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**The effect of wearing an obese body suit on snack food consumption and
alcohol consumption**

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26 **Abstract**

27 A previous study showed that wearing an obese body suit results in increased snack food
28 consumption. The aim of this study was to explore mechanisms that may explain the effect
29 that wearing an obese body suit has on snack food consumption. We examined two potential
30 explanations; that the psychosocial experience of being overweight resulted in stereotype
31 consistent behaviour (overeating) or in impairments to self-control. Ninety-four women
32 participated in a laboratory study in which they were asked to wear an obese body suit or
33 control clothing in a public setting, before being given access to snack food and alcohol.
34 Clothing condition had no effect on snack food or alcohol consumption. It is possible that the
35 presence of alcohol in the taste test removed the previously observed effect of the obese body
36 suit on snack food consumption.

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38 **Key Words:** Obese Body Suit; Obesity; Weight Stigma; Eating Behaviour

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51 **Introduction**

52 The stigma attached to heavier body weights is pervasive (Puhl & Brownell, 2001; Puhl &
53 Heuer, 2009). Identifying oneself as being overweight is associated with depression (Roberts
54 & Duong, 2013), maladaptive eating behaviours (Jones, Grilo, Masheb & White, 2010) and
55 weight gain (Robinson, Hunger & Daly, 2015). These studies suggest that the psychosocial
56 experience of identifying as overweight is associated with worse weight management. One
57 plausible pathway is that the stigma of identifying as being overweight can cause overeating.
58 In line with this, an experimental study has shown that taking on the psychosocial experience
59 of being overweight by wearing an obese body suit can affect eating behaviour. In this study,
60 wearing an obese body suit, relative to control clothing, resulted in increased snack food
61 consumption in women (Incollingo Rodriguez, Heldreth & Tomiyama, 2016).

62 Here we examined *why* the psychosocial experience of being overweight results in
63 greater snack food consumption. Previous studies have shown that perspective taking can
64 result in people displaying stereotype consistent behaviours (Ku, Wang & Galinsky, 2010).
65 For example, taking the perspective of an elderly person resulted in participants walking
66 more slowly (Ku et al., 2010). As such, one possible explanation for the increase in snack
67 food consumption when wearing an obese body suit is that an individual may engage in
68 stereotype consistent behaviour, such as overeating (Brochu & Esses, 2011). Alternatively,
69 anticipating rejection or stigma can lead to decreases in self-control (Baumeister, Dewart,
70 Ciarocco & Twenge, 2005; Inzlicht, McKay & Aronson, 2006). In one study exposure to
71 weight stigmatising messages, relative to neutral messages, led to increased food
72 consumption amongst women who self-identified as being overweight (Major, Hunger,
73 Bunyan & Miller, 2013). As such, an alternative explanation for the effect of the obese body
74 suit on consumption, is that the experience of being overweight can lead to anticipated stigma
75 and decreases in self-control (Baumeister et al., 2005; Major et al., 2013).

76 In the present study women wore an obese body suit or control clothing in a public setting
77 before completing a bogus taste test in which they were asked to taste and rate snack foods
78 and alcohol. If stereotype consistent behaviour (Ku et al., 2010) is responsible for increases in
79 snack food consumption when wearing an obese body suit (Incollingo Rodriguez et al.,
80 2016), then we would predict that there would be an increase in snack food consumption, but
81 not alcohol consumption, in the obese body suit condition relative to the control condition.
82 This is because unlike overeating (Brochu & Esses, 2011), we presume increased alcohol
83 consumption is not a commonly held stereotype about individuals with overweight and
84 obesity. However, if the effect of the obese body suit on snack food consumption was due to
85 decreases in self-control as a result of anticipated stigma (Baumeister et al., 2005; Major et
86 al., 2013), we predict that there would be increases in both snack food and alcohol
87 consumption in the obese body suit condition relative to the control condition.

88 We also examined a series of other psychological mechanisms that could explain the
89 effect of the psychosocial experience of overweight on snack food consumption shown in a
90 previous study (Incollingo Rodriguez et al., 2016). Identifying as overweight is associated
91 with negative affect (Al Mamun et al., 2007; Roberts & Duong, 2013) and eliciting negative
92 affect has led to increased consumption in a number of studies (Agras & Telch, 1998; Chua,
93 Touyz & Hill, 2004; Schotte, Cools & McNally, 1990). Body appearance concerns could also
94 mediate the effect of the obese body suit on snack food consumption as identification of
95 overweight has been associated with high body appearance concerns and low self-esteem
96 (Miller & Downey, 1999). Furthermore, body appearance concerns (Ackard, Neumark-
97 Sztainer, Story & Perry, 2003; Matos, Aranha, Faria, Ferreira & Teresa, 2002) and low self-
98 esteem (Ackard et al., 2003; Martyn-Nemeth, Penckofer, Gulanick, Velsor-Friedrich &
99 Bryant, 2009) are associated with binge eating and maladaptive eating strategies. Thus,

100 wearing an obese body suit may increase negative affect, reduce self-esteem or increase body
101 appearance concerns which in turn could increase snack food consumption.

102 There are also a number of individual differences that could moderate the effect of the
103 obese body suit on snack food consumption. Individuals with higher trait levels of body
104 dissatisfaction may be more sensitive to situational cues which activate negative body image
105 schemas (Cash, Skinner, Rotter & Bandura, 2012) than those who are more satisfied with
106 their bodies. Furthermore individuals with high levels of dietary restraint may be more likely
107 to eat in response to negative affect (Schotte et al., 1990) and so may be more sensitive to the
108 obese body suit manipulation, as it has been shown to induce negative affect in a previous
109 study (Incollingo Rodriguez et al., 2016). Similarly, those who are able to reappraise negative
110 emotion may be less inclined to eat in response to negative affect than those who attempt to
111 suppress negative affect (Evers, Stok & Ridder, 2010), so we examined whether emotional
112 regulation moderated the relationship between obese body suit and snack food consumption.

113

114 **Materials and Methods**

115 *Sample*

116 The eligibility criteria for participation were: women aged 18 or over with no history of food
117 allergies or eating disorders. We asked participants to refrain from eating for two hours
118 before the study to ensure baseline hunger was balanced across groups. Data was collected at
119 the University of Liverpool by three research assistants. Participants were recruited through
120 an experiment participation requirement system, in which first year undergraduate
121 psychology students participate in experiments for course credit. 94 women took part in the
122 study, the sample's age ranged from 18 – 30 years old ($M = 18.62$, $SD = 1.00$) and the
123 sample's BMI ranged from 14.57 - 33.19 ($M = 21.17$, $SD = 4.42$). This study was approved
124 by the University of Liverpool ethics committee (Ref: 0567).

125 *Measures*

126 *Effortful Self-Control:* Participants were instructed to keep a piece of paper clamped between
127 a handgrip for as long as they could. The researcher recorded how much time passed before
128 the participant loosened their grip and the paper fell out. This task is used as a measure of
129 effortful self-control as the participant will experience muscular ache when clamping the
130 handgrip shut and must override their instinct to loosen their grip (Vohs, Baumeister &
131 Ciarocco, 2005).

132

133 *Inhibitory Control:* Participants completed two Stroop tasks, both of which contained the
134 words “blue”, “yellow”, “red” and “green” repeated 20 times in coloured ink incongruent to
135 the word written. Participants were instructed to read aloud the ink colour rather than the
136 word which was written and the researcher recorded the time taken to do so. The semantic
137 meaning of words generally holds more value than the colour in which they are printed so the
138 participant must override their instinct to read the word meaning rather than the ink colour.
139 The Stroop task is a widely used measure of inhibitory control (Inzlicht & Gutsell, 2007).

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141 *Body Anxiety:* The Physical Appearance State Anxiety Scale (PASTAS) (Reed & Thompson,
142 1991) was used to assess body anxiety. Participants rated how anxious, tense or nervous they
143 felt about 16 body parts (e.g. stomach) on a 5 point Likert scale from “not at all” to
144 “exceptionally so”.

145

146 *State Self Esteem:* The appearance subscale of the State Self Esteem Scale (Heatherton &
147 Polivy, 1991) was used to assess self-esteem. Participants responded to 6 items (e.g. “I feel
148 satisfied with the way my body looks right now”) on a 5 point Likert scale where 1 represents
149 “not at all” and 5 represents “extremely”.

150 *Affect:* The Positive and Negative Affect Scale (PANAS) (Watson & Clark, 1988) was used
151 to assess affect. Participants rated the extent to which they felt 10 positively (e.g. interested)
152 and 10 negatively (e.g. irritable) valanced emotions on a 5 point Likert scale of “very slightly
153 or not at all” to “extremely”.

154

155 *Self-Presentation Concerns:* A self-presentation concerns questionnaire was created based on
156 a previous study (Incollingo Rodriguez et al., 2016). Participants responded to 5 questions
157 that asked about their experience whilst wearing the study clothing (e.g. “I felt conscious of
158 my appearance” and “I felt like people were making negative judgements about me”) on a 5
159 point Likert scale from “strongly disagree” to “strongly agree”. The 5 items were averaged to
160 produce a single score.

161

162 *Explicit Perception of Overweight:* In order to examine explicit perception of overweight,
163 participants recorded if they felt larger than usual, heavier than usual and overweight during
164 the study on a 7 point Likert scale from “strongly disagree” to “strongly agree”. The 3 items
165 were averaged to provide a single score.

166

167 *Trait Body Satisfaction:* The Body Satisfaction Scale (Slade, Dewey, Newton, Brodie &
168 Kiemle, 1990) was used to assess trait body satisfaction. Participants rated how satisfied they
169 were with 7 body parts (e.g. legs) on a 7 point Likert scale from “very dissatisfied” to “very
170 satisfied”.

171

172 *Trait Dietary Restraint:* The English version of the Dutch Eating Behaviour Questionnaire
173 (DEBQ) (Strien, Bergers & Defares, 1986) was used to assess trait dietary restraint.

174 Participants responded to 10 items (e.g. “If you have put on weight, do you eat less than you
175 usually do?”) on a five point Likert scale from “never” to “very often”.

176

177 *Emotional Regulation*; The Emotional Regulation Questionnaire (Gross & John, 2003)
178 measures ability to suppress emotional responses (expressive suppression, e.g. “I keep my
179 emotions to myself”) and reappraise situations to think of them in a more positive way
180 (cognitive reappraisal, e.g. “ I control my emotions by changing the way I think about the
181 situation I am in”). Participants responded to 10 items on a 7 point Likert scale from
182 “strongly agree” to “strongly disagree”.

183

184 *Bogus Taste Test*: Participants were provided with two bowls containing 151g of chocolate
185 digestive biscuits and 151g of Maryland chocolate chip cookies, as well as a 175ml glass of
186 red wine and a 200ml glass of water. They were also given two taste perception
187 questionnaires that asked participants to compare the two cookies and the two drinks on a
188 series of sensory properties (e.g. “cookie a/cookie b was crunchy” or ‘the wine/water was
189 rich’). Participants were told that they could eat and drink as much or as little as they liked
190 but that they would need to try at least a small amount of each item in order to complete the
191 questionnaires. Participants were left with the food and drinks for 10 minutes. The bowls
192 were weighed before and after participants completed the taste perception task and snack
193 food consumption (in grams) was recorded. Similarly, the amount of wine was recorded
194 before and after the taste test and alcohol consumed (in ml) was recorded. The bogus taste
195 test has been shown to be a valid measure of snack food consumption (Robinson et al., 2017).

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199 *Procedure*

200 Participants were told that the aim of the study was to examine the effect of physical
201 appearance on time perception. Participants provided written informed consent before
202 completing baseline measures of trait dietary restraint, body satisfaction, emotional
203 regulation, affect, effortful self-control and inhibitory control. Participants were then
204 randomly assigned to one of two conditions and were asked to wear either an obese body suit
205 with clothing or control clothing that matched the clothing in the obese body suit condition
206 (See Figure 1). Participants also wore a backpack that was empty (obese body suit) or
207 contained a 1kg weight (control) to control for the weight of the body suit. After this
208 participants were told that their next task would be randomly assigned, they were asked to
209 select one slip of paper from a box containing five in order to determine which task they
210 would complete. In reality, all of these tasks were the same and participants were led to
211 believe the task was randomly assigned in order to distract them from the study aims. All
212 participants were then given a route around a relatively busy university building and were
213 asked to find coloured pieces of paper on route. After this, participants completed measures
214 of affect, self-esteem, body anxiety, effortful self-control and inhibitory control. Participants
215 were then asked to select their second ‘random task’ in the same way as task one. All
216 participants then completed the bogus taste test. Participants were asked to guess the aims of
217 the study, completed measures of self-presentation concern and their explicit perception of
218 overweight. Participants then removed the study clothing, height and weight were measured
219 and participants were debriefed.

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225 *Figure 1.* Clothing participants wore in the obese body suit (top) and control (bottom)
226 conditions.

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228 **Analysis**

229 Two independent t tests were planned that examined the effect of clothing condition on snack
230 food consumption (grams) and alcohol consumption (ml). Correlation analysis was planned
231 to examine whether any of the proposed mediators (e.g. body anxiety, self-esteem, self-
232 presentation concerns, explicit perception of overweight, effortful self-control, inhibitory
233 control and affect) were associated with snack food or alcohol consumption. If any of these
234 factors were associated with snack food or alcohol consumption we planned to use
235 PROCESS bootstrapped mediation analysis (Hayes, 2013) to examine whether any of these
236 mechanisms mediated the relationship between clothing condition and snack food or alcohol
237 consumption. We also planned PROCESS moderation analyses to examine whether body
238 satisfaction, dietary restraint or emotional regulation (cognitive reappraisal and expressive
239 suppression) moderated the effect of the obese body suit on snack food or alcohol
240 consumption.

241 **Results**

242 *Snack food and alcohol consumption*

243 There were no significant differences between the obese body suit and control conditions on
244 snack food consumption [t (92) = -.53, p = .596, d = .11] or alcohol consumption [t (92) =
245 .92, p = .361, d = .19]. See Table 1 for snack food and alcohol consumption data.

246

247 **Table 1.**

248 Snack food and alcohol consumption data for participants in the obese body suit and control
249 conditions. Values are mean (standard deviation).

	Obese Body Suit	Control
Snack Food Consumption (grams)	39.08 (21.46)	41.54 (23.31)
Alcohol Consumption (ml)	31.75 (38.52)	25.70 (23.17)

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251 *Potential mediators*

252 None of the potential mediators (e.g. body anxiety, self-esteem, self-presentation concerns,
253 explicit perception of overweight, effortful self-control, inhibitory control and affect) were
254 significantly associated with snack food or alcohol consumption (See Table 2). As such the
255 conditions for mediation analysis were not met.

256

257 *Potential moderators*

258 There was no evidence that body dissatisfaction (snack food p = .406, Bias Corrected
259 Confidence Intervals (BCCI) = -2.21, .90; alcohol p = .465, BCCI = -3.53, 1.62), dietary
260 restraint (snack food p = .063, BCCI = -.07, 2.60; alcohol p = .127, BCCI = -.50, 3.94),
261 cognitive reappraisal (snack food p = .975, BCCI = -2.59, 2.51; alcohol p = .901, BCCI = -

262 2.71, 2.39) or expressive suppression (snack food $p = .208$, BCCI = -3.78, .84; alcohol $p =$
 263 .469, BCCI = -4.82, 2.24) moderated the relationship between clothing condition and snack
 264 food or alcohol consumption.

265

266 **Table 2.**

267 Correlations between snack food and alcohol consumption and body anxiety, self-esteem,
 268 self-presentation concerns, explicit perception of overweight, effortful self-control, inhibitory
 269 control, negative affect change and positive affect change (N = 94).

Mediator	Snack Food Consumption	Alcohol Consumption
Body Anxiety	$r(94) = -.068, p = .513$	$r(94) = .014, p = .892$
Self Esteem	$r(94) = .061, p = .561$	$r(94) = -.040, p = .701$
Self-Presentation Concerns	$r(94) = -.067, p = .524$	$r(94) = .027, p = .800$
Explicit Perception of Overweight	$r(94) = -.021, p = .844$	$r(94) = .140, p = .179$
Effortful Control Change	$r(94) = -.091, p = .385$	$r(94) = .157, p = .132$
Inhibitory Control	$r(94) = -.062, p = .552$	$r(94) = -.088, p = .399$
Negative Affect Change	$r(94) = .016, p = .877$	$r(94) = .038, p = .716$
Positive Affect Change	$r(94) = -.100, p = .337$	$r(94) = -.075, p = .470$

270

271 **Discussion**

272 Wearing an obese body suit did not affect snack food consumption or alcohol consumption
 273 during a bogus taste test. Furthermore there was no support for any of the potential mediators
 274 or moderators examined in this study.

275 These findings are in contrast with one other study (Incollingo Rodriguez et al., 2016)
 276 which showed that wearing an obese body suit leads to increased snack food consumption. In

277 this previous study the taste test did not include an alcoholic beverage and previous research
278 has shown that consuming alcohol, relative to consuming non-alcoholic beverages, can
279 increase the reward sensitivity of foods and lead to greater consumption of calorie dense
280 foods (Yeomans, 2010). As such, it may be that the inclusion of alcohol in the taste test led to
281 increased snack food consumption in both the obese body suit and control clothing conditions
282 thereby masking the effect of the obese body suit on snack food consumption.

283

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286 collection.

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