Scaling up diabetes prevention in Victoria, Australia: policy development, implementation and evaluation.

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2 Figures and 2 Tables
Abstract

Objective
The Australian lifestyle intervention program Life! is only the second reported, large-scale diabetes prevention program. This paper describes the genesis and the successful establishment of Life! and its key outcomes for participants and implementation.

Research Design and Methods

Life!, a behavior change intervention, comprises six group sessions over eight months. The Victorian Department of Health funded Diabetes Australia-Victoria to implement the program. Experience of the Greater Green Triangle diabetes prevention implementation trial was used for intervention design, workforce development, training and infrastructure. Clinical and anthropometric data from participants, used for program evaluation, was recorded on a central database.

Results

Life! has a state-wide workforce of 302 trained facilitators within 137 organizations. 29,000 Victorians showed interest in Life! and 15,000 individuals have been referred to the program. In total, 8,412 participants commenced a Life! program between October 2007 and June 2011. 37% of the original participants completed the eight month program. Participants completing sessions one to five lost an average of 1.4 kg weight ($p<0.001$) and waist circumference of 2.5 cm ($p<0.001$). Those completing six sessions lost an average of 2.4 kg weight ($p<0.001$) and waist circumference of 3.8 cm ($p<0.001$). The weight loss of 2.4 kg represents 2.7% of participants’ starting body weight.
Conclusion

The impact of Life! is attributable to applying available evidence for the systems design of the intervention, and collaboration between policy makers, implementers and evaluators using the principles of continuous quality improvement to support successful, large scale recruitment and implementation.

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Type 2 diabetes has been a national health priority in Australia for over a decade. Randomized controlled trials showed that progression to type 2 diabetes in high risk individuals can be prevented through lifestyle behaviour change programs (1-3). Feasibility of such a program in the Australian setting was tested in the Greater Green Triangle Diabetes Prevention Program (GGT DPP) (4). In 2007, the Australian state of Victoria established the first systematic, full scale type 2 diabetes prevention program in the world, known as the Life! Taking Action on Diabetes program (hereafter referred to as Life!).

Policy development for diabetes prevention

Arguments for a health focus arose from impact on the working population of growing preventable chronic disease prevalence. Concurrently, the national diabetes survey study AusDiab showed that only half of diabetes cases were diagnosed and a quarter of the Australian adult population was at high diabetes risk (5). During 2004-06, work was undertaken for the Council of Australian Governments (COAG) on a new economic reform agenda to ensure Australia's prosperity in a global market. COAG subsequently announced that the first tranche of human capital reforms would include a specific focus on diabetes (6).
Further in 2006, as part of work undertaken for COAG the GGT DPP was identified as the only evidence-based diabetes prevention intervention in Australia (7). Combined evidence obtained from the AusDiab study, economic analyses (8), scientific evidence of diabetes prevention effectiveness from randomized controlled trials and the GGT DPP results strengthened the case for a national policy on diabetes prevention.

Establishing a state-wide prevention program in Victoria

In 2007, the Victorian Government approved funding initially until 30 June 2011 for Life!, a large-scale systematic prevention program for high risk individuals. Scaling up is the process of reaching larger numbers of the target population in a broader geographic area by institutionalizing effective programs. Life! is systematic with predefined components interacting as a system. Life! has a direct lineage from the Finnish Diabetes Prevention Study (2), Good Ageing in Lahti region (GOAL) implementation trial (9) and GGT DPP (4,10). Additionally, the Department of Health Victoria had experience of its Healthy Living Course DPP (11). Life! is a statewide program, scaled up from randomized controlled and evaluated implementation trials. Little is known about implementing scaled-up diabetes prevention programs. The first national program was the Finnish national diabetes prevention program originally implemented as FIN-D2D in 2003 (12, 13). Life! is the second scaled up program reported internationally.

This paper describes the genesis, development and evaluation of Life!, the only systematic scaled-up diabetes prevention program to date. In implementing Life! we aimed to measure real world vs clinical trial effect sizes and compliance issues with all the real world constraints including the lack of Medicare funding (Australian universal health cover) for pathology tests of effect.
Research Design and Methods

Intervention

Life! consists of predefined components interacting as a system. Components include a strictly defined intervention based on the GOAL Implementation Trial, modified according to additional theories of behavioral change (14), the Australian setting; standardized facilitator training and a manual (15, 16), payment to facilitators linked to data return to use for performance measurement; continuous quality improvement and evaluation. Within the continuous quality improvement cycle (17) facilitators receive individualized performance feedback. Furthermore, adapted behavior change theories such as the Health Action Process Approach (HAPA) model is used to encourage participants to identify the main determinants of intention building and make lifestyle changes associated with healthy diet and active lifestyle, thus reducing their risk of type 2 diabetes and cardiovascular disease (CVD) risk (14, 18).

Life! uses the five Finnish DPS (2) goals:

- 1. No more than 30% of energy consumed from fat;
- 2. No more than 10% of energy from saturated fat;
- 3. At least 15g fibre/1000kcal;
- 4. At least 30 minutes /day of moderate intensity physical exercise;
- 5. At least 5% weight reduction.

Each participant is provided with a manual to record their lipid, blood pressure and blood glucose levels plus their individualized goals and outcomes. Participant manuals cover content of each session, extra reading material, and tasks to do between sessions (e.g. physical activity and diet diaries).
Life! consisted of a group course, six-session intensive intervention for between 8-15 people (Figure 1). In comparison, earlier clinical trials such as the Diabetes Prevention Study (DPS) and Diabetes Prevention Program (DPP) used individual interventions. The first five sessions occurred every fortnight for nine weeks. This design is based on the social learning theory (19) that advice and support in the beginning of lifestyle change process needs to be frequent to provide motivation. The sixth intervention session is scheduled for eight months after the first session. The objective of session six is to follow up participants and observe maintenance of their newly learned lifestyles (9). Life! is a real world full scale prevention program, so it was only feasible to have six sessions especially since the sessions are group based.

**Program delivery**

Diabetes Australia–Victoria (DA-Vic), a non-governmental consumer body and charity representing people affected by diabetes and those at risk, is the lead agency responsible for state-wide implementation of Life!. Various advisory committees assisted with development, implementation and evaluation of Life! (Figure 2). Program implementation is guided by senior policy officers, academics with a range of expertise, and health professionals.

DA-Vic established a purchaser-provider arrangement whereby accredited providers are contracted to deliver Life!. This provider network comprises non-profit, public sector, and private agencies. Life! providers employ facilitators certified to deliver Life!. As the program developed, a register of both Life! facilitators and providers has been compiled to allow for greater flexibility and program reach. Life! facilitator training comprises a self learning period, knowledge test, completion of the same practical tasks as program participants and a two day face-to-face training in skills for group facilitation and behavior change techniques. Successful
completion certifies the facilitator for one year. Continuing certification requires an annual review day attendance. The review day includes feedback on program and facilitator performance along with peer learning. Through the Life! program a state-wide workforce of professionals trained and certified in evidence-based type 2 diabetes prevention has been built. By June 30 2011, 137 organizations were actively involved with the program and 302 facilitators had been trained.

The cost of delivering Life! to high risk individuals was approximately USD$ 400 per participant. This covers program facilitator costs and participant-related resources. The subsidy was paid to service providers in two instalments after sessions one and five.

Participants

The Australian diabetes risk tool (AUSDRISK), a 10-item questionnaire (20, 21) is used to assess an individual's risk for developing type 2 diabetes. Individuals belonging to one or more of the following groups were considered eligible.

- Aged 50 and over, AUSDRISK score of 12 or more;
- Aged 18 years or older, indigenous Australians of Aboriginal & Torres Strait Islander descent (ATSI) who are at very high risk, AUSDRISK score of 12 or more;
- Aged 18 years or older, previously diagnosed with high risk conditions such as gestational diabetes mellitus (GDM) or atherosclerosis related CVD.

Exclusion criteria included existing diabetes, pregnancy, active cancer and recent myocardial event.
**Social Marketing and Communications**

Increased awareness of diabetes risk and prevention across the community was created through integrated social marketing which consisted of targeted communication activities and mass media campaigns. Media advertising, presence at key events such as a Life! booth at the Royal Melbourne Show, 24-hour telephone help line (13 RISK) and website to promote risk assessment facilitated recruitment of high risk individuals, and increased awareness of type 2 diabetes prevention effectiveness. The program was also promoted to health professionals and a tailored workplace engagement program was also developed.

**Recruitment**

To June 2011 approximately 15,000 participants have been referred into the program through four referral pathways. These were 1) referrals generated through Life! providers or facilitators (36.2%), 2) family physician/health professional setting recruitment (30.2%), 3) social marketing via telephone/web support system recruitment (28.2%), and 4) workplace-generated recruitment (5.4%). Provider or facilitator led recruitment involved Life! facilitators promoting the program to local workplaces and community groups and encouraging individuals to undertake the AUSDRISK test assessing their risk for type 2 diabetes. This form of recruitment became the most useful, especially after May 2010 when funding was available to Life! facilitators and other eligible entities to implement individual sessions with potential program participants aged over 50 years. Workplace generated recruitment was limited due to establishing a process for referring high risk workers to the program whilst maintaining their confidentiality and privacy. The mix of referral pathways mitigated the risk of reliance on just one.
Measures

At baseline, self-reported measures of depression and anxiety (Hospital Anxiety and Depression Scale–HADS) were obtained along with biomedical and demographic data such as blood pressure, fasting lipids and glucose, age, AUSDRISK score, BMI, education, income, smoking habits, CVD history, and employment status. Follow up measures at sessions one, five, and six, included participants’ weight and waist circumference, measured by the facilitator. Participants also completed physical activity and food behaviour questionnaires. To determine physical activity level and achievement of the physical activity program goal, participants were required to indicate the frequency with which they participated in at least 30 minutes of moderate physical activity (seven response options ranging from ‘daily’ to ‘not at all’). Participants who indicated ‘daily’ physical activity of at least 30 minutes achieved the physical activity goal. To examine the fat and fibre eating habits of participants and achievement of the fat and fibre related program goals (referred together as ‘healthy eating goal’), the Fat and Fibre Barometer (22) was completed by the participants. The mean score achieved on this questionnaire was used as an indicator of healthy eating behaviors; a higher mean score indicated healthier eating choices. For the purpose of reporting the healthy eating goal achievement to the program’s funding body, a mean score on the Fat and Fibre Barometer of $\geq 3.5$ for men and $\geq 3.8$ for women was used to define achievement. Participants’ baseline weight was used to determine goal weight and therefore achievement of the 5% weight reduction goal at session five and six.

Data Collection and Statistical Methods

Data were entered into a centralized web-based database by the course facilitator following sessions one, five, and six. Statistical analyses were undertaken using IBM SPSS Statistics 21.
Means with standard errors (SE), and percentages, are presented. Differences between groups at baseline were tested using two-sided independent t-tests for continuous data and chi-square tests for categorical data. Changes over time were tested with two-tailed paired t-tests. For the purpose of this report we have only considered participants who completed sessions five and six of Life! The projected reduction in diabetes risk over five years was estimated by assuming a linear relationship between percentage reduction in waist circumference and weight and reduction in diabetes risk, and using the sample-size weighted results of the Finnish DPS and the US DPP as reference studies (2-4).

Results

Life! Outcomes

Since 2007, over 29,000 people in Victoria have been sent detailed information on how they can prevent diabetes. By June the 30th 2011, 14,819 program referrals had been received with 8,412 people having commenced session one of a Life! program. The baseline characteristics of this cohort presented in Table 1 cover those entering the program during the period from its commencement in October 2007 to June 30, 2011, the end of the first round of funding. Two-thirds were women and the mean age of all participants was 61.3 years (SE 0.1). Mild to severe levels of anxiety and depression were found in 3.6% and 17.7% of participants, respectively. The mean waist circumference was 109.7cm (SE 0.2) for men and 102.5cm (SE 0.2) for women. The mean BMI at session one was 31.2 kg/m\(^2\) (SE 0.1) for men and 32.2 kg/m\(^2\) (SE 0.1) for women (Table 1).

Table 2 displays the outcomes for those that commenced Life! by June 30, 2011. In addition, the outcome measures of those who completed sessions five and six are reported separately in Table
Life! participants analyzed herein showed a sustained reduction in weight and waist circumference in addition to improvements in physical activity and healthy eating. Approximately 47% of participants who attended session five (n=6,632) also attended session six (n=3,114). The overall completion rate of Life! was approximately 37%, however this may not be a true representation of retention. Life! providers were not reimbursed for conducting the final session (session six), therefore this session may not have been available for participants to attend.

After sessions one to five of Life! participants recorded a mean weight loss of 1·4 kg (n=6,632, \( p<0·001 \)) and a mean reduction in waist circumference of 2·5 cm (n=6,630, \( p<0·001 \)). Significant changes in the proportion of participants achieving the healthy eating goal and physical activity goal at session one compared with session five were demonstrated (28.8% vs 59.5%; 10.3% vs 15·8% respectively, \( p<0·001 \)). Those participants completing Life! (sessions one to six), recorded a mean weight loss of 2·4 kg (n=3,114 \( p<0·001 \)) and a mean reduction in waist circumference of 3·8 cm (n=3,114 \( p<0·001 \)). Significant changes in the proportion of participants achieving the healthy eating goal and physical activity goal at session one compared with session six were recorded (31·0% vs. 65·1%; 11·3% vs. 17·6% respectively, \( p<0·001 \)).

In relation to diabetes risk, a body weight reduction from 86·5 to 84·2 kg (2·8%; Table 2) in Life! for those completing six sessions compares with reductions of 4·5 kg or 5·2% at one year in the Finnish Diabetes Prevention Study (2) and 6·8 kg or 7·2% at both six months and one year in the Diabetes Prevention Program (3). The Finnish Diabetes Prevention Study reported a 58% reduction in diabetes risk over four years and 43% reduction over seven years (23). Interpolating on the basis of a linear model produces an imputed reduction of diabetes risk of 32% and 21% respectively for Life!. The Diabetes Prevention Program reported a 58% reduction of diabetes risk over 2·8 years. Interpolating on the basis of a linear model produces an imputed reduction of
diabetes risk of 23%. The Diabetes Prevention Program also reported reduction of waist circumference from 106·1cm to 100·4cm (5·7cm or 5·4%) associated with the reduction of diabetes risk by 58%. Reduction of waist circumference in Life! was from 104·2 to 100·4 cm (3·6%; Table 2); interpolation for those completing six sessions predicts reduction of diabetes risk by 39%. Based on the loss of weight and reduction in waist circumference of participants in this intervention we impute, at eight months, a potential diabetes risk reduction of 21% to 39%.

**Conclusions**

Diabetes prevention programs are widely described as delaying the onset of diabetes or turning back the metabolic clock in the glycemic continuum. Scaling up from an efficacy trial to a state-wide diabetes prevention program presents many challenges. Implementation failure is commonplace (25) because trials emphasize internal over external validity which seldom provides sufficient information to allow successful scale-up. Moderating variables and issues of generalizability are frequently underreported (26).

Two evaluated, scaled-up diabetes prevention programs have reported their results: FIN-D2D (12) in Finland and now Life! in Australia. There is also a recently started US National Diabetes Prevention Program (27) derived from the Indianapolis (28), Montana (29) and Pittsburgh (30) implementation trials. Results of FIN-D2D include reductions in weight of 1·3 kg in men and 1·1 kg in women and 1·3 cm reduction in waist circumference at one year follow-up (13). Life! has demonstrated higher effectiveness than FIN-D2D probably due to the program’s systems design with performance measurement.

**Lessons learnt**
Recruitment of participants into Life! was a key imperative. An arbitrary target of 25,000 people was chosen for funding purposes by the Victorian State Government in Australia. No other targets were set with respect to recruitment, selecting or inviting participants as this program was the first of its kind in Australia. The target of 25,000 individuals to be recruited over the initial four-year period proved unrealistic as the first year was largely spent establishing the program, including the tasks of methodological design, recruiting and training the workforce. During the third year, the participant recruitment rates exceeded the participation target. Time to build the workforce, provider network and infrastructure necessary for supporting a large scale program is an important consideration.

Some recruitment channels were easier to commence than others and having multiple recruitment channels was essential. Social marketing was an important contributor to recruitment and overall program development, promoting the program to the community, to those at risk, and to health professionals. Many health professionals were unaware of the relatively recent evidence about type 2 diabetes prevention. A significant barrier to recruitment included diabetes exclusion prior to program enrolment. To overcome this recruitment barrier, the requirements for Life! eligibility and referral were gradually revised and amended from late 2009. The implementation of the First Visit Initiative in July 2010 where Life! facilitators conducted individual information sessions with potential program participants impacted positively on recruitment and increased program referrals. Significant investment is also required to ensure successful implementation in the areas of program coordination, leadership, facilitator training and certification, program materials, and social marketing and communications.

Due to Australian Medicare (Australian universal health cover) regulations, payment for repeat measurement at three months for lipid and glucose levels could not be made which meant
participants lost the opportunity to get feedback on reduction of their diabetes and CVD risk. It would be helpful to also cover biomedical testing during the intervention rather than just at the beginning. The Medicare policy on laboratory measurements for this type of program should be reviewed.

Initially, Life! targeted a high-risk population only and Victorians aged 50 years or older (unless previous CVD/Gestational Diabetes Mellitus (GDM) history or Aboriginal and Torres Strait Islander). It was beyond the funding scope to expand the program to include lower risk and a younger demographic. The program was funded by the Victorian State government for an initial four year period (2007-June 2011) and funding has now been extended with an expanded remit to include prevention of both CVD and type 2 diabetes. At the same time several program features were revised with the aim of improving the impact of the program and implementation success. The age eligibility was reduced to 45 years; the structure of the program revised from a six group session structure to a one-on-one session followed by five group sessions. Furthermore Life! initially had a payment system whereby providers were remunerated for each participant at three time points, dependent on attendance and completion of minimum participant data requirements for program evaluation. The payment structure and method for the sessions especially having no specific payment for session six has contributed towards the high apparent drop out rate although the 63% dropout rate is not a true representation of retention (as the final session may not have been conducted and therefore participants would not have had the opportunity to attend). The payment structure has now been revised to four time points to ensure session delivery and to encourage service providers to maximize retention particularly between the final two sessions.
The imputed reduction of diabetes risk was calculated on the basis of comparisons of weight reduction in the Diabetes Prevention Program (3) and the Finnish Diabetes Prevention Study (2) and waist circumference in the Diabetes Prevention Program. There are a number of assumptions made, the first being that the relationship between weight or waist loss and reduction in risk of diabetes is linear and so the estimation is an interpolation along a linear relationship. Other assumptions or approximations rely on the finding that in the Finnish Diabetes Prevention Study weight reduction was the only significant association in a multivariate model (23) and that waist reduction is a better predictor of reduction of diabetes risk (31). The intervention in Life! reported in this paper was based on the same principles with comparable interventions to the Finnish study. Based on evidence from the Finnish DPS (2) that risk related to weight tends towards linearity, an interpretation of the impact of the Life! program is that weight reduction should or can have a similar effect. For each kilogram lost, the risk of type 2 diabetes mellitus is reduced by 16% (where 16% per kg is a relative risk reduction rather than an additive approach) (32).

Life! is modelled on three Finnish studies (2,9,12) and other work conducted in Finland (13,33 ) suggests that reduction in diabetes risk follows a linear trend with a greater decrease in risk corresponding to more of the goals attained. In Life! other factors such as healthy eating and physical activity are additional contributory factors along with weight loss. It is widely accepted that large degrees of weight loss give the best result, however modest degrees of weight loss are still helpful. In this light, the Early ACTID (34) randomised controlled trial showed that mean weight loss of 2.3kg and a reduction in waist circumference of 2.5cm at six months and at twelve months, improved glycemic control and insulin resistance. Furthermore, in the Look AHEAD
study, the effect on diabetes remission was by tertiles of weight loss rather than a defined
threshold (35).

It is not possible to estimate the population effect because the proportion of high risk individuals
participating in the program is unknown. Due to a lack of funding for follow up of participants in
Life!, participants’ results after the completion of six sessions cannot be reported. Without
follow up of participants who completed Life! it is not possible to estimate what the delay to the
onset of diabetes will be as a result of participating in Life! By comparison in the GGT DPP,
follow-up of participants at 30 months demonstrated that beneficial changes achieved by
participants were generally sustained with the exception of fasting plasma glucose and some
psychological measures (14).

An important lesson learned from this program is that the effect of large scale programs can be
smaller than those derived from clinical trials. Participants who completed all six sessions of
Life! experienced less weight loss after year one when compared with the DPP and the DPS. The
same phenomenon was observed within FIN D2D in Finland. Such a lesson gives future program
implementers a good estimate for public health impact when scaling up from a clinical trial to the
general population at risk. Furthermore, the waist and weight loss presented in Table 2 for
sessions five and six cannot actually be compared as the cohorts in these follow-ups are not the
same. With smaller number of individuals and greater resources, a much more intensive
intervention was carried out in the clinical trials (including free access to gym and face to face
dietary guidance).

Overall, 8,412 participants commenced the program, 6,632 completed to session five (1,780
dropped out between sessions one and five). The retention rate for sessions one to five was
78.8%. Since Life! is not a randomized controlled trial the 6,407 referred individuals who failed to attend any one or more of the sessions were not followed up due to lack of time and limited resources which are inherent in a scaled up real world program.

**Significance of our findings**

The epidemic of type 2 diabetes requires all governments and policymakers to address the need for both population-based approaches to obesity prevention, and large scale intervention programs for the large high risk population (36). It is important that primary care practitioners and other health professionals recognize that structured evidence-based, lifestyle behavior change programs such as Life! and FIN-D2D can reduce risk— and are different from market driven weight loss programs and generalized health/wellbeing programs.

Implementing real world, large-scale, lifestyle behavior change programs is not easy. Systems design retaining the goals of the Finnish DPS, adding behavioral theories of change, and using principles of continuous quality improvement with performance management based on outcome data are significant system features of the program reported here and informed modifications in mid 2011 for the next statewide program.

Programs to integrate workforce training and development, provider networks to keep health professionals engaged, multiple recruitment channels, and integrated social marketing activities are also important system components for a successful outcome. Fundamental to the scaling up process to provide an extensive and sustainable intervention is creating and maintaining a forum that brings policymakers, implementers and evaluators together.

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Authors Contribution

JD conceived the study, conducted the literature search, wrote the manuscript, and reviewed and edited the manuscript. AJ conducted the literature search, wrote the manuscript, reviewed and edited the manuscript. AT assisted with the literature search and discussion and reviewed and edited the manuscript. GJ assisted with the discussion, reviewed and edited the manuscript. KR assisted with the discussion, reviewed and edited the manuscript. BP did the initial data analysis, reviewed and edited the manuscript. VV and JS conducted the subsequent data analysis, contributed to the discussion, reviewed and edited the manuscript. VV and JS wrote the results and discussion sections of the manuscript. EV and TL contributed to the discussion and edited and reviewed the manuscript. JB contributed to the data analysis and reviewed and edited the manuscript. EJ contributed to the discussion and edited and reviewed the manuscript.

Guarantor Statement

Professor James Dunbar is the guarantor of this work and provided guidance for the data analysis and takes responsibility for the integrity of the data and the accuracy of the data analysis.
Conflicts of Interest

The authors declare no conflicts of interest.
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Loss on With Lifestyle Intervention on Risk of Diabetes. Diabetes Care 2006; September 29:2102-2107


Table 1. Baseline characteristics of participants that have commenced the Life! program.

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<th>Men</th>
<th>Women</th>
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<td></td>
<td>n=2830</td>
<td>n=5582</td>
<td>n=8412</td>
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<tr>
<td>Mean (SE) Age</td>
<td>63.1 (0.2)</td>
<td>60.3 (0.1)</td>
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<td>Mean (SE) AUSDRISK score</td>
<td>19.6 (0.1)</td>
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<td>Mean (SE) Waist circumference</td>
<td>109.7 cm (0.2)</td>
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<td>Mean (SE) Body Mass Index (BMI)</td>
<td>31.2 kg/m² (0.1)</td>
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<td>Mean (SE) Weight</td>
<td>94.9 kg (0.3)</td>
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**Education**

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<td>Primary</td>
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<tr>
<td>Other (pre-primary, no education and other education) or not stated</td>
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<td>860</td>
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**Income**

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<td>Middle</td>
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**Current smoking**

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<td>Daily</td>
<td>165</td>
<td>240</td>
<td>405</td>
</tr>
<tr>
<td></td>
<td>5.8%</td>
<td>4.3%</td>
<td>4.8%</td>
</tr>
<tr>
<td>Not stated</td>
<td>47</td>
<td>96</td>
<td>143</td>
</tr>
<tr>
<td></td>
<td>1.7%</td>
<td>1.7%</td>
<td>1.7%</td>
</tr>
</tbody>
</table>
### CVD

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th></th>
<th>No</th>
<th></th>
<th>No</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2090</td>
<td>73.9%</td>
<td>4795</td>
<td>85.9%</td>
<td>6885</td>
<td>81.8%</td>
</tr>
<tr>
<td>Yes</td>
<td>740</td>
<td>26.1%</td>
<td>787</td>
<td>14.1%</td>
<td>1527</td>
<td>18.2%</td>
</tr>
</tbody>
</table>

### Employment

<table>
<thead>
<tr>
<th>Status</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not working (home duties, unemployed, and retired)</td>
<td>1146</td>
<td>40.5%</td>
</tr>
<tr>
<td>Employed</td>
<td>1101</td>
<td>38.9%</td>
</tr>
<tr>
<td>Other or not stated</td>
<td>583</td>
<td>20.6%</td>
</tr>
</tbody>
</table>

### HADS A

<table>
<thead>
<tr>
<th>Severity</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate-severe anxiety (≥11 score)</td>
<td>333</td>
<td>11.8%</td>
</tr>
<tr>
<td>Mild anxiety (8-10 score)</td>
<td>476</td>
<td>16.8%</td>
</tr>
<tr>
<td>Normal (≤7 score)</td>
<td>2010</td>
<td>71.0%</td>
</tr>
<tr>
<td>Not recorded</td>
<td>11</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

### HADS D

<table>
<thead>
<tr>
<th>Severity</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate-severe depression (≥11 score)</td>
<td>134</td>
<td>4.7%</td>
</tr>
<tr>
<td>Mild depression (8-10 score)</td>
<td>348</td>
<td>12.3%</td>
</tr>
<tr>
<td>Normal (≤7 score)</td>
<td>2338</td>
<td>82.6%</td>
</tr>
<tr>
<td>Not recorded</td>
<td>10</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

Smokes occasionally is defined as not smoking every day. HADS Anxiety (A) and Depression (D) refers to the Hospital Anxiety and Depression Scale.
Table 2. Mean and standard error (SE) weight (kg) and waist circumference (cm) at baseline (S1), session five (S5) and session six (S6) of Life! course participants and percentage of Life! participants achieving each program goal. Session five is two months after the initial session when baseline data was collected, and session six is eight months after the initial session.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Session</th>
<th>Difference between Sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>S1</td>
<td>S5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>2246</td>
<td>94.8 (0.4)</td>
<td>93.1 (0.4)</td>
</tr>
<tr>
<td>Waist</td>
<td>2246</td>
<td>109.6 (0.3)</td>
<td>106.8 (0.3)</td>
</tr>
<tr>
<td>% achieving weight loss goal</td>
<td>2246</td>
<td>-</td>
<td>9.3</td>
</tr>
<tr>
<td>% achieving physical activity goal</td>
<td>2242</td>
<td>13.8</td>
<td>20.4</td>
</tr>
<tr>
<td>% achieving healthy eating goal</td>
<td>1784</td>
<td>32.7</td>
<td>68.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>1141</td>
<td>93.6 (0.5)</td>
<td>90.8 (0.5)</td>
</tr>
<tr>
<td>Waist</td>
<td>1141</td>
<td>109.0 (0.4)</td>
<td>105.0 (0.4)</td>
</tr>
<tr>
<td>% achieving weight loss goal</td>
<td>1141</td>
<td>-</td>
<td>25.9</td>
</tr>
<tr>
<td>% achieving physical activity goal</td>
<td>1038</td>
<td>14.5</td>
<td>21.9</td>
</tr>
<tr>
<td>% achieving healthy eating goal</td>
<td>865</td>
<td>33.5</td>
<td>72.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>4386</td>
<td>83.0 (0.3)</td>
<td>81.8 (0.3)</td>
</tr>
<tr>
<td>Waist</td>
<td>4384</td>
<td>102.2 (0.2)</td>
<td>99.8 (0.2)</td>
</tr>
<tr>
<td>% achieving weight loss goal</td>
<td>4386</td>
<td>-</td>
<td>7.1</td>
</tr>
<tr>
<td>% achieving physical activity goal</td>
<td>4370</td>
<td>8.5</td>
<td>13.4</td>
</tr>
<tr>
<td>% achieving healthy eating goal</td>
<td>3595</td>
<td>26.9</td>
<td>55.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>1973</td>
<td>82.5 (0.4)</td>
<td>80.3 (0.4)</td>
</tr>
<tr>
<td>Waist</td>
<td>1973</td>
<td>101.5 (0.3)</td>
<td>97.8 (0.3)</td>
</tr>
<tr>
<td>% achieving weight loss goal</td>
<td>1973</td>
<td>-</td>
<td>25.0</td>
</tr>
<tr>
<td>% achieving physical activity goal</td>
<td>1830</td>
<td>9.6</td>
<td>15.1</td>
</tr>
<tr>
<td>% achieving healthy eating goal</td>
<td>1571</td>
<td>29.6</td>
<td>60.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6632</td>
<td>87.0 (0.2)</td>
<td>85.6 (0.2)</td>
</tr>
<tr>
<td>Waist</td>
<td>6630</td>
<td>104.7 (0.2)</td>
<td>102.2 (0.2)</td>
</tr>
<tr>
<td>% achieving weight loss goal</td>
<td>6632</td>
<td>-</td>
<td>7.9</td>
</tr>
<tr>
<td>% achieving physical activity goal</td>
<td>6612</td>
<td>10.3</td>
<td>15.8</td>
</tr>
<tr>
<td>% achieving healthy eating goal</td>
<td>5379</td>
<td>28.8</td>
<td>59.5</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td></td>
<td>S1</td>
<td>S6</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>3114</td>
<td>86.5 (0.3)</td>
<td>84.2 (0.3)</td>
</tr>
<tr>
<td>Waist</td>
<td>3114</td>
<td>104.2 (0.2)</td>
<td>100.4 (0.2)</td>
</tr>
<tr>
<td>% achieving weight loss goal</td>
<td>3314</td>
<td>-</td>
<td>25.3</td>
</tr>
<tr>
<td>% achieving physical activity goal</td>
<td>2868</td>
<td>11.3</td>
<td>17.6</td>
</tr>
<tr>
<td>% achieving healthy eating goal</td>
<td>2436</td>
<td>31.0</td>
<td>65.1</td>
</tr>
</tbody>
</table>

*Significant at p<0.001

<sup>a</sup>Discrepancy between difference and table results due to rounding. The differences reported for weight and waist circumference between sessions one and five and for sessions one and six are based upon paired sample t-tests.
<table>
<thead>
<tr>
<th>Referral provides</th>
<th>Session 1</th>
<th>Session 2</th>
<th>Session 3</th>
<th>Session 4</th>
<th>Session 5</th>
<th>Session 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>• A trained facilitator conducts the sessions</td>
<td>Week 1</td>
<td>Week 2</td>
<td>Week 3</td>
<td>Week 4</td>
<td>Week 5</td>
<td>Week 6</td>
</tr>
<tr>
<td>• A physiotherapist / exercise physiologist co-facilitates one session</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• A dietitian co-facilitates one session</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- AUSDRISK tool score
- Height (cm)
- Weight (kg)
- BMI (kg/m²)
- Waist (cm)
- Blood pressure (mmHg)
- Total cholesterol (mmol/L)
- LDL (mmol/L)
- HDL (mmol/L)
- Triglycerides (mmol/L)
- Fasting plasma glucose (mmol/L)
**INPUTS**

- Program Evaluation and Development Committee
- Social Marketing Committee
- Program Steering Committee
- Diabetes Australia – Victoria
- Trainers
- General Practice Victoria
  - Divisions of General Practice
  - Referring GPs
  - Local health services
  - Facilitators
  - Local networks
  - Participants
- Program Evaluation and Development Staff

**PROCESSES**

- PED Committee meetings
  - Develop evaluation framework
  - Ongoing evaluation of data and program development
- SM Committee meetings
  - Develop social marketing strategy
  - Develop marketing materials
- PS Committee meetings
  - Develop program standards and contracts
  - Develop program content, materials and accreditation
- Call for and review expressions of interest
- Project agreements
- Develop partnerships
- Trainers
- Train facilitators
- Program Evaluation tools
- Engagement of providers/facilitators
- Quarterly data analysis
- PED Committee meetings
- Develop evaluation framework
- Ongoing evaluation of data and program development

**OUTCOMES**

- Engage providers to run program
- Resources in provider organisations
- ↑ capacity of services to deliver Life! program
- ↑ facilitator knowledge of:
  - health behaviour change
  - nutrition
  - physical activity
- Participants complete sessions 1–6 of Life! course
- ↑ participant knowledge of:
  - nutrition
  - physical activity
  - Behaviour change, including:
    - ↑ participant dietary quality
    - ↑ participant physical activity
  - Risk factors for type 2 diabetes, including:
    - participant weight reduction
    - ↓ participant waist circumference
- Prospective data collection
- Feedback of results
- Continuous quality improvement cycle
- ↑ effectiveness of Life! program

**OUTCOMES**

- Earlier diagnosis of type 2 diabetes
- Improved management of risk for type 2 diabetes
- Ongoing management of risk for type 2 diabetes
- Decreased incidence of type 2 diabetes