

Eating habits associated with body weight gain in female university students : a UK-based study of Slimming World members

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Eating habits associated with body weight gain in female university students: a UK-based study of Slimming World members

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1 Eating habits associated with body
2 weight gain in female university
3 students: a UK-based study of
4 Slimming World members

5

6 Key words: slimming; cooking; students; convenience food; alcohol consumption; physical activity

7 Running head: Body weight gain in university students

8

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British Food Journal

10

11 **Summary**

12 Objective: This study explored factors associated with body weight gain among
13 British university students **who were members of a slimming club**.

14 Method: Student members of a national commercial slimming programme
15 completed an online survey about **cooking ability**, weight gain, eating habits and
16 physical activity levels. **Non-parametric statistical tests and regression analysis**
17 were employed to examine factors associated with weight gain.

18 Results: The dataset comprised **272** current students. The majority of students
19 **(67%)** reported weight gain between 3.2 and 12.7 kg during university: **20.4%**
20 reported to have gained >12.7 kg. Students commonly attributed their weight gain
21 to academic stress and nearly all identified with needing support to learn to cook
22 on a budget. Students reporting greatest weight gain had most frequent
23 consumption of **ready meals & convenience foods**, take-away & fast foods, and
24 least frequent consumption of fruits & vegetables. Weight-stable students reported
25 lowest consumption of alcohol and were most able to cook complex meals.
26 Students who reported greatest weight gain reported lower physical activity levels.
27 **There were inter-correlations between cooking ability and lifestyle factors. In a**
28 **multivariate model, low physical activity and frequent consumption of ready meals**
29 **and convenience food independently predicted weight gain.**

30 Conclusion: **Weight gain was inversely associated with diet quality, cooking**
31 **ability and physical activity with reliance on ready meals & convenience food and**
32 **low physical activity particularly important.** Prospective studies are needed to
33 confirm these cross-sectional associations and to explore how the university
34 setting may contribute to the effect.

35

36

37 Introduction

38 Approximately 25% of adults in England are obese (Health and Social Care
39 Information Centre, 2015). Obesity places a substantial burden on society, fuelling
40 hospital admissions and annual health care costs (Ellison, 2013). As the UK
41 attempts to reverse the rising trend of obesity among its adult population (Ellison,
42 2013), it is critical to identify population groups at particular risk and to elucidate
43 the factors underpinning risk in order to effect and target weight management
44 interventions.

45 The first year of university has been identified as an 'at risk' period for body
46 weight gain, and a 'Freshman 15' phenomenon has been proposed, which posits
47 that first-year university students gain 15lbs (6.8 kg) (Brown, 2008). Although
48 most studies record lesser average weight gain, weight gain is variable (0.7-3.1kg)
49 (Crombie et al., 2009). Furthermore, when only students who gain weight are
50 considered, observed weight gain is greater and the range narrower (3.1-3.4kg)
51 (Crombie et al., 2009). North American studies predominate this literature, but UK
52 studies have identified a similar phenomenon: an average weight change of +2.5kg
53 was noted among first year female undergraduate students in a single semester,
54 with 22% of students gaining in excess of 6.8kg (Cockman et al., 2013). A multi-
55 centre UK study recorded lesser average weight gain (0.83kg) during the first
56 three months of university, but body weight change was variable (-7.2kg to
57 +11.6kg) (Finlayson et al., 2012). Studies among British non-student populations
58 are not available, although US studies show lower levels of weight gain in the
59 general population (Levitsky et al., 2004).

60 Despite the wealth of literature describing body weight gain at university, the
61 factors underpinning these changes are less clear (Cockman et al., 2013). Several
62 studies have reported increased consumption of processed and take-away foods
63 and/or decreased consumption of fruit and vegetables among students who gain
64 weight (Levitsky et al., 2004; Pliner and Saunders, 2008; Pullman et al., 2009);
65 others report no association between eating patterns and weight change (Holm-
66 Denoma et al., 2008; Kasperek et al., 2008; Racette et al., 2005). Alcohol intake has
67 also been implicated (Adams and Rini, 2007; Butler et al., 2004; Economos et al.,
68 2008; Lloyd-Richardson and Lucero, 2008). Counter-intuitively, most North

69 American studies, which have employed a detailed assessment of diet have not
70 observed increased energy intake among weight gainers (Butler et al., 2004; Jung
71 et al., 2008; Pullman et al., 2009). Studies focusing on the psychological constructs
72 of eating behaviour have reported a link between weight change and dietary
73 restraint, disinhibition, history of dieting and stress (Economos et al., 2008;
74 Finlayson et al., 2012; Girz et al., 2013; Levitsky et al., 2004; Lowe et al., 2006;
75 Serlachius et al., 2007). The relationship between physical activity and weight
76 change is also unclear (Butler et al., 2004; Edmonds et al., 2008; Finlayson et al.,
77 2012; Racette et al., 2005) and lack of body composition measures often blurs
78 interpretation. Further research is necessary to delineate the factors behind
79 weight gain among university students.

80 The objective of the current study was to examine dietary habits, physical activity
81 levels and perceived reasons for weight gain in relation to body weight gain among
82 university students in the UK. Access to data from a national weight management
83 programme (Slimming World, UK) afforded an opportunity to examine the issue in
84 students who self-identified as needing to lose weight. Research to date has
85 sampled from the general student population (Cockman et al., 2013; Finlayson et
86 al., 2012; Nikolaou et al., 2014).

87 **Methods**

88 Members of Slimming World UK who were past or current university students
89 were invited to complete an online survey during autumn 2013. The survey
90 collected the following information: gender; age; student status (current vs. former
91 student); number of years at university; weight gain at university; body weight
92 prior to starting university (underweight – severely overweight); perceived
93 reasons for weight gain; previous attempts at weight loss; perceived barriers to
94 consuming a healthy diet at university; cooking ability; self-reported
95 understanding of a healthy diet (non-existent to very good); consumption
96 frequency of fruits and vegetables, fast food/takeaways, and convenience
97 foods/ready meals; perceived healthfulness of food available on campus; alcohol
98 consumption; effect of alcohol intake on food choices; ability to cook, shop and eat
99 healthily on a student budget; factors influencing food choices at university; and
100 physical activity levels at university. Participants answered all questions in

1 101 relation to their behaviours at university before joining Slimming World.
2
3 102 Response options (e.g. frequency of consumptions; categories of weight gain;
4
5 103 factors influencing food choices) were provided for each question.

6
7 104 The survey was designed and administrated by staff at Slimming World
8
9 105 Headquarters. There were no incentives for participation. A total of 1060 Slimming
10
11 106 World members who were either current or former university students responded
12
13 107 to the survey. This data analysis used a subset of respondents from the original
14
15 108 survey; students who were no longer at university (n=781) and male students (n=
16
17 109 5) were excluded. The former exclusion was instigated to improve data quality,
18
19 110 since current students would be expected to more accurately recall dietary and
20
21 111 physical activity habits and weight gain at university than graduates. Male students
22
23 112 were excluded because they were few in number.

24
25 113 Self-reported weight gain at university was categorised: 0 kg (weight-stable); <3.2
26
27 114 kg (<0.5 stones); 3.2-6.4 kg (0.5-1 stone); 6.4-12.7 kg (1-2 stones); >12.7 kg (>2
28
29 115 stones). No participant in the current study reported weight loss at university.
30
31 116 Category of weight gain was examined against perceived reasons for weight gain at
32
33 117 university using non-parametric tests (SPSS Statistics V23). An ordinal logistic
34
35 118 regression model was fitted to establish the independent effect of descriptively
36
37 119 significant variables (cooking ability, food frequency and physical activity) as
38
39 120 predictors of weight gain category. The statistical analysis was conducted using
40
41 121 SPSS (IBM SPSS 23.0, IBM Armonk, USA).

42 **Results**

43 123 Approximately half of the sample (47.6%) was between 18 and 21 years of age and
44
45 124 just under one quarter (22.3%) of respondents were between 22 and 30 years old.
46
47 125 The majority of responders had been members of Slimming World for less than a
48
49 126 month (46.0%) or between 3-6 months (29.9%) at the point of survey.

50
51 127 Table 1 provides descriptive data for reported weight gain, food group
52
53 128 consumption and physical activity. An eighth of respondents (12.5%) were weight
54
55 129 stable during their time at university, while over half (55.4%) reported gaining in
56
57 130 excess of 6.4kg. Only 15.6% of students reported no weight gain during their first
58
59 131 year at university compared to 34.4% who reported gaining more than 6.4kg.

1 132 58.1% of students reported the same level of weight gain in the two time periods
2 133 while 40.7% reported a higher level of weight gain overall than in first year
3 134 (Wilcoxon=193, n=270, p<0.001).

4 135 Table 1 also shows descriptive data for physical activity and food consumption.
5 136 Self-reported physical activity levels at university varied from 'not at all active'
6 137 (14.3%) to 'active or very active' (14.3%). Less than one in four respondents
7 138 reported that they consumed fruit and vegetables every day when at university,
8 139 whilst one in three indicated that they consumed fruit and vegetables once a week
9 140 or less. Self-reported consumption of takeaways/fast food meals was high, with
10 141 just over half the sample (50.5%) reporting eating take-away & fast food several
11 142 times per week or more; just under a half (47.8%) of respondents reported
12 143 consuming ready meals & convenience food more than three times per week, with
13 144 fewer than one in five respondents (18.2%) reporting consumption of these foods
14 145 greater than 5 times per week. One third of respondents (33.7%) also reported
15 146 that they consumed alcohol on '3 or more nights per week'.

16 147 Table 2 provides information on students' self-assessment of their ability to cook
17 148 various dishes. The dishes ranged from the simple, such as cheese on toast to the
18 149 complex, such as a roast dinner. While 73 (26.6%) of the sample reported being
19 150 able to cook all fourteen of the dishes, less than 5% reported being able to cook
20 151 three or less dishes. Around 40% of students could not make dishes such as
21 152 shepherd's pie, homemade soup and chilli con carne. Fewest students reported
22 153 being able to cook a stew/casserole, with just over half of students claiming
23 154 competency. A total of 82.7% of the sample agreed with the statement 'students
24 155 need support to learn how to cook healthy food/meals' and 91.9% agreed with the
25 156 statement 'students need support to learn how to eat healthily on a budget'.

26 157 There were several significant associations between cooking ability and category
27 158 of weight gain (see Table 3). Specifically, a significantly higher proportion of
28 159 students in the weight stable group reported that they were able to cook the
29 160 following meals from scratch: stir-fry, homemade burger, soup, casserole/stew and
30 161 shepherd's pie. Students who reporting greater difficulty in shopping, cooking and
31 162 eating healthily on a student budget reported greater weight gain ($\rho = 0.237$; $df =$
32 163 265 ; $p < 0.001$).

1 164
2
3
4 165 Chi-square tests indicated statistically significant associations between level of
5 166 weight gain and several food consumption measures, as well as physical activity.
6
7 167 These cross-tabulations are shown in Table 4. Specifically, students reporting
8 168 greatest weight gain (>12.7 kg) were more likely have to be frequent consumers of
9
10 169 ready meals & convenience foods and takeaway & fast food and least likely to
11
12 170 consume fruit & vegetables on a daily basis. There was also a trend (p=0.058) for
13
14 171 alcohol consumption to be associated with weight gain; students in the top two
15
16 172 categories of weight gain (6.4-12.7kg and >12.7kg) had the highest proportion of
17
18 173 frequent drinkers. Weight gain at university was inversely associated with self-
19
20 174 reported physical activity: students reporting greatest weight gain at university
21
22 175 (>12.7 kg) were least likely to report that were 'fairly active' (60-90 minutes
23
24 176 activity per week) or 'active'/'very active'.
25
26 177

27 178 Cooking ability was correlated with alcohol consumption ($\rho_s=-0.226$, n=273,
28
29 179 p<0.001), consumption of takeaway & fast food ($\rho_s=-0.241$, n=273, p<0.001), fruit
30
31 180 & vegetables ($\rho_s=0.380$, n=273, p<0.001), consumption of ready-meals &
32
33 181 convenience food ($\rho_s=-0.320$, n=274, p<0.001) and physical activity levels at
34
35 182 university ($\rho_s=0.166$, n=273, p<0.006).

36 183
37 184 After multivariate adjustment (Table 5) only frequency of consumption of ready
38
39 185 meals & convenience food and physical activity were associated with weight gain.
40
41 186 Specifically, the ordinal logistic regression model showed that the odds of weight
42
43 187 gain increased at all lower levels of physical activity, while the odds of weight gain
44
45 188 decreased with less frequent consumption of ready meals. The model used had a
46
47 189 pseudo r-squared of 23.4%.

48 190
49 191 There were also significant associations between pre-university body weight and
50
51 192 weight gain at university ($\chi^2=33.75$ df=12; p<0.001). The most striking difference
52
53 193 was that students who were weight stable at university invariably reported being
54
55 194 overweight or severely overweight prior to starting university compared to
56
57 195 students who gained body weight at university. Between 23.8% and 43.5% of the
58
59 196 latter groups reported being of a healthy body weight prior to starting university.
60

197
198 When perceived reasons for weight gain at university were examined 'eating
199 unhealthily due to stress relating to studies' was significantly associated with level
200 of weight gain at university ($\chi^2 = 79.47$; $df=4$; $p<0.001$). A greater proportion
201 (90%) of students in the 6.4-12.7 kg group attributed their weight gain to stress
202 compared to approximately 70% of students in other weight gaining groups. There
203 was also only one significant association between weight gain and factors
204 influencing food choice at university: respondents in the weight stable group were
205 less likely to report cost as an important influence on their food choices at
206 university ($\chi^2 =15.25$; $df = 4$; $p = 0.004$).
207

208 Discussion & Conclusion

209 The current study set out to examine eating habits associated with weight gain
210 among UK university students who were members of a slimming club. This focus
211 on a weight-gaining sub-group of the student population who have sought help
212 from a commercial slimming organisation, as opposed to the general student
213 population (Cockman et al., 2013; Finlayson et al., 2012) provides particular
214 perspective. We found considerable variation in weight gain during the first year
215 of university with about a third of students reporting a gain greater than 6.4kg
216 (equivalent to 1 stone). This level of weight gain would be considered clinically
217 significant for an average woman weighing 71kg (>7percent of body weight) and
218 may have important long-term health implications. Meta-analytic data record
219 average weight gain to be 1.36kg over the first year of student life for all students,
220 while the corresponding figure for students who gain weight (excluding weight
221 stable and weight losing students) was 3.38kg (Vadeboncoeur et al., 2015). Clearly
222 recruitment via a slimming club selects people who have a weight problem and
223 who have experienced substantial and greater than average weight gain. This
224 assertion is supported by data from a separate survey of Slimming World student
225 members, which documented that new members had on average a Body Mass
226 Index of 31.0 kg/m² upon entry to the programme (Smith et al., 2014).

227 Overall, reported weight gain over the entire university time period was greater
228 than that reported during first year, concurring with a meta-analysis of studies

1 229 that assessed weight gain in students beyond the first year (Fedewa et al., 2014).
2
3 230 However, our data also showed that rates of weight gain slowed after the first year
4
5 231 for nearly 60% of students, contrary to the meta-analytic study. Our data are in
6
7 232 line with the expectation that membership of a slimming club may ameliorate
8
9 233 weight gain, and Slimming World data on weight loss in student members, which
10
11 234 recorded a weight loss of approximately 5kg for those who were overweight and
12
13 235 obese and 3kg for those who were a healthy weight after 12 weeks membership
14
15 236 (Smith et al., 2014).

15 237 We identified clear associations between weight gain and eating habits. As weight
16
17 238 gain increased diet quality decreased, with students reporting greatest weight gain
18
19 239 reporting least frequent consumption of fruits & vegetables and most frequent
20
21 240 consumption of alcohol, take-away & fast food, and ready meals & convenience
22
23 241 foods. Additionally, we identified an association between cooking ability and
24
25 242 weight gain, and were able to discriminate students' level of weight gain according
26
27 243 to their ability to cook more culinary complex meals.

27 244 Interestingly, cooking ability was negatively correlated with consumption
28
29 245 frequencies of alcohol, takeaway & fast food and ready meals & convenience foods,
30
31 246 and positively correlated with consumption of fruit & vegetables and physical
32
33 247 activity. All these correlations were of moderate magnitude. It is evident that a
34
35 248 constellation of lifestyle habits may be working together to increase risk of weight
36
37 249 gain confirming the cluster analysis approach of Greene et al in a large cross-
38
39 250 sectional study of both male and female North American students (Greene et al.,
40
41 251 2011).

41 252 A multivariate model revealed that weight gain was most strongly associated with
42
43 253 frequency of consumption of ready meals & convenience food and low physical
44
45 254 activity. An axis between poor cooking skills, consumption of ready meals and
46
47 255 risk of obesity has previously been documented in a non-student population (van
48
49 256 der Horst et al., 2011), and ready meal consumption has been associated with the
50
51 257 prevalence of obesity in Brazilian women (Lobato et al., 2009). Supermarket
52
53 258 ready meals in the UK have been criticised for their high fat and salt content
54
55 259 (Remnant and Adams, 2015), although limited data suggest that they are not
56
57 260 consistently high in calories (Celnik et al., 2012). More generally, convenience
58
59 261 food consumption has been implicated in the temporal rise in obesity rates in
60

1 262 Australia (Dixon et al., 2006). Notably, convenience food is heterogeneous in type
2
3 263 and diverse in nutrient composition, for example it can range in type from highly
4
5 264 processed foods such as canned ravioli to single foods such as frozen French fries
6
7 265 and unprocessed salads (Brunner et al., 2010). The finding that low physical
8
9 266 activity is associated with weight gain concurs with other weight gain studies of
10
11 267 university students (Butler et al., 2004; Edmonds et al., 2008; Greene et al., 2011).
12
13 268 Although the strongest connections between weight gain and lifestyle metrics are
14
15 269 for low physical activity and consumption frequency of ready meals & convenience
16
17 270 food, our internal correlations suggest that a multi-behavioural effect is influencing
18
19 271 risk of weight gain.

20
21 272 Stress was identified by students as a factor leading to weight gain particularly for
22
23 273 students gaining between 6.4 and 12.7kg of body weight, congruent with a
24
25 274 previous UK study (Serlachius et al., 2007). The relationship between academic
26
27 275 stress and calorie intake is inconsistent (Barker et al., 2015), but high stress has
28
29 276 been reported to induce a hyperphagic response and tendency to consume high-
30
31 277 fat, high-sugar foods particularly in restrained eaters (Habhab et al., 2009; Wardle
32
33 278 et al., 2000). Moreover, a qualitative study exploring emotional eating behaviours
34
35 279 among North American university students reported that female students
36
37 280 identified stress as a primary trigger for abandonment of normal eating patterns
38
39 281 and increased food consumption (Bennett et al., 2013). The fact that students
40
41 282 reporting greatest weight gain were not so likely to report stress as a perceived
42
43 283 reason for their weight gain is unclear, although one possible explanation may be
44
45 284 that these students are less susceptible to emotional hunger cues. Psychometric
46
47 285 measures of eating behaviour are needed to confirm this possibility.

48
49 286 Finally, the relationship found between bodyweight going to university and weight
50
51 287 gain thereafter is likely to be an artefact of our sampling frame. Students whose
52
53 288 pre-university body weight was in the normal range and who did not gain weight
54
55 289 are unlikely to be included in our sample. The relationship between baseline body
56
57 290 composition and weight change has been examined, but remains unclear
58
59 291 (Kasperek et al., 2008; Mifsud et al., 2009; Mihaolopoulos et al., 2008; Provencher
60
292 et al., 2009). It is possible that overweight students arriving at university are
293 already engaging in practices to prevent further weight gain, whilst those who
294 begin university at a healthy body weight are less aware of a need to engage in

1 295 behaviours that promote weight stability. Greater awareness among students
2
3 296 about the risk of body weight gain at university may therefore be necessary.
4

5 297 Despite the novel nature of our study focusing on a weight-gaining subgroup of the
6
7 298 general student population, it has a number of weaknesses. Specifically, our sample
8
9 299 was female, prohibiting extrapolation to the general student body. However, this
10
11 300 female predominance reflects the gender split of the national Slimming World
12
13 301 membership (Stubbs et al., 2015). Additionally, all data in the current study was
14
15 302 gathered using self-report and retrospective measures; lifestyle information may
16
17 303 have been particularly difficult to accurately recall given that lifestyle changes
18
19 304 would have been promoted – and likely implemented – upon joining Slimming
20
21 305 World. However, restriction of the dataset to current students who had recently
22
23 306 joined the programme reduced the likelihood of such error. Notably self-reported
24
25 307 and researcher-measured body weight among university students shows strong
26
27 308 correlation in student populations (Delinsky and Wilson, 2008; Economos et al.,
28
29 309 2008; Lloyd-Richardson et al., 2009). There is additionally no reason to believe any
30
31 310 form of recall bias according to weight gain group occurred, reinforcing the validity
32
33 311 of associations. As for many dietary studies, the collinearity observed between
34
35 312 food and lifestyle behaviours would suggest that a large sample size or complex
36
37 313 design is necessary to unpick the independent effects of single food behaviours.
38

39 314 Future research should now focus on this weight-gaining sub-group of the student
40
41 315 population to further delineate reasons for weight gain and identify students at
42
43 316 risk. Prospective studies are necessary to strengthen findings, and qualitative
44
45 317 methods would enhance understanding. Ultimately this research is important to
46
47 318 inform the development of interventions to reduce clinically significant weight
48
49 319 gain during early adulthood. Indeed while a mobile phone-based intervention
50
51 320 programme targeting dietary behaviour and physical activity has been shown to be
52
53 321 effective in preventing weight gain in a young Australian adults (Partridge et al.,
54
55 322 2016), there is limited study which addresses obesity prevention in student and
56
57 323 non-students (Allman-Farinelli, 2015). British research investigating weight gain
58
59 324 among a comparable non-student population is also pertinent to determine the
60
325 extent to which the university setting is responsible for weight gain.

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Table 1: Self-reported weight gain, eating behaviours and physical activity levels at university prior to joining Slimming World

| | | Number | Percentage (%) |
|---|---------------------------------------|--------|----------------|
| Self-reported body weight gain throughout university | 0 kg | 34 | 12.5 |
| | <3.2 kg | 24 | 8.9 |
| | 3.2-6.4 kg | 63 | 23.6 |
| | 6.4-12.7 kg | 95 | 35.1 |
| | >12.7 kg | 55 | 20.3 |
| Self-reported body weight gain during the first year | 0 kg | 42 | 15.6 |
| | <3.2 kg | 58 | 21.5 |
| | 3.2-6.4 kg | 77 | 28.5 |
| | 6.4-12.7 kg | 74 | 27.4 |
| | >12.7 kg | 19 | 7.0 |
| Consumption of alcohol | Never | 34 | 12.5 |
| | Less than once per week | 49 | 17.9 |
| | 1-2 nights per week | 98 | 35.9 |
| | 3 or more nights per week | 92 | 33.7 |
| Consumption of takeaways & fast food at university | None | 23 | 8.4 |
| | Once a week | 112 | 41.0 |
| | A few a week | 127 | 46.5 |
| | >5 a week | 11 | 4.0 |
| Consumption of ready meals & convenience foods | Never | 20 | 7.3 |
| | Once a week | 39 | 14.2 |
| | 1-3 per week | 84 | 30.7 |
| | 3-5 per week | 81 | 29.6 |
| | >5 per week | 50 | 18.2 |
| Consumption of fruits & vegetables | Never | 3 | 1.1 |
| | Once or less week | 87 | 31.9 |
| | 2-3 times per week | 78 | 28.6 |
| | 4-5 times per week | 38 | 13.9 |
| | Every day | 67 | 24.5 |
| Physical activity levels | Not at all active | 39 | 14.3 |
| | Rarely active (<30 minutes/week) | 82 | 30.0 |
| | Sometimes active (30-60 minutes/week) | 71 | 26.0 |
| | Fairly active (60-90 minutes/week) | 42 | 15.3 |
| | Active (>90- minutes/week) | 39 | 14.3 |

Table 2 Proportion of students reporting that they are able to cook specific meals

| Meal | Number | % |
|---------------------------------|--------|-------|
| Cheese on toast | 260 | 95.2% |
| Tinned spaghetti hoops on toast | 255 | 93.4% |
| Baked beans on a jacket potato | 250 | 91.6% |
| Scrambled eggs on toast | 236 | 86.4% |
| Full English breakfast | 231 | 84.6% |
| Stir-fry | 214 | 78.4% |
| Spaghetti Bolognese | 193 | 70.7% |
| Shepherds Pie | 174 | 63.7% |
| Roast dinner | 168 | 61.5% |
| Homemade soup | 166 | 60.8% |
| Chilli con carne | 152 | 55.7% |
| Homemade burger | 149 | 54.6% |
| Curry | 143 | 52.4% |
| Casserole/stew | 141 | 51.6% |

Table 3 Weight gain at University tabulated against self-reported ability to cook specific meals; number and percentage of column totals in parentheses.

| Weight Gain | None | <3.2 kg | 3.2-6.4 kg | 6.4-12.7 kg | >12.7 kg | Chi-squared Test |
|--|---------------|-------------|-------------|-------------|-------------|------------------|
| Cheese on toast | 31 (91.2%) | 22 91.7% | 61 96.8% | 89 93.7% | 54 98.2% | 3.44 P=0.497 |
| Tinned spaghetti hoops on toast | 31 91.2% | 23 95.8% | 59 93.7% | 85 89.5% | 54 98.2% | 4.59 P=0.327 |
| Baked beans on a jacket potato | 29 85.3% | 22 91.7% | 58 92.1% | 84 88.4% | 54 98.2% | 5.76 P=0.218 |
| Scrambled eggs on toast | 31 91.2% | 23 95.8% | 58 92.1% | 77 81.1% | 45 81.8% | 7.47 P=0.113 |
| Full English breakfast | 32 94.1% | 18 75.0% | 58 92.1% | 77 81.1% | 43 78.2% | 9.14 P=0.058 |
| Stir-fry | 31 91.2% | 20 83.3% | 55 87.3% | 65 68.4% | 40 72.7% | 12.92 P=0.120 |
| Spaghetti Bolognese | 26 76.5% | 16 66.7% | 52 82.5% | 64 67.4% | 33 60.0% | 8.50 P=0.075 |
| Shepherds pie | 27 79.4% | 13 54.2% | 46 73.0% | 52 54.7% | 35 63.6% | 10.25 P=0.036 |
| Roast dinner | 26 76.5% | 16 66.7% | 43 68.3% | 50 52.6% | 31 56.4% | 8.44 P=0.077 |
| Homemade soup | 27 79.4% | 15 62.5% | 45 71.4% | 52 54.7% | 26 47.3% | 13.66 P=0.008 |
| Chilli con carne | 21 61.8% | 15 62.5% | 39 61.9% | 51 53.7% | 24 43.6% | 5.32 P=0.056 |
| Homemade burger | 25 73.5% | 12 50.0% | 40 63.5% | 44 46.3% | 26 47.3% | 10.92 P=0.027 |
| Curry | 23 67.6% | 13 54.2% | 38 60.3% | 42 44.2% | 25 45.5% | 8.38 P=0.079 |
| Casserole/stew | 25 73.5% | 13 54.2% | 38 60.3% | 37 38.9% | 26 47.3% | 15.01 P=0.005 |

Table 4: Weight gain while at University tabulated against dietary consumption measures and physical activity; number and percentages of consumption categories in parentheses

| Weight gain | None | <3.2 kg | 3.2-6.4 kg | 6.4-12.7 kg | >12.7 kg | Chi-squared Test |
|--|------------|------------|------------|-------------|------------|------------------|
| Frequency of consumption of alcohol | | | | | | |
| Never | 7 (20.6%) | 3 (8.8%) | 4 (11.8%) | 13 (38.2%) | 7 (20.6%) | 20.54 P=0.058 |
| < 1 night per week | 9 (18.8%) | 7 (14.6%) | 11 (22.9%) | 14 (29.2%) | 7 (14.6%) | |
| 1-2 nights per week | 12 (12.5%) | 9 (9.4%) | 30 (31.3%) | 27 (28.1%) | 18 (18.8%) | |
| 3 + nights per week | 6 (6.5%) | 5 (5.4%) | 17 (18.5%) | 41 (44.6%) | 23 (25%) | |
| Frequency of consumption of take-aways & fast food | | | | | | |
| Never | 5 (22.7%) | 6 (27.3%) | 4 (18.2%) | 5 (22.7%) | 2 (9.1%) | 41.65 P<0.001 |
| Once a week | 20 (18%) | 11 (9.9%) | 29 (26.1%) | 34 (30.6%) | 17 (15.3%) | |
| A few a week | 8 (6.3%) | 4 (3.2%) | 28 (22.2%) | 55 (43.7%) | 31 (24.6%) | |
| 5 plus a week | 0 (0%) | 3 (27.3%) | 2 (18.2%) | 1 (9.1%) | 5 (45.5%) | |
| Frequency of consumption of fruit & vegetables | | | | | | |
| Never | 0 (0%) | 1 (33.3%) | 2 (66.7%) | 0 (0%) | 0 (0%) | 34.08 P=0.005 |
| Once or less a week | 6 (7.1%) | 5 (5.9%) | 18 (21.2%) | 30 (35.3%) | 26 (30.6%) | |
| 2-3 a week | 8 (10.4%) | 5 (6.5%) | 15 (19.5%) | 35 (45.5%) | 14 (18.2%) | |
| 3-5 a week | 4 (10.5%) | 3 (7.9%) | 10 (26.3%) | 15 (39.5%) | 6 (15.8%) | |
| Everyday | 16 (23.9%) | 10 (14.9%) | 18 (26.9%) | 15 (22.4%) | 8 (11.9%) | |
| Frequency of consumption of ready meals & convenience foods | | | | | | |
| Never | 7 (35%) | 3 (15%) | 5 (25%) | 4 (20%) | 1 (5%) | 44.14 P<0.001 |
| Once a week | 5 (12.8%) | 6 (15.4%) | 13 (33.3%) | 11 (28.2%) | 4 (10.3%) | |
| 1-3 times a week | 11 (13.4%) | 8 (9.8%) | 24 (29.3%) | 29 (35.4%) | 10 (12.2%) | |
| 3-5 times a week | 8 (9.9%) | 4 (4.9%) | 15 (18.5%) | 35 (43.2%) | 19 (23.5%) | |
| More than five times a week | 3 (6.1%) | 3 (6.1%) | 6 (12.2%) | 16 (32.7%) | 21 (42.9%) | |
| Level of physical activity | | | | | | |
| Not active at all | 3 (7.9%) | 5 (13.2%) | 7 (18.4%) | 11 (28.9%) | 12 (31.6%) | 40.16 P=0.001 |
| Rarely active | 6 (7.3%) | 4 (4.9%) | 17 (20.7%) | 32 (39%) | 23 (28%) | |
| Sometimes active | 9 (13%) | 4 (5.8%) | 12 (17.4%) | 29 (42%) | 15 (21.7%) | |

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|------------------------------|------------|-----------|------------|------------|----------|--|
| Fairly active | 4 (9.5%) | 4 (9.5%) | 16 (38.1%) | 15 (35.7%) | 3 (7.1%) | |
| Active or very active | 11 (28.2%) | 7 (17.9%) | 11 (28.2%) | 8 (20.5%) | 2 (5.1%) | |

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Table 5 Results of ordinal logistic regression predicting odds of moving to a greater weight gain classification according to lifestyle categories (odds ratios with 95% confidence intervals (CI); highest frequency/category as referent)

| | Odds Ratio | Lower CI | Upper CI |
|--|------------|----------|----------|
| Cooking Score | 0.956 | 0.891 | 1.026 |
| Alcohol never | 1.214 | 0.554 | 2.659 |
| Alcohol <1night per week | 0.585 | 0.297 | 1.153 |
| Alcohol 1-2 nights per week | 0.733 | 0.421 | 1.278 |
| Alcohol 3+nights per week | 1 | | |
| Take-aways & Fast food never | 1.076 | 0.234 | 4.953 |
| Take-aways & fast food once a week | 1.240 | 0.339 | 4.531 |
| Take-aways & fast food few times per week | 1.925 | 0.553 | 6.706 |
| Take-aways & Fast food 5+ times per week | 1 | | |
| Fruit & vegetables never | 0.133 | 0.015 | 1.201 |
| Fruit &vegetables once or less per week | 1.430 | 0.697 | 2.939 |
| Fruit & vegetables 2-3 times per week | 1.029 | 0.513 | 2.063 |
| Fruit & vegetables 3-5 times per week | 1.432 | 0.666 | 3.080 |
| Fruit & vegetables every day | 1 | | |
| Ready meal never | 0.162 | 0.051 | 0.509 |
| Ready meal & convenience food once per week | 0.349 | 0.141 | 0.865 |
| Ready meal & convenience food 1-3 per week | 0.349 | 0.163 | 0.751 |
| Ready meal & convenience food 3-5 times per week | 0.474 | 0.227 | 0.989 |
| Ready meal & convenience food >5 times per week | 1 | | |
| Physical activity not active | 3.391 | 1.363 | 8.432 |
| Rarely active | 3.508 | 1.597 | 7.706 |
| Sometimes active | 2.798 | 1.305 | 6.001 |
| Fairly active | 1.879 | 0.827 | 4.272 |
| Physical activity active or very active | 1 | | |

Note - The ordered weight gain classifications are (1) None, (2) <3.2kg, 3) 3.2-6.4kg, 4) 6.4-12.7kg, 5) >12.7kg. The overall model was significant (p=0.011)