Acute effects of exercise on self-regulation of snacking-related variables among habitual snackers

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I certify that all material in this thesis which is not my own work has been identified and that no material has previously been submitted and approved for the award of a degree by this or any other University.

.......................... (Hwajung Oh)
ABSTRACT

Theories of health behaviour change largely focus on two processes, one involving cognitions and one involving more automated and responsive behaviour (Rothman, Sheeran, & Wood, 2009). The former theories focus on beliefs and attitudes, planning, intentions and goal focused actions. The latter focus on capacity to self-control actions in certain situations. Self-regulation theory considers the effort that people invest to control their own responses to achieve particular goals (Vohs & Baumeister, 2004). Within theories of addiction, self-control is fundamentally challenged. Incentive-Sensitization theory (Robinson & Berridge, 1993) suggests that cues become associated with incentive value and a sensitised motivational response. Despite the best of intentions to avoid a certain unhealthy behaviour, a learned automatic response becomes the norm. Only recently have aspects of eating become linked to addictive behaviour (Avena, Rada, & Hoebel, 2008; Benton, 2010) and the idea of building self-regulatory capacity is of increasing interest (Johnson, Pratt & Wardle, 2011).

Short single bouts of exercise appear to reduce self-reported cravings, engagement in addictive behaviours, and salience of cues associated with the behaviour for smokers (Taylor, Ussher, & Faulkner, 2007), and rehabilitating alcoholics (Ussher, Sampuran, Doshi, West, & Drummond, 2004). Regular exercise may also have benefits on self-regulation of other behaviour (Oaten & Cheng, 2006; Ussher, Taylor & Faulkner, 2008). Studies of animals addicted to various substances also support the idea that physical activity attenuates consumption (e.g., Smith, Schmidt, Iordanou, & Mustroph, 2008).

The aims of this thesis were to examine the effect of a short bout of exercise on self-regulatory processes associated with snacking involving behavioural observation, self-report measures, direct and indirect measures of attentional bias. Also the effects of different intensities of exercise, level of stress, participant weight, smoking status, and period of abstinence were explored.

In Study 1, ad libitum chocolate consumption was measured in a simulated workplace (low and high stress situation via Stroop task). The effect of prior moderate intensity exercise (a 15 min-brisk walk) was compared with a passive condition in a randomised 2 x 2 factorial design, involving 78 abstaining regular chocolate eaters. The main findings of Study 1 were that the two (low & high stress) exercise groups ate significantly less chocolate than the passive groups. The manipulation of different stress situations did not influence the effect of exercise on chocolate consumption.
Study 2 and Study 3 involved a randomised counterbalanced cross-over design in which the effects of exercise were compared with a passive condition. In Study 2, the effect of moderate intensity exercise (a 15 min brisk walk) on self-reported craving and attentional bias (using a visual dot probe task, with chocolate and neutral images presented in matched pairs) (both measured before and after each condition) were assessed among different groups (normal and overweight people, and 1 day and > 1 week (during Lent) chocolate abstainers) with a total of 58 participants. Exercise significantly reduced chocolate craving and attentional bias to chocolate images compared with a passive condition and the effects were similar irrespective of Body Mass Index and abstinence period.

In Study 3, given that abstinent smokers are at risk of emotional eating and weight gain, regular smokers and snackers were asked to abstain from smoking. Self-reported craving and attentional bias (using an eye tracking technology with short video clips) for both snack foods and cigarettes (presented alongside neutral images) were measured. The effects of two different intensities of exercise (i.e., 15 mins of moderate and vigorous intensity cycling) were examined among 23 temporarily abstinent smokers compared with a passive condition. The findings revealed that subjective snack cravings and strength of desire to smoke were reduced during and immediately after both moderate and vigorous exercise. In terms of attentional bias, initial attentional bias (% of first fixation) to snacking/smoking images were reduced after both intensities of exercise and maintained attentional biases (% of dwell time) to snacking/smoking images were reduced only after vigorous exercise.

Overall, the series of studies found that a short bout of moderate intensity exercise appears to reduce cravings and attentional bias to snack-related food cues, and the effects were similar among different groups, different type/intensity of exercise, and different measures of cravings. The findings of this thesis have therefore suggested that compared with being sedentary a short bout of physical activity may help to enhance self-regulation of snacking among people with a habit of snacking, particularly with chocolate.
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# Contents

<table>
<thead>
<tr>
<th>Abstract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Page 1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Acknowledgements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Page 3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ch.1. Introduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Page 13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ch.2. Literature Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Page 17</td>
</tr>
</tbody>
</table>

2.1. Food craving and addiction  
2.1.1. Definition of addiction and craving  
2.1.2. Homeostatic hunger vs. hedonic hunger  
2.1.3. Liking vs. Wanting  
2.2. Applied addiction theories  
2.2.1. Cognitive theories  
2.2.1.1. Hedonic Theories  
2.2.1.2. Self-regulation Theory  
2.2.1.3. Reinforcement Theories of Addiction  
2.2.1.4. Incentive-Sensitization Theory  
2.2.1.5. The Elaborated Intrusion (EI) Theory of desire  
2.2.1.6. PRIME Theory  
2.2.2. Psycho-physiology  
2.3. Factors influencing food craving, interest (attentional bias) and food consumption  
2.3.1. Gender, age, BMI and cravings  
2.3.2. Dieting condition and cravings  
2.3.3. Cue exposure and cravings  
2.3.4. Emotional state and cravings  
2.3.5. Personality (impulsivity)  
2.3.6. Other health risk behaviour and food consumption  
2.4. Measurement issues  
2.4.1. Measures of food consumption  
2.4.1.1. Observation (actual amount eaten)  
2.4.1.2. Self-report  
2.4.2. Measures of food craving and attentional bias  
2.4.2.1. Direct measures using self-report  
2.4.2.2. Implicit measures (attentional bias)  
2.4.3. Measure of impulsivity  
2.4.3.1. Self-report measures  
2.4.3.2. Experimental tasks  
2.5. The effects of exercise on eating behaviours and related constructs  

<table>
<thead>
<tr>
<th>2.4. Measurement issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Page 59</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.5. The effects of exercise on eating behaviours and related constructs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Page 69</td>
</tr>
</tbody>
</table>
2.5.1. Overview of previous studies 69
2.5.2. Subjective characteristics 79
2.5.3. Exercise characteristics 81
2.5.4. Mechanism 83

Ch.3: Study 1: Effects of brisk walking on ad libitum snacking in regular chocolate eaters during a workplace simulation 86

3.1. Introduction 86

3.2. Methodology 88
3.2.1. Participants 88
3.2.2. Procedures 89
3.2.3. Measures 90
3.2.4. Statistical analysis 92

3.3. Results 92
3.3.1. Participant Demographics 92
3.3.2. Manipulation checks 95
3.3.3. Effects of condition and task on chocolate consumption 97
3.3.4. Effects of visual stimuli on chocolate craving 98
3.3.5. Mechanisms 98

3.4. Discussion 101

Ch.4: Study 2: The acute effects of moderate intensity exercise on hedonic food cravings and attentional bias (the visual dot probe task) among normal weight and overweight females during temporary and naturalistic (during Lent) abstinence. 109

4.1. Introduction 109

4.2. Methodology 112
4.2.1. Participants 112
4.2.2. Procedures 113
4.2.3. Measures 115
4.2.3.1. Background measures 115
4.2.3.2. Main outcome measures 117
4.2.4. Data analysis 119

4.3. Results 121
4.3.1. Baseline participant characteristics by group sampled 121
4.3.2. Manipulation checks 123
4.3.3. Effect of exercise on attentional bias and chocolate cravings by three sampled groups 124
4.3.4. Effects of condition order on baseline outcome values 124
4.3.5. Correlations between background and trait measures with the 125
outcome measures
4.3.6. Effect of exercise on attentional bias 127
4.3.7. Effects of exercise on self-reported carving and affect 130
4.3.8. Does affect mediate the effects of exercise on attentional bias and cravings
4.3.9. Relationship between measures 136
4.3.10. Summary of qualitative data 137

4.4. Discussion 138

Ch.5: Study 3: The effects of exercise on hedonic food and smoking cravings, and attentional bias among temporarily abstinent smokers 145

5.1. Introduction 145

5.2. Methodology 147
  5.2.1. Participants 147
  5.2.2. Procedures 148
  5.2.3. Measures 150
  5.2.4. Data analysis 153

5.3. Results 155
  5.3.1. Participant demographics and baseline information 155
  5.3.2. Manipulation checks 156
  5.3.3. Correlations between cravings and attentional bias measures 157
  5.3.4. Effects of condition order on outcome values 158
  5.3.5. Effects of exercise on self-reported snacking and smoking craving 158
  5.3.6. Effects of exercise on attentional bias on snacking and smoking 167
  5.3.7. Associations between change in affect and attentional bias (post-treatment) to snack food images 172

5.4. Discussion 172

Ch. 6. General Discussion 179

6.1. Summary of each study 179

6.2. Discussion of findings 181
  6.2.1. Connection between studies 181
  6.2.2. Methodological issues 182
    6.2.2.1. Manipulation of cravings 182
    6.2.2.2. Engaging participants in exercise (monitoring issue) 184
  6.2.3. Measurement issues in assessing eating-related constructs 185
    6.2.3.1. Self-reported measures for craving 185
    6.2.3.2. Attentional bias 186
    6.2.3.3. Relation between self-reported craving and 187
6.2.3.4. Liking and wanting issues with outcome measure 188
6.2.4. Generalizability of the findings 189
   6.2.4.1. Recruitment issues 189
   6.2.4.2. Characteristics of the samples across three studies 189
6.2.5. Dose response issues 191
6.2.6. Theories and mechanisms 191

6.3. Limitations and direction for future research 194
   6.3.1. Limitations 194
   6.3.2. Further research 195

6.4. Implications 196

Ch.7. Conclusion 197

Reference list 198

Appendices 229
## List of Tables

### Chapter 2.
- Table 2.1. DSM-IV-TR substance dependence criteria  
  Page 17
- Table 2.2. The effects of chronic stress on eating-related variables  
  Page 41
- Table 2.3. The effect of stress on eating-related variables in experimental studies  
  Page 45
- Table 2.4. Studies looking at the acute effect of exercise on eating behaviours  
  Page 71

### Chapter 3.
- Table 3.1. Participant demographic and baseline information  
  Page 93
- Table 3.2. Mean (SD) scores for heart rate, Feelings Scale, and Felt Arousal Scale, by condition, over time  
  Page 94
- Table 3.3. The Scores on FCQ-S compared with other sample  
  Page 104
- Table 3.4. The scores on FCQ-T compared with other samples  
  Page 105

### Chapter 4.
- Table 4.1. Participant demographics  
  Page 122
- Table 4.2. Baseline (SD) for the outcome variables by group sampled  
  Page 123
- Table 4.3. Mean (SD) for HR, RPE, and HRR  
  Page 124
- Table 4.4. The effects of session order on outcome variables  
  Page 125
- Table 4.5. Baseline correlations between outcome measures and background and trait measures by condition  
  Page 126
- Table 4.6. Correlation between outcome measures and trait measure after treatment  
  Page 127
- Table 4.7. Mean (SD), and main and interactive effects of condition and time for attentional bias  
  Page 128
- Table 4.8. Mean (SD), and main, and interactive effects of condition and time for subjective measures  
  Page 131
- Table 4.9. The percentage of subjects for the next chocolate consumption  
  Page 134
- Table 4.10. Correlation between attentional bias and subjective measures of cravings  
  Page 137
- Table 4.11. Summary of interview data  
  Page 138

### Chapter 5.
- Table 5.1. Participant demographic and background variable data  
  Page 155
- Table 5.2. Baseline mean (SD) for outcome variables by treatment  
  Page 156
- Table 5.3. Means (SD) for HR, HRR, and RPE  
  Page 157
- Table 5.4. Correlation between subjective measures and attentional bias measures at baseline  
  Page 157
- Table 5.5. Testing the effects of condition order on condition × time interactions for the main outcome variables  
  Page 158
- Table 5.6. Mean (SD), and main and interactive effects of condition and time for subjective measures  
  Page 159
- Table 5.7. Mean (SD), and main and interactive effects of condition and time for attentional bias (% of initial fixations and % of dwell time)  
  Page 168
- Table 5.8. Correlation between ∆ FS & FAS and attentional bias measures by conditions  
  Page 172
Chapter 6.
Table 6.1. Summary of Study 1, 2, and 3
## List of Figures

### Chapter 2.

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Hunger and satiety signalling during consumption of standard (a) and palatable (b) food</td>
<td>20</td>
</tr>
<tr>
<td>2.2</td>
<td>The Determinants of Food Choice Model</td>
<td>21</td>
</tr>
<tr>
<td>2.3</td>
<td>Components of liking, wanting, and learning inside reward</td>
<td>22</td>
</tr>
<tr>
<td>2.4</td>
<td>Two models of addictive behaviours</td>
<td>27</td>
</tr>
<tr>
<td>2.5</td>
<td>The Elaborated Intrusion (EI) Theory of desire</td>
<td>29</td>
</tr>
<tr>
<td>2.6</td>
<td>The human motivational system</td>
<td>30</td>
</tr>
<tr>
<td>2.7</td>
<td>Volkow et al (2003)’s four neural networks model</td>
<td>31</td>
</tr>
<tr>
<td>2.8</td>
<td>Schematic diagram of brain processing</td>
<td>32</td>
</tr>
<tr>
<td>2.9</td>
<td>The brain area of the mesolimbic dopamine pathway and the process of the activity of the pathway</td>
<td>33</td>
</tr>
<tr>
<td>2.10</td>
<td>Theoretical model of reward based stress eating</td>
<td>39</td>
</tr>
<tr>
<td>2.11</td>
<td>Stress-induced eating models: The Individual-Difference Model</td>
<td>40</td>
</tr>
<tr>
<td>2.12</td>
<td>Hypothetical model of how physical activity impacts on hormonal and appetite regulation of energy balance in men and women</td>
<td>79</td>
</tr>
<tr>
<td>2.13</td>
<td>Responses to valence (the feeling scale, FS) and activation (activation scale, FAS)</td>
<td>84</td>
</tr>
</tbody>
</table>

### Chapter 3.

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>The time points of measure</td>
<td>91</td>
</tr>
<tr>
<td>3.2</td>
<td>Mean (SEM) heart rate before, during, and after treatment in the exercise and rest conditions</td>
<td>95</td>
</tr>
<tr>
<td>3.3</td>
<td>Mean (SEM) FS scores after cognitive challenge task by condition and task demand</td>
<td>96</td>
</tr>
<tr>
<td>3.4</td>
<td>Mean (SEM) FAS scores after cognitive challenge task by condition and task demand</td>
<td>96</td>
</tr>
<tr>
<td>3.5</td>
<td>Interaction effects of stress and treatment condition in total chocolate consumption</td>
<td>97</td>
</tr>
<tr>
<td>3.6</td>
<td>The mean (SEM) desire scores of FCQ-S by time (pre and post chocolate cue)</td>
<td>98</td>
</tr>
<tr>
<td>3.7</td>
<td>Mean (SEM) FS scores before, during, and after treatment in the exercise and rest conditions</td>
<td>99</td>
</tr>
<tr>
<td>3.8</td>
<td>Mean (SEM) FAS scores before, during and after treatment in the exercise and rest conditions</td>
<td>99</td>
</tr>
<tr>
<td>3.9</td>
<td>Diagram of the mediating effects of FAS on the relationship between condition and chocolate consumption</td>
<td>100</td>
</tr>
</tbody>
</table>

### Chapter 4.

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>Study overview</td>
<td>112</td>
</tr>
<tr>
<td>4.2</td>
<td>The time frame for measures</td>
<td>114</td>
</tr>
<tr>
<td>4.3</td>
<td>Hypothesised path model for mediation analyses</td>
<td>120</td>
</tr>
<tr>
<td>4.4</td>
<td>Mean (SEM) total attentional bias overtime by condition</td>
<td>128</td>
</tr>
<tr>
<td>4.5</td>
<td>Mean (SEM) initial attentional bias overtime by condition</td>
<td>129</td>
</tr>
</tbody>
</table>
Figure 4.6. The effects of a passive and exercise condition on maintained attentional bias 130
Figure 4.7. Mean (SEM) chocolate craving over time by condition 132
Figure 4.8. Mean (SEM) desire to eat chocolate over time by condition 132
Figure 4.9. Mean (SEM) hunger over time by condition 133
Figure 4.10. Mean (SEM) FS over time by condition 134
Figure 4.11. Mean (SEM) FAS over time by condition 135

Chapter 5.
Figure 5.1. The time frame for measures 150
Figure 5.2. The effects of a passive, moderate exercise, and vigorous exercise condition on desire to snack 161
Figure 5.3. The effects of a passive, moderate exercise, and vigorous exercise condition on hunger 162
Figure 5.4. The effects of a passive, moderate exercise, and vigorous exercise condition on strength of desire to smoke 164
Figure 5.5. The effects of a passive, moderate exercise, and vigorous exercise condition on FS 165
Figure 5.6. The effects of a passive, moderate exercise, and vigorous exercise condition on FAS 165
Figure 5.7. The effects of a passive, moderate exercise, and vigorous exercise condition on MPSS 166
Figure 5.8. The effects of a passive, moderate exercise, and vigorous exercise condition on % of initial fixation on snacking 169
Figure 5.9. The effects of a passive, moderate exercise, and vigorous exercise condition on % of dwell time on snacking 169
Figure 5.10. The effects of a passive, moderate exercise, vigorous exercise condition on % of initial fixation on smoking 170
Figure 5.11. The effects of a passive, moderate exercise, vigorous exercise condition on % of dwell time on smoking 171

Picture

Picture 1. A computer screen and eye tracking camera 149
Picture 2. Three screens used for eye tracking system 151