

Background: Extended intervention contact after an initial, intensive intervention is becoming accepted as best practice in behavioral weight control interventions. What is not clear is whether extended contact mitigates weight regain in the longer-term, or whether it simply delays weight regain until after the extended intervention contact ceases.

Objective: To evaluate maintenance following the Get Healthy, Stay Healthy (GHSH) extended contact intervention, by comparing: the intervention and control group averages at 12 months (the traditional comparison of maintained intervention effects); the intervention and control group averages over the first six months of non-contact (a novel approach which directly compares the relapse effects between groups over the same duration of time); and, the individual participant changes over the first six months of non-contact (to explore the extent to which the group average is reflective of directions of changes for individuals).

Methods: Clients completing the Get Healthy Service (GHS) lifestyle telephone coaching program were randomised to receive extended contact via tailored text messages (GHSH, n=114) or standard care (no additional contact, n=114) and were assessed at baseline (following completion of GHS), six months (following completion of GHSH) and 12 months (no-contact maintenance follow-up). At all three assessments participants self-reported their body weight, waist circumference, physical activity (walking, moderate and vigorous sessions/week) and dietary behaviors (fruit and vegetable serves/day, cups of sweetened drinks per day, takeaway meals per week; Fat, Fiber and Total indices from the Fat and Fiber Behavior Questionnaire). Moderate-vigorous physical activity (MVPA) was also assessed via accelerometry.

Results: Retention over the 12-month trial was high (93%, 211/228). Participants had a mean (±standard deviation) age of 53.4±12.3 years and baseline BMI of 29.2±5.9 kg/m2. The between-group differences detected at 6 months were still present and statistically significant at 12 months for body weight (-1.33kg (-2.61, -0.05)) and accelerometer-assessed MVPA (24.9 minutes/week (5.8, 44.0)). None of the other outcomes were significantly favoured compared to the control group at 12 months. Changes over their first six months of non-contact for the GHSH group were significantly better than the control group in terms of accelerometer-measured MVPA and self-reported moderate activity (other differences
between the groups were all non-significant). In addition to the maintenance seen in the group averages, most intervention participants had maintained their behavioral outcomes during the first six months of non-contact.

**Conclusions:** The GHSH participants were better off relative to where they were initially, and relative to their counterparts not receiving extended contact in terms of MVPA. However, based on the between group difference in bodyweight over the first six months of non-contact, GHSH does appear to simply delay the ‘inevitable’ weight regain. However, this delay in weight regain, coupled with sustained improvements in MVPA, has public health benefit.

**Keywords:** maintenance, mHealth, physical activity, exercise, diet, nutrition, text messages, behavior change

**Trial registration:** Australian New Zealand Clinical Trials Registry (ACTRN12613000949785)
Introduction

A large body of evidence on the maintenance of weight loss and/or behavior change following the end of initial interventions resoundingly shows a ‘relapse effect’, characterized by weight regain and/or behavioral decline back towards baseline levels [1-3]. This has led to a concerted focus on weight loss maintenance interventions, defined in the current literature as ‘extended contact’ interventions - the intervention that continues after initial weight loss intervention, typically at a comparatively lower intensity than the initial intensive phase of intervention. Extended contact interventions have been consistently shown to somewhat mitigate the relapse effect [4-6]. What is not known is whether extended contact helps mitigate weight regain in the longer-term, or whether it simply delays weight regain until after the extended intervention contact ceases.

Studies evaluating text message-delivered, extended contact interventions for weight loss maintenance have shown that after extended contact ceases participant’s body weight has remained, on average, significantly reduced compared to baseline [7, 8]; but not when compared to a control condition [9, 10] (although neither of these studies reported significant intervention effects at the end of extended contact either). These mixed findings further reinforce the need to understand whether the improvements gained through extending contact behavioral interventions can be sustained following the end of such interventions.

The ‘Get Healthy, Stay Healthy’ (GHSH) intervention was an extended contact program delivered via text messages for six months following completion of an initial six-month community-wide lifestyle telephone coaching program called ‘Get Healthy Service’ in Australia [11]. The GHSH intervention was evaluated in a randomized controlled trial compared to normal practice following the Get Healthy Service (no ongoing intervention contact). Anthropometric (weight and waist circumference) and behavioral (physical activity and dietary) indicators were assessed at baseline (following completion of the Get Healthy Service), six months (following completion of GHSH) and 12 months (no-contact maintenance follow-up). We have previously reported that the GHSH intervention was feasible to deliver using semi-automated web-based technology and highly acceptable to participants [12]. Changes in body weight and physical activity (but not dietary outcomes) between baseline and six months were significantly better for the GHSH intervention group compared to the control group [12]. This paper aims to evaluate maintenance beyond the
period of the GHSH extended contact intervention. It does so in three ways by comparing: the intervention and control group averages at 12 months (the traditional comparison of maintained intervention effects); the intervention and control group averages over the first six months of non-contact (a novel approach which directly compares the relapse effects between groups over the same duration of time); and, the individual participant changes over the first six months of non-contact (to explore the extent to which the group average is reflective of directions of changes for individuals).

Methods

Study Design

A detailed description of the trial methods is published elsewhere [11]. Eligible consenting participants were randomized 1:1 to the GHSH intervention and control groups, via a randomization website, by a research assistant with no involvement in participant recruitment. Randomization was across two strata (≥ or < the median of 3kg weight loss during the Get Healthy Service: GHS). Recruitment began in August 2012 and 12-month follow-up data were collected until August 2014. Ethical clearance was received from the Human Research Ethics Committee at The University of Sydney (Protocol number: 03-2011/13523).

Participant Recruitment

All eligible clients completing the initial contact intervention (GHS) within the recruitment timeframe were invited to participate in GHSH during their final coaching call. Eligibility criteria for GHSH were: lives in New South Wales, Australia; no intention of re-enrolling in the GHS coaching; not involved in other GHS evaluations; and, owns a mobile telephone. Interested participants were mailed an information sheet and consent form and then contacted via telephone to establish their eligibility and willingness to participate. Verbal consent to participate was audio recorded and participants returned a signed consent form via reply-paid post.
The Extended Contact Intervention

The GHSH extended contact intervention was delivered via individually tailored text messages. Tailoring data were collected during an initial and an interim telephone call (around 12-weeks) during which participants worked with a trained coach to set a 12-week weight goal (weight maintenance or further weight loss) and two 12-week goals for physical activity and/or dietary behavior change, with targets consistent with national guidelines [13, 14]. For each behavioral goal (diet and/or physical activity), participants were asked to identify: rewards for reaching their goal; expected benefits; preparatory behaviors for goal attainment; barriers and solutions, and a person who could support them to reach their goals. Participants selected their desired number of text messages (from 3–13 per fortnight), timing of texts (e.g., 6 AM), and type of texts. Four types of texts targeted different behavior change strategies, each with different permitted frequencies: prompts to self-monitor weight (once per fortnight); goal checks for behavioral goals (from once per fortnight to once per week for each goal); real-time behavioral prompts (from none to four per fortnight for each goal); and, goal resets for weight and behavioral goals (one in week 6 and one in week 18). At 12 weeks, participants received a second telephone call from their coach to update their tailoring goals and preferences.

Control Group Treatment

To minimize trial attrition, control participants were posted brief written feedback of results following each assessment. The control group received no other contact.

Data Collection

Details of the data collection are reported elsewhere [11]. Briefly, data were collected at baseline, 6- and 12-months. Most outcomes were collected by computer-assisted telephone interviews (CATI), conducted by a research assistant, who was initially blinded to group allocation (information collected in the interviews limited this blinding at 6- and 12-months). The outcomes and measures were the same as those collected in the initial intervention, with the addition of an objective monitor of physical activity and a nutrition assessment tool, the Fat and Fiber Behavior Questionnaire (FFBQ) [15].
**Anthropometric Outcomes**

During the interviews, participants reported their body weight in kilograms (while wearing light clothes and no shoes) and waist circumference. Use of measurement aids during the interview was encouraged (scales and study-provided measuring tapes). Body mass index (BMI) was calculated based on self-reported height at GHS baseline and self-reported weight at each assessment point.

**Physical Activity Outcomes**

Self-report physical activity included the number of weekly sessions spent: walking for $\geq 30$ minutes; doing other moderate-intensity physical activity for $\geq 30$ minutes (termed “moderate”); and, doing vigorous-intensity physical activity for $\geq 20$ minutes [16]. Further, objectively-measured time spent engaged in moderate-to-vigorous physical activity (MVPA) was measured using the Actigraph GT1M - a dual-axis accelerometer. The protocol, described previously [11], required participants to wear it on the hip for seven days during all waking hours. MVPA was assessed using a common method [17] in which 60-second epochs with $\geq 1952$ cpm on the vertical axis summed for each day and averaged per wear day, with non-wear time identified by an algorithm with published validity [18] and excluded along with non-wear days ($<10$ hours wear).

**Dietary Behavior Outcomes**

Dietary outcomes were recalled based on participant’s usual behavior in the past month and included: daily servings of fruit and of vegetables [19]; average daily consumption of sweetened drinks (i.e., cordials, fruit juices, sports drinks, soft drinks not including diet soft drinks); and, takeaway meals per week [20]. Additional outcomes were the FFBQ’s 13-item fat index, 7-item fiber index and 20-item total index, all of which are calculated as the average of the relevant items (1 to 5) with higher values respectively indicating healthier habits concerning fat intake, fiber intake or both.

**Sample Size**

As previously reported [11], the sample size had been chosen a priori to provide $\geq 90\%$ power to detect the following expected differences between groups in primary outcomes with 5% two-tailed significance: two sessions/week of self-reported MVPA; one daily serving each of
fruit and of vegetables; 2 kg body weight; and, 4 cm waist circumference. The study was not powered a priori for questions concerning within-groups changes. For the FFBQ indices, fruit intake, takeaways, and sweetened drinks only, power was adequate (≥80%) to detect differences between groups meeting the minimum differences of interest (MDI). The MDIs were set at: 1 kg weight, 1 cm waist circumference, 30 minutes or 0.5 sessions/week physical activity, 0.5 servings/day fruit and vegetables, 0.5 takeaway meals/week, 0.25 cups/day sweetened drinks and 0.2 units on the FFBQ Indices.

**Statistical Analysis**

Maintenance is considered in three ways. Firstly, whether anthropometric and behavioral outcomes are comparatively better after non-contact (at 12 months) for those who received the GHSH extended contact intervention than for those who had not (controls); second, comparing changes during the first six months of non-contact within the GHSH intervention group (i.e., between six and 12 months) to changes in the control group (i.e., between baseline and six months); finally, considering behavioral maintenance at the individual-level during the first six months of non-contact in the intervention group.

Changes within groups were assessed using paired t-tests. All differences between groups were estimated adjusting for the same potential confounders as per the main outcome evaluation of the GHSH intervention [12]. Differences between the groups in their changes were assessed using separate linear regression models adjusting for baseline values of the outcome and confounders. When assessing change over the period from baseline to 12-months, baseline values were taken as the beginning of the GHSH evaluation. When assessing changes over the first six months of non-contact, baseline values were taken as the beginning of the GHSH evaluation for controls or at 6 months for the intervention group. Group differences in daily values of accelerometer MVPA (log transformed) were assessed using mixed models, that accounted for repeated measures (1–7 days per participant per assessment). The absence of substantial changes in group averages can be suggestive of maintenance; however, this can be achieved by large worsening in some participants being offset by others’ large improvements and does not necessarily show whether individuals maintained their personal outcomes. Accordingly, we further describe how many of the intervention participants maintained their outcomes during non-contact (i.e., individual-level maintenance).
Results

Participants

Participants who remained in the study at 12-months had an average (mean ± standard deviation) age of 53.4±12.3 years and baseline BMI of 29.2±5.9 kg/m² (Table 1). Approximately two-thirds of participants were female. Retention over the 12 month trial was high overall (93%, 211/228), but slightly lower in the intervention group (87%, 99/114) than in controls (98%, 112/114; p=0.002). Those lost to follow up at 12-months (n=17) had significantly heavier baseline BMI, were more likely to smoke at baseline, and reported consuming fewer vegetables and more sweetened drinks at baseline than those who participated in the 12-month follow-up CATI (n=211; see Table 1).

Table 1: Baseline characteristics of participants by study group and for those who remained in the study at 12-months and those that dropped out by 12-months

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD) or n (%)</th>
<th>Mean (SD) or n (%)</th>
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<tbody>
<tr>
<td></td>
<td>GHSH intervention</td>
<td>Control</td>
</tr>
<tr>
<td></td>
<td>(n=114)</td>
<td>(n=114)</td>
</tr>
<tr>
<td></td>
<td>(n=211)</td>
<td></td>
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<tr>
<td><strong>Health &amp; Demographics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age, years</td>
<td>55.5 (12.3)</td>
<td>51.2 (11.9)</td>
</tr>
<tr>
<td>Body Mass Index, kg/m²</td>
<td>29.3 (5.8)</td>
<td>29.6 (6.3)</td>
</tr>
<tr>
<td>Weight, kg</td>
<td>82.8 (19.4)</td>
<td>83.6 (18.9)</td>
</tr>
<tr>
<td>Waist circumference, cm</td>
<td>98.9 (15.4)</td>
<td>99.6 (14.9)</td>
</tr>
<tr>
<td>Gender, % female</td>
<td>74 (64.9%)</td>
<td>78 (68.4%)</td>
</tr>
<tr>
<td>Paid employment, % yes</td>
<td>69 (61.1%)</td>
<td>68 (59.6%)</td>
</tr>
<tr>
<td>Education, % post-school qualification</td>
<td>73 (64.0%)</td>
<td>77 (67.5%)</td>
</tr>
<tr>
<td>English at home, %</td>
<td>109 (96.5%)</td>
<td>(97.4%)</td>
</tr>
<tr>
<td>Indigenous Australian, %</td>
<td>1 (0.9%)</td>
<td>5 (4.4%)</td>
</tr>
<tr>
<td>SEIFA, % in most advantaged 3 quintiles b</td>
<td>86 (75.4%)</td>
<td>78 (68.4%)</td>
</tr>
<tr>
<td>Region, % in major cities</td>
<td>71 (62.3%)</td>
<td>82 (71.9%)</td>
</tr>
<tr>
<td>--------------------------</td>
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<td>------------</td>
</tr>
<tr>
<td>Initial health, %&lt;= &quot;fair&quot;</td>
<td>25 (21.9%)</td>
<td>30 (26.3%)</td>
</tr>
<tr>
<td>Current smoker, %</td>
<td>5 (4.4%)</td>
<td>7 (6.1%)</td>
</tr>
</tbody>
</table>

**Physical activity (PA)**

<table>
<thead>
<tr>
<th>Accelerometer PA, mins/week</th>
<th>196.9 (144.4)</th>
<th>196.2 (143.6)</th>
<th>195.1 (136.2)</th>
<th>214.4 (221.3)</th>
<th>.596</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vigorous PA, sess/week</td>
<td>1.56 (1.86)</td>
<td>2.33 (2.53)</td>
<td>1.9 (2.3)</td>
<td>2.1 (2.2)</td>
<td>.746</td>
</tr>
<tr>
<td>Moderate PA, sess/week</td>
<td>1.11 (1.78)</td>
<td>1.60 (1.97)</td>
<td>1.4 (1.9)</td>
<td>0.8 (1.4)</td>
<td>.125</td>
</tr>
<tr>
<td>Walking PA, sess/week</td>
<td>3.99 (3.04)</td>
<td>3.30 (2.44)</td>
<td>3.6 (2.7)</td>
<td>4.8 (3.7)</td>
<td>.200</td>
</tr>
</tbody>
</table>

**Dietary Behaviors**

<table>
<thead>
<tr>
<th>Vegetable, servings/day</th>
<th>3.1 (1.4)</th>
<th>3.4 (1.8)</th>
<th>3.3 (1.7)</th>
<th>2.6 (0.8)</th>
<th>.005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit, servings/day</td>
<td>2.0 (0.9)</td>
<td>2.0 (1.0)</td>
<td>2.0 (1.0)</td>
<td>2.0 (1.0)</td>
<td>.954</td>
</tr>
<tr>
<td>Sweetened drinks, cups/day</td>
<td>0.2 (0.5)</td>
<td>0.4 (0.9)</td>
<td>0.3 (0.8)</td>
<td>0.1 (0.3)</td>
<td>.035</td>
</tr>
<tr>
<td>Takeaways, meals/week</td>
<td>0.5 (0.8)</td>
<td>0.5 (0.9)</td>
<td>0.5 (0.8)</td>
<td>0.8 (1.3)</td>
<td>.377</td>
</tr>
<tr>
<td>FFBQ Total Score, 1-5</td>
<td>3.3 (0.4)</td>
<td>3.3 (0.4)</td>
<td>3.3 (0.4)</td>
<td>3.2 (0.3)</td>
<td>.536</td>
</tr>
<tr>
<td>FFBQ Fat Score (1-5)</td>
<td>3.5 (0.5)</td>
<td>3.5 (0.5)</td>
<td>3.5 (0.5)</td>
<td>3.5 (0.4)</td>
<td>.887</td>
</tr>
<tr>
<td>FFBQ Fibre Score (1-5)</td>
<td>2.9 (0.5)</td>
<td>2.9 (0.5)</td>
<td>2.9 (0.5)</td>
<td>2.8 (0.4)</td>
<td>.439</td>
</tr>
</tbody>
</table>

**Table 1 footnotes:**

a Figures exclude missing data (i.e. one GHSH intervention participant (Employment, English spoken at home, Referral source, accelerometer MVPA) and one control participant (Waist circumference, Indigenous status))

b Socio-Economic Indexes for Areas (SEIFA), specifically the Index of Relative Socio-Economic Advantage and Disadvantage (IRSAD)

c Figures exclude missing data: n=1 lost to follow-up (employment, English at home, waist circumference)
Sustained improvement after non-contact

Figure 1 shows changes from baseline to 12 months in study outcomes in the control group (12 months of non-contact after the initial GHS intervention) and in the GHSH intervention group (following six months of GHSH extended contact then six months no contact). Results are described in units but plotted relative to a substantial decline or worsening (i.e., MDI), to indicate whether the absence of a significant change was more consistent with maintenance (i.e., a substantial worsening is unlikely) or an inconclusive result (i.e., the error is too large to draw a conclusion). Over 12 months, the GHSH intervention group made significant improvements to waist circumference and the fiber index score, and the control group significantly improved their waist circumference and fat index score. The only significant declines between baseline and 12 months were self-reported walking, which declined in the intervention group, and self-reported vigorous activity, which declined in controls (Figure 1). Self-reported moderate physical activity and most of the dietary outcomes were maintained in both groups.
Figure 1: Mean changes (95% confidence intervals) between baseline and 12 months in study outcomes plotted as multiples of the minimum difference of interest (MDI) in the GHSH intervention (n=114) and control (n=114) groups.

Footnote for Figure 1: missing data are excluded for intervention group/control group: n=13/3 (weight), n=14/6 (waist circumference), n=12/3 (self-report physical activity and diet outcomes), n=16/9 (accelerometer MVPA).

Although both groups had displayed a large degree of behavioral maintenance at 12 months, extended contact was still associated with a significant advantage over control treatment for body weight ($p=0.042$) and accelerometer-assessed MVPA ($p=0.011$), with differences between groups averaging approximately 1.3 kg and 25 minutes per week (Table 2). Only
small and non-significant differences between groups were seen with the other outcomes, however meaningful differences may have been missed for self-report physical activity and vegetable intake.

**Table 2**: Difference in study outcomes between GHSH extended contact group (n=114) and control group (n=114) adjusted for baseline values of the outcome and potential confounders

<table>
<thead>
<tr>
<th></th>
<th>Baseline to 12 months c</th>
<th>First six months of non-contact d</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean difference (95% CI)</td>
<td>p</td>
</tr>
<tr>
<td><strong>Anthropometry</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight, kg</td>
<td>-1.33 (-2.61, -0.05)</td>
<td>.042</td>
</tr>
<tr>
<td>Waist circumference, cm</td>
<td>-0.60 (-2.33, 1.12) a</td>
<td>.492</td>
</tr>
<tr>
<td><strong>Physical activity (PA)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accelerometer PA, mins/week</td>
<td>24.9 (5.8, 44.0)</td>
<td>.011</td>
</tr>
<tr>
<td>Walking PA, sessions/week</td>
<td>-0.07 (-0.69, 0.55) a</td>
<td>.832</td>
</tr>
<tr>
<td>Moderate PA, sessions/week</td>
<td>-0.11 (-0.62, 0.39) a</td>
<td>.661</td>
</tr>
<tr>
<td>Vigorous PA, sessions/week</td>
<td>-0.12 (-0.64, 0.40) a</td>
<td>.658</td>
</tr>
<tr>
<td><strong>Dietary behaviors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetables, serves/day</td>
<td>0.10 (-0.32, 0.53) a</td>
<td>.627</td>
</tr>
<tr>
<td>Fruit, serves/day</td>
<td>-0.00 (-0.22, 0.21)</td>
<td>.975</td>
</tr>
<tr>
<td>Sweetened drinks, cups/day</td>
<td>-0.06 (-0.19, 0.06)</td>
<td>.323</td>
</tr>
<tr>
<td>Takeaways, meals/week</td>
<td>-0.10 (-0.26, 0.06)</td>
<td>.218</td>
</tr>
<tr>
<td>FFBQ Total Index, 1–5</td>
<td>-0.02 (-0.09, 0.06)</td>
<td>.639</td>
</tr>
<tr>
<td>FFBQ Fat Index, 1–5</td>
<td>-0.08 (-0.17, 0.01)</td>
<td>.078</td>
</tr>
<tr>
<td>FFBQ Fibre Index, 1–5</td>
<td>0.09 (-0.03, 0.20) a</td>
<td>.128</td>
</tr>
</tbody>
</table>

**Table 2 footnotes:**

a Inconclusive: non-significant comparison but meaningful differences contained within the 95% confidence intervals (CI)

b Mean differences (intervention – control) adjusting for confounders as per the main GHSH evaluation and baseline values of the outcome as estimated using linear regression, or mixed models accounting for repeated measures for accelerometer data (1–7 days per assessment per participant)

c Missing data are excluded for intervention group/control group: n=13/3 (weight), n=14/6 (waist circumference), n=12/3 (self-report physical activity and diet outcomes), n=16/9 (accelerometer physical activity)

d With baseline values of the outcome taken as values at the beginning of the non-contact period (GHSH baseline in the usual care group and at 6 months upon cessation of extended care in the intervention group). Missing data are excluded for intervention group/control group: n=13/2 (weight), n=15/2 (waist circumference), n=12/2 (self-report physical activity and diet), n=19/6 (accelerometer physical activity)
Changes during the non-contact period after extended care

Figure 2 shows the changes over the first six months of non-contact within each group. Statistically significant changes over the first six months of non-contact occurred only in the control group, not in the intervention group following extended contact. All of these changes were worsening of outcomes rather than improvements (Figure 2). Intervention changes (all non-significant) during this timeframe were suggestive of maintenance for waist circumference, moderate activity, and all of the dietary outcomes, but margins of error precluded definitive conclusions concerning the other outcomes.

When compared with the control group changes over their first six months of non-contact, those receiving intervention fared significantly better than those receiving usual care in terms of accelerometer-measured MVPA and self-reported moderate activity (Table 2). Other differences between the groups were all non-significant. All were small (except for walking) and a substantial effect of extended contact was unlikely for weight, FFBQ indices, takeaways, sweetened drinks and fruit intake, but substantial effects may have been missed concerning waist circumference, walking, vigorous physical activity and vegetable intake.
**Individual-level maintenance of outcomes during non-contact**

In addition to the maintenance seen in the group averages, many intervention participants had maintained their behavioral outcomes during six months of non-contact, while a minority of participants had worsened in their outcomes during that period. Figure 3 shows the percentage of intervention participants who had maintained their outcomes during non-contact. Nearly all outcomes were maintained (i.e., no worsening of ≥ the MDI) by the majority of participants. The proportion of maintenance was lowest for weight (55.5%
and highest for sweetened drinks (91.2% (93/102)), with a substantial proportion of maintenance coming in the form of further improvement for most outcomes. Notably, weight regain was still reasonably common (44.5%, 45/101), despite this maintenance intervention and despite the overall intervention effects for weight outcomes.

**Figure 3:** Percentage of GHSH intervention participants (n=114) maintaining their study outcomes during the first six months of non-contact

**Footnote for Figure 3:** a Maintained by either: no change or further improvement; with “Further Improved” being an improvement ≥ the minimum difference of interest (MDI); and, “Unchanged” being no improvement or worsening ≥ the MDI.
Discussion

Get Healthy, Stay Healthy (GHSH) is an extended contact intervention offered after completion of a free, publically-available lifestyle telephone coaching program. Our evaluation [12] previously found that at the end of GHSH both weight and accelerometer-measured moderate-to-vigorous physical activity were significantly better in the intervention group than the control group, and the present evaluation showed that these between-group differences were still present and statistically significant at 12 months. None of the other outcomes were significantly favoured compared to the control group at 12 months.

The presence of intervention effects following a non-contact period are commonly interpreted as indicative that the intervention’s effectiveness has been maintained [21, 22] but in isolation of other evidence (e.g. the direction of change in individuals), this interpretation can be problematic. Hence, in this study we also considered the lack of substantial regression towards baseline levels as indicating outcomes were maintained. In GHSH, only self-reported walking declined significantly over 12 months in the group who received extended contact with most other outcomes maintained or further improved. Further, during the non-contact period following extended contact (6–12 months), the intervention group did not significantly worsen in any outcomes, instead improving or maintaining outcomes. Over both of these timeframes, there was some uncertainty around the maintenance of self-reported vigorous physical activity and vegetable intake, with wide margins of error failing to rule out worsening in these outcomes.

These findings clearly indicate that by receiving extended contact, participants were “ahead of the game” with respect to some of their outcomes relative to where they were initially, and relative to their counterparts not receiving extended contact. As an innovative approach, we further tested whether these advantages appeared to be achieved by delaying inevitable declines by six months (during the extended contact period) or whether there was some evidence that extended contact genuinely mitigates the amount of behavioral decline occurring during the same amount of non-contact time. The changes over this timeframe significantly favoured the intervention group in terms of accelerometer-measured MVPA and self-reported moderate activity, but without a substantial or significant difference in body weight. So to some extent, the extended contact intervention promoted “maintenance” merely by delaying some of the seemingly inevitable weight regain. This delay in the “inevitable”
meant that there was an extended period of continued or maintained weight loss, which should have public health benefit [23]. Furthermore, the extended contact did help participants to maintain their physical activity behaviors, which independent of changes in weight, should also bring public health benefit [24].

Individual-level maintenance is also important, but seldom considered [1], as average changes at the group level can be stable without individuals necessarily maintaining their personal changes. In GHSH, during the first six months of non-contact (whether following extended- or initial contact), most of the outcomes were maintained by most of individuals, with at least a two-thirds majority maintaining or further improving their outcomes over this time. The outcome for which the most individuals had displayed a failure to maintain outcomes during non-contact (i.e., worsening ≥ the MDI) was body weight, with just under half of participants (intervention and controls) increasing weight by at least one kilogram.

Evidence suggests need for ongoing support that people can access as required over long periods of time. Mobile technologies facilitate this type of ongoing monitoring and contact in cost-effective ways. There is international consensus that obesity is a chronic, relapsing disease process that requires continuous treatment [25]. Whilst it is important to point out that the participants in this study were not necessarily obese at baseline, the majority were working towards weight loss goals, and it is the mechanism of weight loss regain that needs ongoing treatment. Researchers and practitioners need to acknowledge that individuals will cycle in and out of multiple programs across a lifespan and therefore we should not be imagining a single intervention effect to be “maintained”. What we need to do instead, is ensure that individuals have a positive experience in these programs so that they approach the next program with positive expectations and high self-efficacy.

This trial has tested the addition of tailored text messages to a telephone coaching program to extend the duration of care provided. It led to better outcomes for those receiving the texts, whilst that contact was maintained. As we move forward, we need to consider cost-effective mediums to maintain contact with people as they cycle in and out of weight loss and lifestyle support programs, and text messaging may be a feasible and affordable way to do this. Limitations of this trial include: the reliance on self-reported anthropometric outcomes (albeit validated and reliable tools were used); and, that the trial was under powered to detect within-group changes. The strengths of this trial (comprehensively looking at maintenance in three different ways, conducting an RCT within partnership and in a service delivery context) have
resulted in this evaluation directly informing the addition of an extended contact program in the GHS. More pragmatic research trials, like this one, need to be conducted to generate practice-based evidence in order to inform service delivery decisions.

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Abbreviations:

BMI: body mass index
CATI: computer-assisted telephone interview
CPM: counts per minute
FFBQ: Fat and Fibre Behavior Questionnaire
GHS: Get Healthy Information and Coaching Service®
GHSH: ‘Get Healthy, Stay Healthy’
MDI: minimum differences of interest
MVPA: moderate-vigorous physical activity

References


