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

Melissa Oldham1, A. Janet Tomiyama2 & Eric Robinson1

1University of Liverpool, UK

2 University of California Los Angeles, USA

Corresponding Author; Melissa Oldham, moldham@liverpool.ac.uk

**Abstract**

A previous study showed that wearing an obese body suit results in increased snack food consumption. The aim of this study was to explore mechanisms of the effect that wearing an obese body suit has on snack food consumption. We examined two potential explanations; that the psychosocial experience of being overweight resulted in stereotype consistent behaviour (overeating), or that anticipated stigma resulted in impairments to self-control. Ninety-four women participated in a laboratory study where they were asked to wear an obese body suit or control clothing in a public setting, before participating in a bogus taste test in which they were asked to taste and rate snack foods and alcohol. We predicted that if wearing the obese body suit causes stereotype consistent behaviour only snack food consumption would be increased. Alternatively if impairment to self-control is responsible for why wearing the obese body suit increased snack food consumption, a similar increase in alcohol consumption would be observed. Clothing condition had no effect on snack food or alcohol consumption. It is possible that the presence of alcohol in the taste test removed the previously observed effect of the obese body suit on snack food consumption.

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

**Introduction**

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

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

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

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

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

**Materials and Methods**

*Sample*

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

*Measures*

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

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

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

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

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

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

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

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

*Trait Dietary Restraint:* The English version of the Dutch Eating Behaviour Questionnaire (DEBQ) (Strien, Bergers & Defares, 1986) was used to assess trait dietary restraint. Participants responded to 10 items (e.g. “If you have put on weight, do you eat less than you usually do?”) on a five point Likert scale from “never” to “very often”.

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

*Bogus Taste Test:* Participants were provided with two bowls containing 151g of chocolate digestive biscuits and 151g of Maryland chocolate chip cookies, as well as a 175ml glass of red wine and a 300ml glass of water. They were also given two taste perception questionnaires that asked participants to compare the two cookies and the two drinks on a series of sensory properties (e.g. “cookie a/cookie b was crunchy” or ‘the wine/water was rich’). Participants were told that they could eat and drink as much or as little as they liked but that they would need to try at least a small amount of each item in order to complete the questionnaires. Participants were left with the food and drinks for 10 minutes. The bowls were weighed before and after participants completed the taste perception task and snack food consumption (in grams) was recorded. Similarly, the amount of wine was recorded before and after the taste test and alcohol consumed (in ml) was recorded. The bogus taste test has been shown to be a valid measure of snack food consumption and is designed to avoid floor effects and demand characteristics (Robinson et al., 2017).

*Procedure*

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

**Analysis**

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

**Results**

*T Tests*

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

*Potential mediators*

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

*Potential Moderators*

There was no evidence that body dissatisfaction (snack foods p = .406, Bias Corrected Confidence Intervals (BCCI) = -2.21, .90; alcohol p = .465, BCCI = -3.53, 1.62), dietary restraint (snack foods p = .063, BCCI = -.07, 2.60; alcohol p = .127, BCCI = -.50, 3.94), cognitive reappraisal (snack foods p = .975, BCCI = -2.59, 2.51; alcohol p = .901, BCCI = -2.71, 2.39) or expressive suppression (snack foods p = .208, BCCI = -3.78, .84; alcohol p = .469, BCCI = -4.82, 2.24) moderated the relationship between clothing condition and snack food or alcohol consumption.

**Discussion**

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

 These findings are in contrast with one other study (Incollingo Rodriguez et al., 2016) which showed that wearing an obese body suit leads to increased snack food consumption. In this previous study the taste test did not include an alcoholic beverage and previous research has shown that consuming alcohol, relative to consuming non-alcoholic beverages, can increase the reward sensitivity of foods and lead to greater consumption of calorie dense foods (Yeomans, 2010). As such, it may be that the inclusion of alcohol in the taste test led to increased snack food consumption in both the obese body suit and control clothing conditions thereby masking the effect of the obese body suit on snack food consumption.

**Conclusion**

In this study we failed to replicate the effect that wearing an obese body suit has on snack food consumption. It is possible this was due to the inclusion of alcohol in the taste test.

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