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Title: Variation in outcomes of The Melbourne Infant, Feeding, Activity and Nutrition Trial (InFANT) Program according to maternal education and age.

Short Title: Infant obesity prevention intervention: differential effects

Authors: Adrian J Cameron¹, Kylie Ball¹, Kylie D Hesketh¹, Sarah A McNaughton¹, Jo Salmon¹, David A Crawford¹, Sandrine Lioret¹, Karen J Campbell¹

Affiliations: ¹Centre for Physical Activity and Nutrition Research, Deakin University, 221 Burwood Hwy, Burwood 3125, Australia.

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All Correspondence to:

Dr Adrian Cameron, Senior Research Fellow,
Centre for Physical Activity and Nutrition Research,
Deakin University, Melbourne, Australia
221 Burwood Hwy, Burwood, Victoria, Australia 3125
Telephone: +613 92446433; Fax: +613 92446017; Email: adrian.cameron@deakin.edu.au

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Abstract

**Objective:** To assess the effectiveness of the Melbourne Infant Feeding, Activity and Nutrition Trial (InFANT) Program according to maternal education and age.

**Methods:** A cluster-randomized controlled trial involving 542 mother/infant pairs from 62 existing first-time parent groups was conducted in 2008 in Melbourne, Australia. The intervention involved 6x2-hour dietitian-delivered sessions, DVD and written resources from infant age 4-15 months. Outcomes included infant diet (3x24hr diet recalls), physical activity (accelerometry), television viewing and body mass index. We tested for moderation by maternal education (with/without a University degree) and age (<32 and ≥32 years). The trial was registered with the ISRCTN Register (identifier 81847050).

**Results:** Interaction effects with the treatment arm were observed for maternal education and age. The intervention effects on vegetable (positive effect) and sweet snack consumption (negative effect) were greater in children with higher educated mothers while intervention effects on water consumption (positive effect) were greater in infants with lower educated mothers. The intervention was also more effective in increasing both vegetable and water consumption in infants with mothers aged <32 years.

**Conclusions:** Child obesity prevention interventions may be differentially effective according to maternal education and age. Evidence of differential effects is important for informing more sensitively targeted/tailored approaches.
Introduction

A growing body of evidence now suggests that overweight and obesity in childhood and adolescence have adverse health consequences in adulthood and confer a greater risk of premature mortality (Reilly and Kelly, 2011). During childhood and adolescence, excess body weight is also associated with a greater likelihood of psychosocial problems including social discrimination and reduced self-esteem (Hesketh et al., 2004; Latner and Stunkard, 2003). Body weight and its inherent cardiovascular risk are patterned according to socioeconomic indicators in most developed countries, with socioeconomic position being inversely related to obesity rates and the accumulation of cardiovascular risk in both adults and children (Australian Bureau of Statistics, 2009; Brunner et al., 1999; Sassi et al., 2009; Shrewsbury and Wardle, 2008; Wells et al., 2010).

Differences in weight according to socioeconomic indicators of either maternal education or parental occupation have been reported from as early as three months of age (Wijlaars et al., 2011). In Australia, as well as in England, recent studies in school-aged children have found socioeconomic gradients (in income and social class in England, and in area-level disadvantage in Australia) in the prevalence of obesity to be increasing over the past decade (Hardy et al., 2012; Stamatakis et al., 2010). Variation in obesity-related behaviours (increased television viewing and consumption of energy-dense snacks and drinks as well as decreased consumption of fruits and vegetables) by parental education and income has also been observed in pre-school children and persists throughout childhood and into adolescence (Cameron et al., 2012). Maternal age is likewise a strong determinant of obesity-related behaviours in infants and children independent of child age. Although studies of sedentary behaviour (King et al., 2011) and physical activity (McMinn et al., 2008) find younger maternal age to be protective (associated with greater activity and less sedentary time), studies of infant diets (Giovannini et al., 2004; Navia et al., 2009; Smithers et al., 2012) find the opposite (younger maternal age is a risk factor for poor diets). For childhood obesity, one recent study in 10-12 year old Greek boys and girls found younger maternal age to be a risk factor while conversely, a recent study among 7 to 14 year old Brazilian boys reported older maternal age to be associated with overweight or obesity (Bernardo and Vasconcelos, 2012; Farajian et al., 2012). A large American study of maternal age and the health of adult offspring found a strong link between adult obesity and having been born to a mother of <25 years (Myrskyla and Fenelon, 2012). Considering the findings above, the impact of maternal
age on childhood obesity-related behaviours is uncertain but clearly warrants further investigation.

Although the majority of behavioural intervention studies in diet and activity (or obesity prevention more generally (Waters et al., 2011)) do not report moderation effects of their findings (Kremers et al., 2007; Yildirim et al., 2011), such analyses are important in order to generate stronger hypotheses which can be tested in the next generation of intervention studies (Kraemer et al., 2002). Moderation analyses are also important for identifying target groups for whom interventions may be more or less effective even where an overall intervention effect may be null (Kraemer et al., 2002).

The Melbourne Infant Feeding, Activity and Nutrition Trial (InFANT) Program was a cluster-randomised controlled trial of an early childhood obesity prevention intervention implemented in first-time parent groups in Melbourne, Australia (Campbell et al., 2008). The primary outcomes of this trial in children aged 20 months have previously been published (Campbell et al., 2013). Here we present analyses of the effects of the intervention according to both maternal education and maternal age.

**Methods**

The study design, sample selection, intervention features and details of each of the primary outcome measures of the Melbourne InFANT Program have been reported previously (Campbell et al., 2008; Campbell et al., 2013). This trial has been registered with the ISRCTN (International Standard Randomised Controlled Trial Number) Register (http://isrctn.org) (identifier ISRCTN81847050). A brief summary of the study methods is presented here. A brief summary of the study methods is presented here.

**Study Design**

The study was a cluster-randomized controlled trial among first-time parent groups in Melbourne, Australia. Hanna et al. provide an overview of the purpose and scope of the Government-funded first-time parent groups that all new parents are invited to attend (with their child) in the state of Victoria (which includes Melbourne) (Hanna et al., 2002). Existing first-time parent groups active during the study period and with eight or more English speaking parents were eligible for involvement (n=74). Individual parents provided informed written consent to participate. A total of 542 (86%) eligible parents (541 mothers and 1
father) in 62 groups consented to participate. Equal numbers of parent groups (randomly allocated) were assigned to the intervention and control arms respectively. As the study was among first-time parent groups, parity and number of children per household were constant (n=1). Over 98% of the sample were either married or living as married. The final sample size was chosen based on the ability to detect a 25% increase in consumption of vegetables in the intervention group accounting for within-group clustering and likely attrition (Campbell et al., 2013). Local government areas randomly chosen for inclusion in the study spanned the socioeconomic spectrum. Analysis according to an area level index of relative disadvantage (Australian Bureau of Statistics, 2006) showed that three areas from each of the lowest and highest tertiles of disadvantage were included, with another eight areas from the middle tertile (Campbell et al., 2013).

The dietitian-delivered intervention occurred between June 2008 and February 2010. Six 2-hour sessions were delivered quarterly with data collection at child ages approximately 4 months (baseline) and 20 months (intervention conclusion). The intervention, described in detail elsewhere, (Campbell et al., 2008) sought to build parent knowledge, skills and social support regarding infant feeding (though breast feeding was not a focus), physical activity and sedentary behaviours. Intervention delivery consisted of peer support as well as group discussion of the barriers to (and facilitators of) healthy eating and activity. Six key messages were the focus of the intervention which also incorporated a purpose-designed DVD, written materials and a regular newsletter reinforcing key messages. Control parents received usual care from their maternal and child health nurse as well as six newsletters regarding non-obesity-related aspects of child health or development.

Measures

Outcome Variables

Outcome variables and analyses were chosen based on those reported in the primary outcomes paper for this study (Campbell et al., 2013).

Diet: Infant diets were assessed at the conclusion of the intervention by telephone-administered multipass 24-hour recall with parents (n=389) (Blanton et al., 2006; Spence et al., 2013). Two or three days of dietary data were collected, including one weekend day (note that in >90% of cases, three days of data were collected) (Lioret et al., 2013). A food measurement booklet was created including both photographs of food in measured quantities based on available serving size information (Webb et al., 2008), and pictures from the food
model book used in the 2007 Australian Child Nutrition and Physical Activity Survey (Department of Health and Ageing, 2008; Spence et al., 2013). Each food/beverage item recorded was matched to an appropriate nutrient composition and quantity, using the 2007 AUSNUT Database (Food Standards Australia New Zealand, 2008). The average daily intake of fruits (excluding juice), vegetables (excluding potatoes), non-core sweet foods (eg, chocolate, candy, cakes), non-core savoury foods (eg, crisps, savory biscuits), non-core drinks (i.e. fruit juice, soft drinks) and water were calculated (Campbell et al., 2013).

Objectively Assessed Physical activity: Infant physical activity of light-, moderate-, or vigorous-intensity (assessed together as the intervention aimed to increase physical activity of any intensity) was assessed using ActiGraph accelerometers (Model GT1M, Pensacola, Florida, USA) at intervention conclusion (Hnatiuk et al., 2012). Validated cut-points of 192-1672 and >1672 counts per minute were used to determine activity of light and moderate/vigorous intensity respectively (Hnatiuk et al., 2012). Data were recorded in 15 second epochs for seven consecutive days. All those with at least 4 days of valid data (where counts were recorded for at least 7.4 hours) (Hnatiuk et al., 2012) were included in analyses of physical activity (n=286), as we have previously shown that 4 days of data were sufficient to achieve acceptably reliable estimates (Hnatiuk et al., 2012). Non-wear time was defined as 20 or more consecutive minutes of zero counts; these data were excluded.

Television viewing time: Infant television viewing time was assessed at intervention conclusion via a parent-completed questionnaire asking about time spent watching TV on a typical day (n=459). This measure was shown to have good test-retest reliability (Campbell et al., 2013).

Body mass index (BMI): Infant weight and height/length were measured by trained staff at 4 months and 20 months (n=457). BMI (kg/m²) and BMI z-score were calculated using World Health Organization (WHO) sex-specific BMI-for-age growth charts (WHO growth reference study group, 2006).

Moderator variables

Maternal Education: Maternal education was used as an indicator of socioeconomic position (the data from one father who completed the main carer questionnaire was excluded from these analyses). Maternal education was collapsed into two groups (university education
(54.1%) vs. no university education) in order to maximise power available for between-group comparisons. Income was not assessed in this study.

**Maternal age:** Maternal age was calculated based on maternal report of date of birth at baseline. A dichotomous maternal age variable was created with the cut-point of 32 years being the median age of mothers in the sample.

**Statistical Analyses**

Differences in outcomes between those in the intervention and control arms were assessed using random effects linear regression models, estimated using maximum likelihood and accounting for clustering of participants in first time parent groups. As some outcomes exhibited highly skewed distributions, standard errors were bootstrapped (2000 resamples) in all regression models. Baseline data were not available for dietary outcomes, television viewing or physical activity because the age of the children at this time point (four months) meant that the diet was largely milk-based and ambulatory activity was minimal. Child z-BMI data at baseline was available and was included as a covariate in all models where z-BMI was the outcome. Accelerometer wear time differed significantly between intervention and control groups (Campbell et al., 2013), and this was therefore accounted for in models where physical activity was the outcome.

To assess moderation by maternal education and age, models assessing each of the outcomes contained terms for maternal education/age and treatment status as well as a term for the interaction between maternal education/age and intervention status. The effect of the intervention on the outcome was considered to be moderated by maternal education or age respectively where the coefficient of the interaction term was significantly different to zero (Whisman and McClelland, 2005). We used a liberal p-value of 0.2 as an indicator of significance as the test for moderation/interaction is highly sensitive to both sample size and sample distributions (Fairchild and MacKinnon, 2009) and the purpose of moderator analysis of randomized controlled trials is both hypothesis generation as well as hypothesis testing (Kraemer et al., 2002). Following interaction/moderation analysis, we examined the strength and direction of the intervention effect in sub-groups defined by either maternal education or age by conducting stratified analyses for each outcome. Based on the potential for reduction in statistical power when collapsing a continuous variable using a median split (Whisman and McClelland, 2005), all moderation analyses testing for an interaction between the effect of
the intervention and maternal age were also conducted using maternal age as a continuous variable. The strength and direction of the coefficient of the interaction term was virtually identical regardless of whether a continuous or dichotomous age variable was used (results not shown). Furthermore, for those moderation and stratified analyses where a significant finding was observed, we tested the effect of adjusting for maternal education or maternal age in the respective models. The association between maternal education and maternal age was assessed using a chi-square test. All analyses were conducted on an intention-to-treat basis using Stata software (Release 12; StataCorpLP, College Station, TX, USA).

**Results**

A summary of the baseline demographic characteristics and body weight of mothers and children included in these analyses is presented in Table 1. Mean maternal age and the proportion with a University degree were similar in the control and intervention groups. No significant relationships were observed between maternal education and maternal age (dichotomous categories) in the total sample ($\chi^2 = 3.4$, df=1, $p=0.07$) or among participants in either the intervention ($\chi^2 = 2.1$, df=1, $p=0.25$) or control ($\chi^2 = 1.3$, df=1, $p=0.14$) arms.

**Moderation effect of maternal education on intervention effect:** Moderation of the intervention effect by maternal education was observed for consumption of vegetables (interaction, $p=0.16$), water ($p=0.15$) and sweet snacks ($p=0.19$) among infants (Table 2). For vegetables, consumption was greater in the intervention group only among those whose mothers did have a University degree (positive intervention effect, mean difference beta = 11.0 g/day [-0.47 to 22.5]). Likewise an intervention effect of lower consumption of sweet snacks was also only observed among infants whose mothers did have a University degree (negative intervention effect, beta = -5.22 g/day [-9.1 to -1.3]). In contrast, an intervention effect for consumption of water was observed only among infants whose mothers did not have a University degree (positive intervention effect, beta = 65.3 g/day [10.2 to 120.5]). All significant findings were unchanged upon adjustment for maternal age in the model. No moderation effect according to maternal education was observed for the effect of the intervention on z-BMI, consumption of fruit, non-core drinks or savoury snacks, television viewing or physical activity.

**Moderation effect of maternal age on intervention effect:** Moderation of the intervention effect by maternal age was observed for the consumption of both vegetables (interaction
p=0.003) and water (p=0.01) (Table 3). For vegetables, greater consumption in the intervention group was only observed among infants whose mothers were younger than 32 years (intervention effect, mean difference beta = 22.3 g/day [95% CI 8.4 to 36.3]). Similarly, an intervention effect on water intake was only seen in infants with mothers younger than 32 years (intervention effect, mean difference beta = 90.0 g/day [40.6 to 139.4]). All significant findings were unchanged upon adjustment for maternal education in the model. No moderation effect according to maternal age was observed for the effect of the intervention on children’s z-BMI, consumption of fruit, sweet snacks, non-core drinks or savoury snacks, television viewing or physical activity.

Discussion

Despite the fact that it is important to understand among which groups an intervention is most effective, few obesity prevention trials report the results of moderation analyses (Kremers et al., 2007). The present study assessed how maternal education and age moderated the effects of an infant obesity prevention intervention delivered to first-time parents in pre-existing social groups. Interaction effects with the treatment arm were observed for both maternal age and education.

In relation to maternal education, we observed a greater intervention effect on the consumption of vegetables and sweet snacks in mothers with higher education levels. Following a literature search for obesity-prevention initiatives reporting similar moderation analyses, our findings were found to be in contrast with the two previous studies, both in early primary school-aged children (Epstein et al., 2008; Marcus et al., 2009). In both the Epstein and Marcus studies, the intervention was more successful in improving diets in children whose mothers were of low socioeconomic position. The opposite findings in our own study may be a result of differences in the intervention (with no focus on vegetables in the Marcus study (Marcus et al., 2009)), the study populations of mothers or children (overweight children in a clinical setting in the Epstein study (Epstein et al., 2008)), the age of the children (infants in the current study compared to primary school children in the other studies) or the precise outcomes reported. Interestingly, in contrast to the food-related intervention effects, an intervention effect on water consumption was only observed in children of less educated mothers. This suggests that maternal education did not have a
uniform effect on the effectiveness of the intervention, being a positive influence for some outcomes and a negative influence for others.

The moderation analysis of maternal age revealed that the intervention was more effective in increasing both vegetable and water consumption in those whose mothers were aged less than 32 years. Importantly, although no intervention effect was observed for either vegetable consumption or water intake in the total sample (Campbell et al., 2013), for both outcomes a highly significant intervention effect was observed in infants with younger mothers. This finding may be particularly important for two reasons. Firstly, previous studies have shown poorer infant diets to be linked to lower maternal age (Giovannini et al., 2004; Navia et al., 2009; Smithers et al., 2012). A recent study of adult health outcomes among a large American cohort found the probability of adult obesity to be strongly linked to having been born to a young mother (<25 years). While many adverse health outcomes are associated with advanced maternal age (Myrskyla and Fenelon, 2012), Myrskyla and Fenelon also noted that in the United States, 37% of all children born in 2000 were to mothers aged <25 years (by 2010 this had declined to 33% (Martin et al., 2012)), leading them to conclude that “the public health concern regarding maternal age should focus on young, not old mothers”. Secondly, young mothers may be more amenable to behaviour change interventions. A recent study of the parenting styles of 508 first-time mothers from the United Kingdom found that older maternal age (as well as higher education) were strongly associated with parenting styles characterised by anxiety and the use of routine (Arnott and Brown, 2013). It has also been suggested that older mothers are more knowledgable and competent because of their life experience (Gottesman, 1992). These characteristics may mean that older mothers are less open to new ideas and behaviour change, with younger mothers potentially more open to the messages of the intervention.

The intervention effect on vegetable consumption in younger mothers appears particularly strong in the InFANT trial, with a greater intervention effect on consumption of vegetables compared with fruit in this group. We might have expected that vegetable consumption would be harder to change than fruit consumption due to the greater preparation and cooking time usually associated with vegetable consumption. In combination with the evidence discussed previously showing that poorer infant diets are associated with younger maternal age (Giovannini et al., 2004; Navia et al., 2009; Smithers et al., 2012), the intervention effect
Explanations for education and age-related differential intervention effects in an RCT are likely to be different from those which might explain population level patterns in these characteristics (such as those observed in a recent French study (Betoko et al., 2013)). Population level education and age-related gradients in behaviours may be mediated by factors that include differences in knowledge, food or health literacy, access, availability, social support, financial resources and coping resources (among others). Generational differences in lifestyles and habit strength may also be important in relation to maternal age. In the context of a randomized controlled intervention study, while the factors above may represent barriers to (or facilitators of) the intervention message, differences in trial attrition, session attendance, and program usefulness may also be important. In the InFANT Program, similar attrition levels, session attendance and overall similar levels of reporting of program relevance and usefulness were observed regardless of area-level socioeconomic position (Lunn et al., submitted), suggesting that the capacity and desire to participate in the intervention were not likely to be major explanations for the observed education-related differences in effect.

Alternate hypotheses that may be important explanations of differences in the intervention effect between groups include the possibility that some of the messages or modes of delivery in the Melbourne InFANT Program simply appealed to (or were more meaningful among) different groups of mothers. The cost of behaviour change may also be an important driver with changes in some behaviours potentially cheaper to implement than others. It could be that increases in water intake in infants of younger and less educated mothers were greater because these women perceived this to be the most achievable strategy from a financial perspective. In this regard, maternal age of first-time mothers may actually represent a socioeconomic indicator in that older (first-time) mothers are likely to have greater financial resources at their disposal than younger mothers due to longer time in paid employment. Working against the cost hypothesis is the fact that the moderation analysis revealed no difference in the intervention effect for other potentially cost-neutral or cost-negative interventions such as restricting television viewing or the consumption of non-core drinks and sweet or savoury snacks.
**Strengths and limitations:** The Melbourne InFANT Program provides an important addition to the limited literature on obesity prevention interventions in infants. This study provides a valuable indication as to who such interventions might work best among in terms of both maternal education and age. Such information provides clues regarding the intervention strategies that might work best among particular groups. Strengths of the trial include the use of gold standard measures for diet and activity as well as excellent recruitment and low attrition levels (Campbell et al., 2013). High levels of reported relevance and interest were observed in all groups, regardless of maternal education or age. Limitations worth considering include the fact that women excluded from these analyses due to missing data were more likely to have low levels of education (28.6% versus 17.2%). Furthermore, since the sample size of the trial was based on the likely effect of the intervention in the whole group receiving it, moderation/interaction analysis as conducted here means that the sample size may be insufficient to identify true differences where they exist. Missing data for the multiple outcomes examined further limit the available sample size. For these reasons, intervention effects that appear large but do not reach statistical significance in stratified analyses may nevertheless be worth exploring in future studies specifically designed to examine intervention differences according to maternal education and/or age. Regarding assessment of socioeconomic position, we acknowledge that education alone is only one indicator of socioeconomic position and that a composite index created using data from a range of indicators (such as employment, occupation, income and household wealth) may be preferable (Fillol et al., 2011). Among women moving in and out of the workforce during childbearing years, however, employment and income-related measures are likely to fluctuate and were thus not appropriate indicators of socioeconomic position for this study. A final limitation is the potential for bias in parent proxy-reported child television viewing time (Bryant et al., 2007; Clark et al., 2009). A review of measures of children’s sedentary behaviour identified very few validated proxy-report measures of television viewing (Lubans et al., 2011). Further research is needed to determine whether there is a bias in proxy-reported child TV viewing according to maternal age or education. Regardless, the likelihood of an erroneous result here is small as the tests for moderation of the effect of the intervention on television viewing time by either maternal age or education both resulted in p>0.6.

**Conclusions:** In the community based implementation of infant obesity-preventions such as the Melbourne InFANT Program, careful consideration should be given to the effects of the
intervention in different population groups based on both maternal education and age. Moderation by maternal education was observed for the effect of the intervention on consumption of vegetables, water and sweet snacks. In the case of water intake, the intervention was more successful in mothers without a University degree, while for the consumption of both vegetables and sweet snacks, a significant intervention effect was only observed in mothers with a University degree. Moderation by maternal age was observed for the effect of the intervention on vegetable consumption and water intake. In both cases, the intervention was effective in younger but not older mothers. In summary, it is important to acknowledge that obesity prevention interventions may operate differently in different groups. Evidence for such differential effects is important in order to understand where and why this occurs, and to guide both community-wide implementations and the design of future interventions testing the hypotheses generated.
Conflict of Interest Statement: The authors declare that there are no conflicts of interest.

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Table 1. Baseline characteristics of the 389 first-time mothers and infants included in the dietary analyses\textsuperscript{a} according to treatment arm. Melbourne InFANT study, 2008.

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>Control</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n=389)</td>
<td>(n=198)</td>
<td>(n=191)</td>
</tr>
<tr>
<td><strong>CHILDREN</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age at baseline (years), mean (sd)</td>
<td>0.31 (0.11)</td>
<td>0.31 (0.11)</td>
<td>0.32 (0.11)</td>
</tr>
<tr>
<td>Male (%)</td>
<td>46.0</td>
<td>45.4</td>
<td>46.6</td>
</tr>
<tr>
<td>zBMI, mean (sd)</td>
<td>-0.49 (1.02)</td>
<td>-0.55 (0.96)</td>
<td>-0.43 (1.1)</td>
</tr>
<tr>
<td><strong>MOTHERS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age at baseline (years), mean (sd)</td>
<td>32.3 (4.2)</td>
<td>32.3 (4.3)</td>
<td>32.3 (4.1)</td>
</tr>
<tr>
<td>BMI before pregnancy (kg/m(^2)), mean (sd)</td>
<td>24.3 (5.1)</td>
<td>24.1 (4.7)</td>
<td>24.5 (5.6)</td>
</tr>
<tr>
<td>Education level, (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (completed up to final year of 2(^{o}) school)</td>
<td>21.1</td>
<td>22.9</td>
<td>22.0</td>
</tr>
<tr>
<td>Intermediate (completed trade/ certificate post 2(^{o}) school)</td>
<td>24.7</td>
<td>22.9</td>
<td>26.5</td>
</tr>
<tr>
<td>High (completed University degree or beyond)</td>
<td>54.2</td>
<td>56.8</td>
<td>51.5</td>
</tr>
<tr>
<td>Born in Australia (%)</td>
<td>79.1</td>
<td>79.7</td>
<td>78.4</td>
</tr>
<tr>
<td>English is main language spoken at home (%)</td>
<td>93.8</td>
<td>93.6</td>
<td>93.9</td>
</tr>
</tbody>
</table>

\textsuperscript{a}Note that while summary statistics presented here are for those included in dietary analysis (because this involved the largest number of outcomes, and included those outcomes among which moderation effects were observed), the included sample for other outcomes (BMI, television viewing and physical activity) differed according to the number with available data.
Table 2. Assessment of the effect of the intervention in the Melbourne InFANT Program (2008-10) according to maternal education level

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Education = Low&lt;sup&gt;c&lt;/sup&gt;</th>
<th>Education = High&lt;sup&gt;c&lt;/sup&gt;</th>
<th>Interaction (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MD&lt;sup&gt;a&lt;/sup&gt;Beta&lt;sup&gt;b&lt;/sup&gt; (95% CI)</td>
<td>p</td>
<td>MD&lt;sup&gt;a&lt;/sup&gt;Beta&lt;sup&gt;b&lt;/sup&gt; (95% CI)</td>
<td>p</td>
</tr>
<tr>
<td>zBMI</td>
<td>-0.01 (-0.10; 0.08)</td>
<td>0.78</td>
<td>-0.07 (-0.29, 0.14)</td>
<td>0.49</td>
</tr>
<tr>
<td>Fruit intake (g/d)</td>
<td>10.99 (-6.09; 28.06)</td>
<td>0.21</td>
<td>14.79 (-9.43, 39.01)</td>
<td>0.23</td>
</tr>
<tr>
<td>Vegetable intake (g/d)</td>
<td>4.53 (-4.38; 13.43)</td>
<td>0.32</td>
<td>-4.28 (-19.14, 10.58)</td>
<td>0.57</td>
</tr>
<tr>
<td>Water intake (g/d)</td>
<td>24.17 (-9.85; 58.20)</td>
<td>0.16</td>
<td>65.35 (10.16, 120.54)</td>
<td>&lt;sup&gt;0.02&lt;/sup&gt;</td>
</tr>
<tr>
<td>Non-core drinks intake (g/d)</td>
<td>-2.21 (-13.71; 9.30)</td>
<td>0.71</td>
<td>5.3 (-9.85, 20.46)</td>
<td>0.49</td>
</tr>
<tr>
<td>Sweet snacks intake (g/d)</td>
<td>-3.69 (-6.41; -0.96)</td>
<td>0.008</td>
<td>-1.55 (-5.43, 2.33)</td>
<td>0.43</td>
</tr>
<tr>
<td>Savoury snacks intake (g/d)</td>
<td>-1.01 (-2.82; 0.80)</td>
<td>0.28</td>
<td>-1.17 (-3.61, 1.26)</td>
<td>0.35</td>
</tr>
<tr>
<td>Television viewing (min/d)</td>
<td>-15.97 (-25.97; -5.96)</td>
<td>&lt;sup&gt;0.002&lt;/sup&gt;</td>
<td>-19.43 (-34.2, -4.67)</td>
<td>&lt;sup&gt;0.01&lt;/sup&gt;</td>
</tr>
<tr>
<td>Physical activity (mins/d)</td>
<td>-2.94 (-11.44; 5.55)</td>
<td>0.5</td>
<td>1.78 (-10.07, 13.64)</td>
<td>0.77</td>
</tr>
</tbody>
</table>

<sup>a</sup> Mean difference coefficients estimated from linear regression analysis.

<sup>b</sup> Random effects linear regression models, estimated using maximum likelihood with bootstrapped standard errors, were fitted to compare continuous outcomes between the trial arms, taking account of clustering. The model which assessed the effect of the intervention on zBMI adjusted for baseline zBMI. The model which assessed the effect of the intervention on physical activity adjusted for accelerometer wear time as this differed significantly between groups.

<sup>c</sup> High education = University degree; Low education = all other
Table 3. Assessment of the effect of the intervention in the Melbourne InFANT Program (2008-10) according to maternal age

<table>
<thead>
<tr>
<th></th>
<th>Total MD^aBeta^b (95% CI)</th>
<th>p</th>
<th>Age &lt;32 years MD^aBeta^b (95% CI)</th>
<th>p</th>
<th>Age ≥ 32 years MD^aBeta^b (95% CI)</th>
<th>p</th>
<th>Interaction (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>zBMI</td>
<td>-0.01 (-0.10; 0.08)</td>
<td>0.78</td>
<td>0.04 (-0.17, 0.25)</td>
<td>0.71</td>
<td>-0.06 (-0.23, 0.12)</td>
<td>0.53</td>
<td>0.5</td>
</tr>
<tr>
<td>Fruit intake (g/d)</td>
<td>10.99 (-6.09; 28.06)</td>
<td>0.21</td>
<td>7.51 (-15.61, 30.63)</td>
<td>0.52</td>
<td>9.16 (-13.4, 31.72)</td>
<td>0.43</td>
<td>1</td>
</tr>
<tr>
<td>Vegetable intake (g/d)</td>
<td>4.53 (-4.38; 13.43)</td>
<td>0.32</td>
<td>22.34 (8.38, 36.31)</td>
<td>0.002</td>
<td>-8.89 (-20.52, 2.74)</td>
<td>0.13</td>
<td>0.003</td>
</tr>
<tr>
<td>Water intake (g/d)</td>
<td>24.17 (-9.85; 58.20)</td>
<td>0.16</td>
<td>90.04 (40.62, 139.45)</td>
<td>&lt;0.0001</td>
<td>-29.3 (-80.53, 21.93)</td>
<td>0.26</td>
<td>0.01</td>
</tr>
<tr>
<td>Non-core drinks intake (g/d)</td>
<td>-2.21 (-13.71; 9.30)</td>
<td>0.71</td>
<td>-4.16 (-30.88, 22.55)</td>
<td>0.76</td>
<td>-2.23 (-12.43, 7.97)</td>
<td>0.67</td>
<td>0.9</td>
</tr>
<tr>
<td>Sweet snacks intake (g/d)</td>
<td>-3.69 (-6.41; -0.96)</td>
<td>0.008</td>
<td>-4.43 (-8.52, -0.34)</td>
<td>0.03</td>
<td>-2.83 (-6.81, 1.16)</td>
<td>0.16</td>
<td>0.64</td>
</tr>
<tr>
<td>Savoury snacks intake (g/d)</td>
<td>-1.01 (-2.82; 0.80)</td>
<td>0.28</td>
<td>0.05 (-2.01, 2.11)</td>
<td>0.96</td>
<td>-1.59 (-4.19, 1.01)</td>
<td>0.23</td>
<td>0.33</td>
</tr>
<tr>
<td>Television viewing (min/d)</td>
<td>-15.97 (-25.97; -5.96)</td>
<td>0.002</td>
<td>-12.99 (-27.58, 1.6)</td>
<td>0.08</td>
<td>-17.26 (-30.23, -4.29)</td>
<td>0.01</td>
<td>0.66</td>
</tr>
<tr>
<td>Physical activity (mins/d)</td>
<td>-2.94 (-11.44; 5.55)</td>
<td>0.5</td>
<td>-1.82 (-14.11, 10.48)</td>
<td>0.77</td>
<td>-4.15 (-14.76, 6.47)</td>
<td>0.44</td>
<td>0.73</td>
</tr>
</tbody>
</table>

^a Mean difference coefficients estimated from linear regression analysis.
^b Random effects linear regression models, estimated using maximum likelihood with bootstrapped standard errors, were fitted to compare continuous outcomes between the trial arms, taking account of clustering. The model which assessed the effect of the intervention on zBMI adjusted for baseline zBMI. The model which assessed the effect of the intervention on physical activity adjusted for accelerometer wear time as this differed significantly between groups.
References


