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**Feasibility and preliminary efficacy of the M.A.D.E (Mothers And Daughters Exercising) 4  
Life program: a pilot randomized controlled trial.**

**Abstract**

*Background:* The aim was to assess the feasibility and preliminary efficacy of a community-based physical activity (PA) intervention targeting mothers and daughters.

*Methods:* A randomized controlled trial of 48 primary school-aged girls and their 40 mothers were randomized to (i) Mothers And Daughters Exercising for Life (*MADE4Life*) (n=21 mothers, n=25 daughters) or (ii) wait-list control (n=19 mothers, n=23 daughters). The 8-week program involved 8 sessions; 25-minute separate mothers and daughters education sessions and 60-minutes PA together. Assessments were at baseline, post-intervention and 3-month post-intervention. Primary outcome measure was daughters' moderate-to-vigorous physical activity (MVPA) (accelerometer). Secondary outcomes included accelerometer-assessed light/moderate/vigorous PA, BMI, waist circumference, body composition, blood pressure, resting heart rate, sedentary behaviors and mothers' self-reported PA, parenting measures and cognitions. Intention-to-treat analysis used linear mixed models.

*Results:* Recruitment and retention goals were exceeded. Attendance rates, program acceptability and satisfaction were high. There was no significant group-by-time effect for daughters' % MVPA (-0.08; 95%CI -1.49, 1.33,  $d=-0.03$ ) or other secondary outcomes for girls (post-intervention range  $d=0.01-0.46$ ). Significant intervention effects were found for mothers' % VPA ( $P=0.04$ ,  $d=0.25$ ) and role modelling ( $P=0.02$ ,  $d=0.66$ ).

*Conclusion:* *MADE4Life* was both feasible and acceptable. Although very small effect sizes were found for the daughters, significant changes were seen for mothers ( $d=0.25-0.66$ ). Future fully powered trials targeting PA in mothers and daughters is warranted.

## INTRODUCTION

Physical inactivity in children and adults is a global public health concern and associated with a number of chronic diseases<sup>1</sup>. Internationally, the prevalence of physical inactivity in youth is high. For example, only 7% of children aged 6-19 years in Canada<sup>2</sup>; 15.3% aged 4-17 years from Germany<sup>3</sup> and 29% aged 11-18 years from the US<sup>4</sup> meet physical activity (PA) guidelines. Of particular concern, is the marked sex difference with girls consistently shown to be less active than boys across all age groups<sup>1</sup>.

Many interventions have been designed and evaluated to increase PA in children through settings including schools, family and communities but with limited success. A recent systematic review of school-based PA programs that included objective measures of PA, found studies were methodologically poor, programs were largely unsuccessful and led only to an increase in MVPA of 4 minutes per day<sup>5</sup>. Further, a recent review of family-based PA interventions reported a lack of effectiveness of family-based PA programs targeting children characterised by poor study quality and a lack of objectively measured PA<sup>6</sup>.

Given the inconclusive evidence for generic approaches to PA promotion and the gender disparity in PA levels, targeted interventions for girls may have particular potential<sup>7</sup>. However, a recent review of interventions to promote PA among girls revealed mixed results. Only seven of 21 interventions successfully increased PA. The review reported only three interventions were community-based, none having a follow-up assessment beyond post intervention assessment and only one employed objectively measured PA. Importantly, the review called for further high-quality, community-based interventions targeting girls and that use objective measures of PA<sup>7</sup>.

One novel approach to increase PA levels is the targeting of both mothers and daughters<sup>8</sup>. This is particularly important as women are less active than men<sup>1,9</sup> and maternal involvement in PA has been positively associated with child PA levels, and is stronger for daughters<sup>10-12</sup>. However, there have been limited RCTs conducted in mothers and daughters which have noted

limitations including small sample size, no true control group, lack of follow up assessment beyond post intervention and only two RCTs<sup>13,14</sup> utilized an objective measure of PA.

Therefore, the primary aim of this randomized control trial was to evaluate the feasibility and preliminary efficacy of a mother-daughter program targeting improvements in PA levels.

## METHODS

### *Participants*

Mothers and their primary school-aged daughters (5-12 years) were recruited from an Australian community through media releases, school newsletter advertisements, school presentations to students and parents, local newspapers and local television news. Mothers were screened for eligibility by telephone questionnaire. Eligibility criteria included mothers passing a pre-exercise risk assessment screen, and obtaining a doctor's clearance if >40 years. Approval was obtained from the University of Newcastle Human Research Ethics Committee and mothers provided written consent and daughter(s) providing assent. Mothers were ineligible if they reported previous heart disease or diabetes, orthopedic or joint problems which would inhibit PA or if they were pregnant.

### *Study design*

This study was a pilot randomized controlled trial (RCT). Mothers and their daughter(s) were stratified by BMI category (Healthy Weight; 18-24.99, Overweight; 25-29.99, Obese1; 30-34.99, Obese2; 35-39.99, Obese3; >40) and randomly assigned to either the (i) *MADE4Life* intervention or (ii) a six-month wait-list control. The allocation sequence was generated by a computer-based random number-producing algorithm in block lengths of six to guarantee an equal chance of allocation to each group. To ensure concealment, the sequence was generated by a statistician, concealed in envelopes and given to a researcher who was not involved in the assessment of participants. Researchers were blinded at the baseline assessment sessions.

Outcome measures were collected from mothers and daughters at baseline (prior to randomization; July, 2011), immediate post-intervention [post-intervention] (10-week follow-up; September, 2011) and three-month follow-up [follow-up] (20-week-follow-up; December, 2011). Measurements were taken after school University of Newcastle, Australia, using the same instruments at each time point. The wait-list control received no intervention prior to attending the post-intervention and follow-up assessment sessions. The primary endpoint for this study was the post-intervention assessment. The Consolidated Standards of Reporting Trials (CONSORT) guidelines were adhered to for this study<sup>15</sup>.

#### *The MADE4Life intervention*

The *MADE4Life* program involved mothers and daughters attending weekly after-school 90 minute sessions over 8-weeks. Mothers and daughters attended separate education sessions for the first 25 minutes, with both participating in the final 60 minute PA sessions. Mothers' and daughters' education and PA sessions were delivered by female researchers with qualifications in physical education teaching. The major focus of the mother-daughter PA sessions were fun active games, health-related fitness<sup>16</sup>, zumba, aerobics<sup>17</sup>, pilates, yoga<sup>18</sup>, rough and tumble play<sup>19</sup> and fundamental movement skills<sup>20</sup>.

The aim of the *MADE4Life* program was to encourage PA in girls and their mothers, and to promote PA role modelling and parenting PA parenting practices in mothers. *MADE4Life* was informed by Social Cognitive Theory<sup>21</sup> and operationalized key constructs of self-efficacy, social support and outcome expectations (Table 7) and adopted intervention components the 'Healthy Dads, Healthy Kids' program<sup>22,23</sup> while other components were based on teaching experiences of the researchers. Moreover, *MADE4Life* activities were based upon fun, interactive games and fitness activities developed by the research team, incorporating popular music. *MADE4Life* encouraged reciprocal reinforcement between mothers and daughters<sup>24</sup> of PA e.g. daughters encouraging mothers to be active and vice versa.

Daughters' education sessions focused on developing an active lifestyle, benefits of PA and ways to reduce screen time. The 'daughter's booklet' contained weekly worksheets for daughters to complete with activities, e.g., the importance of PA, fun ways to be active, reducing screen time. Daughters completed weekly 'pink slip' homework tasks that encouraged home PA with their mothers, e.g., creating home-based fitness circuits. Pink slips were reviewed weekly by facilitators and daughters were rewarded with a 'scratch n smell' sticker to attach to a sticker chart.

Mothers' education sessions consisted of evidence-based information on PA, behavior change, role modelling and parenting strategies to support their daughter(s) PA. Sessions focused on the importance of mothers being a positive and active female role model<sup>13</sup>. Mothers were given a 'mother's handbook' to file weekly session outlines and various resources that supported mother-daughter PA (e.g., pedometers, skipping ropes). Mothers were encouraged to set SMART goals and self-monitor their daily PA using pedometers.

#### *MADE4Life Outcome measures*

Assessment sessions were held one week prior to intervention commencement. Families received a \$10 voucher from a local supermarket chain on completing assessments. The primary outcome was daughters' % time spent in moderate to vigorous physical activity (MVPA) at post-intervention. Actigraph GT3X and GT3X+ (ActiGraph, LLC, Fort Walton Beach, FL) accelerometers, which are considered to be valid and reliable for both children<sup>25</sup> and adults<sup>26</sup>, were used to assess PA for seven consecutive days in all participants. Accelerometers were initialised to collect data in 15 second epochs for daughters and 60 second epochs for mothers<sup>27</sup>. Daughters' data with  $\geq 20$  minutes<sup>28,29</sup> and mothers' data with  $\geq 60$  minutes of consecutive zeros were considered non-wear time and excluded from analysis. Activity counts were calculated for time spent in moderate (MPA) (4-5.9 METS) and vigorous (VPA) ( $\geq 6$  METS) PA. Total counts were divided by total minutes monitored to calculate mothers' and daughters' mean counts per

minute (CPM). Separate cut-points were applied for daughters<sup>27,30</sup> and mothers<sup>31</sup> to determine the amount of time spent in sedentary, light, moderate, and vigorous PA. To account for wear time variation, values were calculated for percentage of monitored time spent in sedentary behavior (% SED), LPA (%LPA), MPA (%MPA), VPA (%VPA) and MVPA (% MVPA). Participants' data were included in the analysis if accelerometers were worn for  $\geq 480$  minutes on  $\geq 4$  days<sup>29,32</sup>.

Participants were given an activity monitor sheet to log non-wear time activities such as swimming and bike riding. To support retention rates of the primary outcome, families were sent two reminder text messages throughout their 7-day wear time.

### ***Feasibility, acceptability and satisfaction***

Process measures including feasibility, acceptability and satisfaction were assessed via: *recruitment* (40 mother-daughter dyads to be screened and randomized); *retention* (a minimum of 80% retention of primary outcome; calculated by summing the total number of daughters' returning acceptable accelerometer data); and *attendance* (a minimum of 80% attendance over the eight sessions; calculated by summing the total weekly attendance). *Acceptability* and *satisfaction* were measured via a process evaluation questionnaire, using a 5-point Likert scale ('strongly disagree to strongly agree') and for enjoyment of activities ('really didn't enjoy to really enjoyed') (Table 6). Mothers also completed three short-open-ended questions asking what they did and did not like about *MADE4Life* and suggestions for improvement.

Secondary outcomes are reported in Table 1.

### **Data analysis**

Analyses were performed using SPSS Statistics 20 (IBM Inc. Armonk, NY). Descriptive analysis (percentages and frequency counts) were conducted to assess retention, recruitment, attendance and satisfaction. Data are presented as means (SDs) for continuous variables and counts (percentages) for categorical variables. Means and standard deviations were calculated for all normally distributed variables. Characteristics of completers versus dropouts were tested using

independent  $t$  tests for continuous variables and chi-squared ( $\chi^2$ ) tests for categorical variables. The significance level was set at .05 for all analyses. Analyses were performed separately for mothers and daughters and included all randomized participants.

Linear mixed models (LMM) were used to assess all outcomes (primary and secondary) for the impact of group (Intervention and Control), time (treated as categorical with levels baseline and post-intervention and baseline and follow-up) and the group-by-time interaction, with these three terms forming the base model. LMM were fitted with an unstructured covariance structure for all primary and secondary outcomes. 95% confidence intervals (CIs) and differences between means were determined via LMM. Analyses included all randomized participants. Age, daughters age, SES and BMI were examined for mothers; for daughters, age and SES were examined as pre-specified covariates to determine if they contributed significantly to the models<sup>33</sup>. Significant covariates were then examined via two-way interactions with time and treatment, with all significant terms added to the final model to adjust the results for these effects. The *MADE4Life* study was designed as a pilot randomized controlled trial; hence it was not deemed to be adequately powered from a statistical perspective. Therefore, to demonstrate effects and trends, Cohen's  $d$ <sup>34</sup> was used to determine effect sizes by calculating mean differences from the mixed models and the pooled standard deviation of the two groups at baseline ( $d = (M_1 - M_2) / \sigma_{\text{pooled}}$ ).

## RESULTS

The baseline characteristics of daughters and mothers are summarised in Table 2 and Table 3 respectively. Mean age of daughters was 8.5 years (1.7) and mean BMI z-score was 0.7 (1.2). After adjusting for non-wear time based on self-report accelerometer logs, no differences were found, therefore the non-adjusted wear time is reported. Daughters' accelerometer assessed % time in MVPA was 5.7 (2.3). At baseline, 19% (n=9) of the daughters met the PA guidelines. In comparison to children's age-matched accelerometer data, 7% of children met the PA guidelines,



therefore when comparing our sample of daughters to normative data, our daughters were a higher active sample.

Mean age (SD) of mothers was 39.1 (4.8) and mean BMI was 27.6 (5.5). Mothers' accelerometer assessed % time in MVPA was 3.5 (2.1). At baseline, 40% (n=16) of the mothers met the PA guidelines. Recent self-report data from Australia report 44% of women aged 35-44 to be sufficiently active. Therefore our sample of mothers are slightly less active compared to normative data. For the primary outcome, all randomized daughters with baseline data (n=48) were analysed at both follow-up time points.

### *Feasibility*

The first aim was to determine program feasibility. Figure 1 illustrates the flow of participants through the trial. In just over three weeks, a total of 122 families registered their interest for the program and were screened for eligibility. The most successful recruitment strategy was via local school newsletters with more than half of mothers reporting this as the primary exposure, followed by local radio, school gate/school presentations, university website, newspaper and television news. The target sample size was met with 40 mothers and 48 daughters attending baseline assessment sessions.

The 80% retention target was met for the primary outcome (accelerometer data) with 100%, 81% and 83% at baseline, post-intervention and follow-up respectively. Similarly, retention rates for mothers were high with 98%, 85% and 83% at each assessment. The study had excellent retention for assessments with 100% attending baseline assessments, 93% attended post-intervention and 91% at follow-up. There were no significant differences in follow-up rates between the *MADE4Life* and control group daughters at post-intervention ( $\chi^2=0.94$ ,  $df=1$ ,  $P=0.33$ ) or follow-up ( $\chi^2=2.02$ ,  $df=1$ ,  $P=0.15$ ), and for mothers post-intervention ( $\chi^2=0.02$ ,  $df=1$ ,  $P=0.894$ ) and follow-up ( $\chi^2=1.129$ ,  $df=1$ ,  $P=0.270$ ). Daughters lost at post-intervention had higher average per day screen time ( $P=0.05$ ) at baseline compared to daughters retained at follow-

up. Mothers lost at post-intervention had a lower mean fat mass ( $P=0.05$ ) at baseline than mothers retained at follow-up.

Average attendance at program sessions was high (82%). Two families withdrew for reasons not related to the *MADE4Life* program i.e., sickness and family commitments. Contact was lost with one additional family, who attended only two sessions. For the remaining 18 families, average attendance was 93%, and median number of sessions attended was 8 (range=6-8). The most common reasons for non-attendance were sickness (50%), family commitments (30%) and work commitments (20%). All eight *MADE4Life* program sessions were implemented as planned (100%).

*Acceptability and satisfaction* results are summarised in Table 6. Overall, mothers reported *MADE4Life* was highly acceptable which is reflected by the high mean scores. Mothers' qualitative answers indicated program highlights were spending quality time with their daughters in PA in a fun, supportive environment with other mothers and daughters.

#### *Preliminary efficacy*

Tables 4 and 5 report the results of primary and secondary outcomes for daughters and mothers respectively. There was no significant intervention effect ( $d=-0.03$ ) for the primary outcome of daughters' % time in MVPA. Similarly, very small effect sizes were reported for daughters secondary outcomes of % VPA;  $d=-0.09$ , %MPA;  $d=0.04$  and CPM  $d=-0.09$  post-intervention. At follow-up, a small effect size was found for daughters' CPM  $d=0.20$ , with a significant within-group effect for the treatment group at follow-up (with a +75 counts per minute, increase from pre to post; 95% CI 7.17, 144.68). A medium effect size for daughters' % LPA;  $d=-0.46$  was revealed at both post-intervention and follow-up. Both the treatment and control daughters showed within-group effects for % LPA at post-intervention and, in addition, the control daughters showed a within-group difference at follow-up. Small-to-medium effect sizes were found in the

intervention group for daughters' %SED at both post-intervention ( $d=0.20$ ) and follow-up ( $d=0.38$ ) and medium effect sizes were found for daughters' blood pressure ( $d=0.32-0.40$ ).

Intervention mothers' % MVPA effect size was  $d=0.25$  at post-intervention. Intervention mothers increased their % MVPA by 0.4% at post-intervention compared to the control group who decreased by 0.1%. A significant intervention effect was found for mothers % VPA ( $P=0.04$ ,  $d=0.25$ ), with the overall group by time effect significant ( $P=0.04$ ) with the mothers in the *MADE4Life* group increasing their % VPA (+0.22%, 95% CI; 0.05, 0.39) compared to the control group (+0.04% 95% CI; -0.15, 0.22). A large ( $d=0.66$ ) and significant ( $P<0.04$ ) treatment effect size was found for mothers' PA role modelling.

Medium effect sizes were found for mothers' MET minutes at both post-intervention ( $d=0.42$ ) and follow-up ( $d=0.53$ ), with a significant within group difference in favour of the *MADE4Life* mothers. *MADE4Life* mothers' also recorded a significant within group effect for their parenting for PA beliefs, with medium effect sizes post-intervention ( $d=0.34$ ) and follow-up ( $d=0.44$ ). A large effect size ( $d=-0.70$ ) was found for mothers sitting time on a non-work day post-intervention in favour of the *MADE4Life* group.

## DISCUSSION

The aim of this pilot RCT was to evaluate the feasibility and preliminary efficacy of a program targeting PA in pre-adolescent girls and their mothers. The *MADE4Life* program and study methods were highly feasible as demonstrated by successful recruitment, retention, and high levels of satisfaction and acceptability. The potential efficacy of the program was demonstrated by the encouraging effect sizes for some of the targeted measures (maternal role modelling, MET mins, maternal beliefs and sitting time). However, we did not see an effect on our primary outcome, which would need to be tested in a fully powered trial.

Our feasibility metrics demonstrate the appeal of the program. Recruitment goals were met promptly within three weeks, following a variety of promotion strategies. This may be

attributed to the novelty of the *MADE4Life* program i.e., new, engaging, girls only program which appealed to mothers and daughters. In contrast, other studies have had difficulties in recruitment<sup>35</sup>, particularly when using wait-list or no intervention control groups<sup>36</sup>.

Attendance levels were excellent (82%) and much higher than other mother-daughter studies which report attendance ranging from 65%<sup>37</sup> to 70–77% attendance<sup>35</sup>. The high retention in the current study for both mothers and daughters and complying to assessments studies is similar to Ransdell et al, 2003<sup>35</sup> (85% compliance) and Ransdell et al, 2004 with a 93% completion rate for the intervention group but only 43% for the control group<sup>13</sup>. The high attendance for the *MADE4Life* may be attributed to the positive rapport built with the study leader and program staff as the quality of facilitators rated very highly (average 4.8 out of 5). It may also be due to the variety of fun and engaging program activities. Considering the difficulties of accelerometer adherence<sup>38</sup>, our retention rates were high and likely facilitated by reminder text messages sent during assessment weeks, rapport built with the program facilitators, and the incentive of a store gift card given for assessment attendance.

Program Acceptability and Satisfaction was demonstrated through the very positive ratings from mothers' on program quality, impact, content and support. Mothers rated their overall enjoyment of the program close to the maximum possible score. This could be attributed in part to program alignment with SCT<sup>21</sup>, with an emphasis on self-efficacy, social support and outcome expectations or the qualifications, teaching experience and teaching strategies employed by the facilitators. In addition, high program satisfaction may have also been facilitated by the content tailored specifically for females, pedagogically designed sessions, encouragement of social support, and use of engaging mother-daughter home tasks that were appealing to the whole family.

The preliminary efficacy of the *MADE4Life* program was assessed via the primary outcome physical activity (%MVPA) in daughters. For daughters, only a very small effect size

was found, however, the study was underpowered and not designed to detect significant differences. The small effect size may also be due to the study inclusion criteria. The study was open to all girls, as opposed to a recruiting ‘low active’ girls or those not involved in organised sports or activities, as has been the case in previous mother-daughter studies<sup>12,13,35</sup> or focusing on recruiting exclusively overweight or obese girls<sup>39,40</sup>. Our baseline findings suggest the girls recruited were more active than the general population, compared to objective data in boys and girls<sup>41</sup>. Therefore, both study arms may have had less potential for improvement due to a ‘ceiling effect’<sup>42</sup>. The MADE4Life program may have been unable to increase daughters’ PA for other reasons. For example, it is noteworthy that other areas of focus of the MADE4Life intervention included rough and tumble play and fundamental movement skills for mothers and daughters, which are problematic to measure with accelerometers and both have often distinct benefits<sup>19,20</sup>. Although these variables were not evaluated, the potential impact of the MADE4Life program might also be further explored through assessing these aspects. Further, co-physical is important variable, however, was not evaluated in this trial. The literature on the efficacy of mother-daughter/parent daughter PA studies are mixed, with some studies reporting significant increases in daughters PA<sup>13,39,43</sup> while others not<sup>14,37</sup>. Such variation in findings may be attributed no follow-up beyond post-intervention assessment and not using objective PA measures. There has only been one mother-daughter RCT which has assessed MVPA objectively (via accelerometer) in daughters and this study did not find a significant difference between groups for MVPA or mean daily CPM<sup>14</sup>. Notably, PA assessment in this study was relatively short (i.e., 2 weekdays). Moreover, there has been only one pre-post study which used accelerometry in daughters<sup>39</sup>, however, data were only collected during the intervention sessions, i.e. between 9am-5pm Monday to Friday during a summer camp. Results for daughters’ MVPA indicated a significant increase in daily MVPA from Week 1 to Week 4 during the intervention<sup>39</sup>. This may have been due to the high retention rate<sup>39</sup> and because the daughter were a captive audience, participating in structured daily exercise sessions at the organised camp, therefore increasing MVPA. Limitations of this study included the absence of a control group and no

assessment of PA at baseline and post-intervention. It is unknown whether the daughters' MVPA was increased outside the intervention period and whether increases in MVPA would be sustainable. In addition, maternal PA was not assessed in this study<sup>39</sup>.

A moderate effect size at immediate post-intervention was reported for mothers' %MVPA and encouraging results were revealed for mothers' %VPA, with a significant intervention effect. Indeed, very few studies exclusively targeting mothers-daughters have used objective measures of PA i.e., pedometers<sup>13</sup> or accelerometers<sup>14,39</sup>. However, limitations of these particular studies include no objective assessment for the study mothers, aggregating three day step counts as a family average rather than reporting separately for daughters and mothers<sup>13</sup> and no follow-up beyond post-intervention assessment<sup>14,39</sup>. Given the decrease in PA levels from post-intervention to follow-up in the current study, future interventions may need to increase the intervention dose, for example, bi-weekly sessions) and/or include booster sessions during the maintenance phase.

A large effect size was found for mothers' PA 'role modelling' with mothers in the *MADE4Life* group significantly improving their frequency of doing activity with their daughter(s), organisation for family PA and using their own behavior to encourage daughters' PA. This is a novel finding and there are no mother-daughter studies that have measured these or similar constructs.

#### Study limitations and strengths

The sample size was small and hence not fully powered to detect significant differences in outcomes. This is the first study focussing on intergenerational females, to objectively assess PA in daughters and mothers. Further strengths include the randomized design, high retention percentage, intention to treat analysis, follow-up assessments beyond immediate post-intervention and a theoretically-grounded program.

#### Conclusion

This study aimed to assess the feasibility and preliminary efficacy of a novel mother-daughter PA gender tailored program. It makes an important contribution to the paucity of studies targeting mothers and daughters. Importantly, it was a RCT and used objectively measured PA. Future trials could screen participants with low baseline PA levels as a way to target low active mothers and daughters. Furthermore, future studies should continue to include objectively measuring PA in both mothers and daughters, and target and assess co-physical activity and fundamental movement skills. Overall, the *MADE4Life* program was highly feasible and acceptable to mothers and daughters and larger statistically powered trials are warranted.

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**Table 1:** Secondary measures assessed in the *MADE4Life* program

Variables	Description	Scoring outcome
<b>BMI and BMI z-score</b>	Weight was measured in light clothing, without shoes and on a digital scale to 0.1kg (model CH-150kp, A&D Mercury Pty, Adelaide, Australia). Height was measured to 0.1 cm using the stretch stature method (Mentone Educational Centre, Victoria, Australia) and the Biospace Stadiometer (BSM370, Seoul, Korea). Mothers' BMI was calculated using the standard equation, weight kg/height m <sup>2</sup> . Daughters' BMI z-score was calculated using age-adjusted standardized scores (z-scores) in reference to the UK 1990 reference population <sup>44</sup> .	n/a
<b>Waist circumference</b>	Waist circumference was measured at the umbilicus level with non-extensible steel tape (KDSF10-02, KDS, Osaka, Japan) to the nearest 0.1cm.	n/a
<b>Blood pressure and resting heart rate</b>	Blood pressure and resting heart rate were measured using NISSEI/DS-105E digital electronic blood pressure monitors (Nihon Seimitsu Sokki Co. Ltd., Gunma, Japan) under standardised procedures.	n/a
<b>Body Composition</b>	Bioimpedance was used to assess body composition, including fat mass, fat free mass and total body water. Body composition was assessed by the InBody720 (Biospace Co., Ltd, Seoul, Korea), a multi-frequency bioimpedance device featuring an eight-point tactile electrode system. This method has been shown to be valid and reliable <sup>45</sup> .	n/a
<b>Self-report PA behaviors</b>	Mothers' self-reported their PA via a modified version <sup>46</sup> of the validated Godin Leisure-time Exercise Questionnaire (GLETO) <sup>47</sup> and reported the number of times per week (average week over the past month) and minutes per session they spent in strenuous (rapid heartbeats, sweating), moderate (not exhausting, light perspiration) and mild (minimal effort and no perspiration) for a minimum of 10 minutes per session. Calculation of this variable has been explained in detailed elsewhere <sup>22</sup> . MET scores (MET-minutes/week) were generated <sup>48</sup> and final MET mins were calculated using self-reported Strenuous and Moderate Mets (excluding mild) representing MVPA.	Total time spent in moderate intensity activity was multiplied by 4.5. Total time spent in strenuous activity was multiplied by 7. These variables were then added.
<b>Mothers' sedentary behavior</b>	Adapted from a valid and reliable sitting time questionnaire <sup>49</sup> . Mothers reported typical sitting time on a work and non-work day for time spent sitting for transport, work, watching TV, using a computer at home, other leisure activities and sleep time <sup>49</sup> .	Time spent in each domain was added to determine overall work day sitting time and non-work day sitting time
<b>Daughters' sedentary behaviour and screen time</b>	Mothers proxy-reported their eldest participating daughter's leisure activity over a typical week using the previously validated Children's Leisure Activities Study Survey (CLASS) <sup>50</sup> .	Screen recreation (SR) was calculated by summing the three domains TV/Videos, PlayStation/Nintendo/Computer games and Computer/internet. Total sedentary behavior for each of Monday-Friday and Saturday-Sunday were calculated by converting reported values to minutes and summing the 15 domains. An average was then calculated.
<b>Maternal parenting for PA</b>	Mothers' parenting of PA was measured by adapting either full scales or selected items of previously validated scales on maternal logistic support for PA and maternal explicit modelling <sup>51,52</sup> , maternal beliefs <sup>53</sup> , maternal self-efficacy and general support <sup>54</sup> . Details of the maternal parenting for PA scales have been reported in further detail elsewhere .	Maternal scores for each domain was added to determine an overall score for each maternal PA subscale.

## Mother-daughter physical activity intervention

<b>Maternal social-cognitive variables</b>	Key SCT cognitions <sup>21</sup> related to mothers' PA were adapted from validated measures of self-efficacy <sup>55</sup> , outcome expectations <sup>56</sup> , social support , and intention <sup>57</sup> .	Maternal scores for each domain was added to determine an overall score for each SCT cognition.
<b><i>Demographics</i></b>	Information regarding maternal demographics including mothers' age, socioeconomic status (SES) postcode, highest level of education, marital status, and weekly household income were collected.	SES was based on postal code of residence using the Index of Relative Socioeconomic Advantage and Disadvantage from the Australian Bureau of Statistics census-based Socio-Economic Indexes for Areas (SEIFA) <sup>58</sup> .

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**Table 2:** Baseline characteristics of Daughters randomized to the MADE4Life intervention and control groups

Characteristics	Control (n = 23)		MADE4Life program (n = 25)		Total (n = 48)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)
Age (years)	8.63	1.76	8.36	1.72	8.49	1.73
Weight (kg)	33.06	9.88	31.42	8.37	32.21	9.06
Height (m)	132.48	12.09	131.85	10.25	132.15	11.05
BMI (kg/m <sup>2</sup> )	18.49	3.06	17.80	2.69	18.13	2.87
BMI z-score	0.81	1.09	0.65	1.27	0.71	1.18
Waist [umb] (cm)	65.60	9.47	64.71	8.69	65.14	8.98
Waist z-score	2.12	1.63	2.10	1.89	2.11	1.75
Systolic blood pressure (mmHg)	94	6	94	13	94	10
Diastolic blood pressure (mmHg)	60	7	57	9	58	8
Resting heart rate (BPM)	84	13	83	10	83	12
Fat mass %	24.22	7.76	22.84	8.23	23.50	7.95
<b>Physical activity</b>						
Mean CPM	452.69	123.97	482.95	168.97	468.45	148.34
% time in MVPA	5.60	1.77	5.71	2.76	5.65	2.32
% time in MPA	3.83	1.00	3.93	1.62	3.88	1.35
% time in VPA	1.77	1.08	1.78	1.27	1.78	1.17
% time in LPA	31.12	5.50	34.02	5.97	32.67	5.86
% time in SED	63.18	6.79	60.27	7.90	61.66	7.46
<b>Sitting time (minutes/day) <sup>a, b</sup></b>						
Sitting time daily average	382.00	187.03	363.30	143.20	372.16	163.55
<b>Screen time (minutes) <sup>a, b</sup></b>						
Screen time (average minutes/day)	162.29	99.49	145.61	58.80	153.54	80.08
	n	%	n	%	n	%
<b>BMI Category</b>						
Healthy weight <sup>c</sup>	14	60.8%	18	72%	32	66.6%
Overweight	6	26.1%	3	12%	9	18.8%
Obese	3	13.1%	4	16%	7	14.6%

Abbreviations: MADE4Life = Mothers and Daughters Exercising for Life; kg = kilograms; BMI = body mass index; umb = umbilicus measurement; mmHg = millimetres of mercury; BPM = beats per minute; CPM = counts per minute; MVPA = moderate/vigorous physical activity; MPA = moderate physical activity, VPA = vigorous physical activity; LPA = light physical activity; SED = sedentary activity;

<sup>a</sup> Reported by mothers for eldest daughter only if more than one child enrolled; <sup>b</sup> n=19 (control); n= (21 intervention); N=40 (total); <sup>c</sup> Child grade 1 thinness included (n=2)

**Table 3:** Baseline characteristics of Mothers randomized to the MADE4Life intervention and control group

Characteristics	Control (n = 19)		MADE4Life program (n = 21)		Total (n = 40)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)
Age (years)	39.53	5.26	38.71	4.41	39.10	4.79
Weight (kg)	73.99	15.2	74.63	14.16	74.33	14.47
Height (m)	164.58	6.78	163.98	4.01	164.27	5.44
BMI (kg/m <sup>2</sup> )	27.35	5.60	27.80	5.45	27.59	5.46
Waist [umb] (cm)	93.43	13.99	93.76	9.62	93.60	11.74
Systolic blood pressure (mmHg)	115	9	112	14	113	12
Diastolic blood pressure (mmHg)	76	7	74	11	75	10
Resting heart rate (BPM)	68	9	69	10	68	9
Fat mass %	34.93	8.42	36.61	6.73	35.81	7.53
<b>Physical activity a</b>						
Mean CPM	333.03	108.84	355.97	132.67	345.38	121.24
% time in MVPA	3.40	1.82	3.65	2.35	3.53	2.10
% time MPA	3.20	1.40	3.30	1.96	3.25	1.71
% time VPA	0.20	0.47	0.36	0.90	0.29	0.73
% time LPA	37.32	6.58	38.03	7.49	37.71	7.00
% time in SED	59.27	7.11	58.32	8.65	58.76	7.89
<b>Godin Leisure Time (GLTEQ)</b>						
Total Met Minutes exc mild	592.89	842.96	443.45	551.68	514.44	699.82
<b>Sitting time (min)</b>						
Work day <sup>b</sup>	358.81	172.85	529.21	194.77	451.31	201.69
Non-work day	324.74	125.18	345.95	186.95	335.88	158.97
<b>Parenting for PA<sup>c,d</sup></b>						
Maternal role modelling	13.95	3.34	13.38	2.67	13.65	3.03
Maternal logistic support	9.32	2.08	10.14	1.42	9.75	1.79
Maternal beliefs	18.11	2.21	17.17	2.07	17.60	2.16
Maternal self-efficacy	16.95	2.27	17.52	1.94	17.25	2.10
Maternal support	14.00	3.51	13.48	1.89	13.73	2.75
<b>Physical activity cognitions<sup>c,e</sup></b>						
Self-efficacy	18.37	4.50	17.90	5.18	18.13	4.81
Outcomes expectations	14.42	1.12	13.33	2.03	13.85	1.73
Social support	3.42	1.42	3.38	1.32	3.40	1.35
Intention	4.53	0.61	4.80	0.40	4.67	0.52
	n	%	n	%	n	%
BMI Category						
Healthy weight	7	36.8%	6	28.6%	13	32.5%
Overweight	7	36.8%	8	31.1%	15	37.5%
Obese	5	33.4%	7	33.4%	12	30%
SES <sup>f</sup>						
1-2 (lowest)	0	0%	0	0%	0	0%
3-4	1	2%	2	4%	3	3%
5-6	16	36%	17	35%	33	36%
7-8	28	62%	29	61%	57	61%
9-10 (highest)	0	0%	0	0%	0	0%

**Abbreviations:** MADE4Life = Mothers and Daughters Exercising for Life; kg = kilograms; BMI = body mass index; umb = umbilicus measurement; mmHg = millimetres of mercury; BPM = beats per minute; CPM = counts per minute; MVPA = moderate/vigorous physical activity; MPA = moderate physical activity, VPA = vigorous physical activity; LPA = light physical activity; SED = sedentary activity; <sup>a</sup> n=18 (control); n=21 (intervention) N=39; <sup>b</sup> n=16 (control); n=19 (intervention); N=35 (total); <sup>c</sup> mean score represented; <sup>d</sup> Range 1-4; <sup>e</sup> Range 1-5; <sup>f</sup> Socio-economic status by population decile for SEIFA Index of Relative Socioeconomic Advantage and Disadvantage.



## Mother-daughter physical activity intervention

**Table 4:** Changes in outcome variables for **daughters** by treatment group from baseline to immediate post-intervention and 3-month post-intervention and differences in outcomes among the treatment groups at immediate post-intervention and 3-month post-intervention follow up (ITT analysis) (n= 48)

Outcome	Time point	Treatment group		Mean difference between groups (95% CI) <sup>a</sup>	Group * Time (overall) <i>P</i>	Effect Size (Cohen's <i>d</i> )
		Mean change from Baseline (95% CI) <sup>a</sup>				
		Control (n =23 )	MADE4Life program (n =25 )			
<i>Weight (kg)</i>	1	0.88 (0.50, 1.27)	0.37 (-0.02, 0.76)	-0.52 (-1.06, 0.03)	0.16	-0.06
	2	1.90 (1.38, 2.42)	1.69 (1.17, 2.22)	-0.20 (-0.94, 0.54)		-0.02
<i>BMI z-score</i>	1	0.45 (-0.08, 0.17)	-0.08 (-0.20, 0.05)	-0.12 (-0.30, 0.06)	0.39	-0.10
	2	0.14 (0.02, 0.27)	0.08 (-0.05, 0.21)	-0.06 (-0.24, 0.13)		-0.05
<i>Waist z-score</i>	1	0.17 (-0.03, 0.36)	0.34 (0.14, 0.54)	0.17 (-0.11, 0.45)	0.44	0.10
	2	0.35 (0.16, 0.54)	0.42 (0.22, 0.61)	0.07 (-0.21, 0.34)		0.04
<i>Systolic blood pressure (mmHg)<sup>b</sup></i>	1	-5.50 (-9.44, -1.56)	-4.64 (-8.62, -0.66)	0.86 (-4.74, 6.46)	0.24	0.01
	2	-8.02 (-11.56, -4.49)	-3.84 (-7.60, -0.08)	4.18 (-0.98, 9.34)		0.40
<i>Diastolic blood pressure (mmHg)<sup>b</sup></i>	1	-8.03 (-12.81, -3.24)	-5.36 (-10.16, -0.56)	2.67 (-4.12, 9.46)	0.49	0.32
	2	-9.25 (-12.49, -6.02)	-6.50 (-9.83, -3.17)	2.75 (-1.90, 7.40)		0.33
<i>Resting heart rate (BPM)</i>	1	-7.50 (-15.47, 0.47)	-5.43 (-13.36, 2.51)	2.07 (-9.17, 13.32)	0.24	0.17
	2	-7.17 (-13.30, -1.05)	-0.23 (-6.61, 6.15)	6.94 (-1.90, 15.78)		0.57
<i>Fat mass (%)</i>	1	0.34 (-0.30, 0.98)	0.74 (0.09, 1.40)	0.40 (-0.52, 1.32)	0.07	0.05
	2	1.76 (0.90, 2.61)	3.23 (2.33, 4.14)	1.48 (0.23, 2.73)		0.19
<i>Mean CPM <sup>b</sup></i>	1	111.39 (41.95, 180.83)	99.23 (28.08, 170.37)	-12.17 (-111.58, 87.25)	0.69	-0.09
	2	45.72 (-20.39, 111.83)	75.92 (7.17, 144.68)	30.20 (-65.18, 125.58)		0.20
<i>% time in SED <sup>b</sup></i>	1	-5.74 (-8.19, -3.29)	-2.90 (-5.40, -0.40)	2.84 (-0.66, 6.34)	0.14	0.38
	2	-4.28 (-6.35, -2.21)	-1.56 (-3.70, 0.57)	2.72 (-0.25, 5.69)		0.36
<i>% time in LPA <sup>b,c</sup></i>	1	4.84 (2.82, 6.85)	2.14 (0.09, 4.20)	-2.69 (-5.57, 0.18)	0.08	-0.46
	2	3.99 (2.28, 5.70)	1.31 (-0.47, 3.07)	-2.69 (-5.15, -0.22)		-0.46
<i>% time in MPA <sup>b</sup></i>	1	0.58 (-0.06, 1.23)	0.63 (-0.00, 1.28)	0.05 (-0.87, 0.96)	0.73	0.04
	2	0.35 (-0.013, 0.82)	0.11 (-0.38, 0.60)	-0.24 (-0.92, 0.45)		-0.18
<i>% time in VPA <sup>b</sup></i>	1	0.36 (-0.09, 0.81)	0.26 (-0.20, 0.72)	-0.10 (-0.74, 0.54)	0.67	-0.09
	2	-0.05 (-0.05, 0.44)	0.16 (-0.34, 0.66)	0.21 (-0.49, 0.91)		0.18
<i>% time in MVPA <sup>b</sup></i>	1	0.96 (-0.03, 1.95)	0.88 (-0.12, 1.88)	-0.08 (-1.49, 1.33)	0.99	-0.03
	2	0.28 (-0.57, 1.13)	0.31 (-0.57, 1.19)	0.03 (-1.20, 1.25)		0.01
<i>Daughters sitting time 7 day average (min/day)<sup>d</sup></i>	1	2.78 (-58.03, 63.60)	-14.43 (-78.44, 49.58)	-17.21 (-105.49, 71.07)	0.87	-0.11
	2	-27.59 (-100.27, 45.09)	-25.81 (-99.76, 48.14)	1.78 (-101.90, 105.46)		0.01
<i>Daughters mean screen time (min/day)<sup>d</sup></i>	1	-22.67 (-54.08, 8.74)	-7.81 (-40.09, 24.48)	14.86 (-30.17, 59.89)	0.40	0.19
	2	-24.00 (-51.92, 3.93)	2.99 (-25.76, 31.73)	26.98 (-13.09, 67.05)		0.34

Abbreviations: **MADE4Life** = Mothers and Daughters Exercising for Life; kg = kilograms; Time point 1 = immediate post-intervention Time point 2 = 3-month post-intervention; BMI = body mass index; umb = umbilicus measurement; mmHg = millimetres of mercury; BPM = beats per minute; CPM = counts per minute; MVPA = moderate to vigorous physical activity; VPA = vigorous physical activity; MPA = moderate physical activity, LPA = light physical activity; SED = sedentary activity; <sup>a</sup> intervention minus control; <sup>b</sup> adjusted for AGE; <sup>c</sup> adjusted for SES; <sup>d</sup> reported by mother for eldest daughter if more than one child enrolled

## Mother-daughter physical activity intervention

**Table 5:** Changes in outcome variables for **mothers** by treatment group from baseline to immediate post-intervention and 3-month post-intervention and differences in outcomes among the treatment groups at immediate post-intervention and 3-month post-intervention follow up (ITT analysis) (n= 40)

Outcome	Time point	Treatment group		Mean difference between groups (95% CI) <sup>a</sup>	P	Effect Size (Cohen's d)
		Control (n =19)	MADE4Life program (n =23)			
Weight (kg) <sup>b</sup>	1	-0.49 (-1.48, 0.51)	0.45 (-0.57, 1.46)	0.93 (-0.49, 2.35)	0.15	0.06
	2	0.17 (-0.10, 0.44)	0.49 (0.20, 0.77)	0.32 (-0.08, 0.71)		0.02
Waist [umb] (cm) <sup>b</sup>	1	-1.48 (-4.41, 1.46)	1.14 (-1.87, 4.15)	2.61 (-1.59, 6.82)	0.40	0.22
	2	-0.57 (-2.41, 1.27)	0.95 (-0.96, 2.86)	1.52 (-1.13, 4.18)		0.13
BMI (kg/m <sup>2</sup> )	1	-0.04 (-0.55, 0.46)	-0.17 (-0.69, 0.35)	-0.13 (-0.85, 0.60)	0.34	-0.02
	2	-0.26 (-0.69, 0.18)	0.10 (0.36, -0.36.56)	0.36 (-0.28, 0.99)		0.07
Systolic blood pressure (mmHg) <sup>b</sup>	1	-4.35 (-8.45, -0.24)	-2.59 (-6.79, 1.61)	1.76 (-4.11, 7.63)	0.53	0.14
	2	-6.74 (-11.63, -1.85)	-2.95 (-7.92, 2.01)	3.79 (-3.18, 10.76)		0.30
Diastolic blood pressure (mmHg) <sup>b</sup>	1	-4.50 (-7.80, -1.20)	-2.15 (-5.51, 1.20)	2.34 (-2.36, 7.05)	0.60	0.23
	2	-5.17 (-8.97, -1.37)	-3.95 (-7.84, -0.06)	1.22 (-4.22, 6.66)		0.12
Resting heart rate (BPM)	1	-1.24 (-5.16, 2.69)	-0.14 (-4.03, 3.76)	1.10 (-4.43, 6.63)	0.91	0.11
	2	-1.94 (-5.03, 1.14)	-1.82 (-5.09, 1.46)	0.13 (-4.37, 4.63)		0.01
Fat mass % <sup>b</sup>	1	-0.20 (-1.53, 1.14)	-0.62 (-1.20, 0.75)	-0.42 (-2.33, 1.49)	0.39	-0.06
	2	-0.90 (-2.38, 0.59)	0.41 (-1.15, 1.98)	1.31 (-0.85, 3.47)		0.17
Mean CPM <sup>c</sup>	1	-7.07 (-47.39, 33.24)	16.75 (-20.92, 54.41)	23.82 (-31.35, 78.99)	0.33	0.20
	2	-1.32 (-40.64, 38.00)	-12.70 (-50.93, 25.52)	-11.38 (-66.20, 43.45)		-0.09
% time in SED <sup>c</sup>	1	0.36 (-2.20, 2.93)	0.91 (-1.50, 3.32)	0.54 (-2.97, 4.06)	0.59	0.07
	2	-1.00 (-2.85, 2.66)	-1.23 (-3.93, 1.51)	-1.13 (-5.01, 2.75)		-0.14
% time in LPA <sup>c</sup>	1	-0.18 (-2.53, 2.18)	-1.39 (-3.60, 0.84)	-1.21 (-4.44, 2.03)	0.20	-0.17
	2	0.18 (-2.42, 2.78)	1.77 (-0.83, 4.38)	1.60 (-2.08, 5.28)		0.23
% time in MPA <sup>c</sup>	1	-0.19 (-0.88, 0.51)	0.20 (-0.44, 0.85)	0.39 (-0.56, 1.33)	0.17	0.23
	2	-0.10 (-0.80, 0.61)	-0.50 (-1.18, 0.19)	-0.40 (-1.38, 0.58)		-0.23
% time in VPA <sup>c</sup>	1	0.04 (-0.15, 0.22)	0.22 (0.05, 0.39)	0.18 (-0.07, 0.43)	0.04	0.25
	2	0.07 (-0.12, 0.25)	-0.07 (-0.25, 0.11)	-0.14 (-0.39, 0.12)		-0.19
% time in MVPA <sup>c</sup>	1	-0.14 (-0.93, 0.65)	0.38(-0.35, 1.12)	0.53 (-0.55, 1.61)	0.06	0.25
	2	-0.03 (-0.82, 0.76)	-0.59 (-1.36, 0.18)	-0.56 (-1.67, 0.54)		-0.27
Mothers sitting time work day (min/day) <sup>b</sup>	1	23.52 (-75.64, 122.67)	-44.16 (-142.86, 54.54)	-71.49 (-209.28, 66.27)	0.24	-0.35
	2	-53.32 (-228.23, 121.58)	71.30 (-111.60, 254.20)	124.62 (-128.44, 377.69)		0.62
Mothers siting time non-work day (min/day)	1	88.16 (-7.54, 183.86)	-22.50 (-117.86, 72.86)	-110.66 (-245.75, 24.43)	0.15	-0.70
	2	29.21 (-53.79, 112.22)	29.53 (-55.82, 114.89)	0.32 (-118.73, 119.38)		0.00
Mothers godin weekly met minutes_excMild	1	50.42 (-203.79, 304.64)	346.00 (90.61, 601.40)	295.58 (-64.76, 655.92)	0.21	0.42
	2	71.33 (-302.95, 445.61)	438.76 (62.51, 815.01)	367.43 (-163.27, 898.13)		0.53
Parenting for PA Role modelling <sup>f</sup>	1	0.04 (-1.10, 1.19)	2.05 (0.89, 3.21)	2.00 (0.37, 3.63)	0.02	0.66
	2	0.26 (-0.85, 1.38)	0.62 (-0.55, 1.79)	0.36 (-1.26, 1.97)		0.12
Parenting for PA beliefs <sup>f</sup>	1	0.32 (-0.73, 1.36)	1.06 (0.01, 2.11)	0.74 (-0.74, 2.23)		0.34

# Mother-daughter physical activity intervention

	2	0.21 (-0.78, 1.20)	1.17 (0.16, 2.19)	0.96 (-0.49, 2.38)	0.39	0.44
Parenting for PA Logistic Support <sup>f</sup>	1	-0.26 (-0.99, 0.47)	-0.30 (-1.04, 0.45)	-0.03 (-1.08, 1.01)		-0.12
	2	0.53 (-0.17, 1.22)	0.27 (-0.44, 0.99)	-0.25 (-1.25, 0.74)	0.80	-0.14
Parenting for PA Self Efficacy <sup>e,f</sup>	1	0.53 (-0.54, 1.59)	-0.42 (-1.49, 0.66)	-0.94 (-2.46, 0.58)		-0.45
	2	-0.58 (-1.96, 0.80)	-1.52 (-2.93, -0.11)	-0.94 (-2.91, 1.04)	0.45	-0.45
Parenting for PA Support <sup>f</sup>	1	0.53 (-0.54, 1.60)	-0.43 (-1.50, 0.65)	0.65 (-0.85, 2.16)		0.24
	2	-0.58 (-1.96, 0.80)	-1.54 (-2.96, -0.13)	0.96 (-2.94, 1.01)	0.43	0.35
(SCT) Self Efficacy	1	-1.74 (-4.10, 0.62)	-0.41 (-2.78, 1.97)	1.33 (-2.01, 4.68)		0.28
	2	-2.53 (-4.80, -0.29)	-1.37 (-3.64, 0.89)	1.15 (-2.03, 4.33)	0.68	0.24
(SCT) Outcome Expectations <sup>d</sup>	1	-0.05 (-0.84, 0.74)	-0.09 (-0.89, 0.72)	-0.04 (-1.16, 1.09)		-0.02
	2	-0.68 (-1.99, 0.62)	-1.22 (-2.54, 0.10)	-0.54 (-2.39, 1.32)	0.83	-0.31
(SCT) Social Support <sup>b</sup>	1	-0.00 (-0.47, 0.47)	-0.07 (-0.54, 0.41)	-0.07 (-0.74, 0.61)		-0.05
	2	0.04 (-0.46, 0.53)	0.03 (-0.46, 0.54)	-0.00 (-0.71, 0.71)	0.97	0.00
(SCT) Intention	1	0.16 (-0.41, 0.01)	-0.24 (-0.49, 0.02)	-0.08 (-0.44, 0.28)		-0.15
	2	-0.47 (-0.854, -0.09)	-0.47 (-0.86, -0.08)	0.00 (-0.54, 0.55)	0.88	0.00

Abbreviations: *MADE4Life* = Mothers and Daughters Exercising for Life; kg = kilograms; Time point 1 = immediate post-intervention Time point 2 = 3-month post-intervention; BMI = body mass index; umb = umbilicus measurement; mmHg = millimetres of mercury; BPM = beats per minute; CPM = counts per minute; MVPA = moderate to vigorous physical activity; VPA = vigorous physical activity; MPA = moderate physical activity, LPA = light physical activity; SED = sedentary activity; <sup>a</sup> intervention minus control; <sup>b</sup> adjusted for BMI; <sup>c</sup> Intervention n=23, Control n=18; <sup>d</sup> adjusted for ses; <sup>e</sup> adjusted for age; <sup>f</sup> reported by mother for eldest daughter if more than one child enrolled

**Table 6: Mothers' process evaluation from the M.A.D.E 4 Life program**

Construct (n= number of items)	Example of item	Mean (SD)
Quality of program <sup>a</sup> (n=4)	<i>The M.A.D.E 4 Life program was enjoyable</i>	4.6 (0.5)
Quality of facilitators <sup>a</sup> (n=4)	<i>The facilitators had a high level of knowledge and good communication skills</i>	4.8 (0.4)
PA session content <sup>b</sup> (n=8)	<i>Rough &amp; tumble play/Boxing/Pilates/Zumba</i>	4.3 (0.2)
Impact on family members <sup>a</sup> (n=5)	<i>The M.A.D.E 4 Life program had a positive impact on my families PA levels</i>	3.7 (0.2)
Behavior change <sup>a</sup> (n=3)	<i>As a result of the M.A.D.E 4 Life program I spend more time being active with my daughter</i>	3.9 (0.1)
Program support <sup>a</sup> (n=2)	<i>The M.A.D.E 4 Life program taught me how to increase my PA levels</i>	4.5 (0.1)

<sup>a</sup> 1=Strongly disagree to 5= Strongly agree; <sup>b</sup> 1=Really didn't like to 5=Really liked;  
PA = physical activity