

## Supplementary Appendix

This appendix has been provided by the authors to give readers additional information about their work.

### **Supplementary Material**

Results for university- and sex- stratified changes in weight, body mass index, exercise volume per week, and sedentary time per day over 4-month lockdown are shown in Supplementary table 1. Characteristics of psychological status and dietary habits during a 4-month lockdown are shown in Supplementary table 2. University- and body mass index-stratified and multivariable-adjusted results for the relationships of COVID -19 induced stress, change in sedentary time and depression to weight change were shown in Supplementary Table 3 and 4 respectively. Supplementary table 5 is pooled, multivariable-adjusted and sex-stratified results for the relationships of change in sedentary time and depression to percentage change in weight.

Findings for COVID-19 induced stress, change in sedentary time, depression were generally similar in both direction and magnitude by sex and in two universities (Supplementary Table 3). Consistent with greater absolute weight gain among overweight versus normal weight persons, magnitudes of relationships were larger among those who were overweight at baseline, but findings were qualitatively similar in both normal weight and overweight persons (Supplementary Table 4). The results were also similar when evaluated as relative (percent) weight changes rather than absolute weight changes (Supplementary Table 5).

27 Supplementary table 1. University- and sex- stratified changes in weight, body mass index,  
 28 exercise volume per week, and sedentary time per day in participants during a 4-month  
 29 lockdown.  
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	Baseline	Change over 4-month lockdown Mean (95% CI)	P Value	Baseline	Change over 4-month lockdown Mean (95% CI)	P Value
Total (N = 12,889)		Males (N = 2,549)			Females (N = 10,340)	
Body Weight, kg	63.4±10.3	2.6 (2.0 to 3.2)	< 0.001	52.0 ± 7.7	2.1 (1.9 to 2.4)	< 0.001
Body mass index, kg/m <sup>2</sup>	21.2 ± 3.2	0.9 (0.7 to 1.1)	< 0.001	20.2 ± 2.7	0.9 (0.8 to 0.9)	< 0.001
Overweight, n (%)¶	297 (11.7)	414 (16.2)	< 0.001	1,510(14.6)	2,011 (19.4)	< 0.001
Obesity, n (%)¶	74 (2.9)	144 (5.6)	< 0.001	299 (2.9)	649 (6.3)	< 0.001
Exercise volume, MET- hr/wk	13.9 ±12.3	-0.6 (-1.1 to -0.1)	0.02	8.8 ± 8.3	2.5 (2.3 to 2.7)	< 0.001
Sedentary time, hr/day	6.9 ± 3.3	3.9 (3.7 to 4.1)	< 0.001	7.3 ± 3.4	3.6 (3.5 to 3.7)	< 0.001
University 1 (N = 9,472) §		Males (N = 1,509)			Females (N = 7,963)	
Body Weight, kg	62.3 ±10.2	2.8 (2.0 to 3.5)	< 0.001	52.0 ± 7.8	2.1 (1.9 to 2.4)	< 0.001
Body mass index, kg/m <sup>2</sup>	21.0 ± 3.2	0.9 (0.7 to 1.2)	< 0.001	20.3 ± 2.7	0.9 (0.8 to 1.0)	< 0.001
Overweight, n (%)	214 (14.5)	284 (18.8)	< 0.001	1,370(17.2)	1,783(22.4)	< 0.001
Obesity, n (%)	57 (3.8)	107 (7.1)	< 0.001	263 (3.3)	573 (7.2)	< 0.001
Exercise volume, MET- hr/wk	14.2 ±12.5	0.1 (-0.8 to 1.0)	0.60	9.1 ± 8.5	2.8 (2.5 to 3.1)	< 0.001
Sedentary time, hr/day	6.9 ± 3.4	3.7 (3.4 to 4.1)	< 0.001	7.3 ± 3.4	3.5 (3.3 to 3.6)	< 0.001
University 2 (N = 3,417) §		Males (N = 1,040)			Females (N = 2,377)	
Body Weight, kg	65.0 ±10.3	2.4 (1.4 to 3.3)	< 0.001	52.2 ± 7.6	2.2 (1.7 to 2.6)	< 0.001
Body mass index, kg/m <sup>2</sup>	21.4 ± 3.1	0.8 (0.5 to 1.1)	< 0.001	20.1 ± 2.5	0.9 (0.7 to 1.1)	< 0.001
Overweight, n (%)	83 (8.0)	130 (12.5)	< 0.001	140 (5.9)	228 (9.6)	< 0.001
Obesity, n (%)	17 (1.6)	37 (3.6)	< 0.001	36 (1.5)	76 (3.2)	< 0.001
Exercise volume, MET- hr/wk	13.7 ±12.2	-1.5 (-2.6 to -0.5)	0.003	7.7 ± 7.3	1.3 (0.9 to 1.8)	< 0.001
Sedentary time, hr/day	7.0 ± 3.2	4.0 (3.7 to 4.4)	< 0.001	7.3 ± 3.3	4.1 (3.9 to 4.3)	< 0.001

31 § University 1 was Hunan Traditional Chinese Medical College, Hunan, University 2 is  
 32 China; Jinhua Polytechnic, Zhejiang, China.  
 33 Data was expressed as mean ± standard deviation or number (percent) accordingly.  
 34 ¶ Overweight and obesity cut-off point were referred to Asian criteria, overweight is BMI ≥  
 35 24 and < 28 kg/m<sup>2</sup>, and obesity BMI ≥ 28 kg/m<sup>2</sup>. These were expressed as number (percent).  
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48 Supplementary table 2. Characteristics of psychological status and dietary habits during a 4-  
 49 month lockdown.

Variables	Males (N = 2,549)	Females (N = 10,340)	Total (N = 12,889)	50 51
Psychological status				52
COVID-19 induced stress				53
None	1,667 (65.4)	5,955 (57.6)	7,622 (59.1)	54
Mild	177 (6.9)	835 (8.1)	1,012 (7.9)	55
Moderate	431 (16.9)	2,265 (21.9)	2,696 (20.9)	56
Major	100 (3.9)	515 (5.0)	615 (4.8)	57
Severe	174 (6.9)	770 (7.4)	944 (7.3)	58
Depression score	5 ± 8	6 ± 8	6 ± 8	59
Anxiety score	39 ± 10	39 ± 10	39 ± 10	60
Dietary habits				61
Alcohol, drinks/wk	1.8 ± 2.9	0.7 ± 1.6	0.9 ± 2.0	62
Snacking per day				63
No	429 (16.8)	1,246 (12.1)	1,675 (13.0)	64
Day or late-night	1,004 (39.4)	4,840 (46.8)	5,844 (45.3)	65
Day and late-night	1,116 (43.8)	4,254 (41.1)	5,370 (41.7)	66
Breakfast frequency/wk				67
Less than once	259 (10.2)	1,029 (10.0)	1,288 (10.0)	68
Two to six	1,425 (55.9)	5,981 (57.8)	7,406 (57.5)	69
Every day	865 (33.9)	3,330 (32.2)	4,195 (32.5)	70
Lunch frequency/wk				71
Less than once	40 (1.6)	149 (1.4)	189 (1.5)	72
Two to six	474 (18.6)	2,648 (25.6)	3,122 (24.2)	
Every day	2,035 (79.8)	7,543 (73.0)	9,578 (74.3)	

73 Data was expressed as mean ± standard deviation or number (percent) accordingly.  
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99 Supplementary table 3. University-stratified and multivariable-adjusted results for the  
 100 relationships of COVID -19 induced stress, change in sedentary time and depression to  
 101 weight change during a 4-month lockdown.

	University 1 (N =9,472)		University 2 (N =3,417)		Total (N = 12,889)	
	Weight Change (kg) Mean (95% CI)	P Value	Weight Change (kg) Mean (95% CI)	P Value	Weight Change (kg) Mean (95% CI)	P Value
COVID -19 induced stress ¶						
None	Reference		Reference		Reference	
Mild	- 0.031 (-0.259 to 0.197)	0.99	0.118 (-0.226 to 0.463)	0.86	-0.015 (-0.205 to 0.176)	0.99
Moderate	0.020 (-0.369 to 0.329)	0.99	0.126 (-0.369 to 0.619)	0.95	-0.025 (-0.310 to 0.261)	0.99
Major	0.044 (-0.376 to 0.463)	0.99	0.180 (-0.473 to 0.834)	0.93	0.056 (-0.298 to 0.409)	0.99
Severe	0.492 (0.147 to 0.839)	0.03	0.784 (0.028 to 0.1.36)	0.002	0.551 (0.254 to 0.847)	< 0.001
Change in sedentary time, hr/day	0.470 (0.451 to 0.489)	< 0.001	0.502 (0.471 to 0.532)	< 0.001	0.476 (0.460 to 0.492)	< 0.001
Depression score	0.017 (0.006 to 0.029)	0.003	0.025 (0.004to 0.045)	0.02	0.017 (0.007 to 0.027)	0.001

102 Multivariable model was used to adjust for sex, age, baseline weight, change in exercise  
 103 volume, dietary habits (including breakfast and lunch frequency per week, and snacking  
 104 frequency per day), alcohol, smoking, anxiety score, and all the variables shown in the table  
 105 simultaneously. Mean variance inflation factors were 1.20, 1.24, and 1.21 for university 1,  
 106 university 2 and total analyses respectively.

107 § University 1 was Hunan Traditional Chinese Medical College, Hunan province, University  
 108 2 is China; Jinhua Polytechnic, Zhejiang province, China.

109 ¶ For COVID -19 induced stress, no stress was a reference.

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111 Supplement table 4. BMI-stratified and multivariable-adjusted results for the relationships of  
 112 COVID -19 induced stress, change in sedentary time and depression and to weight change  
 113 during a 4-month lockdown.

	BMI < 24 kg/m <sup>2</sup> ‡ (N = 2,180)		BMI ≥ 24 kg/m <sup>2</sup> ‡ (N = 10,709)		Total (N = 12,889)	
	Weight Change (kg) Mean (95% CI)	P Value	Weight Change (kg) Mean (95% CI)	P Value	Weight Change (kg) Mean (95% CI)	P Value
COVID -19 induced stress ¶						
None	Reference		Reference		Reference	
Mild	- 0.070 (-0.262 to 0.122)	0.83	0.609 (- 0.190 to 1.408)	0.21	-0.002 (-0.192 to 0.188)	0.99
Moderate	-0.040 (-0.334 to 0.252)	0.99	0.168 (-0.875 to 1.210)	0.99	-0.006 (-0.291 to 0.280)	0.99
Major	-0.023 (-0.382 to 0.336)	0.99	0.762 (-0.655 to 2.179)	0.54	0.069 (-0.285 to 0.422)	0.98
Severe	0.492 (0.193 to 0.791)	< 0.001	1.106 (0.051 to 2.295)	0.01	0.551 (0.254 to 0.847)	< 0.001
Change in sedentary time, hr/day	0.451 (0.435 to 0.468)	< 0.001	0.651 (0.589 to 0.714)	< 0.001	0.476 (0.459 to 0.492)	< 0.001
Depression score	0.021 (0.013 to 0.029)	< 0.001	0.035 (0.004 to 0.066)	0.03	0.023 (0.015 to 0.031)	< 0.001

114 Multivariable model was used to adjust for sex, age, change in exercise volume, dietary  
 115 habits (including breakfast and lunch frequency per week, and snacking frequency per day),  
 116 alcohol, smoking, anxiety score, and all the variables shown in the table simultaneously.

117 Mean variance inflation factors for all analyses were 1.08.

118 ‡ 24 kg/m<sup>2</sup> is cut-off point of overweight for Asian criteria.

119 ¶ For COVID -19 induced stress, no stress was a reference.

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121 Supplementary table 5. Pooled, multivariable-adjusted and sex-stratified results for the  
 122 relationships of change in sedentary time and depression to percentage change in weight  
 123 during a 4-month lockdown.

	Males (N = 2,549)		Females (N = 10,340)		Total(N = 12,889)	
	Weight Change (kg)	P Value	Weight Change (kg)	P Value	Weight Change (kg)	P Value
	Mean (95% CI)		Mean (95% CI)		Mean (95% CI)	
COVID -19 induced stress¶						
None	Reference		Reference		Reference	
Mild	0.207 (-0.556 to 0.969)	0.94	-0.120 (-0.508 to 0.267)	0.90	-0.096 (-0.442 to 0.250)	0.93
Moderate	-0.526 (-1.674 to 0.622)	0.69	0.030 (-0.551 to 0.612)	0.99	-0.090 (-0.609 to 0.430)	0.99
Major	0.329 (-1.114 to 1.772)	0.96	0.014 (-0.704 to 0.731)	0.99	0.039 (-0.605 to 0.682)	0.99
Severe	1.240 (0.113 to 2.367)	0.02	0.920 (0.310 to 1.530)	< 0.001	0.956 (0.417 to 1.495)	< 0.001
Change in sedentary time, hr/day	0.825 (0.763 to 0.888)	< 0.001	0.876 (0.843 to 0.909)	< 0.001	0.867 (0.837 to 0.896)	< 0.001
Depression score	0.037 (0.001 to 0.073)	0.04	0.033 (0.012 to 0.054)	0.002	0.029 (0.011 to 0.047)	0.002

124 Multivariable model was used to adjust for age, baseline weight, change in exercise volume,  
 125 dietary habits (including breakfast and lunch frequency per week, and snacking frequency per  
 126 day), alcohol, smoking, anxiety score, and all the variables shown in the table simultaneously.  
 127 Mean variance inflation factors were 1.14, 1.15, and 1.15 for three analyses respectively.

128 ¶ For COVID -19 induced stress, no stress was a reference.

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