Effect of a web-based versus face to face lifestyle intervention on perceived benefits and barriers to exercise in midlife women: A three arm equivalency study.

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Abstract

Background:
Noncommunicable diseases (NCD) account for more than 18 million deaths in women annually, with many of these deaths being attributed to modifiable risk factors like physical inactivity. Women perceive a range of benefits and barriers to exercise, however, there is little evidence about the effect of different lifestyle intervention delivery modes on perceptions of exercise.

Objectives:
This study compares the effect of a multiple health behaviour change intervention called the Women's Wellness Program or WWP. This intervention was delivered in three different modes on perceived exercise benefits, perceived exercise barriers, and actual physical activity and exercise in midlife women.

Methods:
Women aged 45 to 65 years were recruited via the study website. Women were assigned in blocks to three different treatment groups (A. online independent; B. face-to-face with nurse consultations, and; C. online with virtual nurse consultations). All participants received the 12 week intervention that utilises principles from social-cognitive theory to provide a structured guide to promote healthy lifestyle behaviours with an emphasis on regular exercise and healthy eating. Data were collected using self-report online questionnaire at baseline (T1) and post intervention (T2) including perceived exercise benefits and barriers (EBBS) and exercise and physical activity (SPA). Data analysis examined both within and between groups changes over time.

Results:
Participants in this study (n = 225) had a mean age of 50.9 years ± 5.9 and most were married or living with a partner (83.3%, n = 185). Attrition was 30.2% with 157 participants completing the final questionnaire. Women in all intervention groups reported a significant increase in positive perceptions of exercise (p < .05); a significant increase in exercise and overall physical activity (p < .01), with moderate to large effect sizes noted for overall physical activity (d = .5 - .87). Participants receiving support from registered nurses in the face to face and online groups, had a greater magnitude of change in benefits perceptions and physical activity compared to the online independent group. There was no significant change in exercise barriers perceptions within or between groups over time.

Conclusions:
Results of this study suggest the multiple health behaviour change interventions can be effective in increasing exercise benefits perceptions, overall physical activity and exercise in midlife women. While web-based programs are cost effective, flexible and can be delivered remotely, providing a range of options including face to face group delivery and personalised e-health coaching from registered nurses, has potential to enhance participant engagement and motivation.

Keywords:
Exercise benefits and barriers, physical activity, lifestyle intervention, women, delivery mode, prevention, noncommunicable disease
Introduction

Noncommunicable diseases (NCDs) pose a significant threat to women’s health globally. Recent estimates suggest that NCDs like cardiovascular disease, cancer, respiratory disease and type 2 diabetes account for more than 18 million deaths in women each year and it is estimated that rates will continue to rise in the next decade [1 2]. While it is clear that regular exercise has many physical and mental health benefits and is an important component of good health, many health promotion programs fail to adequately address the often correlated nature of many modifiable risk factors [3 4]. For example, physical inactivity is often associated with other modifiable lifestyle risk factors such as an unhealthy diet, tobacco smoking and overweight and obesity, with many adults having multiple risk factors for NCD’s [3 5].

Among women, midlife is a time when risk of developing a NCD increases, particularly among those who do not adhere to recommended physical activity and healthy eating guidelines [6 7], and often experience menopause related weight gain [8 9]. According to Mishra and colleagues, midlife (particularly peri-menopause) is possibly a sensitive period when the cumulative effects of unhealthy lifestyle behaviours have greater impact on disease risk [10]. Therefore, engaging in regular physical activity [3], eating a healthy diet [11 12], and maintaining weight within normal range [8] in midlife are essential to reduce risk and ensure optimal health and well-being as women age.

There is evidence that multiple health behaviour change (MHBC) interventions tailored for women are effective in changing behaviour [13-16]. Further, given the multiple and complex role demands and stressors reported by women in this age group [17], flexible health promotion interventions have the potential to yield greater success. Over the past decade ‘web-based’ or ‘internet’ interventions also show promising results in promoting physical activity and healthy eating [18]. Moreover, though web-based interventions targeting multiple health behaviours are fewer in number, there is evidence they can provide an effective, flexible, cost-effective means of promoting healthy lifestyle behaviours [19-21].

Despite the potential efficacy of MHBC interventions, women perceive a range of benefits and barriers to changing exercise behaviour [22-24]. Research suggests that perceived benefits of exercise include physical health and fitness, improved mental health and stress reduction, and reduced risk of illness [25-27]. While barriers are often complex and relate to a range of personal, social and environmental factors such as lack of time, motivation, family support and care-giving responsibilities, climate and physical safety [25-27]. Arguably, these perceptions are very important to consider when designing health promotion interventions, with evidence that benefits/barriers perceptions are correlated with actual exercise behaviour change [25 28].

To date, there is a paucity of evidence about how different intervention delivery modes effect benefits and barriers perceptions. In this context, the Women’s Wellness Program (WWP) is a 12 week MHBC intervention designed for midlife women, targeting a range of modifiable risk factors including regular physical activity and exercise and healthy eating [13 29]. The WWP includes detailed health education to promote health literacy and knowledge about the benefits of regular physical activity and exercise and
incorporates strategies to overcome barriers including realistic goal setting and health coaching to promote self-efficacy for exercise. The Program is designed to be delivered in a community practice setting by Registered Nurses trained to deliver the program both face-to-face and online.

This study investigates and compares the effect of the WWP intervention delivered in three different modes/arms (online independent; face-to-face with nurse consultations, and; online with virtual nurse consultations) on perceived exercise benefits, perceived exercise barriers, and actual physical activity and exercise in midlife women.

**Methods**

**Participants and procedure**

Participants were Australian women aged between 40 and 65 years old. Details of study participants, recruitment procedures, inclusion/exclusion criteria and attrition are described elsewhere [29]. Briefly, following media publicity about the study, participants were recruited across Australia via the study website. Women with an existing diagnosis of a non-communicable disease or without computer/internet access were excluded.

**Measures**

A self-report online questionnaire was used to collect data from participants at baseline (T1) and post-intervention (T2), including: (1) socio-demographic information (T1 only); (2) perceived exercise benefits and barriers [27], and; (3) exercise and physical activity (Seattle Physical Activity questionnaire) [30].

This paper presents pre and post intervention perceived exercise benefits and barriers measured using the Exercise Benefits and Barriers Scale (EBBS) [27]. The EBBS is a 46 item instrument using a forced response Likert type scale. The scale contains 29 benefits items summed to calculate a total benefits sub-scale score (EBBS\textsubscript{BEN}), with higher scores indicating higher benefits perceptions. Benefits items were then grouped and summed to create benefits sub-categories: life enhancement, physical performance, psychological outlook, social interaction and preventive health. The total 46 item scale contains 14 barriers items summed to get a total barriers subscale score (EBBS\textsubscript{BAR}), with higher scores indicated higher barriers perceptions. Barriers items are then grouped and summed to create barriers sub-categories: exercise milieu, time expenditure, physical exertion and family encouragement. The EBBS demonstrates good reliability and internal consistency in studies that investigate exercise benefits and barriers in women [22 24].

Additional anecdotal feedback about what participants liked and disliked about the Program and invitation to make ‘other comments’ was obtained through three open ended questions asked post intervention via the online questionnaire.

**Intervention**

Participating women completed baseline questionnaires before being assigned in blocks to one of the three different treatment modality groups. The 12 week program utilises
principles from social-cognitive theory to provide participants with a structured guide to promote healthy lifestyle behaviours with an emphasis on regular physical activity and exercise, healthy eating, healthy weight, stress management, and health screening behaviours. In relation to exercise and physical activity, the intervention provides evidence based information about the benefits of regular physical activity, aerobic exercise, strength training, and stretching exercise. Photographic illustrations of strength exercises are provided with practical advice on starting and maintaining regular physical activity schedule, with walking the recommended activity for participants who are sedentary or unfit. Weekly planning and goal setting is encouraged with participants encouraged to reflect on their barriers to exercise behaviour change. The WWP intervention including the Program Book, the Program Website and health consultations are delivered in three different formats: (1) online independent (Arm A) had access to the WWP website that contains all of the information provided in the book and an electronic copy of Program book only; (2) face-to-face group supported (Arm B) included a hard copy of Program book, and four 30-60 minute face-to-face consultations provided by a registered nurse at 0 weeks, 4 weeks, 8 weeks and 12 weeks, and; (3) online supported (Arm C) were able to access the WWP website, download an electronic copy of Program book, and were also provided four virtual consultations though a portal built in to the website at 0 weeks, 4 weeks, 8 weeks and 12 weeks. Intervention fidelity was maintained through provision of structured facilitator training, consistent record keeping and auditing and by employing one Registered nurse to deliver all consultations. Further details of the three intervention modes are reported elsewhere [29].

**Statistical analysis**

Analyses were performed using SPSS (Statistical Package for the Social Sciences) version 22 [31]. Descriptive data are expressed as counts and percentages or mean (SD), while inferential statistics were performed using $\chi^2$ tests, $t$-tests, and Analysis of Covariance (ANCOVA) or their non-parametric equivalent. Statistical significance was set at $\alpha = .05$. Effect size was also calculated using Cohen's $d$ standard formula [32] to examine the meaning and magnitude of change in the three groups over the study period. Using Cohen's guidelines [32] an effect size of 0.20 was deemed to be small, an effect size of 0.50 was moderate, and an effect size of 0.80 or more is considered to be a large.

**Ethical approval**

Prior to recruitment and data collection, ethical approval was obtained from the relevant Human Research and Ethics Committee (QUT HREC Approval No: 1300000048). Participation was voluntary and women were able to withdraw from the study at any time. Further, participants did not receive any rewards or incentives for participation, however they were able to retain the program book and materials and have ongoing access to the website resources.

**Results**

Participants in this study had a mean age of 50.9 years ± 5.9 and most were married or living in a de-facto relationship (83.3%, n = 185). Overall, 79.1% of women were Australian born, most worked either full- or part- time (53.1% or 29.5% respectively), and almost two-thirds (69.8%) of participants were university educated. Many of the
participating women reported being overweight (35.5%) or obese (32.9%) and few had undertaken regular moderate or vigorous physical activity in the last month (32.3% and 1.8% respectively).

While 225 women completed the baseline questionnaire, an attrition rate of 30.2% meant that 157 completed the final questionnaire following the 12 week intervention. A comparison of retained participants and those lost to follow up, showed significantly more participants being lost from the online independent Arm A (35.5%) compared to Arm B (9.7%) and Arm C (30.2%). Comparison of baseline socio-demographic and health characteristics of the three intervention groups showed no significant within or between group differences [29].

Table 1 presents mean total exercise benefits, barriers and benefits and barriers sub-scale scores pre and post intervention within each group. While there was no statistically significant change in barriers scores over time, in contrast there was a significant increase in average total benefits, psychological and social sub-scale scores within all three intervention groups. One way between groups analysis of covariance (ANCOVA) showed no significant difference between the three intervention groups over time for both total exercise benefits ($F(2, 153) = .30, p = .74, \text{partial eta squared} = .004$), or total exercise barriers scores ($F(2, 153) = .65, p = .52, \text{partial eta squared} = .01$).

<table>
<thead>
<tr>
<th>Table 1. Mean perceived benefits and barriers to exercise scores within and between groups pre and post intervention ($N = 157$)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Arm A ($n = 89$) Online self-directed</strong></td>
</tr>
<tr>
<td><strong>Pre</strong></td>
</tr>
<tr>
<td><strong>Perceived benefits</strong></td>
</tr>
<tr>
<td>Total benefits</td>
</tr>
<tr>
<td>Life enhancement</td>
</tr>
<tr>
<td>Physical</td>
</tr>
<tr>
<td>Psychological</td>
</tr>
<tr>
<td>Social</td>
</tr>
<tr>
<td>Preventive health</td>
</tr>
<tr>
<td><strong>Perceived barriers</strong></td>
</tr>
<tr>
<td>Total barriers</td>
</tr>
<tr>
<td>Exercise milieu</td>
</tr>
<tr>
<td>Time expenditure</td>
</tr>
<tr>
<td>Physical exertion</td>
</tr>
<tr>
<td>Family encourage</td>
</tr>
</tbody>
</table>

*aMean scores are based on an ordinal scale representing the extent to which women strongly disagree/disagree/agree/strongly agree that item is a benefit/barrier to exercise (range 1-4 with high scores representing higher agreement ).

*bExercise Benefits Subscale.

*cExercise Barriers Subscale.

*Within groups paired t-test, $p <.05$.

Changes in overall physical activity, aerobic exercise and general daily activity are presented in Table 2. There was a significant difference in all physical activity variables within all groups post intervention ($p <.01$). Between group comparison of overall
physical activity was close to statistically significant ($F(2, 148) = 45.1$, $p = .052$), partial eta squared = .04); with greater increase in face-to-face supported Arm B and online supported Arm C compared to online independent Arm A.

Table 2. Comparison of overall physical activity, aerobic exercise and general daily activity within groups pre and post intervention ($N = 157$)

<table>
<thead>
<tr>
<th></th>
<th>Arm A ($n= 89$)</th>
<th>Arm B ($n = 37$)</th>
<th>Arm C ($n = 31$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Online independent</td>
<td>Face-to-face supported</td>
<td>Online supported</td>
</tr>
<tr>
<td><strong>Mean ± SD</strong></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td><strong>Median</strong></td>
<td>6.0</td>
<td>7.0***</td>
<td>6.0</td>
</tr>
<tr>
<td><strong>Exercise %($n$)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 or less times weekly</td>
<td>55.7 (49)</td>
<td>33.7 (30)</td>
<td>59.5 (22)</td>
</tr>
<tr>
<td>3-4 times weekly</td>
<td>31.8 (28)</td>
<td>36.0 (32)</td>
<td>21.6 (8)</td>
</tr>
<tr>
<td>5+ times weekly</td>
<td>12.5 (12)</td>
<td>30.3 (27)</td>
<td>18.9 (7)</td>
</tr>
<tr>
<td><strong>Test statistic</strong></td>
<td>21.3**</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>General activity %($n$)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sedentary</td>
<td>18.0 (16)</td>
<td>6.7 (6)</td>
<td>13.9 (5)</td>
</tr>
<tr>
<td>Mildly active</td>
<td>49.4 (44)</td>
<td>36.0 (32)</td>
<td>52.8 (19)</td>
</tr>
<tr>
<td>Moderately/very active</td>
<td>32.6 (29)</td>
<td>57.3 (51)</td>
<td>33.3 (12)</td>
</tr>
<tr>
<td><strong>Test statistic</strong></td>
<td>25.7**</td>
<td>9.3***</td>
<td></td>
</tr>
</tbody>
</table>

Table 3 presents results of effect size analysis within and between groups over time in perceived benefits and barriers to exercise and overall physical activity. A small effect for perceived barriers to exercise was observed, with small to moderate effect for perceived benefits to exercise within all three groups post intervention (Cohen’s $d_{change}$). A moderate to large effect was seen in overall physical activity, within all intervention groups. Using Cohen’s $d_{change}$ to compare the difference in effect size between Arm A (online independent) and Arm B (face-to-face supported) and Arm C (online supported) there was a small to moderate effect size observed for all variables.

Table 3. Effect size within and between groups over time in perceived benefits and barriers to exercise, and overall physical activity ($N = 157$)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cohen’s $d_{change}$</th>
<th>Cohen’s $d_{2}$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Arm A Online independent</td>
<td>Arm B Face-to-face supported</td>
</tr>
<tr>
<td><strong>Perceived benefits</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total benefits</td>
<td>.27</td>
<td>.30</td>
</tr>
<tr>
<td>Life enhancement</td>
<td>.02</td>
<td>.00</td>
</tr>
<tr>
<td>Physical</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>Psychological</td>
<td>.70</td>
<td>1.0</td>
</tr>
<tr>
<td>Social</td>
<td>.21</td>
<td>.33</td>
</tr>
<tr>
<td>Preventive health</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td><strong>Perceived barriers</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*a*Overall physical activity including exercise and general daily activity measured on a scale of 0 to 10.

*b*Paired $t$-test and Wilcoxon Signed Rank test.

*c*Weekly aerobic exercise.

*d*McNemar’s Test.

*e*General daily activity.

*p<.05; **p < .01.
### Total barriers
- Arm A: 0.10
- Arm B: 0.11
- Arm C: 0.03
- Mean: 0.10

### Exercise milieu
- Arm A: 0.20
- Arm B: 0.00
- Arm C: 0.00
- Mean: 0.10

### Time expenditure
- Arm A: 0.00
- Arm B: 0.20
- Arm C: 0.00
- Mean: 0.10

### Physical exertion
- Arm A: 0.00
- Arm B: 0.20
- Arm C: 0.00
- Mean: 0.10

### Family encourage
- Arm A: -0.14
- Arm B: 0.00
- Arm C: 0.00
- Mean: 0.10

### Overall physical activity
- Arm A: 0.50
- Arm B: 0.60
- Arm C: 0.87
- Mean: 0.60

*a Cohen’s d$_{change}$ compared the difference in effect size within groups over time.
*b Cohen’s d$_{2}$ compared the difference in effect size between groups post-intervention.
*c Exercise Benefits Subscale.
*d Exercise Barriers Subscale.

To further illustrate and compare the magnitude of change over time within and between each of the three groups, Table 4 presents exercise benefits and barriers subscale variables and overall PA, grouped by effect size and study arm. Of note in the large effect size for psychological benefits in all groups and overall physical activity in the online supported group C. There was a moderate effect size for overall physical activity in the online independent (Arm A) and face-to-face supported (Arm B) groups observed.

**Table 4. Comparison of magnitude of change post intervention within each group for exercise benefits and barriers subscale scores, and overall physical activity**

<table>
<thead>
<tr>
<th>Effect size$^a$</th>
<th>Arm A Online independent</th>
<th>Arm B Face-to-face supported</th>
<th>Arm C Online supported</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Large &gt;.7</strong></td>
<td>Psychological benefits</td>
<td>Psychological benefits</td>
<td>Psychological benefits</td>
</tr>
<tr>
<td><strong>Moderate .4 - .7</strong></td>
<td>Overall PA</td>
<td>Overall PA</td>
<td></td>
</tr>
<tr>
<td><strong>Small .2 - .4</strong></td>
<td>Total benefits score</td>
<td>Social benefits</td>
<td>Physical benefits</td>
</tr>
<tr>
<td></td>
<td>Exercise milieu barriers</td>
<td>Time barriers</td>
<td>Life enhancement benefits</td>
</tr>
<tr>
<td><strong>Very small &lt;.2</strong></td>
<td>Family barriers</td>
<td>Total barriers score</td>
<td>Total benefits score</td>
</tr>
<tr>
<td></td>
<td>Total barriers score</td>
<td>Life enhancement benefits</td>
<td>Social benefits</td>
</tr>
</tbody>
</table>

$^a$ Cohen’s d$_{change}$ compared the difference in effect size with groups over time.

**Discussion**

**Principal results**

This study reports results of a three arm multiple health behaviour change intervention on perceived exercise benefits and barriers, and self-reported physical activity and exercise in midlife women. Post intervention, women in all three arms reported a significant increase in overall exercise benefits perceptions and increased physical activity.
In regard to exercise benefits, there was a significant change in perceptions about the psychological and social benefits in particular, with large effect sizes noted. This change was associated with a significant increase in overall physical activity and exercise, with moderate to large effect sizes across all three groups. What is striking about these results is the proportion of participants who moved from lower levels of exercise to reporting regular exercise on 5 or more days per week post intervention. These changes in benefits perceptions and actual physical activity are likely to be a result of specific program content and strategies, including detailed health promotion information contained in the program book, individualised goal setting and weekly exercise planning activities undertaken by all participants over the 12 weeks of the trial.

When comparing the magnitude of change between groups over time, the online independent group (Arm A) was used as the comparison group. In comparison to the online independent group, both the face-to-face supported group (Arm B) and online supported group (Arm C) had greater change in benefits and barriers perceptions and overall physical activity post intervention. Women received face-to-face support reported moderately higher social benefits, with the online supported group reporting moderately higher psychological benefits. This is likely to be attributed to the additional support that Arm B and C received through nurse consultation and health coaching and the peer support available in Arm B. These results suggest that personalised consultation provided by registered nurses with knowledge and skills in health behaviour change theory and communication can facilitate positive behaviour change.

In support of this, anecdotal feedback from participants indicated that having the opportunity to discuss personal health issues, work and family commitments and discuss strategies for change with a supportive health professional was highly valued by women in the face-to-face and online supported groups. In contrast, feedback from participants in the online independent group highlighted the lack of support being a barrier to engagement with the program, and it is likely this contributed to the higher attrition rate in this group. However, participants in the online independent group who remained in the study reported significant increases in physical activity, indicating that for some women undertaking an online intervention independently is an effective option for undertaking a behaviour change intervention.

Interestingly, despite a reported increase in physical activity and positive benefits perceptions, there was no statistically significant change in average exercise barriers perceptions within or between groups post intervention. A possible explanation is that average exercise barriers perceptions in all groups at baseline were relatively low, perhaps reflecting the fact that participants were motivated volunteers who self-selected to enrol in a health promotion program.

**Comparison with prior work**

In relation to the effect of a behaviour change intervention on exercise benefits and barriers perceptions, there are limited studies to allow direct comparison. Our results are somewhat similar to a study of Latino American women that found an increase in total benefits perceptions following a nine month bi-weekly education and exercise intervention [33]. In contrast, Kennedy and colleagues [33] report a decrease in barriers perceptions [33]. Other studies in women, report no change in total benefits or barriers
perceptions post exercise intervention [34 35]. One of these studies was a seven week structured walking program designed for post-menopausal African American women [35] and the other a 12 week group exercise program for mother and daughter pairs [34]. A more recent study investigated perceived benefits and barriers to exercise participation in n = 43 overweight women with polycystic ovarian syndrome participating in a three arm 20 week lifestyle program, finding a significant improvement in increased benefits and decreased barriers perceptions [36]. Our study appears to be the first to report the effect of a 12 week multiple health behaviour change intervention on exercise benefits and barriers perceptions in healthy midlife women.

There is a large body of literature in relation to the effect of web-based physical activity interventions with our results aligning with systematic review [18] and meta-analysis [37] findings that indicate the majority of internet PA interventions in adults lead to significant increases in physical activity. These studies both report that average effect sizes are usually small ($d = .14$), in contrast, our study found moderate to large effect sizes across all intervention groups ($d = .5 - .87$). A possible explanation for these results is that the WWP intervention is specifically designed for midlife women with variable fitness levels, and allows personal choice in type, intensity and frequency of physical activity and exercise with realistic goal setting facilitating incremental change over time. The intervention materials also explicitly address the multiple benefits of regular exercise for midlife women’s health and healthy ageing and provides practical strategies for overcoming barriers to change, perhaps enhancing participant motivation to exercise.

Similar to studies comparing different intervention delivery modes [38 39] our study found increases in physical activity in all groups. A similar study by Steele et al.[38] investigated the effectiveness of delivery modes for a 12 week pedometer based behaviour change program (Health-eSteps), comparing face to face, internet mediated and internet only delivery with equivalent magnitude of increase in physical activity over time reported. In contrast, our study found a greater magnitude of change in PA in the face to face and online supported group compared to the online independent group. Previous results have similarly shown that individualised support provided by skilled registered nurses has the potential to increase self-efficacy beliefs and facilitate exercise behaviour change in midlife women [13].

**Limitations**

Results of this study need to be considered in light of limitations. Firstly, although women were recruited across Australia, volunteers were generally well educated and from high income groups. This is often the case for studies involving online interventions with volunteers predominantly white, middle aged and female [18]. In terms of attrition, average barriers scores were higher in the online independent group (Arm A) that had the highest level of attrition (35.5%), so data collected post intervention did not include those participants. Further, this study had no control group, largely because it was designed to investigate the equivalency of the different intervention arms. Without a control group it is difficult to definitively attribute post-test changes to the effects of the intervention. Lastly, the study relied on self-report data that can be prone to response bias, with participants more likely to report positive outcomes for behaviour change measures such as physical activity.
Conclusions

Despite limitations, results of this study suggest the multiple health behaviour change intervention (Women’s Wellness Program) is likely to be effective in increasing exercise benefits perceptions, overall physical activity and exercise in midlife women. Moderate to large effect sizes found in this study are particularly encouraging, indicating that for motivated participants, undertaking the program in different modes was beneficial in changing exercise behaviour and positive perceptions of increased physical activity. While web-based interventions are cost effective, flexible and can be delivered remotely, providing a range of options including face to face group delivery and personalised e-health coaching from registered nurses, has potential to enhance participant engagement and motivation. With an increased focus on prevention of NCD’s evident, this study makes a timely contribution to knowledge about exercise behaviour change for prevention of NCD in midlife women.

Acknowledgements

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Conflicts of Interest

None declared.

Abbreviations

EBBS: Exercise benefits and barriers scale
WWP: Women’s Wellness Program
NCD: Noncommunicable disease
MHBC: Multiple health behaviour change
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