BMI in Males and Females: the
Role of Emotional, External,
Restrained Eating and
Dieting Self-Efficacy.

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Submitted in partial fulfilment of the requirements of the BA Hons in Psychology at
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March 2014

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Acknowledgments

Thank you to everyone who participated in this study
and to my supervisor John Hyland.

A special thanks to Colm and Ruby
- for their unwavering support.
Abstract

This study explored the relationship between BMI, external, emotional, restrained eating and dieting self-efficacy in adult males and females. An online survey using Dutch Eating Behaviour Questionnaire and scenario based Diet Self-efficacy assessed 116 females and 50 male participants over 18yrs. Emotional eating significantly predicted BMI and restrained eating. Females reported significantly higher levels of restrained and emotional eating and lower dieting self-efficacy while experiencing negative affect compared to males. Restrained eating was significantly higher for overweight compared to normal weight men. Restrained eating significantly predicted BMI in men. Dieting self-efficacy did not differ significantly between overweight and normal weight participants. A major risk factor identified for females was emotional eating and for men was restrained eating, both of which significantly contributed to weight gain. Interventions should target emotional eating and be gender specific.
**Introduction**

Obesity is now a global concern; affecting societies at all stages of economic growth and development. It is estimated that one and a half billion adults and children globally are classified as overweight and 500 million are obese (WHO, 2013). Worldwide overeating is beginning to pose a greater risk than hunger. In Ireland, recent data reports that 61% of Irish adults are overweight or obese (HSE, 2012). Obesity is related to a myriad of health conditions from health disease, stroke, hypertension, cancer, diabetes and osteoarthritis. Each year in Ireland, it is estimated that approximately two thousand premature deaths can be attributed to obesity, resulting in an estimated cost of €4 billion to the state (HSE, 2012). A recent analysis by Keaver et al. (2013) projected that 85% - 90% of the Irish population will be overweight or obese by 2030.

*Environmental Influences of Obesity*

The obesogenic environment has been defined by Swinburn et al. (2002, as cited in Lake & Townshend, 2006) as “the sum of influences that the surroundings, opportunities, or conditions of life have on promoting obesity in individuals or populations.” In other words an environment that promotes consumption of highly palatable, energy-dense foods and one that is not conducive to weight loss (Wadden, Brownell, Foster, 2002). Some researchers suggest that the increase in consumption of unhealthy foods has been facilitated in some countries, including Ireland, by market deregulation allowing for greater proliferation of fast food industries compared to countries with more stringent regulations; such as price control and protection of agricultural producers (De Vogli, Kouvonen & Gimeno, 2013). Supporting this view a significant relationship has been found between the concentration of fast-food outlets in close proximity to homes and levels of obesity (Maddock, 2004; Spence, Cutumisu, Edwards & Evans, 2008; Pearce, Blakely, Witten & Bartie, 2007).
Although a causal link has not be established, exposure to food advertising is widely believed to increase consumption of unhealthy food (Bacardi-Gascón, Diaz-Ramírez, Cruz López, López Zuñiga, & Jiménez-Cruz, 2013; Andreyeva, Kelly & Harris, 2011) leading to increased caloric intake, making individuals more likely to gain weight and become obese (Rosenheck, 2008; Bowman, Gortmaker, Ebbeling, Pereira, & Ludwig, 2004). As a result of this research some Scandinavian countries (Alkharfy, 2011) as well as Quebec in Canada has banned food advertising to children (Dhar, & Baylis, 2011).

Adding to these barriers, developments in transport, increased use of gadgets and appliances and e-commerce have caused people to become increasingly inactive. A cross-sectional study found that although Ireland is one of the higher scoring countries in Europe for physical activity, 44% of the population lead a sedentary lifestyle (Varo et al., 2003). Researchers drawing on a large European wide sample, have empirically linked low physical activity/high sedentary behaviour, TV/video game use and consumption of energy snack food in children to a higher risk of obesity in adulthood (te Velde et al., 2007; Huh et al., 2011)

**Behavioural and Psychological Influences of Obesity**

Despite the “potency of the obesogenic environment” (Blundell et al., 2005, p. 614) not all people become overweight or obese; some people maintain a ‘normal’ weight. This poses the question, if exposed to the same environmental pressures why are some people more susceptible to weight gain than others? As well as established genetic, physiological and metabolic factors related to overweight and obesity there are considerable behavioural and psychological risk factors to consider (Blundell et al., 2005; Stroebe, Papes & Aarts, 2008). Behavioural act of eating is often accompanied or triggered by internal states such as hunger, wanting and satiety but are also influenced by individual traits such as eating style or self-efficacy and it is important to consider both when measuring susceptibility and resistance
to temptation (Blundell et al., 2005). The most relevant theories about behavioural and psychological influences of overeating that this study will focus on are; psychosomatic, externality and restraint theory which relate to three prominent eating styles; external, emotional and restrained eating in addition to self-efficacy derived from social learning theory.

External Eating

Externality theory (Schachter, 1971) proposes that food-related stimuli such as sight, smell and taste provide a stronger appetitive trigger than internal states of hunger or satiety. In an obesogenic environment with unswerving aggressive marketing of highly palatable food, individuals are exposed to powerful cues to eat around the clock. Harris, Bargh & Brownell, (2009) investigated the link between external cues in advertising and consumption. They asked adults to watch TV clips interspersed with food advertisements and then take part in an apparent unrelated taste test of healthy and unhealthy snacks. Participants who saw the advertisements ate significantly more and for significantly longer than those who didn’t view the advertisements.

Rodin (1981, as cited in Stroebe, 2008) suggests that externality is not just present in those who overeat or who are obese but is an adaptive response present in all people. Whereas, Herman & Polivy (2008) suggest that normative cues affect everyone but sensory cues have a greater effect on obese individuals. Beaver et al. (2006) found strong personality-linked differences in sensitivity to food cues related to rewards. Those with high reward sensitivity experience more food cravings, more intensely and more frequently and are more likely to be overweight than those less sensitive. A cognitive element that plays a role in externality is ‘attention bias;’ an important factor in impairing an individual’s ability to delay
gratification (Metcalf, & Mischel, 1999). fMRI studies have shown greater attention bias for food in obese versus lean individuals (Yokum & Stice, 2011).

Another aspect of externality is eating in response to social cues; research shows eating behaviour is shaped by these interactions (Herman, Roth & Polivy, 2003). de Castro (1994) suggests social facilitation effects that increase eating in the presence of friends and family are due to relaxation of inhibitions as well as longer meal times.

**Emotional Eating**

The emotional eating construct is derived from the psychosomatic theory of obesity. Kaplan & Kaplan (1957, as cited in Stroebe et al. 2008) suggested overeating was due to a disturbance in appetite, driven by a conditioned response to unhealthy food and that overeating was done in order to reduce feelings of fear and anxiety. Due to this learned association individuals are motivated to eat any time they feel anxious or scared. This theory had some shortcomings in that it failed to explain why normal-weight individuals would not develop the same negative-emotion reducing responses. Bruch (1961, as cited in Stroebe et al. 2008) attributed overeating to a maladapted inability to differentiate between internal emotional states and hunger; a product of ineffective parenting. Contemporary animal studies suggest there is a ‘self-medicating’ function to eating hedonic foods when stressed. Human studies (Bongers, Jansen, Havermans, Roefs & Nederkoom, 2013) found that negative emotional arousal did lead to increase in consumption of sweet high energy-dense foods and in addition proposed mood enhancement as a possible motivation for the increased food intake and choice of food type after finding a positive relationship between improvement in mood and number of calories consumed.

Building on psychosomatic view of eating, research in the area of emotional eating has largely focussed on negative emotional effects. Stress has been found to increase the
drive to eat (Groesz et al., 2012; Greeno, & Wing, 1994); consumption of sweet high fat ‘comfort food’ (Epel, Lapidus, McEwen & Brownell, 2001), even in the absence of hunger (Rutters, Nieuwenhuizen, Lemmens, Born & Westerterp-Plantenga, 2009). Oliver, Wardle & Gibson (2000) manipulated stress levels in men and women and found that stress did not affect overall consumption compared to control group. However, they did find that high scoring emotional eaters ate more sweet high-fat and more energy-dense foods than those who scored low on stress and emotional eating measures.

A cross-sectional study based on adolescent sample found an association between emotional eating and increased intake of sweet high energy-dense foods, such as cake and ice cream, salty high energy-dense foods like crisps, and sugary drinks Nguyen_Michel, Unger & Spruijt-Metz (2008). Geliebter & Aversa (2003) in a review study similarly found a relationship between eating in response to emotional states and BMI. Likewise, Turker et al., (2012) found emotional eating to be a significant risk factor for BMI in adolescent females. Conversely Wardle et al., (1992) found no relationship between emotional eating and BMI in a study involving adolescents. This study aims to look at how emotional eating relates to actual weight and to other eating styles.

Restrained Eating

Restrained eaters are those chronic dieters who try to cognitively control what they consume, compared to those whose eating is more disinhibited (Herman & Mack, 1975). Restrained eaters have been found to consume more hedonic food such as ice-cream, milkshake or cookies when in negative emotional states (Cools, Schotte & McNally, 1992), when anxious (Herman & Polivy, 1975) or experiencing ego threat (Heatherton, Herman & Polivy, 1991). Similar findings were made in studies using positive mood enhancement
which too lead to increased food intake in restrained eaters (funny movie clip) (Cools et al., 1992; Yeomans & Coughlan, 2009)

Regardless of emotional states, restraint alone has been associated with heightened appetitive urges and cravings in response to foods cues. Herman & Mack (1975, as cited in Stroebe, van Koningsbruggen, Papies, Aarts, 2012) suggest that restrained eaters control their food intake not by adhering to internal cues of hunger or satiety but by adhering to self-set dieting rules. They demonstrated that once these rules are broken (in this case by a milkshake pre-load) it induces a ‘what-the-hell-effect’. Supporting fMRI studies show that unrestrained eaters found palatable food more appealing (indicated by activation in areas of the brain related to satiation and memory), after they had been fed, compared to unrestrained eaters who had fasted (Demos, Kelley & Heatherton, 2011; Coletta et al., 2009).

Polivy, Coleman & Herman, (2005) showed that deprivation induced cravings and resulted in overeating the craved food in restrained eaters. Further, Fedoroff, Polivy & Herman, (1997) demonstrated that even the sight or smell of food was enough in increase consumption, cravings, liking and desire in restrained but not unrestrained eaters. Ward & Mann (2000) suggest that without gustatory, visual or olfactory cues even high cognitive load alone can interfere with self-monitoring and diet rules in restrained eaters resulting in increased consumption.

It seems food cues, hedonic thoughts and cognitive load can disrupt the self-regulatory mechanisms in restrained eaters prompting them to ‘forget’ their dieting goals and increasing indulgence. Further, Urbszat, Herman & Polivy (2002) assigned restrained eaters to a non-diet or diet condition in which subjects in diet condition would be expected to diet for one week. Following assignment to each condition participants took part in a bogus taste-test. Restrained eaters expecting to have to diet for the following week consumed more than
restrained eaters in non-diet condition or unrestrained eaters. Even thinking about dieting increased consumption.

Nevertheless, the research of long term effects of restrained eating is mixed; two studies involving children and adolescents suggest that dieting and restraint lead to increased risk of obesity in adulthood (Field et al., 2003; Stice, Cameron, Killen, Hayward & Taylor, 1999). Rideout & Barr (2009) reported a lower BMI was linked to restraint but higher BMI related to dieting. de Lauzon-Guillain (2006) found a strong association between adiposity and restrained eating in normal weight but not overweight participants and concluded that restrained eating does not promote weight gain. Marcus, Wing & Lamparski (1985) found that binge eating severity in obese female patients significantly related to dietary restraint. This study is interested in what relationship exists between BMI and restrained eating, whether overweight individuals are more likely to control their eating by limiting their intake and does restraint lead to higher BMI. Also whether particular eating styles increase risk of restrained eating or is it an effective way to control weight.

The research paints a negative picture for emotional, external and restrained eating styles with strong links established to weight gain. In an obesogenic environment achieving weight control goals requires much more cognitive resources than giving into temptation does (Stroebe et al., 2012). Increased daily stresses can lead to greater and more frequent emotional responses; relentless advertising and enticement to consume is all around coupled with extreme pressure to conform to a certain body shape for men and women; all these pressures have a profound effect on behaviour, well-being and weight.

*Dieting Goals*

The conflict model of hedonic eating (Stroebe, van Koningsbruggen, Papes & Aarts, 2013) suggest that restrained eaters find it difficult to resist temptation of palatable foods
because of incompatibility between their goal of weight control and goal of eating enjoyment. This same internal conflict could apply to emotional and external eaters too. Yet even in an obesogenic environment susceptibility to indulge varies from person to person.

The National Weight Control Registry (2014) comprises successful dieters who have lost 30 pounds or more and maintained their weight loss for more than 12 months. Having unsuccessfully negated the toxic environment to become overweight or obese, what is that changed in this minority of people to assist them with their weight loss and maintenance?

From the goal conflict perspective Stroebe et al. (2012) suggests that for these individuals, who manage to resist daily temptations, highly palatable food stimuli trigger their weight control goals allowing them to resist temptation when needed. Fishbach, Friedman & Kruglanski, (2003) too suggests that tempting stimuli were found to activate overriding goals and affect goal-related behaviour. However, neither study mentions how this change in thinking and behaviour comes about. If an individual is consistently unsuccessful in their resistance of temptation what is it that suddenly changes? If everyone is subjected to the same external cues and temptations what makes some people able to overcome what others cannot? This study considers the role self-efficacy play in weight control.

**Self-efficacy**

Self-efficacy is an element of Social Cognitive Theory (Bandura, 1989) and refers to an individual’s belief in their ability to perform a task or behaviour (Bandura, 1994). Those with high task self-efficacy will expend more effort on the task, for longer and will be more adept to deal with challenges, obstacles or failures according to Bandura (1977). Highly efficacious individuals will set themselves more challenging goals and are better able to stay committed to their goals (Bandura, 1994). Low self-efficacy corresponds to a lack of
commitment and conviction to goals and high likelihood of abandoning tasks when faced with an obstacle (Bandura, 1994).

Bandura (1994) states there are four sources of self-efficacy; personal experience, vicarious learning, social persuasion and physiological feedback. If a person has experienced success in the past their self-efficacy for that task will increase, which corresponds with Stroebe et al., (2012) & Fishbach et al, (2003) goal conflict theory findings; that once an individual has succeeded at the task over time the cues that once triggered overeating may now trigger weight loss goals. Vicarious learning comes about by witnessing the success of a comparable person. Similarly a comparable person’s failings despite the effort can lower self-efficacy (Bandura, 1994). Verbal persuasion in form of encouragement from others helps to eliminate self-doubts and instil a belief that success is possible. Lastly individuals rely on emotional and somatic feedback when evaluating their success at a task. Stress reactions, physical fatigue, emotional states, mood can affect a person’s judgement of their self-efficacy and can be interpreted as an energising or debilitating depending on whether self-efficacy is high or low (Bandura, 1994).

Bandura (1994) proposed that an individual does not possess general self-efficacy for all behaviours but rather specific self-efficacy related to particular tasks. Human behaviour is firstly formulated in thoughts; a mental plan is made of the tasks ahead. If an individual is lacking in self-efficacy they will most likely anticipate failure and will tend to focus more on what can go wrong, whereas a person with high self-efficacy will visualise success (Bandura, 1994).

Self-efficacy and Health Behaviours

Many studies on the adoption of health behaviours have measured self-efficacy to establish how it influences behaviour change; from physical exercise (McAuley, 1993; McAuley,
Jerome, Elavsky, Marquez & Ramsey, 2003), alcohol consumption (Christiansen, Vik & Jarchow, 2002), cigarette smoking (Schnoll et al., 2011) to nutrition (Anderson, Winett & Wojcik, 2007). In relation to eating behaviours, findings suggest that self-efficacy pertains to improvements in diet such as increasing dietary fiber (Hagler et al. 2007; Schnoll & Zimmerman, 2001) or fruit and vegetable intake (Steptoe, Perkins-Porras, Rink, Hilton & Cappuccio, 2004) or decreasing fat intake (Schwarzer & Renner, 2000). Only one study (Steptoe et al., 2004) suggested self-efficacy as a predictor of dietary behaviour change.

Self-efficacy has also been studied in relation to weight loss and weight control. Warzisk, Sereika, Styn, Music & Burke (2008) found self-efficacy, measured by weight efficacy lifestyle questionnaire (WEL), improved significantly throughout a weight loss programme and supported greater actual weight loss in participants. Dennis & Goldberg (1996) found that obese women with high self-efficacy at baseline had significantly higher weight loss following a weight treatment programme than those with low self-efficacy. They also found improvements in self-efficacy corresponded to similar weight loss effects as the high-efficacious participants.

Studies on self-efficacy have primarily focussed on weight loss rather than maintenance and none have considered self-efficacy among a healthy-weight sample. Also the focus has primarily been on improvements in self-efficacy following behaviour change as part of a weight loss programme. Overall the suggestion is that self-efficacy is an important factor in weight loss and that self-efficacy improves as individuals lose weight. Teixeira et al., (2004) found that self-efficacy, particularly exercise self-efficacy was a significant pretreatment predictor of achieving long-term weight management goals, after follow up after 16 months.
Dieting Self-efficacy

Gaining weight or losing weight are not behaviours as such (Linde, Rothman, Baldwin & Jeffery, 2006), but consequences of behaviours such as eating high calorie food in response to emotional states or external cues. In order to be successful at losing or maintaining weight, an individual would have to be confident that they can adhere to their diet goals, which would correspond to their self-efficacy for the task. Determining the ability a person has to not yield to situational factors that lead to overeating and in turn weight gain would be extremely beneficial in developing preventative measures for obesity. Dieting self-efficacy is defined as an “individual’s belief in his or her ability to adhere to a diet, to lose weight or to maintain a current weight status” (Stich, Knauper & Tint, 2009, p. 17). There has been little research to date involving situation based self-efficacy and overeating. Stotland, Zuroff & Roy (1991) found that restrained eaters with high situational-based dieting self-efficacy (SDS) ate less (cookies) in a subsequent taste-test than those with low SDS. Glynn & Ruderman (1986) using their scale to measure eating self-efficacy (ESES) when experiencing negative affect and found that increased ESES scores were significantly related to weight loss. However, the ESES or SDS scales do not measure cravings of energy-dense, sweet carbohydrate and fat-rich foods which have been identified as a significant contributor to failed diets and weight gain (Rodin, Mancuso, Granger, Nelbach, 1991; Christiansen, 2007; Christensen, & Pettijohn, 2001; Stich et al., 2009).

Gender Differences in Eating Behaviour

Generally women are believed to experience emotions more intensely than men (Fujita, Diener & Sandvik, 1991; Lalama, 2003; Barrett, Robin, Pietromonaco & Eyssell, 1998) and it has been found that they tend to report higher levels of emotional eating than
Men also (Oliver et al., 2000; Tanofsky, Wilfley, Spurrell, Welch & Brownell, 1997). Moore (2010) found that females reported higher levels of negative emotional intensity and lower levels of confidence in their abilities to resist eating temptations associated with emotional experiences, compared to men.

Macht, Roth & Ellgring, (2002) induced anger, fear, sadness and joy using film clips in male only participants after which they received pieces of chocolate to eat. Interestingly, they found a divergent effect in the sadness and joy conditions; joy significantly increased and sadness significantly decreased appetite. In the joy condition there was a significantly higher tendency to eat more chocolate but it was found to taste more pleasant and have a more stimulating effect in the sadness condition. Authors attributed this effect to mood maintenance and mood regulation. Dube, LeBel & Lu (2005) found that men’s comfort food consumption was motivated by positive emotions whereas women’s consumption was triggered by negative effects. If there are gender differences in how emotions are experienced it would be expected that the same gender differences would be seen in emotional eating in particular for negative emotion, externality and confidence to resist temptation in situations involving negative and positive affect.

Harris et al. (2009) found that the effect of food advertising as an external trigger of consumption was particularly powerful for those trying to control their eating (restrained eaters) and men, who consumed one standard deviation more after viewing snack advertisements. An additional surprising finding showed men reported less hunger following snack advertisements and greater hunger following nutrition advertisements suggesting a complete dissociated eating pattern. Using a longitudinal design, Drapeau et al., (2003) found significant differences in men and women in restrained eating and weight control. Women relied on restrained eating behaviour and avoided more fatty food than men. Women were found to be more susceptible to emotional and situational eating cues. In women, a high
restrained eating behaviour was found to promote weight gain, whereas in men, the opposite trend was found.

Few studies too have considered the gender differences in self-efficacy. One study using WEL found that treatment seeking obese men reported higher pre-treatment self-efficacy than women, which predicted higher weight loss in men and not women (Presnell, Pells, Stout & Musante, 2008).

Research Objectives

To truly tackle an obesity epidemic a full understanding of the contributing factors is needed. Much research in the area of eating behaviours has involved clinical samples and has been significantly gender imbalanced. Understanding the behavioural and psychological strengths and weaknesses that influence eating behaviours will enhance the existing body of knowledge about weight control. This study aims to investigate the relationship between eating behaviours, self-efficacy and actual weight in a non-clinical sample of males and females. Specifically this study will determine the relationship between external, emotional, restrained eating, dieting self-efficacy and BMI and in addition whether there is a causal relationship between any of these elements and BMI. It will also investigate gender differences that exist in eating behaviours and dieting self-efficacy. Further this study will explore the differences in dieting self-efficacy between normal weight versus overweight individuals. Finally this study will try to determine which eating styles are more of a treat to overweight versus normal weight men. The findings will complement the existing research on eating behaviours, will attempt to close a gap in knowledge regarding the role of dieting self-efficacy plays in weight control and establish what are the vulnerabilities in eating behaviour apply to men.
Hypotheses

Hyp1: There will be significant relationships between external eating, emotional eating, restrained eating, dieting self-efficacy and BMI scores.

Hyp2: Emotional eating will significantly predict BMI.

Hyp3: There will be a significant difference between dieting self-efficacy in normal versus overweight participants.

Hyp4: There will be significant gender differences in eating styles; external eating, emotional eating and restrained eating.

Hyp5: There will be significant gender differences in dieting self-efficacy; emotional, high calorie and social/internal.

Hyp6: There will be a significant difference between external, emotional and restrained eating in overweight versus normal weight men.
Methodology

Participants

The target population for this study were males and females over 18 years of age with body mass index (BMI=kg/m\(^2\)) score of between 18.5 (normal) - 35 (moderately obese). A non-probability convenience sample was accessed via social media (facebook) and via direct email contact with researcher’s work colleagues. Data was collected by way of an online survey. Participation was entirely voluntary and confidential, no identifying information was gathered. Consent was sought by way of a tick box prior to completion of survey. The necessary N for power of .80 and significance of .05 for multiple regression with 8 variables in 107 (Cohen, 1992)

A total of 169 participants agreed to take part in the study; 51 males with mean BMI of and 188 females with mean BMI score of 25.2. Two females and one male were excluded for having BMI scores outside of the 18.5 - 35 range as scores in this range can indicate disordered eating. Therefore the final sample consisted of 166 participants; 50 males with mean BMI of 26 ($SD= 3.6$) and 116 females with mean BMI of 24.6 ($SD=3.4$).

Design

The study will comprise correlation and between-subjects analysis. It is quantitative in nature using online surveys to access non-probability sample of convenience using social media. Being over the age of 18 years and having BMI between ranges 18.5 to 35 was only inclusion criteria. Gender was the only demographic detail gathered for comparison.

This study aims to investigate the relationship between dependent variables emotional eating, external eating, restrained eating, dieting self-efficacy BMI. Between-subjects analysis aims to compare scores from two independent groups (overweight and normal-weight) on their scores in dependent variable dieting self-efficacy. It will also investigate sex differences
between two independent gender groups (male and female) for dependent variables external, emotional and restrained eating styles and separately gender differences for dieting self-efficacy in negative emotionally charged situations (NEE), situations involving social and or internal factors (SIF) and situations involving high calorie temptation (HIF). Finally, a comparison of dependent variables; external, emotional and restrained eating styles between two independent groups; overweight and normal weight men will be carried out.

**Materials**

An online survey used two surveys; Dutch Eating Behaviour Questionnaire (DEBQ) (Van Strien, Frijters, Bergers & Defares, 1986) measuring external, emotional and restrained eating styles and Dieting self-efficacy (Diet-SE) (Stich et al., 2009) a situational based survey measuring confidence to resist eating when being influenced by negative emotion, social/internal factors or high calorie food temptation. A replica of each survey can be found in the appendix.

DEBQ has been used to measure eating styles extensively for over 25 years, has been translated into eight languages and adapted for children and parents reporting on children (Barrada, Van Strien, Cebolla & Barrada, 2013). It consists of 33 items in total divided into three subscales. The response format is a 5 item Likert scale ranging from 1= never to 5 = very often. Raw score totals are calculated by totalling up the item scores for each DEBQ-scale. Scale scores are obtained by dividing the raw scale score by the total number of items in that scale endorsed by the participant. Participants were asked to consider each statement carefully and select the most appropriate option that applied to them. External eating subscale consists of 10 items measuring eating behaviour in response to external cues such as sight or smell of food. Examples of questions are “If food tastes good to you, do you eat more than usual?” and “If you walk past a baker do you have the desire to buy something delicious”
Emotional eating subscale consists of 13 items measuring the extent negative emotional experiences trigger the desire to eat. Examples of questions are “Do you get the desire to eat when anxious, worried or tense?” and “Do you get the desire to eat when somebody lets you down?” Restrained eating subscale consists of 10 items measuring extent to which food intake is controlled. Examples of questions are “When you have eaten too much, do you eat less than usual the following days?” and “Do you take into account your weight when you eat?” Reverse scoring is necessary for item 31 in external eating subscale. The three subscales in the DEBQ have high internal consistency and validity; Cronbach's α coefficients measuring .80 (restrained eating), .94 (emotional eating) and .95 (restrained eating) (Van Strein et al., 1986).

Dieting self-efficacy (Diet-SE) is an 11 items in total adapted into three subscales; high caloric food temptation (HCF), social/internal (SIF) and negative emotional events (NEE) Responses are in the format of a 5 item Likert scale ranging from 0 = Not at all confident to 4 = Very confident. An overall score is obtained by totalling up all the item scores and scale scores totalling items in that scale endorsed by the participant.

Participants were asked to imagine themselves in each situations and rate how confident they are that they could overcome it. High caloric food temptation (HCF) describes situations in which exposure to highly palatable food is a factor and participants indicate their confidence in resisting temptation to eat such as “You are out with a friend at lunch time and your friend suggests that you stop and get some ice cream. How confident are you that you would resist the temptation?” Social and Internal (SIF) describes situations involving internal states or socialising with friends and participants indicate how confident they are that they would resist eating, such as; “You feel like celebrating. You are going out with friends to a good restaurant. How confident are you that you would celebrate without overeating?”
Negative emotional events (NEE) describes scenarios in which emotions may influence the temptation to eat such as; “You just had an upsetting argument with a family member. You are standing in front of the refrigerator and you feel like eating everything in sight. How confident are you that you would find some other way to make yourself feel better?”

Diet-SE has high internal consistency ranging from $\alpha = .82$ to $.87$ for all three subscales. Further, test-retest reliability for 2-3 week interval is $rtt = .83$ (Stich et al., 2009)

Item 8 (NEE subscale) was reworded from ‘candy’ bar to ’chocolate’ bar to make it more applicable to non-American participants.

BMI scores were obtained by directing participants to an external link to National Heart Lung and Blood Institute website which includes a BMI calculator. Participants were asked to enter their weight and height in metric or imperial (standard) quantities and then compute their BMI which they were then asked to enter into online survey, before they were allowed to proceed.

Online questionnaires were set up using forms in Google Drive. Questionnaire responses were stored in spreadsheet also in Google Drive. Both were password protected and stored only online.

Data analysis was carried out using IBM SPSS version 21.

**Procedure**

Ethical approval for this research was obtained from the Dublin Business School ethics review board prior to data collection.

The online survey included a brief introduction, instructions of how to complete the survey, consent question and demographics (gender & BMI). Participants were provided with a link to an external site containing a BMI calculator as it was decided this would make calculation easier for the participant and reduce the number of spoiled cases.
Although the surveys are widely used some of the questions could have induce some negative cognitions and as such contact details and link to website for Bodywhys (bodywhys.ie, 2014) was included at the beginning and end of survey. Contact details for researcher and supervisor were also provided.

A URL to the online survey was posted on social media website facebook for one week. A request was made to participants to share the link on their own home-page in order to connect with more participants as well as participants outside of the researcher’s network. A URL link was also emailed to contacts at the researcher’s place of employment after obtaining permission from CEO to do so.

No personal details were collected and the researcher had no way of identifying individual participants.
Results

Descriptive Statistics

166 participants were included in analysis 30% male (n=50) and 70% female (n=116). The mean BMI score for the group was 25.1 ($SD=3.50$) which is the very upper limit of normal weight category, bordering on overweight category (WHO, 2014). Females had a mean BMI score of 24.6 ($SD=3.39$) which is classed as normal and males had mean BMI score of 26 ($SD=3.61$) classed as overweight.

Table 1. Descriptive Statistics of Psychological Measures for Males (n=50)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>26.0</td>
<td>3.61</td>
</tr>
<tr>
<td>Emotional Eating*</td>
<td>1.93</td>
<td>0.77</td>
</tr>
<tr>
<td>External Eating*</td>
<td>3.04</td>
<td>0.49</td>
</tr>
<tr>
<td>Restrained Eating*</td>
<td>2.39</td>
<td>0.68</td>
</tr>
<tr>
<td>SE Negative Emotion**</td>
<td>7.32</td>
<td>3.30</td>
</tr>
<tr>
<td>SE Social/Internal**</td>
<td>8.04</td>
<td>4.10</td>
</tr>
<tr>
<td>SE High Calorie**</td>
<td>6.20</td>
<td>4.10</td>
</tr>
</tbody>
</table>

*External eating, Emotional eating, Restrained eating measured by Dutch Eating Behaviours Questionnaire

**Negative emotion, High calorie, Social/internal self-efficacy scores measured by Diet-SE

As indicated in Table 1 males had an average score for external eating, a low score for emotional eating, below average for restrained eating, average confidence in their ability to resist temptation in negative emotional situations, were only a little confident in high calorie scenarios and moderately confident situations where social or internal factors could hamper resistance to eat.
Table 2. Descriptive Statistics of Psychological Measures for Females (n=116)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>24.6</td>
<td>3.40</td>
</tr>
<tr>
<td>Emotional Eating*</td>
<td>2.77</td>
<td>0.99</td>
</tr>
<tr>
<td>External Eating*</td>
<td>3.13</td>
<td>0.56</td>
</tr>
<tr>
<td>Restrained Eating*</td>
<td>3.02</td>
<td>0.82</td>
</tr>
<tr>
<td>SE Negative Emotion**</td>
<td>5.66</td>
<td>3.48</td>
</tr>
<tr>
<td>SE Social/Internal**</td>
<td>7.76</td>
<td>4.10</td>
</tr>
<tr>
<td>SE High Calorie**</td>
<td>6.16</td>
<td>4.26</td>
</tr>
</tbody>
</table>

*External eating, Emotional eating, Restrained eating measured by Dutch Eating Behaviours Questionnaire
**Negative emotion, High calorie, Social/internal self-efficacy scores measured by Diet-SE

As indicated in Table 2 females had average mean scores for external eating, emotional eating, restrained eating, moderately confident in their ability to resist temptation in negative emotion situations, only a little confident in high calorie scenarios and moderately confident in situations where social or internal factors could hamper resistance to eat.

Table 3 Means and Standard Deviations for all participants (n=166)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>25.0</td>
<td>3.51</td>
</tr>
<tr>
<td>Emotional Eating</td>
<td>2.52</td>
<td>1.0</td>
</tr>
<tr>
<td>External Eating</td>
<td>3.10</td>
<td>0.54</td>
</tr>
<tr>
<td>Restrained Eating</td>
<td>2.83</td>
<td>0.83</td>
</tr>
<tr>
<td>Diet Self-Efficacy</td>
<td>20.17</td>
<td>9.70</td>
</tr>
</tbody>
</table>
Inferential Statistics

Prior to beginning analysis of inferential statistics a check for whether dependent variables satisfied assumptions required for parametric tests was carried out. An alpha level of .05 was used for all statistical tests.

Hyp1: There will be significant relationships between external eating, emotional eating, restrained eating, dieting self-efficacy and BMI scores.

Table 4 Correlation table

<table>
<thead>
<tr>
<th>Variable</th>
<th>BMI</th>
<th>Emotional Eating</th>
<th>External Eating</th>
<th>Restrained Eating</th>
<th>Diet self-efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional Eating</td>
<td>.217**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External Eating</td>
<td>-.010</td>
<td>.394**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restrained Eating</td>
<td>.125</td>
<td>.223**</td>
<td>.104</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diet Self-Efficacy</td>
<td>-.200**</td>
<td>-.570**</td>
<td>-.534**</td>
<td>.056</td>
<td></td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed)

As indicted in Table 3 the mean score for BMI was 25.10 (SD=3.51), for emotional eating was 2.52 (SD=1.0), for dieting self-efficacy was 20.17 (SD=9.70), for restrained eating was 2.83 (SD=0.83) and for external eating was 3.10 (SD=0.54). A Pearson’s correlation coefficient found that there was a weak positive significant relationship between emotional eating and BMI (r(164) = 0.22, p = .005) and a weak negative relationship between dieting self-efficacy and BMI (r(164) = -.20, p= .010). A weak positive relationship was found between emotional eating and restrained eating (r(164) = 0.22, p = .004). A moderate positive relationship was found between emotional and external eating (r(164) = -.57, p < .001).
Finally, and strong negative relationship was found between external eating and dieting self-efficacy ($r(164) = -.57, p <.001$).

External eating, restrained eating were not found to be significantly related to BMI. Also no relation was found between restrained eating, external eating and restrained eating and dieting self-efficacy. Correlations are illustrated in Table 4.

*Post-hoc hypothesis*

Hyp1.1: Emotional eating will significantly predict restrained eating.

Using simple regression it was found that emotional eating significantly predicts restrained eating. ($F(1,164) = 8.54, p = .004, R^2 = .05$) (Emotional eating, beta = .223, $p = .004$).

Confidence limits relatively wide showing 95% confidence that the population slope is between -.06 and .31.

Hyp1.3: Dieting self-efficacy will significantly predict BMI. Using simple regression it was found that dieting self-efficacy ($F(1,164) = 6.81, p = .010, R^2 = .04$) (Dieting self-efficacy, beta = -.200). Confidence limits were moderately wide, showing 95% confidence that the population slope is between -.127 and -.018.

Hyp2: Emotional eating will significantly predict BMI.

Using simple regression it was found that emotional eating significantly predicts BMI. ($F(1,164) = 8.12, p = .005, R^2 = .05$) (Emotional eating, beta = .217, $p = .005$). Confidence limits were relatively wide however, showing 95% confidence that the population slope is between .234 and 1.29.

Hyp3: There will be significant difference between dieting self-efficacy in normal versus overweight participants.
A Levene’s test confirmed that equal variances could be assumed. Normal weight participants ($M=21.27$, $SD=9.17$) were found to have higher levels of dieting self-efficacy than overweight ($M=18.67$, $SD=10.24$). The difference was not found to be statistically significant using an independent samples t-test ($t(164) = 1.72$, $p = .088$).

Hyp4: There will be a significant difference between male and female external, emotional and restrained eating scores.

A Levene’s test confirmed that equal variances could be assumed.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>$t$</th>
<th>$df$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional eating</td>
<td>Males</td>
<td>1.93</td>
<td>0.77</td>
<td>-5.417</td>
<td>164</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>2.77</td>
<td>0.98</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External eating</td>
<td>Males</td>
<td>3.04</td>
<td>0.49</td>
<td>-.941</td>
<td>164</td>
<td>.348</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>3.13</td>
<td>0.56</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restrained eating</td>
<td>Males</td>
<td>2.39</td>
<td>0.68</td>
<td>-4.719</td>
<td>164</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>3.02</td>
<td>0.82</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Indicted in Table 5 females ($M=3.02$, $SD=0.82$) were found to have higher levels of restrained eating than males ($M=2.40$, $SD=0.68$). The 95% confidence limits show the population mean difference of variables lies somewhere between -.88 and -.36. An independent samples t-test found that there was a statistically significant difference between restrained eating levels of males and females ($t(164) = -4.72$, $p<.01$). Females ($M=2.77$, $SD=0.98$) were also found to have higher levels of emotional eating than males ($M=1.93$, $SD=0.77$). The 95% confidence limits show the population mean difference of variables lies
somewhere between -1.15 and -.54. An independent samples t-test found that there was a statistically significant difference between emotional eating levels of males and females ($t(164) = -5.42$, $p < .01$). The results are illustrated in figure 1.

The difference between scores for external eating for males and females was not found to be significant.

![Graph showing gender differences in emotional and restrained eating.](image)

Figure 1 *Gender differences in emotional and restrained eating.*

Hyp5: There will be a significant difference between males and females scores on self-efficacy in negative emotional, high calorie and social/internal situations.
As indicated in Table 6 females (M=5.66, SD=3.48) were found to have lower self-efficacy in situations when negative emotion might make it difficult to resist eating than males (M=7.32, SD=3.30). The 95% confidence limits show that the population mean difference of variables lies somewhere between .52 and 2.81. An independent samples t-test found that there was a statistically significant difference between self-efficacy scores when in negative emotional situations in males and females (t (164) = 2.87, p = .005). The difference in self-efficacy scores when in high calorie and social situations between males and females was not found to be significant.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE Negative emotion</td>
<td>Males</td>
<td>7.32</td>
<td>3.30</td>
<td>2.871</td>
<td>164</td>
<td>.005</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>5.66</td>
<td>3.48</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE Social/Internal</td>
<td>Males</td>
<td>8.04</td>
<td>4.10</td>
<td>.409</td>
<td>164</td>
<td>.683</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>7.76</td>
<td>4.06</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE High calorie</td>
<td>Males</td>
<td>6.20</td>
<td>4.06</td>
<td>.051</td>
<td>164</td>
<td>.959</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>6.16</td>
<td>4.26</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A Levene’s test confirmed that equal variances can be assumed.
Hypothesis 6: There will be a significant difference between overweight and normal weight men in external eating, emotional and restrained eating.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional eating</td>
<td>Normal</td>
<td>1.87</td>
<td>0.73</td>
<td>-0.458</td>
<td>48</td>
<td>0.649</td>
</tr>
<tr>
<td></td>
<td>Overweight</td>
<td>1.97</td>
<td>0.81</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External eating</td>
<td>Normal</td>
<td>3.10</td>
<td>0.49</td>
<td>0.818</td>
<td>48</td>
<td>0.417</td>
</tr>
<tr>
<td></td>
<td>Overweight</td>
<td>2.99</td>
<td>0.50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restrained eating</td>
<td>Normal</td>
<td>2.12</td>
<td>0.73</td>
<td>-2.652</td>
<td>48</td>
<td>0.011</td>
</tr>
<tr>
<td></td>
<td>Overweight</td>
<td>2.61</td>
<td>0.56</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Indicated in Table 7 normal weight men ($M=2.12, SD=.73$) were found to score lower in restrained eating than overweight men ($M=2.61, SD=.56$). The 95% confidence limits show that the population mean difference of variables lies somewhere between -.85 and -.12. An independent samples t-test found that there was a statistically significant difference between restrained eating in normal weight versus overweight men ($t(48) = -2.65, p = .011$). Normal weight men ($M=2.53, SD=.88$) scored lower than overweight men ($M=3.20, SD=1.01$) for emotional eating however, this difference was not found to be significant. Results are illustrated in figure 2.

There was only a very slight difference between scores for external eating between normal weight ($M=3.14, SD=.55$) and overweight men ($M=3.11, SD=.58$) which was not found to be significant.
Post-hoc Hypothesis

**Hyp6.1** Restrained eating will be a significant predictor of BMI for males participants.

Using simple regression it was found that restrained eating significantly predicted BMI in overweight men ($F(1,48) = 16.43$, $p < .001$, $R^2 = .26$) (Restrained eating, beta = .505, $p < .001$). Confidence limits show 95% confidence that the population slope is between 1.35 and 4.02.
Discussion

Research aim

Obesity is a growing concern in Ireland and globally. Overweight and obesity is responsible for a myriad of serious health problems. Today’s modern environment presents numerous obstacles to healthy living and actively encourages consumption and weight gain. The author believes there is little understanding among the population of personal eating styles and how motivations to eat and emotions can impact eating behaviour, weight gain and ultimately health. Findings of this study could help increase awareness of the vulnerabilities that exist in people’s ability to resist temptation, which could assist in making more effective weight control/loss programmes that are tailored to an individual and gender specific. Self-efficacy has been found to play an important role in health behaviours. This study will investigate if confidence in ability to adhere to dieting goals and resist temptation is related to actual weight and eating styles. As far as the author is aware no research exploring the links between eating styles, dieting self-efficacy in males and female adults has been conducted.

The initial task of this study was to investigate how eating style i.e. eating in response to external cues, eating when experiencing negative emotions, restrained eating, dieting self-efficacy and BMI relate to one another and whether a causal relationship between any of these variables exists. Next it will look at whether emotional eating particularly is a predictor of BMI. Following this an examination of importance of dieting self-efficacy in weight control will be carried out by comparing self-efficacy of normal weight (BMI>= 18.5 and <=25) to overweight (BMI>= 25.1 and <= 35) participants. Following this the study aimed to explore gender differences in external, emotional and restrained eating styles as well as dieting self-efficacy in high calorie, social and negative emotion situations. Finally, isolating male only participants this study will investigate differences in eating styles in overweight versus normal-weight males.
Hypothesis testing

Hyp1: Initially the study looked at the role eating style; eating in response to emotions or external cues or consciously restraining food intake, dieting self-efficacy and actual weight (BMI). Significant relationships between emotional eating and each of variables; restrained eating, external eating and BMI were found. Dieting self-efficacy was found to be related to BMI and external eating. Relationships between emotional eating i.e. eating in response to emotions such as anger or boredom was a significant predictor of actual weight (BMI), restrained eating. Further dieting self-efficacy was found to significantly predict BMI. This only partially supports the hypothesis as there wasn’t a significant relationship found between restrained eating and external eating or restrained eating and dieting self-efficacy or restrained eating and BMI or between BMI and external eating.

Hyp2: The nature of the relationship between emotional eating and BMI was explored further finding that emotional eating was a significant predictor of BMI, supporting the hypothesis.

Hyp3: The hypothesis that there would be a significant difference in overall dieting self-efficacy between normal weight (BMI=18.5-25) and overweight (BMI=25.1-35) participants was not supported in this study.

Hyp4: Gender differences in eating styles (emotional eating, external eating and restrained eating) were then investigated. Women were found to eat in response to emotions and to have a restrained eating style significantly more than men somewhat supporting the hypothesis. A significant gender difference for external eating was not supported.
Hyp5: The study then investigated whether gender differences exist in dieting self-efficacy scores in each of the three scenarios involving negative emotions, social factors and high calorie food temptation. Considering the results of hypothesis five the gender difference seen in self-efficacy in negative emotional situations was expected. However gender differences in high calorie and social settings was not supported.

Hpy6: Finally an investigation of possible vulnerabilities in eating style of men was carried out by comparing scores on emotional, external and restrained eating of overweight versus normal weight men. Restrained eating was found to be significantly different between the two groups. The hypothesis was not fully supported as there was no significant difference found between the groups for emotional or restrained eating. Further analysis revealed that restrained eating is a significant predictor of BMI in men.

Findings Summary

It is evidenced by this study that emotions play a pivotal role in eating behaviour. Everyone experiences negative emotions from time to time. Emotions such as fear and anxiety would normally trigger a stress response which prepares the body for fight or flight; increased blood flow to musculature structure and a reduction in activity in areas not needed such as the digestive system; which would suggest that the adaptive response to negative affect would be a decrease in appetite. Yet for some individuals an increase in appetite is the ‘normal’ response to negative emotions. Previous studies have found correlations between emotional eating and the consumption of comfort food sweet high energy-dense foods (Epel et al., 2001; Oliver et al., 2000; Nguyen_Michel et al., 2008). It has also been suggested that because of this seemingly maladaptive response pattern that emotional eating is linked to weight gain (Geliebter & Aversa, 2003). Dallman et al. (2005) linked comfort food
preference in stressed rats as a means of self-medicating to reduce the negative effects of a stressor. This effect in humans is supported by Bongers et al., 2013 who found that mood enhancement was positively correlated with calorie consumption.

The emotional eating scale of the DEBQ measures if desire to eat is induced by negative emotional states such as boredom, loneliness and anxiety or fear (Van Strien et al., 1986). This current study found there was a positive relationship between emotional eating and actual weight (BMI) and further that emotional eating was a strong predictor of BMI. This current study complements previous findings and in addition suggests there could be a causal relationship between an emotional eating style and weight gain which should be tested further experimentally.

Psychosomatic theory of eating states that overeating is an attempt to reduce internal negative affect such as anxiety due to repressed trauma or a maladaptive learned association. It implies that the triggers to eat operate at a more unconscious level than those associated with external or restrained eating. This association would promote a more dissociative pattern of eating and could explain why emotional eaters are more likely to gain weight. Further, unlike external cues an individual cannot easily avoid their emotions. A better understanding of why negative emotion leads to overeating and how it can be overcome is crucial for the development of interventions of overeating that leads to obesity. This current study used a non-clinical convenience sample and as such there was no control for levels of depression among participants. Previous studies have found a positive relationship between depression emotional eating and BMI (Turker et al., 2012).

Emotional eating has been strongly linked with a restrained eating style which is the deliberate and chronic restriction of food intake (Herman & Mack, 1975). Restrained eaters establish for themselves; dieting rules, which drive their decisions to eat or not (Herman & Mack, 1975). The research on restrained eating effects on actual weight has been mixed. A
prospective study by Field et al., (2003) using a large male and female adolescent sample (n=14,972) and found that controlling weight is not only ineffective; it may actually promote weight gain. Stice et al., (1999) made similar observations using an all-female sample. Contrary to these findings de Lauzon-Guillain, (2006) carried out a longitudinal study using adults and adolescents and concluded that restrained does not promote weight gain.

This study failed to find a relationship between restrained eating and BMI when both males and females were included. Previous research employed longitudinal designs looking at the effects of a restrained eating style over time whereas the current study is correlational. Some researchers state it is important to make a distinction between dieting and restrained eating; Rideout & Barr (2009) dieting involves intent to restrict eating in order to lose weight but restrained eating is effort to restrict eating so as not to gain weight. This may be important to control for this is future studies.

A surprising and interesting finding of this study was when analysis on only male participants found that overweight men had significantly higher levels of restrained eating than normal weight men and that restrained eating was a significant predictor of BMI for men. Macht et al., (2002) and Dube et al., (2005) suggest that men are more influenced by positive emotions when it comes to the consumption of ‘comfort food’. Also Harris et al (2009) suggested men showed a more dissociative eating pattern in response to viewing food advertisements. Gender roles in society are evolving and blending. Research in the area of restrained eating has traditionally focussed on women but this study suggests this could be an out-dated approach that needs to be readdressed.

Conversely females showed higher levels of restrained eating when compared to males. Women scored higher as emotional eaters than men and emotional eating was found to predict BMI as well as restrained eating. This supports the notion that perhaps restrained eating is an effective method of controlling weight in women. 40% of females participants in
this study reported above-average levels of restrained eating. These findings completely contradict Drapeau et al., (2003) who suggested that restrained eating lead to weight gain in women but had the opposite effect on men. There has been a wealth of research involving restrained eaters while experiencing negative and positive emotions (Cools, et al., 1992; Yeomans & Coughlan, 2009; Herman & Polivy, 1975) however the author is unaware of any volume of research that suggest there could be a causal link between emotional eating and restrained eating bar DEBQ validation (Wardle, 1987).

Self-efficacy has a profound effect on the effort an individual will expend on a task, their perseverance with a task and commitment to goals (Bandura 1994). Self-efficacy has been found to be a key influencing factor in health related behaviour change (McAuley, 1993; (McAuley et al., 2003; Christensen, 2002; Schnoll et al., 2011; Anderson et al., 2007). Teixeira et al., (2004) found that exercise self-efficacy was a significant pretreatment predictor of achieving long-term weight management goals. It was expected in the current study that higher levels of dieting self-efficacy would be found among normal weight participants compared to overweight participants but the hypothesis was not supported.

When all participants were included overall dieting self-efficacy and BMI were negatively correlated and further it was found that dieting self-efficacy was a significant predictor of (BMI). Considering the previous results and the role that eating style has on dieting self-efficacy this finding should be considered with some caution. It cannot be concluded conclusively that dieting self-efficacy alone could explain BMI as it seems to be strongly influenced by eating style and emotions. Stotland et al., (1991) considered restrained eaters who had high levels of self-efficacy and Glynn & Ruderman (1986) considered high self-efficacious individuals while experiencing negative affect and both found that self-efficacy was effective in limiting consumption. Future research in this area should focus on a more ecologically sound test of the effects of self-efficacy on diet control using participants
with various eating styles. A post-hoc analysis in this current study using a Pearson’s correlation coefficient found that there was no significant relationship between BMI and dieting self-efficacy ($r(164) = -0.094, p = .227$) when controlling for emotional eating. This study is unable to confirm that self-efficacy plays a role in successful weight control. Rather the findings of this study lend more support for the findings that self-efficacy is something that can be improved by a change in health behaviours and/or weight loss (Warzisk, 2008; Dennis & Goldberg, 1996) instead of it being a driving force as was hypothesised.

This study failed to find a significant difference in self-efficacy among normal and overweight participants but one caveat to mention is that the current study is looking at participant weight at one point in time. So although in the normal weight bracket currently it is impossible to know the trend of an individual’s weight. Future research would be more informative using longitudinal design to measure self-efficacy in individuals who effectively control their weight and or individuals who have lost weight and were able to maintain it over an extended period of time so a better understanding of contribution self-efficacy makes in weight control can be garnered.

This study confirmed previous findings (Oliver et al., 2000; Tanofsky, 1997) that women reported significantly higher levels of emotional eating than men. Additionally women reported significantly lower levels of dieting self-efficacy in situations involving negative emotional arousal as would be expected. The finding in the current study supports the findings by Moore et al., (2010) who found that females experience more intense negative emotions in comparison to males and also have lower confidence in their abilities to resist eating temptations associated with emotional experiences. Research has found that women typically experience higher levels of stress and more intense negative affect than men, (Fujita et al., 1991) but is this actually because they feel more intense negative affect or report more than men? Lalama (2003) says that the research to date supporting the hypothesis that women
are more emotional than men is flawed and full of gender bias. According to her, gender differences have been attributed to variations in socialization which have rendered females more willing to express their feelings than men and not because of biological differences. Dube et al., (2005) found that consumption of comfort food helped alleviate women’s negative emotions.

Externality theory (Schachter, 1971) proposes that food-related stimuli such as sight, smell and taste provide a stronger appetitive trigger than internal states of hunger or satiety. It is thought that in today’s obesogenic environment an individual susceptible to external cues would have a difficult time controlling their weight. Previous research has shown that external cues can promote hedonic appetitive thoughts (Harris et al., 2009; Beaver et al., 2006). This study was unable to confirm if this was the case among the sample but it did find that external eating style was not related to BMI.

**Limitations**

There are a number of limitations with this study. A non-probability convenience sample was accessed via social media (facebook) and via direct email contact with researcher’s work colleagues. This type of sample cannot be considered to be representative of the entire population. This reflects a limited external validity of this study. Almost all the participants would share similar socioeconomic backgrounds, ethnicity and education. There is a well-established link between socioeconomic status and obesity (Nguyen-Michel et al., 2008). In a true random sample members from all SES backgrounds would have been included.

Due to much previous research into eating behaviours being based on female only sample this study included males also. Nevertheless due to the method used to access participants (facebook and work colleagues) and to a certain degree because of the nature of
the questionnaires (eating behaviours) females are over represented 70% - 30% increasing the risk of sampling error.

This study used self-reports to determine eating style and dieting self-efficacy. Adriaanse, de Ridder & Evers (2011) claim that self-reports of emotional eating style could more likely measure perception of a negative emotions and eating relationships than they do the individual's actual eating behaviour when being emotional. Evers, de Ridder & Adriaanse (2010) suggest a ‘triple recall bias’ is at play as individuals are required to recall their negative emotions, their eating behaviour, and the association between the two. Further, they claim that this bias could affect all eating scales such as external or restrained and not emotional eating. Further, it has been posited that when individuals are in a non-emotional state they may underestimate the impact emotional states can have on their behaviour (Nordgren, van der Pligt, & van Harreveld, 2007).

This study used Body Mass Index value as a measure of actual weight. There is considerable criticism about the accuracy of this ratio. The researcher had to assume the accuracy of the BMI values entered by participants in this study. It is plausible that some individuals may not have agreed with the BMI calculation obtained using the online calculator and entered a modified score. Weight and height measurements would have been estimated it is believed for many if not all participants. Wen & Kowaleski-Jones (2012) found the use of BMI in studies has led to underestimates of prevalence of overweight and obesity in the population. They found that both men and women tend of over-report height and under-report weight.

The questionnaires used to measure for emotional eating and dieting self-efficacy in emotionally charged situations only focus on negative emotions although there is a growing volume of research that suggests positive emotions also affect eating behaviour and food
choices, sometimes more than negative emotions do (Patel & Schlundt, 2001; Evers, et al., 2013; Dingemans, Martijn, van Furth & Jansen, 2009).

Strengths

The current study employed simultaneous measures of eating behaviour and self-efficacy to try to establish a clearer picture of what motivates individuals to eat. This is the first study the author is aware of that has used the dieting self-efficacy measure since its development (Stich et al., 2009) and the first to investigate the relationship between dieting self-efficacy and eating styles, emotional eating, external eating and restrained eating. Strength of this study is that it included male participants who are over overlooked in studies involving eating behaviours, particularly restrained eating. Further the analysis was based on non-clinical sample including normal as well as overweight participants.

Future Research

The current study employed correlation and between subjects (t-tests) analysis. Although some causal relationships were established using linear regression it falls short of the robustness offered by using probability sampling and experimental design. Future research should seek to use a wider demographic with equal representation of males and females, more ethnically diverse and representative of all socioeconomic levels. Having established that females are more likely to eat in response to negative emotions future studies should look at why this is the case. Comparing groups on emotional and non-emotional eaters, investigating mood fluctuations before and after food consumption and possibly employing fMRI would begin to establish the emotional and neurological links to emotional eating. Irish men have 3rd highest obesity prevalence in Europe (worldobesity.org 2008).
Future research should focus on motivation to overeat in men and limitations to resisting temptation.

**Conclusion**

This study complements existing research in the area of emotional eating and weight gain. It is evidenced by this study that emotions play a pivotal role in eating behaviour particularly for women. An emotional eating style was found to be an important contributor to weight gain. Emotional eating was also found to be an influencing factor of restrained eating. External and restrained eating however was not found to impact on BMI. Nor was restrained eating related to external eating or dieting self-efficacy. Emotional eating was positively related to external eating and dieting self-efficacy. Women were found to report a restrained eating style and lower levels of self-efficacy following negative emotionally charged events, significantly more than men. Initial analysis suggested that dieting self-efficacy was a significant predictor of BMI were further analysis revealed there was no association when controlling for emotional eating. A significant difference in dieting self-efficacy was not found between overweight and normal weight participants. Restrained eating was found to be a risk factor for overweight men and a contributor to weight gain in both normal and overweight men.

Interventions should be targeted at preventing and treating emotional eating effects, particularly in women. Education on individual and gender differences in eating styles and effective methods to use for mood enhancement other than eating such as exercise, should be key elements in intervention development. Future research should take the form of longitudinal studies and true experiments that explore links between self-efficacy and weight control as well as investigating why the response to negative emotions is indulgence and what motivates overeating in men.
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doi:10.1038/sj.ijo.0802727


Appendix A

Online Questionnaire Instructions, consent and demographics

My name is Darlene Brady. I am a Psychology student in Dublin Business School and as part of my final year studies I am conducting research that explores eating attitudes and behaviours of male and female adults. I would like to invite you to participate by completing and submitting the questionnaires below. It should take approximately 10 minutes to complete.

Participation in this study is entirely voluntary so you are not obliged to take part. Participation is completely anonymous and confidential. Responses cannot be attributed to any one participant and for this reason it will not be possible to withdraw from participation once survey has been submitted. Survey data will be securely stored electronically and password protected.

The questionnaires used in this study have been widely used in previous research. They are not intended for use as a diagnostic tool for eating disorders but rather developed to capture more general eating attitudes and behaviours in the population. However, it is possible that some questions may cause some minor negative feelings for some participants, in which case contact information for support services are included here and again at the end of the survey. Please take note of these should you require them.

It is important that you understand that by completing and submitting the questionnaires that you are consenting to participate in the study.

Thank you for your time, your participation is greatly appreciated.

Contact details
Do you consent to taking part in survey?

What is your gender?

Body Mass Index (BMI) is a measure of height to weight ratio.

Please go to the following link to calculate your BMI and enter it below. (14 pounds=1 stone=6.35 kilos) [http://www.nhlbi.nih.gov/guidelines/obesity/BMI/bmicalc.htm](http://www.nhlbi.nih.gov/guidelines/obesity/BMI/bmicalc.htm)
Appendix B

DEBQ questionnaire instructions & questions
First set of questions were from DEBQ. Participants were instructed that the “following 33 questions measure eating attitudes and behaviours” and to “Please consider each statement carefully and select the most appropriate option that applies to you.”

1. If you have put on weight, do you eat less than you usually do?
   Ans: Never, Seldom, Sometimes, Often, Very Often, Not applicable

2. Do you try to eat less at mealtimes than you would like to eat?
   Ans: Never, Seldom, Sometimes, Often, Very Often

3. How often do you refuse food or drink offered because you are concerned about your weight?
   Ans: Never, Seldom, Sometimes, Often, Very Often

4. Do you watch exactly what you eat?
   Ans: Never, Seldom, Sometimes, Often, Very Often

5. Do you deliberately eat foods that are slimming?
   Ans: Never, Seldom, Sometimes, Often, Very Often

6. When you have eaten too much, do you eat less than usual the following days?
   Ans: Never, Seldom, Sometimes, Often, Very Often, Not applicable

7. Do you deliberately eat less in order not to become heavier?
   Ans: Never, Seldom, Sometimes, Often, Very Often

8. How often do you try not to eat between meals because you are watching your weight?
   Ans: Never, Seldom, Sometimes, Often, Very Often

9. How often in the evening do you try not to eat because you are watching your weight?
   Ans: Never, Seldom, Sometimes, Often, Very Often

10. Do you take into account your weight with what you eat?
    Ans: Never, Seldom, Sometimes, Often, Very Often

11. Do you have the desire to eat when you are irritated?
    Ans: Never, Seldom, Sometimes, Often, Very Often, Not applicable

12. Do you have a desire to eat when you have nothing to do?*
    Ans: Never, Seldom, Sometimes, Often, Very Often, Not applicable
13. Do you have a desire to eat when you are depressed or discouraged?
   Ans: Never, Seldom, Sometimes, Often, Very Often, Not applicable

14. Do you have a desire to eat when you are feeling lonely?
   Ans: Never, Seldom, Sometimes, Often, Very Often, Not applicable

15. Do you have a desire to eat when somebody lets you down?
   Ans: Never, Seldom, Sometimes, Often, Very Often, Not applicable

16. Do you have a desire to eat when you are cross?
   Ans: Never, Seldom, Sometimes, Often, Very Often, Not applicable

17. Do you have a desire to eat when you are approaching something unpleasant to happen?
   Ans: Never, Seldom, Sometimes, Often, Very Often

18. Do you get the desire to eat when you are anxious, worried or tense?
   Ans: Never, Seldom, Sometimes, Often, Very Often

19. Do you have a desire to eat when things are going against you or when things have gone wrong?
   Ans: Never, Seldom, Sometimes, Often, Very Often

20. Do you have a desire to eat when you are frightened?
   Ans: Never, Seldom, Sometimes, Often, Very Often, Not applicable

21. Do you have a desire to eat when you are disappointed?*
   Ans: Never, Seldom, Sometimes, Often, Very Often, Not applicable

22. Do you have a desire to eat when you are emotionally upset?
   Ans: Never, Seldom, Sometimes, Often, Very Often, Not applicable

23. Do you have a desire to eat when you are bored or restless?
   Ans: Never, Seldom, Sometimes, Often, Very Often, Not applicable

24. If food tastes good to you, do you eat more than usual?
   Ans: Never, Seldom, Sometimes, Often, Very Often

25. If food smells and looks good, do you eat more than usual?
   Ans: Never, Seldom, Sometimes, Often, Very Often

26. If you see or smell something delicious, do you have a desire to eat it?
   Ans: Never, Seldom, Sometimes, Often, Very Often
27. If you have something delicious to eat, do you eat it straight away?  
   Ans: Never, Seldom, Sometimes, Often, Very Often

28. If you walk past the baker do you have the desire to buy something delicious?  
   Ans: Never, Seldom, Sometimes, Often, Very Often

29. If you walk past a snackbar or a cafe, do you have the desire to buy something delicious?  
   Ans: Never, Seldom, Sometimes, Often, Very Often

30. If you see others eating, do you also have the desire to eat?  
   Ans: Never, Seldom, Sometimes, Often, Very Often

31. Can you resist eating delicious foods?  
   Ans: Never, Seldom, Sometimes, Often, Very Often

32. Do you eat more than usual, when you see others eating?  
   Ans: Never, Seldom, Sometimes, Often, Very Often

33. When preparing a meal are you inclined to eat something?  
   Ans: Never, Seldom, Sometimes, Often, Very Often
Appendix C

Diet Self-Efficacy questionnaire instructions and questions

The following 11 questions relate to situations and behaviours that can hinder weight loss or weight control. Please imagine yourself in each of the following situations and rate how confident you are that you could overcome them, using the options below.

1. You are having dinner with your family and your favorite meal has been prepared. You finish the first helping and someone says, "Why don't you have some more?" How confident are you that you would turn down a second helping?
   Ans: Not at all confident, A little confident, Moderately confident, Quite confident, Very confident

2. You often overeat at dinner because you are tired and hungry when you get home. How confident are you that you would not overeat at dinner?
   Ans: Not at all confident, A little confident, Moderately confident, Quite confident, Very confident

3. There is a party at work for a co-worker and someone offers you a piece of cake. How confident are you that you would turn it down?
   Ans: Not at all confident, A little confident, Moderately confident, Quite confident, Very confident

4. You just had an upsetting argument with a family member. You are standing in front of the refrigerator and you feel like eating everything in sight. How confident are you that you would find some other way to make yourself feel better?
   Ans: Not at all confident, A little confident, Moderately confident, Quite confident, Very confident

5. You are invited to someone's house for dinner and your host is an excellent cook. You often overeat because the food tastes so good. How confident are you that you would not overeat as a dinner guest?
   Ans: Not at all confident, A little confident, Moderately confident, Quite confident, Very confident

6. You finished your meal and you still feel hungry. There are cakes and fruits available. How confident are you that you would choose the fruits?
7. You are at a friend's house and your friend offers you a delicious looking pastry. How confident are you that you would refuse this offer?

Ans: Not at all confident, A little confident, Moderately confident, Quite confident, Very confident

8. You are having a hard day at work and you are anxious and upset. You feel like getting a chocolate bar. How confident are you that you would find a more constructive way to calm down and cope with your feelings?

Ans: Not at all confident, A little confident, Moderately confident, Quite confident, Very confident

9. You feel like celebrating. You are going out with friends to a good restaurant. How confident are you that you would celebrate without overeating?

Ans: Not at all confident, A little confident, Moderately confident, Quite confident, Very confident

10. You are out with a friend at lunch time and your friend suggests that you stop and get some ice cream. How confident are you that you would resist the temptation?

Ans: Not at all confident, A little confident, Moderately confident, Quite confident, Very confident

11. You just had an argument with your boyfriend or girlfriend. You are upset, angry, and you feel like eating something. How confident are you that you would talk the situation over with someone or go for a walk instead of eating?

Ans: Not at all confident, A little confident, Moderately confident, Quite confident, Very confident