Health Policy Advisory Committee on Technology

Technology Brief

Online programs for weight loss

February 2014
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**Technology, Company and Licensing**

**Register ID**
WP 155

**Technology name**
Online programs for weight loss

**Patient indication**
Adults and adolescents with a body mass index (BMI) of at least 25 kg/m² who are at risk of, or have, overweight or obesity-related comorbidities

**Description of the technology**
Online weight loss programs are web-based programs designed to help people lose weight. They are usually interactive and include features that mimic those typically provided in face-to-face counselling with a nutritionist or dietician. However, there is wide variation in the number and type of features the different programs provide. These can include general or individualised information, diet and physical activity plans, goal setting, blogs, chat rooms and self-monitoring tools for weight, diet and physical activity. Some online programs merely offer education and tools, while others provide feedback ranging from generic to tailored information and e-counselling.(1)

Many of the programs require users to fill out a questionnaire on their eating patterns, fitness levels and goals before proceeding. A personalised meal plan and workout program is usually then created.

**Company or developer**
There are numerous weight loss programs available on the internet developed by a diverse range of companies and individuals. Some are produced or endorsed by sports or media celebrities with well-known profiles, such as the “Michelle Bridges 12-Week Body Transformation”(2), whereas others are produced by large weight loss companies such as Weight Watchers (3); still others are developed by universities or hospitals.(4)

**Reason for assessment**
Online weight loss programs may result in significant cost savings for the healthcare system, as reduced weight decreases the relative burden of disease attributable to type 2 diabetes, some forms of cancer, and cardiovascular disease, to name a few. They provide an alternative for people who are unable or unwilling to visit dieticians or nutritionists for weight loss assistance.
Stage of development in Australia

☐ Yet to emerge
☐ Experimental
☐ Investigational
☐ Nearly established

☒ Established
☐ Established but changed indication or modification of technique
☐ Should be taken out of use

Licensing, reimbursement and other approval

Online weight loss programs are not required to be registered on the Australian Register of Therapeutic Goods and are not actively regulated by the Australian Therapeutic Goods Administration.

Australian Therapeutic Goods Administration approval

☐ Yes
☐ No
☒ Not applicable

ARTG number(s) NA

Technology type Program
Technology use Therapeutic

Patient Indication and Setting

Disease description and associated mortality and morbidity

In simple terms, overweight and obesity are defined as an excess accumulation of body fat that increases the risk of developing preventable health conditions.(5) Clinically, people are considered overweight if they have a BMI score of between 25.0 and 29.9 kg/m², while obese people have a BMI of at least 30.0 kg/m². Waist circumference, waist-to-hip ratio, and waist-to-height ratio may also be used as adjunct tools to inform the diagnosis of overweight and obesity, as evidence indicates they provide a better representation of lean-to-fat body mass composition than BMI alone.(6-8)

Overweight and obesity are primarily caused by an imbalance between dietary energy intake and energy expenditure. There are a number of risk factors that can influence an individual’s likelihood of becoming overweight or obese, including genetic factors, certain diseases, use of corticosteroids, occupational factors and lifestyle factors.(9, 10) The increasing global trends in overweight and obesity have been primarily attributed to the increased intake of energy-dense foods and reduced physical activity owing to increasingly sedentary work practices and changing modes of transportation.(11) In Australia, people who have a low socio-economic status, a lower level of education, live in rural regions or are
from certain ethnicities have an increased prevalence of overweight and obesity than other members of the population.\(^{(12)}\)

In terms of burden of disease, overweight and obesity were the third most common risk factors, behind tobacco use and high blood pressure, for the loss of productive life years in Australia in 2003.\(^{(13)}\) In total, 7.5 per cent of the total disease burden in Australia in 2003 was attributable to being overweight and obesity, accounting for 197,600 disability-adjusted life years (DALYs). The impact of overweight and obesity is similar in New Zealand, where it ranks second behind tobacco consumption as the most significant risk factor for loss of productive life years.\(^{(14)}\) In 2006, overweight and obesity were responsible for 7.9 per cent of health loss in New Zealand, or 75,100 DALYs.\(^{(15)}\)

The high burden of disease is attributable to the wide range of health problems associated with obesity, including an increased risk of cardiovascular disease, certain types of cancer, type 2 diabetes, psychosocial disorders, hypertension, sleep apnoea and musculoskeletal problems such as hip and knee arthritis, to name a few.\(^{(13, 16)}\) In addition to the impact on quality of life, many of these conditions also carry an increased risk of death. Specifically, high body mass has been attributed to increased rates of death in Australia from ischaemic heart disease, type 2 diabetes, stroke, colorectal cancer and breast cancer.\(^{(13)}\) To further highlight the relative importance of overweight and obesity to the health of Australians, it was included as one of Australia’s National Health Priority Areas in 2008.\(^{(13)}\)

**Number of patients**

According to data collected by the Australian Bureau of Statistics, there has been a steady increase in the prevalence of overweight and obesity among Australians older than 18 years from 56.3 per cent in 1995 to 63.4 per cent in 2011–12.\(^{(17)}\) Perhaps even more alarming than the high overall prevalence is the proportion of obese adults in this population (28.3%).\(^{(17)}\) In total, this equates to more than 8 million Australian adults who are overweight and more than 6 million who are obese. The prevalence of overweight and obesity among children aged 5 to 17 years has increased more gradually over the same period from 21.0 per cent to 25.3 per cent.\(^{(17, 18)}\) There is also a lower prevalence of obesity among children than adults, with 7.6 per cent reporting a BMI over 30.0 kg/m\(^2\) in 2011–12.\(^{(17)}\)

In 2011–12, a greater proportion of adult Australian men (41.9 per cent) were overweight than women (28.8%), although the prevalence of obesity was comparable (28.0 per cent).\(^{(17)}\) Overweight and obesity also varied with age, with the highest prevalence being reported in adults aged 65 to 74 years (74.7%) and the lowest being reported in adults aged 18 to 24 years.\(^{(17)}\) There is also a significant difference between the prevalence of overweight and obesity between metropolitan (61.1%), inner regional (68.0%), and outer regional and remote (70.1%) regions of Australia.
Similar trends in the prevalence of obesity over time have also been observed in New Zealand, where prevalence estimates among adults aged 18 years and older have increased from 19 per cent in 1997 to 28 per cent in 2011–12. Comparisons between the prevalence of obesity among children are difficult to draw, due to the collection of data for different age groups. However, children from New Zealand aged 5 to 14 years had a significantly higher prevalence of obesity (11.0%) than Australian children aged 5 to 17 years (7.6%). The prevalence of obesity in New Zealand also exhibits significant ethnic and social disparities as the Māori and Pacific Islander populations (62%) and populations from the lowest socio-economic areas (40%) are disproportionately affected by obesity, compared with the European population (26%) and people from the highest socio-economic areas (23%).

Speciality: Gastrointestinal, Health promotion
Technology setting: Community care, Primary care

Impact

Alternative and/or complementary technology

Online programs for weight loss may serve as an alternative to community-based weight loss initiatives for hard-to-reach populations that may not otherwise access weight loss services. They may also be used as part of a multi-modal strategy that includes a combination of surgical, face-to-face and online weight loss tools to manage weight loss in patients with clinically severe obesity.

Current technology

Programs designed to assist in the management of overweight and obesity typically include strategies to modify diet and lifestyle factors responsible for weight gain. While there is currently no gold standard for ensuring sustainable, long-term weight management, programs which include individual face-to-face counselling have proven to be effective.

Current Australian clinical practice guidelines recommend a multicomponent lifestyle-based intervention as the first-line strategy for the management of patients with obesity. For patients with a BMI between 25.0 and 29.9 kg/m² this strategy includes monitoring BMI, screening for comorbidities, promoting the benefits of a healthy lifestyle and assisting in identifying local programs that may assist in weight loss. The management of patients who are clinically obese is more involved and includes more frequent monitoring of BMI, discussing the health issues associated with a high BMI, screening for comorbidities, explaining the benefits of weight management, assistance in setting up a personalised weight loss program and long-term review and monitoring.

In severely obese patients or in cases where lifestyle-based interventions for weight loss have failed surgical intervention may be required. To qualify for a government-funded
procedure to manage body weight, adult patients older than 18 years must have either a BMI greater than 40.0 kg/m\(^2\) or a BMI greater than 35.0 kg/m\(^2\), a serious medical comorbidity and a lack of success with non-surgical interventions for weight loss.\(^{(22)}\)

**Diffusion of technology in Australia**

The uptake of any internet-based intervention is ultimately limited by the availability of internet service. In Australia, internet access is widely available, with 79 per cent of Australian households having an internet connection in 2010–11.\(^{(23)}\) Of these, 92 per cent were connected via broadband, five per cent had access to dial-up internet and in three per cent the connection type was unknown. Internet access also varies between metropolitan and regional areas, with 82 per cent of people living in metropolitan areas being connected compared with 74 per cent in rural and regional locations.\(^{(23)}\) This difference may indicate a potentially limiting factor for the uptake of internet-based interventions for weight loss in rural settings, despite the greater need for such interventions in this population.

The high level of internet availability in Australia suggests that online programs for weight loss can be readily accessed by the majority of the population. However, data on the diffusion and uptake of online programs for weight loss in Australia is limited. Data from the United States suggest that 13 per cent of women and five per cent of men access commercial weight loss programs,\(^{(24)}\) however differences in internet access and population demographics make comparisons with Australia difficult. A recent Australian study investigated the characteristics of 11,341 participants enrolled in a web-based weight loss program (The Biggest Loser Club) \(^{(25)}\) between August 2007 and May 2008.\(^{(26)}\) The study reported that women of higher socioeconomic status living in major Australian cities were the main adopters of this program, but that there was also substantial involvement from traditionally harder to reach populations such as men and younger Australians.

**International utilisation**

It is not possible to estimate the current level of diffusion and uptake of web-based programs for weight loss internationally owing to the open and unmonitored nature of web-based interventions.

**Cost infrastructure and economic consequences**

The cost of online weight loss programs varies. Some of the most basic programs that only provide access to tools are free, while others, such as those provided by more well-known weight loss companies, such as Weight Watchers \(^{(3)}\) and SureSlim \(^{(27)}\), require monthly payments of around $31 to $70, depending on the options chosen (the greater the support, the higher the cost). Some programs also include registration fees. The programs can be ongoing or for a limited period of time, usually around 6 to 12 weeks.
The Biggest Loser Online Diet Club (25), which is one of the largest online weight loss programs in Australia, enrolled 11,341 participants. It operates on a subscription-based model, with costs varying depending on the length of the subscription. (26) A subscription to the plan currently costs $49.95 for a single month, $119.85 for three month, and $239.40 for 12 months. In comparison, a 12 week face-to-face weight loss program consisting of an initial 1-hour consultation with a dietician in a public hospital ($70), followed by fortnightly 30-minute follow-up consultations ($35) would cost more than a 12-month subscription to the Biggest Loser Online Diet Club. (28) Online weight loss programs also have the additional benefit of reduced travel time and cost for participants.

The potential cost savings of an online weight loss program to the healthcare system are significant. The estimated total financial cost of overweight and obesity in Australia has increased from $3.8 billion in 2005 to $8.3 billion in 2008. (1) This sum includes $3.6 billion in lost productivity, $2.0 billion in healthcare expenditure and $1.9 billion in carer fees. However, the total cost to society is not limited to healthcare expenditure, with the estimated net cost of loss of wellbeing due to overweight and obesity totalling $49.9 billion in 2008. (1)

**Ethical, cultural or religious considerations**

No ethical, cultural or religious issues were identified in the literature.

**Evidence and Policy**

Due to the wealth of literature available for online weight loss programs, only those studies which systematically reviewed randomised controlled trial (RCT) evidence were eligible for inclusion in this Technology Brief. In addition, RCTs published after the latest search period of the included systematic reviews, with a follow-up greater than 2 years, were eligible for inclusion. Studies assessing online weight loss programs in children, adolescents, the elderly (≥ 65 years of age) or specific minority groups were not eligible for inclusion.

**Safety and effectiveness**

Four systematic reviews (Level I intervention evidence) were eligible for inclusion in this Technology Brief (29-32), one of which was excluded (29) because all of its included studies were included in the other three systematic reviews. As well as this, one of the reviews (31) was an update of another (32); therefore, two systematic reviews (reported across three studies) are reported on herein (30-32) (Table 1). Although there was study overlap apparent between these two systematic reviews also (this is presented in Table 1), the extent of overlap was not substantial enough to warrant exclusion of either review.
Table 1 Study profile of included systematic reviews

<table>
<thead>
<tr>
<th>Inclusion criteria</th>
<th>Kodama et al. 2012 (30)</th>
<th>Neve et al. 2010 (32); Manzoni et al. 2011 (31)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult participants who were considered overweight or obese by study definition. RCTs with parallel design in which: a web-user group was compared with a non-web-user control group; the intervention included controlling dietary intake and increasing physical activity; internet use was aimed at initial weight loss or weight maintenance; outcomes were changes to absolute body-weight.</td>
<td>Participants aged ≥18 years with BMI ≥25 kg/m². RCTs in which: at least one web-based intervention arm whose primary aim was achieving weight loss or weight maintenance; the aim was to achieve positive dietary and physical activity behaviour change; outcomes were adiposity measures.</td>
<td></td>
</tr>
<tr>
<td>Exclusion criteria</td>
<td>NR</td>
<td>Control patients who used the internet for reasons other than obtaining standard non-personalised information.</td>
</tr>
<tr>
<td>Search period</td>
<td>1980 to April 2011</td>
<td>1995 to March 2010</td>
</tr>
<tr>
<td>Number of included studies</td>
<td>23 RCTs</td>
<td>26 RCTs</td>
</tr>
<tr>
<td>Study overlap</td>
<td>14/23 studies were included in Neve et al 2010/Manzoni et al 2011</td>
<td>14/26 studies were included in Kodama et al 2012</td>
</tr>
</tbody>
</table>

RCT: randomised controlled trial; NR: not reported; BMI: body mass index.

The latest search date of the two included systematic reviews was April 2011. None of the RCTs published after this date reported patient outcomes to two years.

Kodama et al. 2012 (30)

The systematic review examined the weight loss or weight maintenance effect of an internet component in obesity treatment programs for overweight or obese adult participants and to identify specific characteristics of these programs that may improve weight loss outcomes. Literature searches of MEDLINE and EMBASE (between 1980 and April 2011) were undertaken to identify relevant studies published in any language (Table 1). Three of the authors independently reviewed the search results to determine relevant studies; discrepancies were resolved by a fourth author. Examination of reference lists for additional studies also took place. To be eligible for inclusion in this systematic review the internet component of the weight loss program had to be either supplementary (obesity treatment program plus web-based support versus obesity treatment program alone) or substitutive (web-based program versus in-person care).

A total of 23 eligible RCTs reporting outcomes in 8,697 patients were included in the systematic review. The aim of the lifestyle modification was initial weight loss in 18 studies and weight maintenance in five studies. The intervention period (including education and observation) ranged from 3 to 30 months across the included RCTs, with only eight studies...
following patient outcomes beyond 12 months. In 11 of the included studies, at least 80 per cent of participants were women; the mean age and BMI of the participants across all 23 studies was 46 years (standard deviation [SD] 6) and 32 kg/m$^2$ (SD 3), respectively. The majority of studies that defined overweight or obesity (16/22) had a minimum BMI for targeted participants of 25 kg/m$^2$ to 30 kg/m$^2$; however, three studies had a minimum cut-off more than 25 kg/m$^2$ to define overweight and another three studies specifically targeted participants with a BMI of at least 30 kg/m$^2$. The method of randomisation was described in 11 of the included studies and 17 studies conducted intention-to-treat analyses. The dropout rate ranged from 0 to 80 per cent (mean 17.8%) and reasons for dropout were reported in 12 studies. The authors did not carry out formal critical appraisal of the included studies.

The comparative net effect on weight loss was calculated by subtracting the change from baseline to final body weight in the control group from the experimental group. All effect sizes were pooled with a fixed-effect or random-effects (when between-study heterogeneity was significant) model. Analyses were repeated for subgroups based on pre-specified study characteristics. Meta-regression analyses were also conducted to determine the influence of study characteristics on study results.

**Effectiveness**

Of the 23 included studies, 16 used the internet in conjunction with non-web-based obesity support in both the experimental and control group (supplementary) and one study used the internet in place of face-to-face counselling (substitutive). The six remaining studies compared the effectiveness of both forms of internet use. In the majority of included studies (n=20), participants received individualised instructions from the weight loss website and some received additional content (n=14). Fourteen studies required patients to submit information on their dietary intake and physical activity and nine studies allowed participants to communicate with instructors via email. Another nine studies provided counselling via face-to-face or telephone contact, in addition to the internet program.

Meta-analyses found a modest, yet significant, improvement in mean weight loss in patients who used internet weight loss programs compared with non-web-based programs (-0.68 kg, $p=0.03$). Between-study heterogeneity was large and significant ($I^2$ 84.4%, $p<0.001$), which reduced the validity of the result.

Sensitivity analyses found that weight loss was more influenced by characteristics of the web-based program than by patient characteristics such as age and BMI. These program characteristics included period of program use, website content and the role and aim of internet use (**Table 2**).
Table 2 Stratified analyses of effect of web-based interventions on weight loss

<table>
<thead>
<tr>
<th>Variable</th>
<th>Numbe\r of studies</th>
<th>Mean difference (95% CI) kg</th>
<th>Significance \b</th>
<th>I² (%)</th>
<th>p value of heterogeneity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Educational period</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 6 months</td>
<td>9</td>
<td>-1.55 (-2.05 to -1.05)</td>
<td>0.001</td>
<td>10.6</td>
<td>0.35</td>
</tr>
<tr>
<td>≥ 6 months to &lt; 12 months</td>
<td>8</td>
<td>-0.39 (-1.38 to 0.60)</td>
<td>0.44</td>
<td>89.0</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>≥ 12 months</td>
<td>8</td>
<td>-0.20 (-1.46 to 1.06)</td>
<td>0.75</td>
<td>87.1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Content of web-based intervention</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Included additional content (other than instruction)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>9</td>
<td>-1.33 (-2.32 to -0.34)</td>
<td>0.008</td>
<td>85.2</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Yes</td>
<td>16</td>
<td>-0.25 (-0.98 to 0.47)</td>
<td>0.49</td>
<td>81.0</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Included self-monitoring (in addition to instruction)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>12</td>
<td>-1.15 (-1.88 to -0.42)</td>
<td>0.002</td>
<td>81.9</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Yes</td>
<td>13</td>
<td>-0.14 (-1.06 to 0.79)</td>
<td>0.77</td>
<td>82.8</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Included email counselling (in addition to instruction)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>10</td>
<td>-1.05 (-1.90 to -0.21)</td>
<td>0.02</td>
<td>85.0</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Yes</td>
<td>15</td>
<td>-0.17 (-1.09 to 0.75)</td>
<td>0.72</td>
<td>84.9</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Aim of using internet</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial weight loss</td>
<td>20</td>
<td>-1.01 (-1.68 to -0.34)</td>
<td>0.03</td>
<td>85.2</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Weight maintenance</td>
<td>5</td>
<td>0.68 (-0.50 to 1.85)</td>
<td>0.26</td>
<td>61.9</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>Role of using internet</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supplement</td>
<td>23\c</td>
<td>-1.00 (-1.57 to -0.43)</td>
<td>&lt;0.001</td>
<td>79.2</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Substitute</td>
<td>8\c</td>
<td>1.27 (0.29 to 2.25)</td>
<td>0.01</td>
<td>73.7</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

CI: confidence interval.
\a To avoid double counting where two or more results were reported, the data with the longest intervention period were used.
\b p value for significance of weight change between the experimental and control groups.
\c Six data sets were added because six studies used internet as both supplement and substitute.

Manzoni et al. 2011 (31, 32)
The objective of this systematic review (31) was to update a previous systematic review (32) on the effectiveness of internet-based interventions for weight loss and weight maintenance in overweight and obese adults. The original systematic review searched MEDLINE/PreMEDLINE, EMBASE and several other electronic databases for English-language studies published from 1995 to April 2008. The updated systematic review was conducted by a different research group with a search period from April 2008 to March 2010. Inclusion and exclusion criteria are reported in Table 1. All studies obtained from the database search were assessed for relevance by two independent reviewers. A third reviewer was used in the case of disagreement. Similarly, critical appraisal and data extraction of the retrieved studies was undertaken by two independent reviewers; a third reviewer was utilised if consensus could not be reached (for the original systematic review only).

The original systematic review included 20 articles, reporting outcomes across 18 RCTs. The update search identified eight new studies. The total number of participants across all of the included studies was 8,324. The aim of the lifestyle modification was initial weight loss in 19 studies and weight maintenance in 7 studies. The length of intervention was from six weeks to 6-months (n=17 studies) and up to 12 months (n=6) and two years (n=2). Patients were recruited from: the general public (n=18 studies), the healthcare system (n=3), work sites (n=2), universities (n=1) and the United States Air Force (n=1). The mean age of participants was 46 years, the majority (77%) of whom were women. The dropout rate ranged from 0 to 70 per cent (mean 23%): 12 studies lost 0 to 20 per cent of participants; 11 studies lost 20 to 50 per cent; and two studies lost over 50 per cent.

The original systematic review assessed the quality of the included studies, whereas the updated systematic review did not. Of the original 20 included studies, only three met 8 of the 10 criteria required for a high-quality study. A large proportion of the studies (n=14) did not disclose the method of randomisation; however, most conducted intention-to-treat analyses (n=14), measured their outcomes in a reliable and consistent manner and used appropriate statistical analyses.

Effect sizes were calculated for all experimental comparisons within each study and results were pooled using a fixed-effect or random-effects (when between-study heterogeneity was significant) model, where appropriate, in the original systematic review. However, this was not done in the update because of the significant heterogeneity among the studies.

**Effectiveness**

In the original systematic review, three studies compared web-based weight loss interventions to a control. Two of the studies showed no significant difference in mean weight change, while the other, which compared an online weight loss program with a weight loss program using a manual, found significantly better weight loss outcomes with the manual at both 16 and 52 weeks' follow-up. Five studies compared web-based weight loss programs consisting of online education only with an enhanced online weight loss
program (with additional features such as behavioural therapy, interactive feedback, etc.). All of these studies reported significantly better weight loss outcomes using enhanced online programs compared with information-only sites up to 12 months. Interestingly, one study found an enhanced online program with behavioural therapy produced better outcomes than a commercial program even though the latter provided prescriptive meal and exercise plans and the enhanced web-based program did not.

With regards to weight loss maintenance, meta-analyses found significantly less weight was regained in participants in the experimental groups compared with the control groups (weighted mean difference -0.30 [95% CI -0.34 to -0.26] p<0.0001). However, another study that was not included in the meta-analysis because of heterogeneity showed no significant difference in regained weight between the two groups. The included studies also found there was little difference in the amount of weight regained between participants in the experimental and the control groups who received face-to-face care. There was also little difference in the amount of weight regained if the participant had received frequent or minimal face-to-face contact.

The original systematic review also looked at the effectiveness of weight loss related to usage of the web-based intervention. The findings of this are summarised in Table 3.

Table 3 Weight loss success and online program usage

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number of studies</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logins/usage</td>
<td>11</td>
<td>Four studies found significant difference in login frequency between groups; three had a higher login rate for web-based interventions with behavioural therapy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5/7 studies found greater numbers of logins were associated with greater weight loss</td>
</tr>
<tr>
<td></td>
<td></td>
<td>One study found initial login rate significantly lower in those who dropped out by 12 months compared with those who completed the intervention</td>
</tr>
<tr>
<td>Self-monitoring</td>
<td>10</td>
<td>Three studies reported significantly higher levels of self-reporting in:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Web-based program with behavioural therapy compared with commercial program</td>
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<td></td>
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<td>2. Web-based program with human email counselling compared with automated counselling</td>
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<tr>
<td></td>
<td></td>
<td>3. Web-based program compared with face-to-face intervention</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6/7 studies reported significant correlation between weight change and self-monitoring</td>
</tr>
<tr>
<td>Peer/social support</td>
<td>4</td>
<td>One study reported higher perceived social support in web-based programs with behavioural therapy compared with commercial programs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Two studies reported a significantly higher number of peer contacts in web-based programs compared with face-to-face programs</td>
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</tbody>
</table>
Three studies reported a significantly higher attendance in face-to-face programs compared with web-based programs.

One study reported higher attendance at group meetings in web-based program with behavioural therapy compared with commercial programs.

Two studies found a significant correlation between meeting attendance and weight change.

One study found a greater number of posts in web-based programs with minimal motivational interviewing compared with web-based program with enhanced motivational interviewing.

One study found a positive correlation between the number of posts and weight loss.

Overall, the authors of the original and updated review concluded that there was not enough evidence to determine the effectiveness of web-based interventions in achieving initial weight loss and weight loss maintenance. Meta-analyses, conducted in the original review, found that online interventions achieved similar initial weight loss to control or minimal contact groups and that online programs with enhanced features (such as behavioural therapy, human email counselling, homework activities, etc.) achieved better initial weight loss than information/education only web-based programs. It is also possible that web-based interventions may be particularly useful in helping people maintain their weight loss as the outcomes achieved using this type of intervention were comparable to face-to-face contact.

Safety

There are no known adverse effects of web-based weight loss programs; therefore, there were no safety outcomes reported in the included studies.

Additional information: Australian RCT(1)

An RCT was carried out in Newcastle, Australia to determine if overweight and obese adults experienced a greater reduction in BMI at 12 and 24 weeks with the use of an online weight loss program with additional support features compared with a standard online version. A total of 301 patients aged 18 to 60 years with a BMI of 25 to 40 kg/m², not participating in any other weight loss program, were recruited and 158 were randomised to the ‘enhanced’ online program group and 143 to the ‘basic’ online program group. Assessors were blinded to group allocation.

Patient demographics were similar at baseline between the two groups with regards to age, BMI, nationality and weekly household income. Retention rates at 12 weeks follow-up were not significantly dissimilar between the enhanced (84.9%) and basic (74.7%) program groups (p=0.66); however, significantly more participants in the enhanced group (81.0%) attended the 24 week assessment compared with the basic group (68.5%; p=0.01). For those participants with missing data at 12 or 24 weeks, their missing data was imputed using the
last observation carried forward (LOCF) and baseline observation carried forward (BOCF) approach.

Weight, BMI and waist circumference were significantly lower in both groups at 12 and 24 weeks follow-up. BMI reduction was similar between both treatment groups at 12 and 24 weeks follow-up in the LOCF, BOCF and completers (participants who completed their 24 week assessment) analyses. As seen in Table 4, for each analysis, there were no significant between-group differences in mean weight loss at 24 weeks or in the proportion of patients with clinically significant weight loss (≥5%) at 24 weeks.
Table 4 Mean weight loss and proportion of clinically significant weight loss at 24 weeks

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD) % weight loss at 24 weeks</th>
<th>Proportion of patients with clinically significant weight loss at 24 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Enhanced</td>
<td>Basic</td>
</tr>
<tr>
<td>LOCF</td>
<td>-4.3 (6.4)</td>
<td>-3.6 (4.9)</td>
</tr>
<tr>
<td>BOCF</td>
<td>-4.2 (6.3)</td>
<td>-3.2 (4.7)</td>
</tr>
<tr>
<td>Completers</td>
<td>-4.6 (4.8)</td>
<td>-3.9 (4.1)</td>
</tr>
</tbody>
</table>

SD: standard deviation; LOCF: last observation carried forward; BOCF: baseline observation carried forward.

With regards to secondary effectiveness outcomes, BOCF analyses found a significantly greater reduction in resting heart rate at 24 weeks in participants randomised to the enhanced group compared with the basic group ($p=0.03$). Subgroup analyses (carried out using data from the ‘completers’ population only) found no significant relationships between treatment group and sex ($p=0.52$), BMI ($p=0.45$) or age ($p=0.72$) for the outcome of weight loss.

Finally, website usage was significantly greater in participants in the enhanced online program group at 12 and 24 weeks ($p=0.02$). In the completers population significant relationships were seen between percentage weight loss at 12 and 24 weeks and total website usage from baseline to 12 weeks and 24 weeks ($p<0.001$). Participants with clinically significant weight loss ($\geq5\%$) at 12 and 24 weeks used the website on significantly more days than those with weight loss $<5\%$ at 12 (median 44 days versus 13 days, $p<0.001$) and 24 (median 58 days versus 16 days, $p<0.001$) weeks. Overall, the authors of this RCT concluded that enhanced online weight loss programs offered limited additional benefits to standard online programs; however, enhanced programs did improve retention and website usage which can be attributed to improved weight loss outcomes.

**Economic evaluation**

Three studies which conducted cost-effectiveness analyses on web-based interventions for weight loss were identified and are summarised briefly below (33-35).

Krukowski et al. (2011) compared the cost-effectiveness of a web-based weight loss program to an in-person weight loss program in a dual centre RCT involving 323 obese volunteers (BMI 25-50 kg/m$^2$). The web-based program involved one 60-minute virtual group session per week, while the in-person program involved a weekly 60-minute group session. Both treatments offered the same behavioural strategies to achieve targeted habit changes. The total cost of conducting the in-person program was US$706$¹ per person compared with US$372 per person for the internet program. The main difference in cost was due to travel expenses of US$158 per person. The incremental cost-effectiveness ratio

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¹ 1 USD = 1.11 AUD (Source: [http://www.xe.com/currencyconverter/convert](http://www.xe.com/currencyconverter/convert))
was US$2,160 per (discounted) life-years gained for the in-person program relative to no intervention/no weight loss and US$7,177 per life-years gained for the in-person program relative to the internet program.

Meenan et al. (2009) conducted a multicentre RCT comparing three weight loss interventions in 1,032 overweight or obese participants (BMI 25-45 kg/m$^2$) on medication for hypertension or dyslipidaemia: 1) personal contact including monthly contact with an interventionist by telephone or in person; 2) unlimited access to an interactive website that provided ongoing web-based support; 3) a self-directed control condition. Over a 30-month period the costs of the personal contact intervention exceeded those of the interactive website. The 30-month implementation cost for the 342 personal contact participants was US$537,242 (US$1,571 per participant) and US$214,879 (US$617 per participant) for the 348 internet participants.

Finally, McConnon et al. (2007) conducted an RCT comparing an internet-based resource for obesity management with usual care in 221 obese volunteers (BMI $\geq 30$ kg/m$^2$). The internet intervention provided advice, tools and information to support behaviour change in terms of dietary and physical activity patterns. Results from the 12-month data suggested that the internet-based resource was not a cost-effective tool for weight loss. Total costs per person per year were higher in the internet group than the usual care group (£992.40$^2$ compared with £276.12), primarily due to the fixed costs associated with setting up the website.

**Ongoing research**

Table 5 lists RCTs involving online weight loss programs identified. Trials that were reported as being completed (31 in total) were not included in the table. In addition, three studies due to finish in 2009, 2010 and 2012 with an unknown recruitment status were also excluded. A total of 26 trials, including 22 RCTs, two non-randomised controlled trials and two case series studies involving web-based weight loss programs were identified. The majority of the trials (n=23) are based in the United States.

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$^2$ 1 GBP = 1.84 AUD (Source: [http://www.xe.com/currencyconverter/convert](http://www.xe.com/currencyconverter/convert))
## Table 5: Registered RCTs involving online based weight loss programs

<table>
<thead>
<tr>
<th>Trial Identifier (Country) Multicentre/single centre</th>
<th>Trial status</th>
<th>Interventions</th>
<th>Population</th>
<th>Follow up</th>
<th>N</th>
<th>Estimated completion date</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCT01408147 (United States) NR</td>
<td>Recruiting</td>
<td>Online weight loss program Standard care</td>
<td>Women (18–40 years old) with delivery within 6–52 weeks who exceed pre-pregnancy weight by at least 4.5 kg or have current BMI &gt;22 kg/m²</td>
<td>12 months</td>
<td>430</td>
<td>July 2016</td>
</tr>
<tr>
<td>NCT00983476 (United States) NR</td>
<td>Recruiting</td>
<td>Individual and group in-person sessions to deliver a manual-based MOVE program Web-based MOVE program Usual care plus educational handouts on weight loss</td>
<td>Individuals (&gt;18 years old) with a DSM-IV diagnosis of schizophrenia, schizoaffective disorder, bipolar disorder, recurrent major depressive disorder with psychosis or PTSD with a BMI ≥30 kg/m² or ≥28 kg/m² if 10 pounds of recent weight gain</td>
<td>12 months</td>
<td>300</td>
<td>May 2014</td>
</tr>
<tr>
<td>NCT0187116 (United States) NR</td>
<td>Recruiting</td>
<td>Weight loss program (includes online component and telephone component to monitor progress) Pamphlet to help guide weight loss without access to web-based program</td>
<td>Women (&gt;18 years old) with ductal carcinoma in situ or stage I–III invasive breast cancer</td>
<td>12 months</td>
<td>80</td>
<td>June 2016</td>
</tr>
<tr>
<td>NCT01134783 (United States) NR</td>
<td>Ongoing but not recruiting</td>
<td>15-week web-based course Face-to-face, in-person class meetings Web-based curriculum plus face-to-face, in-person meetings Control</td>
<td>Students (18–35 years old) attending 2-year community or technical colleges</td>
<td>24 months</td>
<td>441</td>
<td>May 2014</td>
</tr>
<tr>
<td>NCT01358643 (United States) NR</td>
<td>Enrolling by invitation only</td>
<td>Web-based diet and exercise program A program in which you wear a small device on your arm that measures physical activity DVD-based home exercise program</td>
<td>Operations Enduring Freedom and Iraqi Freedom veterans with BMI ≥30 kg/m²</td>
<td>12 weeks</td>
<td>30</td>
<td>May 2012</td>
</tr>
<tr>
<td>NCT01664026 (Argentina) NR</td>
<td>Ongoing but not recruiting</td>
<td>Web-based lifestyle modification program with telephone counselling Web-based lifestyle modification program without telephone counselling</td>
<td>Males or females (25–70 years old) with BMI ≥30 kg/m² and &lt;40 kg/m²</td>
<td>6 months</td>
<td>350</td>
<td>December 2013</td>
</tr>
<tr>
<td>NCT Number</td>
<td>Status</td>
<td>Description</td>
<td>Eligibility</td>
<td>Duration</td>
<td>Recruitment End Date</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
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<td></td>
</tr>
</tbody>
</table>
| NCT01889082      | Ongoing but not recruiting   | Face-to-face behavioural weight loss  
| (United States)  |                               | Web-based behavioural weight loss  
| NR               |                               | Web-based behavioural weight loss plus optional group sessions             | Individuals (18–25 years old) with BMI 25-45 kg/m² | 3 months | September 2013       |
| NCT01043718      | Ongoing but not recruiting   | Online lifestyle program (more intensive)  
| (United States)  |                               | Online lifestyle program (less intensive)                                  | Individuals (18–80 years old) receiving primary care with BMI >30 kg/m²    | 18 months| December 2012        |
| Single centre    |                               |                                                                              |                                                                            |          |                      |
| NCT01578512      | Recruiting                    | Face-to-face weekly group weight loss sessions  
| (United States)  |                               | One group and 7 web-based lessons  
| NR               |                               | Single session behavioural weight loss                                      | Individuals (18–35 years old) with BMI 25-45 kg/m²                         | 6 months | November 2012        |
| NCT01912209      | Not yet open for participant  | New web-based nutritional and lifestyle management program  
| (United States)  | recruiting                     | Usual care via traditional website                                          | Baptist Health Employees (≥18 years old) with metabolic syndrome           | 12 months| March 2015           |
| Single centre    |                               |                                                                              |                                                                            |          |                      |
| NCT01222858      | Ongoing but not recruiting   | Web-based weight loss lessons  
| (United States)  |                               | Web-based eating and activity intervention including multimedia lessons and self-monitoring with automated feedback | Individuals (18–70 years old) with BMI 25-45 kg/m² referred by their clinician because of an obesity-related comorbidity | 6 months | May 2013             |
| NR               |                               |                                                                              |                                                                            |          |                      |
| NCT01558297      | Ongoing but not recruiting   | NR                                                                           | Individuals with BMI 25-55 kg/m²                                           | 6 months | August 2016          |
| (United States)  |                               |                                                                              |                                                                            |          |                      |
| NCT01032590      | Not yet open for recruitment  | 12-week web-based weight loss  
| (United States)  |                               | 12 weeks of usual dietary and physical activity followed by web-based 12-week weight loss program | Individuals (≥21 years old) with a diagnosis of colorectal cancer who completed treatment 1-10 years ago | 5 years  | July 2016            |
| Single centre    |                               |                                                                              |                                                                            |          |                      |
| NCT010044147     | Ongoing but not recruiting   | Online program for weight loss (standard)  
| (United States)  |                               | Online program for weight loss (modulated)  
<p>| Multicentre      |                               | Online program for weight loss (resources)                                  | Obese individuals 21–75 years old with BMI &gt;30 kg/m²                       | 12 months| September 2012       |
| NCT01946191      | Not yet open for              | Online tracking tools and weight maintenance coaching visits and real-      | Primary care patients (18–75 years old) who have lost ≥5% of their body weight | 36 months| September 2017       |</p>
<table>
<thead>
<tr>
<th>ID</th>
<th>Status</th>
<th>Program details</th>
<th>Eligibility</th>
<th>Duration</th>
<th>Number</th>
<th>Start Date</th>
</tr>
</thead>
</table>
| NCT01232699      | Ongoing, not recruiting | Web-based group behavioural weight loss with individual online motivation interviewing (MI)  
Web-based group behavioural weight loss without MI | Individuals (≥ 18 years old) with a BMI of between 18 and 50 kg/m²  
426 | December 2015 |
| NCT01606813      | Recruiting           | Brief physician counselling plus usual care  
Brief physician counselling plus referral and access to a web-based weight control program  
Brief physician counselling plus referral and access to the internet weight control program plus brief follow-up email notes of support and accountability from primary care physicians | Individuals (21–65 years old) with BMI 25-50 kg/m² | 12 months | 647 | March 2016 |
| NCT0188172       | Recruiting           | Weight Watchers Online Program  
Web-delivered eating and activity program | Individuals (18–70 years old) with BMI 27-40 kg/m² | 12 months | 360 | June 2015 |
| NCT01043718      | Ongoing but not recruiting | More intensive online lifestyle change program with elements of a behavioural program developed by the Diabetes Prevention Program (DPP)  
Less-intensive online DPP materials | Individuals (18–80 years old) with BMI >30kg/m² | 18 months | 120 | December 2012 |
| NCT01307644      | Ongoing but not recruiting | Weight loss and maintenance through interactive website only  
Interactive website plus a peer-led online support group  
Interactive website plus professional weight loss counselling via e-mail | 40–69 year-old women with BMI 28-39.9 kg/m² or 40 -45 kg/m² (with physician clearance) | 30 months | 301 | March 2015 |
| NCT01841372      | Not yet open for recruitment | Virtual reality (Second Life) to improve weight maintenance  
Face-to-face group weight loss | Individuals (21–65 years old) with BMI 25-39.9 kg/m² | 12 months | 202 | July 2017 |
<p>| NCT01902979      | Recruiting           | Online pedometer and nutrition | Individuals (&gt;45 years old) with spinal stenosis | 6 months | 88 | September |</p>
<table>
<thead>
<tr>
<th>Country</th>
<th>Intervention</th>
<th>Comparator</th>
<th>BMI Requirement</th>
<th>Publication Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Canada)</td>
<td>NR</td>
<td>Usual care</td>
<td>BMI ≥25 kg/m²</td>
<td>2015</td>
</tr>
</tbody>
</table>

Other issues

- Online weight loss programs are unregulated, which means anyone, including individuals or groups with no knowledge or qualifications in nutrition or dietetics, has the ability to produce them. Therefore, there is potential for people to be following guidance and advice which not only fails to assist in weight loss but may be detrimental to their health.
- It is unlikely that online weight loss programs can cater to the needs of all potential clients, such as those with food allergies or specific cultural dietary requirements or with particular physical exercise limitations. Qualified professionals are better able to tailor diet or exercise plans specific to an individual’s needs.
- Individuals who are motivated are likely to succeed in their weight loss regardless of the program they use. There are also concerns that use of such online programs may simply delay an individual from seeking more interventional treatments which may be more suited to their needs (namely severely obese people), this delay may affect the individual’s prognosis. As such, it is important to define the psychological, personality and learning preferences of individuals who would benefit most from online weight loss programs and target them for this type of weight loss. Similarly, individuals who are unlikely to benefit from online weight loss programs, for example those who are severely obese, could be identified using a maximum BMI cut-off.

Summary of findings

Based on the results reported in the two included systematic reviews, web-based interventions for initial weight loss and weight maintenance appear to achieve similar outcomes to other weight loss interventions, including conventional diet and exercise programs without access to online information or interaction. The reviews’ findings also suggested that certain aspects of online weight loss programs appear to enhance their success, including behavioural therapy, professional feedback via email, homework activities and discussion forums.

It is likely that the participants themselves play a key role in the success of their weight loss; however, the availability of web-based programs allows accessible, generally inexpensive measures to be taken as a first-line treatment to reduce the burden of obesity, and research in this area should be continued.

Long-term evidence is important in determining the efficacy of online weight loss programs. Studies looking at weight loss maintenance in participants who achieved initial weight loss using web-based interventions, ideally beyond 24 months, should be undertaken. As well as studies which measure the participants’ weight loss in terms of achieving their goals (for example, improvements in quality of life).
HealthPACT assessment

Based on the results observed in the included studies (that is, similar weight loss/weight maintenance outcomes in participants with or without web-based interventions), together with the abundance of ongoing research and the fact that online weight loss programs are already widely accessible throughout Australia, it is recommended that this technology be archived. Online weight loss programs are unlikely to be an effective replacement for conventional weight loss programs available through current healthcare practices.

Number of studies included

All evidence included for assessment in this Technology Brief has been assessed according to the revised NHMRC levels of evidence. A document summarising these levels may be accessed via the HealthPACT web site.

- Total number of studies 2
- Total number of Level I intervention studies 2

Search criteria to be used (MeSH terms)

- Weight loss (MeSH) OR weight maintenance (text) OR weight management (text) OR weight reduction programs (MeSH) OR diet, reducing (MeSH) AND
- Web based (text) OR online (text) OR
- Online weight loss * (text) OR web based weight loss * (text)

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19. New Zealand Ministry of Health (2012). *The Health of New Zealand Adults 2011/12: Key findings of the New Zealand Health Survey*, New Zealand Ministry of Health,


22. National Health and Medical Research Council (2013). *Clinical practice guidelines for the management of overweight and obesity in adults, adolescents and children in Australia*, National Health and Medical Research Council, Canberra.


