

1 **Supplementary Online Information**

2 **Methods**

3 **Table S1.** Dietary intake breakdown of the three meals for each of the two experimental diets (HFD and HCD) provided to participants.

	HFD (Days 1-5)			HCD (Days 1-5)		
	Breakfast	Lunch	Dinner	Breakfast	Lunch	Dinner
Energy (kJ)²	4072 ± 344	4093 ± 346	4140 ± 350	4088 ± 346	4069 ± 344	4232 ± 358
CHO (g)	38.7 ± 3.3	39.1 ± 3.3	38.7 ± 3.3	172.2 ± 14.6	170.7 ± 14.4	177.3 ± 15.0
Sugars (g)	5.3 ± 0.4	9.1 ± 0.8	16.3 ± 1.4	160.5 ± 13.6	96.8 ± 8.2	90.3 ± 7.6
CHO (% TEI)	15 ± 0	15 ± 0	15 ± 0	67 ± 0	67 ± 0	67 ± 0
Glycemic index	63.3 ± 0.0	52.7 ± 0.0	53.1 ± 0.0	47.5 ± 0.0	67.6 ± 0.0	51.0 ± 0.0
Glycemic load	24.5 ± 2.0	20.4 ± 1.6	19.7 ± 1.6	81.8 ± 6.6	115.0 ± 9.3	90.7 ± 7.3
Protein (g)	42.2 ± 3.6	42.8 ± 3.6	43.5 ± 3.7	43.1 ± 3.6	43.6 ± 3.7	43.9 ± 3.7
Protein (% TEI)	18 ± 0	18 ± 0	18 ± 0	18 ± 0	18 ± 0	18 ± 0
Fat (g)	73.9 ± 6.2	74.1 ± 6.3	75.3 ± 6.4	16.3 ± 1.4	16.1 ± 1.4	17.6 ± 1.5
Fat (% TEI)	67 ± 0	67 ± 0	67 ± 0	15 ± 0	15 ± 0	15 ± 0
Saturated fat (g)	40.7 ± 3.4	45.2 ± 3.8	29.0 ± 2.5	8.9 ± 0.8	7.9 ± 0.7	2.8 ± 0.2
Polyunsaturated fat (g)	4.2 ± 0.4	2.3 ± 0.2	2.1 ± 0.2	2.2 ± 0.2	1.8 ± 0.1	1.3 ± 0.1
Monounsaturated fat (g)	11.6 ± 1.0	18.6 ± 1.6	20.9 ± 1.8	3.8 ± 0.3	4.2 ± 0.4	5.4 ± 0.5
Fibre (g)	8.1 ± 0.7	8.8 ± 0.7	12.2 ± 1.0	13.2 ± 1.1	13.2 ± 1.1	22.0 ± 1.9

4 Data are mean ± SD. CHO, carbohydrate; HCD, high carbohydrate diet; HFD, high fat diet; TEI, total energy intake.

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8 Results

9 **Table S2.** Further dietary intake breakdown of the meals and snacks for each of the two Habitual periods for sedentary males with
10 overweight/obesity (n=7).

	Habitual pre HFD (Days -7 to -1)						Habitual pre HCD (Days -7 to -1)					
	B/fast	AM snacks ¹	Lunch	PM snacks ¹	Dinner	Late PM snacks ¹	B/fast	AM snacks ¹	Lunch	PM snacks ¹	Dinner	Late PM snacks ¹
Energy (kJ)	1566 ± 368 ^{b,c,d,e}	696 ± 839 ^{c,e}	3294 ± 510 ^{d,f}	633 ± 630 ^e	3603 ± 1156 ^f	1148 ± 1065	1693 ± 489 ^{b,c,d,e,f}	857 ± 897 ^{c,e}	2853 ± 569 ^{d,e,f}	664 ± 765 ^e	3805 ± 1128 ^f	611 ± 403
Energy (% of DEI)	15 ± 3 ^{b,c,d,e}	5 ± 6 ^{c,e}	31 ± 8 ^{d,f}	5 ± 5 ^e	33 ± 10 ^f	10 ± 8	16 ± 5 ^{c,d,e,f}	7 ± 7 ^{c,e}	27 ± 3 ^{d,e,f}	6 ± 7 ^e	37 ± 11 ^f	6 ± 4
Sugars (g)	15.3 ± 6.3	12.1 ± 16.6	21.8 ± 13.9 ^d	6.5 ± 9.5	22.2 ± 8.4	12.7 ± 10.8	19.8 ± 8.3 ^d	11.4 ± 11.3 ^e	16.5 ± 6.5	6.7 ± 5.1 ^e	23.8 ± 17.3	12.6 ± 9.8
Saturated fat (g)	5.0 ± 2.0 ^{c,e}	3.0 ± 4.0 ^{c,e}	12.7 ± 3.4 ^{d,f}	2.5 ± 3.4 ^e	11.4 ± 4.7 ^f	4.2 ± 3.2	6.0 ± 2.5 ^{c,e}	3.5 ± 3.9 ^{c,e}	10.4 ± 3.0 ^{d,f}	2.9 ± 3.5 ^e	12.9 ± 4.4 ^f	2.6 ± 2.9
Polyunsat. fat (g)	1.8 ± 0.9 ^{c,e}	1.0 ± 1.1 ^{c,e}	5.0 ± 0.7 ^{d,f}	0.7 ± 0.9 ^e	5.9 ± 3.1 ^f	0.9 ± 0.8	1.3 ± 0.8 ^{c,e}	1.3 ± 1.5 ^{c,e}	4.9 ± 1.8 ^{d,f}	0.8 ± 1.4 ^e	5.9 ± 2.5 ^f	0.4 ± 0.4
Monounsat. fat (g)	3.7 ± 2.0 ^{c,e}	1.9 ± 2.1 ^{c,e}	13.3 ± 3.3 ^{d,f}	2.2 ± 2.9 ^e	14.3 ± 6.1 ^f	3.1 ± 2.7	3.6 ± 1.6 ^{c,e}	3.2 ± 3.4 ^{c,e}	10.2 ± 3.2 ^{d,f}	2.9 ± 5.2 ^e	13.2 ± 2.9 ^f	1.8 ± 1.6
Fibre (g)	6.0 ± 2.5 ^{b,c,d,e,f}	1.4 ± 1.5 ^{c,e}	9.5 ± 1.8 ^{d,f}	1.0 ± 1.5 ^e	8.5 ± 3.2 ^f	1.0 ± 1.0	5.4 ± 2.2 ^{b,d,e,f}	2.2 ± 3.0 ^{c,e}	7.4 ± 1.1 ^{d,f}	1.7 ± 1.8 ^e	7.5 ± 2.0 ^f	0.6 ± 0.4

11 Key: CHO, carbohydrate; DEI, daily energy intake; HCD, high carbohydrate diet; HFD, high fat diet. ¹Snacks are defined as any calorie
12 consumption at least 15 min following the main meal; ²Percentage relative to total energy from that mealtime. Data are mean ± SD;
13 significantly different (P<0.05) within measure ^b compared to AM snacks, ^c compared to Lunch, ^d compared to PM snacks, ^e compared
14 to Dinner, ^f compared to Late PM snacks.

Table S3. Anthropometric and resting energy expenditure measures from overweight, sedentary males (n=8) from baseline, the end of the habitual period, and the end of each experimental dietary period.

	Time of measure					
	Baseline (Day -7)		Habitual (Day 0)		Experimental (Day 5)	
	Pre-HFD	Pre-HCD	Pre-HFD	Pre-HCD	HFD	HCD
Body composition¹						
Body mass (kg)	96.6 ± 10.1	96.9 ± 9.4	96.3 ± 9.2	96.6 ± 9.5	96.0 ± 9.3	96.1 ± 9.2
Fat mass (kg)	32.0 ± 4.9	31.6 ± 4.3	31.7 ± 4.8	31.4 ± 4.3	31.8 ± 4.8	31.3 ± 4.0
Lean mass (kg)	61.4 ± 7.3	62.0 ± 7.2	61.4 ± 6.8	61.9 ± 8.0	60.9 ± 6.9	62.1 ± 9.2
Bone mineral content (kg)	3.25 ± 0.47	3.29 ± 0.49	3.26 ± 0.46	3.26 ± 0.45	3.278 ± 0.47	3.26 ± 0.47
Visceral adipose tissue (kg)	1.74 ± 0.62	1.74 ± 0.62	1.75 ± 0.58	1.69 ± 0.49	1.70 ± 0.55	1.63 ± 0.57
Body fat (%)	34.2 ± 3.9	33.8 ± 3.8	34.0 ± 4.0	33.8 ± 4.2	34.3 ± 4.1	33.8 ± 3.7
Resting energy expenditure (kJ/d)	9056 ± 1047	9045 ± 1328	8806 ± 1069	9005 ± 1353	8759 ± 819	8504 ± 843

¹From DXA measures; NS differences were observed between pre-condition measures.

Table S4. Wear time for activity monitor analysis across the habitual (Day -7 to Day 0) and Experimental (Day 1 – 5) periods for overweight, sedentary males (n=8).

	Time of measure			
	Habitual (Day -7 to 0) Pre-HFD	Pre-HCD	Experimental (Day 1 to 5) HFD	HCD
ActivPal , total wear time (min) ¹	970 ± 95	984 ± 103	955 ± 69	965 ± 80
Actigraph , wear time (min) ¹	950 ± 134	926 ± 166	938 ± 168	917 ± 145
Pre-prandial wear time, breakfast (min)	58 ± 3	58 ± 3	49 ± 14	51 ± 9
Pre-prandial wear time, lunch (min)	61 ± 1	60 ± 2	59 ± 3	60 ± 2
Pre-prandial wear time, dinner (min)	61 ± 1	60 ± 2	61 ± 0	60 ± 3
Postprandial wear time, breakfast (min)	176 ± 9	176 ± 10	169 ± 14	173 ± 12
Postprandial wear time, lunch (min)	176 ± 6	178 ± 4	175 ± 7	178 ± 4
Postprandial wear time, dinner (min)	163 ± 17	145 ± 29	164 ± 16	149 ± 21
Sensewear , wear time ²				
Waking (h)	951 ± 246	932 ± 101	904 ± 232	966 ± 127
Sleep (h) ³	469 ± 104	471 ± 103	488 ± 296	435 ± 115

¹From Activpal and ActiGraph activity monitors where only waking hours were analysed, when total wake time was >10 h. ²From SenseWear Armband monitors estimated from total wear time (>98%) over 24 h. ³Data are n=7 due to one participant removing the monitor overnight for one condition. Data are mean ± SD.