ARTICLE

Food and health

Frequency and variety of usual intakes of healthy foods, fruit, and vegetables predicts lower 6-year weight gain in young women

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Abstract

Background/objectives We previously demonstrated that fruit and vegetable consumption, was associated with less weight gain over 6 years in young women for all body mass index (BMI) categories. This study evaluated the relationship between diet quality and 6-year weight change, in Australian women initially in the healthy weight range ($\geq$18.5 BMI <25 kg/m^2) at baseline.

Subjects/methods A total of 4083 young women (27–31 years) in the healthy weight range ($\geq$18.5 BMI <25 kg/m^2) enroled in the Australian Longitudinal study on Women's Health (ALSWH) were analysed. Diet quality was measured by the Australian Recommended Food Score (ARFS) and the Fruit and Vegetable Index (FAVI) using dietary data derived from a validated food frequency questionnaire. Weight change was calculated as the difference between baseline and 6-year follow-up weight (kg). Multiple linear regression models were used to analyse the association between baseline ARFS and FAVI and 6-year weight change.

Results At baseline, mean diet quality was low for both indices [ARFS (maximum 72) = 29.9 and FAVI (maximum 333) = 94.2] and women gained 3.7 kg of weight during 6 years of follow-up. Regression modelling revealed that every one point increase over 6 years in either the ARFS or FAVI score was associated with statistically significantly less weight gain over 6 years, although the amount was small (33 and 12 g, respectively).

Conclusions Higher diet quality predicts lower prospective weight gain in young women however, further research is needed over a longer follow-up period and in diverse population groups.

Introduction

Worldwide, non-communicable diseases are the leading cause of morbidity and mortality, contributing to 73% of all-cause mortality and 62% of disability adjusted-life years [1]. Overweight and obesity are major risk factors contributing to the development of non-communicable diseases

[2]. In 2016, the World Health Organization (WHO) estimated that in adults ($\geq$18 years), 39% were overweight (39% men, 40% women), and 13% were obese (11% men, 15% women) [3]. In the 2017–2018 Australian National Health Survey, prevalence of overweight and obesity in young adults increased by 12% between the age groups of 18–24 years and 25–34 years, which is the largest increase in prevalence between consecutive age groups [4].

Young adults have poorer diet quality compared with older age groups [5, 6]. Lifestyle changes (e.g. moving away from home) during young adulthood may contribute to unhealthy eating habits including skipping breakfast [7] and frequent consumption of fast food [8, 9] and meals outside the home [8]. These eating habits in young adults can contribute to greater consumption of energy-dense, nutrient-poor foods and increase the risk of overweight and obesity [10, 11]. Evidence has shown that Australian women are gaining weight at a faster rate compared with their parents, with the prevalence of overweight and obesity significantly increasing in cohorts born after 1960 [6].

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Furthermore, young women are at higher risk of weight gain compared with all other age groups [5, 6, 12, 13]. The 2017–2018 Australian National Health Survey, reported that the prevalence of overweight and obesity in women increased from 40% amongst those aged 18–24 years to 49% for those aged 25–34 years [4]. Research from the Australian Longitudinal Study of Women's Health (ALSWH) found that young women gained weight at a faster rate compared with the previous generation of Australian women [13].

While the causes of overweight and obesity are multi-factorial and complex, diet is a leading modifiable risk factor [14]. Studies have reported that food habits, dietary patterns, diet quality, and total food intake predict future weight gain in adults [15]. Our systematic review highlighted that only a limited number of studies have examined the relationship between diet quality and prospective weight change [16, 17]. We previously examined the association between two diet quality indices, the Australian Recommended Food Score (ARFS) and the Fruit and Vegetable Index (FAVI), and weight gain during 6 years of follow-up in a sample of young women ($n = 3945$) from the ALSWH. Overall, women with the highest FAVI scores [mean (SD): 117.2 (18.9) out of a maximum total of 333 points] gained less weight had by 72 g ($p = 0.04$) compared with those with the lowest FAVI scores [mean (SD) 34.6 (28.0) points]. We found that higher ARFS scores were associated with less weight gain, only amongst those in the sub-sample reporting plausible total energy intakes (TEIs) ($n = 1356$) ($p > 0.05$) [18]. However, this analysis included women of all BMI categories and health status groups. Understanding the role of diet quality in maintaining a healthy body weight in women of child-bearing age is essential for developing effective dietary interventions for weight gain prevention in a high-risk population [13, 19]. Therefore, the aim of the current analysis was to examine the association between diet quality, measured by ARFS and FAVI indices, with prospective 6-year weight change in young women initially in the healthy weight range.

Subjects and methods

Participants

The current study analysed data from young women (aged 27–31 years) participating in the ALSWH cohort study at two timepoints, 2003 and 2009. Further details are reported elsewhere [20, 21]. Participants were excluded at baseline if they reported having a diagnosis of type 2 diabetes, heart disease or any type of cancer (excluding skin cancer), were currently pregnant, or were not in a healthy weight range ($18.5 \leq BMI < 25$ kg/m^2). Figure 1 summarises the participant
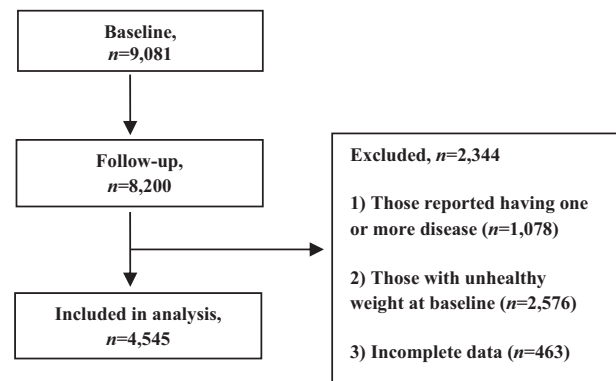

Fig. 1 Participant flow chart

selection criteria for the current analysis. The study was approved by the University of Newcastle and the University of Queensland Human Research Ethics committees. All participants gave written informed consent prior to their inclusion in the study.

Anthropometry

Weight [kilograms (kg)] and height [metres (m)] were self-reported at baseline and follow-up. Weight change (Δ) was defined as the absolute difference (kg) in weight between baseline and follow-up. BMI was calculated at each timepoint by dividing body weight (kg) by height (m^2). Women were classified according to the World Health Organization (WHO) criteria as: underweight, $BMI < 18.5$; healthy weight, $18.5 \leq BMI < 25$; overweight, $25 \leq BMI < 30$; or obese, $30 \leq BMI$.

Confounders

Participants self-reported their baseline walking and moderate and strenuous physical activity (PA) frequency, which was used to derive a PA score in metabolic equivalents per minute (MET. Mins) [22]. Education level was self-reported as: 'no formal' or 'nil', 'school certificate', 'trade/apprenticeship', 'university degree' or 'higher degree'. The participants location of residence were categorised using the Australian Bureau of Statistics definitions: urban (with 100,000 or more people), rural (with 200–999 people) and remote (<200 people). Participants self-reported their smoking status as: 'current smoker', 'never smoked', or 'ex-smoker'. Marital status was defined as: 'married', 'defacto', 'separated', 'divorced', 'widowed', or 'single'.

Dietary intake assessment and diet quality indices

Dietary intake was self-reported using the Dietary Questionnaire for Epidemiological Studies Version 2 (DQESv2) food frequency questionnaire (FFQ) which assesses the

consumption of 74 food items over the previous 12 months [23]. The DQESv2 has been previously validated in young women in ALSWH [24]. Participants reported their usual consumption of each food item using a 10-point Likert scale, ranging from 'never' up to 'three or more times per day'. Photographs were used to represent different serving sizes for vegetables, potatoes, and meat casserole dishes, enabling a portion factor to be calculated that accounted for serving size variability. Nutrient intakes were quantified using the Australian nutrient composition database and the Nutrient Data Table (NUTTAB) [25] and software developed by the Cancer Council of Victoria.

The Australian Recommended Food Score (ARFS)

The ARFS was adapted from the USA Recommended Food Score (RFS) [26] and has been previously validated in Australian women [27, 28]. Points in the ARFS are awarded based on regular consumption of FFQ items that align with recommendations in the National Dietary Guidelines [27, 29]. The ARFS contains a total of 74 items that are categorised into seven sub-scales for specific food groups (based on the Australian Guide to Healthy Eating food groups [29]), with scores ranging from zero to 74 points. The sub-scale scores are calculated by awarding one point for each food item reported to be consumed at least once a week. The total score within each sub-scale for the following food groups are: 22 points for vegetables (including cooked potato without fat); 14 points for fruit; 14 points for protein foods; 14 points for grains; seven points for dairy; 1 point for fats and 2 points for alcoholic beverages. Zero points are awarded when alcohol is not consumed due to the U-shaped association between alcohol intake and health status [27]. The maximum ARFS score is 74, reflecting the highest diet quality score and the most optimal score for meeting nutrient requirements [27].

The Fruit and Vegetable Index (FAVI)

The baseline DQESv2 fruit and vegetable consumption data [22], were used to inform the development of the FAVI score [18]. The FAVI was divided into two sub-scales: fruit including fresh fruit, canned or frozen fruit and fruit juices (24 items), and vegetables including cooked potatoes with fat (24 items). The frequency of consumption for all fruit and vegetable items were scored using the 10-point Likert scale from 'never', scored as zero, up to '≥3 times per day' scored as nine points. The maximum possible score was 117 points for the fruit sub-scale and 216 points for the vegetable sub-scale, giving a maximum total FAVI score of 333 points. A higher FAVI score indicates a more frequent and wide variety of fruits and vegetables usually consumed [18].

Statistical analysis

Descriptive data were presented as means and standard deviations. Social-demographic variables were reported across tertiles of diet quality indices. P values from analysis of variance (ANOVA) and chi-square tests were reported to compare between co-variables across tertiles of diet quality indices. Multiple linear regressions were used to evaluate 6-year weight change, to test the relationship between each diet quality and longitudinal weight change. Three regression models were applied: (1) a crude model (unadjusted), where the dependent variable was weight change, and the independent variables were baseline diet quality index of interest; (2) a specifically adjusted model, where model 1 was adjusted for PA, education, number of births, area of residence, marital status, smoking, and weight at baseline; and (3) a fully adjusted model, where the same variables were used as in model 2, but with the addition of TEI. All statistical analyses were carried out using STATA 11 (College Station, TX: StataCorp LP 2011). Weight change was checked and shown to follow a normal distribution. Statistical analyses were considered statistically significant if $p < 0.05$.

Results

In the study cohort ($n = 9081$) at baseline, 4083 young women in the healthy weight range met the inclusion criteria and provided data at baseline and follow-up. While 4983 young women were excluded as their BMI was classified as underweight ($n = 298$), overweight ($n = 1343$) or obesity ($n = 935$). Figure 1 shows the flow of participants through the study. There were no significant differences in diet quality scores (ARFS and FAVI) or confounders (level of PA, smoking status, and level of education), between those with or without missing data for weight change, $p > 0.05$ (data not shown). Participant characteristics at baseline and follow-up are summarised in Table 1. On average, women were aged 27.6 ± 1.5 years and gained 3.5 ± 6.7 kg over 6 years of follow-up. Baseline diet quality scores were relatively low: ARFS 28.3 ± 9.2 (maximum 74) and FAVI 73.1 ± 44.2 (maximum 333), with a total daily energy intake of 6848.5 ± 2620.9 kJ.

When women were categorised into ARFS tertiles, there were significant differences in weight change, energy intake (baseline), level of education (baseline), level of PA (baseline and follow-up), smoking status (baseline and follow-up), and location of residence (baseline and follow-up) ($p < 0.05$). Weight change was [+4.1 (6.8) kg], [+3.6 (6.5) kg], and [+3.7 (6.7) kg] for women in the lowest (the worst diet quality scores), middle and highest ARFS tertiles, $p = 0.04$ (Table 2).

Table 1 Description of subject characteristics and anthropometric measurement for 4083 young women at baseline and follow-up

Variable	Baseline mean ± SD	Follow-up mean ± SD
Participant characteristics		
Age (years)	27.6 ± 1.5	33.7 ± 1.5
Physical activity (METs. minutes)	1178.5 ± 1407.2	1178.8 ± 1410.2
Weight change	n/a	3.7 ± 6.7
	Percentage	Percentage
BMI		
(Healthy weight/overweight/ obese) %	100/0/0	74/20/5
Smoking status (Non-smoker/ex-smoker/ smoker) %	58/18/24	60/23/17
Area of residence (Urban/rural/remote) %	60/36/3	62/34/4
Education (No formal/school certificate/trade and apprentice/University degree and higher) %	1/28/24/47	n/a
Marital status (Married/defacto/separated/ divorced/ widowed/single) %	38/21/3/1/0/37	61/16/2/2/0/18
Diet quality scores at baseline	Mean ± SD	Mean ± SD
ARFS	29.9 ± 9.2	n/a
FAVI	94.2 ± 29.1	n/a
TEI (KJ)	6809.2 ± 2610.9	n/a

ARFS Australian Recommended Food score, *FAVI* Fruit and Vegetables Index, *METs. minutes* metabolic equivalents per minute, *n/a* not applicable, *TEI* total energy intake

When women were categorised into FAVI tertiles, there were significant differences in weight change, energy intake (baseline), level of education (baseline), BMI (baseline and follow-up), level of PA (baseline and follow-up), smoking status (baseline and follow-up), and location of residence (baseline and follow-up) ($p < 0.05$). Weight change was [+4.9 (7.3) kg], [+3.8 (6.3) kg], and [+3.5 (6.7) kg] for women in the lowest (the worst diet quality scores), middle, and highest FAVI tertiles, $p = 0.00$ (Table 3).

Table 4 reports the multivariate linear regression analyses between ARFS and FAVI and weight change over 6 years. ARFS was significantly associated with less weight gain in the crude and fully adjusted models, while the FAVI was significantly associated with less weight gain in all the three models. In the fully adjusted model, for every one point increase in the ARFS and FAVI, weight gain over 6 years reduced by 33 and 12 g, respectively.

Discussion

The current analysis indicates that those in the highest ARFS tertile (highest diet quality scores) gained significantly less weight compared with women in the lowest ARFS tertile (3.7 ± 6.7 kg compared with 4.1 ± 6.8 kg). Although this association was statistically significant, the

difference in mean weight gain was very small (0.4 kg) so the results of this study should be interpreted with caution. These findings are consistent with previously reported results highlighting that ALSWH young women, across all BMI categories ($n = 4287$) with the highest ARFS scores gained 1.1 kg less weight over 6 years of follow-up compared with women with the lowest ARFS scores [18]. However, in the current analysis the full impact of high diet quality scores (i.e. a score of ≥45) on weight may not be captured, as the mean ARFS was 28 out of a maximum score of 74, indicating that poor diet quality was common. However, a cross-sectional study of Australian adults ($n = 7441$) within the Australian Diabetes, Obesity, and Lifestyle study, indicated that even small improvements in dietary quality can be beneficial for cardiometabolic risk factors, including abdominal obesity [30].

Analysis of Australian women ($n = 1242$) aged 36.9(7.5) years within the Resilience for Eating and Activity Despite Inequality (READI) cohort study indicated that each unit increase in diet quality, measured by the Australian Dietary Guideline Index (DGI), resulted in a decrease in BMI by 0.014 kg/m^2 over 5 years of follow-up [31]. Furthermore, greater change in BMI was found in women with a lower diet quality score at baseline compared with those with a higher diet quality score ($p < 0.10$) [31]. The US Nurses' Health Study II (NHS II) cohort of women aged 25–42 years ($n = 116,671$) found that for each one standard deviation increase in diet quality score, using the Alternate Health Eating Index-2010 (AHEI-2010), −0.66 kg less weight was gained (95% CI: −0.68, −0.64) over 4 years of follow-up [32]. The US Framingham Offspring and Spouse cohort study found that women ($n = 590$) initially of a healthy weight (BMI < 25 kg/m^2), aged 25–71 years with poorer diet quality, measured by the Framingham Nutritional Risk Score (FNRS) were more likely to develop overweight or obesity (OR 1.76; 95% CI 1.16, 2.69) compared with those with higher diet quality [33]. In the current study, women in the lowest ARFS tertile reported lower TEIs compared with those in the highest ARFS tertile (6274.0 ± 2535.5 kJ compared with 7412.6 ± 2731.0 kJ). Even factoring in likely mis-reporting of TEI, this finding suggests that higher energy intakes and higher dietary quality scores did not exacerbate weight gain over time. Results from the Framingham Offspring and Spouse cohort are also in agreement with these findings [33]. This highlights the complexity of the diet–obesity relationship and more specifically, the difficulties of estimating TEI. Further analysis of dietary patterns rather than an over emphasis on total energy and nutrient intakes is warranted.

In the current study, women who had higher FAVI scores also gained significantly less weight, compared with those who had lower scores at baseline (3.5 ± 6.7 kg compared with 4.9 ± 7.3 kg, $p = 0.00$) however, the difference

Table 2 Social-demographic variables of young women in the Australian Longitudinal Study on Women's Health (ALSWH) ($n = 4083$) at baseline and follow-up by tertile of Australian Recommended Food Score (ARFS) baseline

Baseline					Follow-up			
Variable	Tertile 1 ($n = 1434$: 35%)	Tertile 2 ($n = 1371$: 34%)	Tertile 3 ($n = 1278$:31%)		Tertile 1 ($n = 1434$:35%)	Tertile 2 ($n = 1371$;33%)	Tertile 3 ($n = 1278$;31%)	
	Mean ± SD	Mean ± SD	Mean ± SD	p value	Mean ± SD	Mean ± SD	Mean ± SD	p value
ARFS	21.7 ± 4.6	30.5 ± 2.2	41.9 ± 5.0	n/a	21.7 ± 4.6	30.5 ± 2.2	41.9 ± 5.0	n/a
Weight (kg)	60.6 ± 8.7	60.9 ± 7.4	61.4 ± 8.1	0.02*	65.3 ± 11.5	65.3 ± 10.8	65.5 ± 10.1	0.93
ΔWeight (kg)	n/a	n/a	n/a	n/a	4.1 ± 6.8	3.6 ± 6.5	3.7 ± 6.8	0.04*
Energy intake (KJ/d)	6274.0 ± 2535.5	6836.4 ± 2479.3	7412.6 ± 2731.0	<0.00*	n/a	n/a	n/a	n/a
Age (years)	27.5 ± 1.5	27.5 ± 1.4	27.6 ± 1.5	0.15	33.6 ± 1.4	33.6 ± 1.4	33.7 ± 1.5	0.14
	Percentage	Percentage	Percentage		Percentage	Percentage	Percentage	
BMI: healthy weight (%)	100.0	100.0	100.0	0.36	74.7	77.0	75.7	0.06
BMI: overweight (%)	n/a	n/a	n/a	n/a	19.5	19.5	20.1	0.06
BMI: obese (%)	n/a	n/a	n/a	n/a	5.9	3.5	4.2	0.06
Physical activity in METs (nil/low/moderate/high) (%)	12.4/38.5/19.8/29.1	6.6/36.7/24.0/32.7	4.6/27.0/24.0/44.9	<0.00*	14.7/37.2/22.0/26.2	11.9/34.0/22.6/31.5	6.6/32.1/27.0/34.4	<0.00*
Smoking status (never-ex-smoker/current) (%)	56.6/15.6/27.7	57.5/17.5/25.0	58.6/20.1/21.3	<0.00*	64.4/17.8/19.8	61.7/25.7/12.66	67.6/22.9/12.6	<0.00*
Residence (urban/rural/remote) (%)	57.6/39.2/3.2	61.0/35.5/3.5	62.5/33.8/3.7	<0.00*	59.2/37.4/3.4	62.2/34.0/3.8	64.1/32.6/3.4	<0.00*
Highest education (nil/ school certificate/trade/university degree) (%)	1.8/34.1/24.9/39.2	1.00/25.7/25.8/47.5	1.0/23.4/21.7/35.9	<0.00*	n/a	n/a	n/a	n/a

ARFS Australian Recommended Food score, *BMI* body mass index, *kg* kilograms, *KJ* kilojoules, *METs* metabolic equivalents per minute, *n/a* not applicable, *SD* standard deviation, *TEI* total energy intake

*Statistically significant ($p < 0.05$)

in mean weight gain was small (1.4 kg) however, the difference in mean weight gain was small (1.4 kg), so results should be interpreted with caution. This is consistent with our previous study [18] in women of all BMI categories which found that higher FAVI scores were associated with less weight gain by 1.6 kg over 6 years follow-up. A systematic review and meta-analysis of 17 cohort studies ($n = 563,277$ adults) reported that every 100 g increase in fruit consumption was associated with weight loss of 13.7 g per year (95% CI, −22.97 to −4.40) [34]. No significant association was found between vegetable consumption and weight change in adults [34]. However, greater consumption of all vegetables and fruit, both together and separately were associated with a 9–17% reduced risk of overweight, abdominal obesity, and weight gain [34]. The authors of this study advised that the overall quality of the evidence was low and results should be interpreted with caution. Bertoia et al., [35] conducted a combined analysis of three large prospective cohort studies, including US adults ($n = 133,468$) aged 25–75 years, and found that a higher consumption of vegetables and fruit was associated with weight change −0.25 lb (95% CI: −0.35 to −0.14 lb) and −0.53 lb (95% CI: −0.61 to −0.44 lb) over 4 years. More specifically, the results indicated that a higher consumption of starchy vegetables including baked, boiled, or mashed potatoes (0.74 lb; 95% CI 0.19–1.30 lb) or corn (2.04 lb; 95% CI: 0.94–3.15 lb) were independently associated with weight gain [35]. These findings highlight the importance of analysing sub-groups such as starchy vegetables, as the

impact on weight management may vary compared with the overall vegetable food group.

Limitations of the current study need to be acknowledged. Firstly, when comparing participants with the highest diet quality scores versus those with the lowest diet quality scores the difference in weight change was small despite the relationship being statistically significant. However, the use of self-reported dietary data may have obscured the magnitude of this relationship, as previous findings from the ALSWH cohort indicated that women under-reported their weight by 0.95 kg (95% CI: 0.44–1.47 kg) therefore, results should be interpreted with caution [36]. Body weight were self-reported and thus the potential for recall bias cannot be excluded however, a validation study concluded the level of agreement between self-reported and objectively measured weight and height was acceptable [36]. Another limitation was the use of self-reported FFQ data, which is associated with mis-reporting, particularly as body weight increases [37]. Although the DQESv2 has been validated in women of child-bearing age [24], it does not include a wide range of energy-dense, nutrient-poor foods and therefore may not be a true representation of dietary patterns, particularly for those with the poorest diet quality.

Strengths of this study are the use of two diet quality indices. The ARFS was based on variety and frequency of healthful food items that align with recommendations in the Australian Dietary Guidelines, while the FAVI index considered only fruit and vegetable variety and frequency. In

Table 3 Dietary, anthropometry, social-demographic, and health variables of young women in the Australian Longitudinal Study on Women's Health (ALSWH) ($n = 4083$) at baseline and follow-up by tertile of baseline Fruit and Vegetables Index (FAVI)

Variable	Baseline				Follow-up			
	Tertile 1 ($n = 1378$, 34%) Mean ± SD	Tertile 2 ($n = 1350$, 33%) Mean ± SD	Tertile 3 ($n = 1356$, 33%) Mean ± SD	p value	Tertile 1 ($n = 1378$, 34%) Mean ± SD	Tertile 2 ($n = 1350$, 33%) Mean ± SD	Tertile 3 ($n = 1356$, 33%) Mean ± SD	p value
FAVI	52.1 ± 13.1	84.7 ± 9.9	121.8 ± 19.5	n/a	52.1 ± 13.1	84.7 ± 9.9	121.8 ± 19.5	n/a
Energy intake (KJ/d)	6154.2 ± 2741.9	6534.4 ± 2357.6	7353.6 ± 2720.2	<0.00*	n/a	n/a	n/a	n/a
Age (years)	27.5 ± 1.5	27.5 ± 1.4	27.6 ± 1.5	0.23	33.6 ± 1.5	33.6 ± 1.4	33.7 ± 1.5	0.74
Weight (kg)	60.7 ± 9.7	60.9 ± 7.4	61.4 ± 8.1	<0.01*	65.7 ± 12.3	65.4 ± 10.8	65.2 ± 10.4	0.72
ΔWeight (kg)	n/a	n/a	n/a	n/a	4.8 ± 7.3	3.8 ± 6.4	3.5 ± 6.7	<0.00*
	Percentage	Percentage	Percentage		Percentage	Percentage	Percentage	
BMI: healthy weight (%)	100.0	100.0	100.0	<0.00*	60.3	77.3	76.2	<0.00*
BMI: overweight (%)	n/a	n/a	n/a	n/a	24.3	18.2	20.5	<0.00*
BMI: obese (%)	n/a	n/a	n/a	n/a	15.4	4.5	3.3	<0.00*
Physical activity in METs (nil/low/moderate/high) (%)	15.2/36.1/19.2/29.6	7.8/37.8/23.6/30.8	5.2/29.9/22.6/42.4	<0.00*	14.3/35.9/21.3/28.4	12.2/36.2/23.4/28.3	7.3/32.2/24.7/35.9	<0.00*
Smoking status (never-/ex-smoker/current) (%)	54.2/14.4/31.4	58.8/16.8/24.4	57.7/20.0/22.2	<0.00*	55.3/23.9/20.8	63.3/21.1/15.6	63.3/24.2/12.6	<0.00*
Residence (urban/rural/remote) (%)	56.6/40.2/3.2	60.2/36.8/3.0	62.0/34.0/4.0	<0.00*	62.2/34.5/3.3	61.4/35.3/3.3	63.5/32.6/3.9	<0.00*
Highest education (nil/school certificate/trade/university degree) (%)	2.7/39.9/27.6/29.9	0.9/26.7/24.3/48.1	1.0/23.7/22.9/52.7	<0.00*	n/a	n/a	n/a	n/a

ARFS Australian Recommended Food score, *BMI* body mass index, *kg* kilograms, *FAVI* Fruit and Vegetables Index, *KJ* kilojoules, *METs* metabolic equivalents per minute, *n/a* not applicable, *SD* standard deviation, *TEI* total energy intake

*Statistically significant ($p < 0.05$)

Table 4 The relationship between diet quality index scores and weight change over 6 years for 4083 young women, obtained from linear regression models

Predictor	Model	[1]ΔWeight (kg) β-co-efficient	[1]ΔWeight (kg) 95% CI	*R*-squared	p value
ARFS	1	−0.04	−0.07, −0.03	>0.01	0.00*
	2	−0.03	−0.06, 0.00	0.02	0.06
	3	−0.04	−0.07, −0.00	0.03	0.03*
FAVI	1	−0.02	−0.03, −0.02	>0.00	0.00*
	2	−0.01	−0.02, −0.00	0.02	0.03*
	3	−0.01	−0.02, −0.00	0.04	0.02*

ARFS Australian Recommended Food score, *FAVI* Fruit and Vegetables Index, *95% CI* 95% confidence interval

*Statistically significant ($p < 0.05$)

Model 1 Crude model: the dependent variable is 6-year weight change in kg and independent variable is baseline diet quality index scores (ARFS or FAVI) in tertiles

Model 2 Adjusted model: same as the crude model plus adjustments for physical activity, education, number of births, area of residence, marital status, smoking, weight at baseline

Model 3 Fully adjusted model: same as adjusted model plus adjustments for total energy intake

addition, the current study used data from a sub-sample of healthy weight women from a national dataset (ALSWH), followed-up over 6 years.

In conclusion, women in the healthy weight range from the young ALSWH cohort gained weight over 6 years of follow-up. However, those with higher diet quality scores gained slightly less weight, suggesting that consuming a diet that aligns more closely with recommendations in the national dietary guidelines, including consumption of plenty of vegetables and fruit, may help to slow the rate of weight gain. However, this alone is not likely to prevent the risk of weight gain at this life stage. Further research is needed over a longer follow-up period, and in other populations to further examine the relationship between diet quality and weight change.

Compliance with ethical standards

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