

Calorie Labelling on Menus: Are There Adverse Outcomes Related to Eating Disturbances?

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

Obesity is a serious health concern in Canada. Thirty-seven percent of the population are overweight and approximately 25% are obese. Increased energy intake from eating outside the home has contributed to the rise in obesity. Approximately one quarter of all Canadians consume food in a quick-service restaurant on a given day. Although not all food consumed outside the home is of poor nutritional quality, restaurants generally offer foods that have larger portions, and are higher in calories and fat. Menu labelling has the potential to promote healthier eating by informing consumers about the calorie content of meals. Currently, there is little or no research on possible unintended effects of displaying calorie information at restaurants and quick-service establishments. In particular, it is unclear how such information would affect individuals with clinical eating disorders, or those with eating disturbances. In the current study, 325 female undergraduate students over the age of 16 took part in a 10-minute paper-based survey after meal consumption in a cafeteria on the University of Waterloo campus. The study employed a pre-post design, with data collection occurring in paired and unpaired samples one month before calorie information was added to menu boards, and one week after. In the 299 participants with usable data the prevalence of eating disturbances (EAT-26 > 20) was 10.4%. Calorie consumption decreased from baseline (mean=678.2 kcal) to follow-up (mean=602.3 kcal; $p=0.049$). There were no statistically significant changes in any of the other outcomes from baseline to follow-up, including body image satisfaction, anxiety, mood, and frequency of engaging in unhealthy behaviours. Additionally, there were no interactions between eating disturbance level and time, which suggests that calorie labels did not differentially affect those in this high-risk population. Overall, no adverse outcomes related to eating disturbances were

associated with the implementation of calorie labels in this at-risk population. The results have potential implications for menu labelling regulations.

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1.0 Introduction

1.1 Obesity

1.1.1 Prevalence and Concerns

Obesity is a growing public health concern in Canada. Recent estimates indicate that one quarter of adult Canadians are obese and an additional 37% are overweight.¹ Globally, the World Health Organization (WHO) estimates that over 1 billion adults worldwide are overweight and 500 million are obese.² In the past three decades, rates of obesity have doubled for most age groups.¹ Excess weight is also a concern among young adults; a recent Canadian study found the prevalence of overweight and obesity for University students to be 23%.³ Obesity has been associated with the incidence of type 2 diabetes, asthma, gallbladder disease, osteoarthritis, chronic back pain, certain types of cancer, and cardiovascular disease.¹ A Canadian study estimated that in 2000, 9.3% of deaths between the ages of 20-64 could be attributed to overweight and obesity, an increase of 4.2% since 1985.⁴ Obesity also has an economic burden both through direct health care costs and indirectly through output lost due to premature death. In 2008, the estimated annual cost of obesity in Canada was estimated at \$4.6 billion, up \$735 million from 2000.¹

1.1.2 Determinants of Obesity

Obesity is most commonly diagnosed using body mass index (BMI). BMI is calculated by dividing weight (kilograms) by height squared (metres²). A BMI of 25 kg/m²-29.9 kg/m² is considered overweight for adults. A BMI of 30kg/m² or greater is considered obese.⁵ Weight gain is a function of energy expenditure and energy intake. In industrialized countries, there has been a shift in behaviour in recent years towards less energy expenditure, and greater energy

intake. These changes coincide with the rise in obesity.¹ Recent data suggests that 85% of Canadian adults are not meeting the guidelines set by the Canadian Society for Exercise Physiology of 150 minutes/week of moderate to vigorous physical activity.⁶ Sedentary behaviour has been associated with higher levels of obesity, after adjusting for age and socioeconomic status.⁶

Although physical activity is an important determinant of obesity, increased energy intake at the population level is primarily responsible for the rise in obesity.^{7,8} Both the type and the quantity of food consumed in the Canadian diet have shifted in recent decades. Consumption of sugar, fat, and animal products has increased, replacing previous diets rich in complex carbohydrates and fibre.^{9,10} The quantity of food has increased in recent decades as well. In grocery stores, the number of large sized items available increased 10-fold between 1970 and 2000, and mimicking this is an increase in the size of serving dishes. Since 1960 the surface area of an average dinner plate increased by 36%.¹¹

Energy intake has also risen due to patterns of eating outside the home. Data from the U.S. reveals that 32% of Americans' daily calorie intake comes from food consumed outside the home, and 46% of the food budget is spent on food away from home.¹² According to the Canadian Community Health Survey (2004), one quarter of all Canadians consumed food in a fast-food outlet in the last 24 hours.¹³ Most recent Canadian estimates suggest that approximately 60% of Canadians eat at a restaurant at least once per week, and 7% consume food at a restaurant daily.¹⁴ While not all food consumed outside of the home is of poor nutritional quality, restaurants generally offer foods that have larger portions, and are higher in calories, fat, and sodium.^{15,16} Restaurants are competing with other chains to provide consumers with the best

value for money, which has led to an increase in portion sizes of popular food items in quick-service establishments.¹⁷

Consuming food outside the home is an important risk factor for obesity as it increases energy intake. Regardless of BMI, individuals poorly estimate calorie amounts of large portions of food.¹⁸ This inaccuracy translates into increased energy intake, and increased calorie consumption from fat.^{17,19,20} The literature suggests that the odds of becoming overweight or obese increase with greater fast-food consumption.²¹ Given the high prevalence of consuming food at restaurants and quick-service establishments and the impact they have on diet, these locations offer excellent opportunities for public health interventions.

1.1.3 Menu Labelling

The provision of nutrition information at restaurants and quick-service establishments represents a population level intervention aimed at moderating calorie intake outside the home (see Figure 1). The rationale behind menu labelling is to provide consumers with calorie information to help them make more informed, and potentially healthier choices.

In 2008, New York City implemented a law that required restaurant chains with 15 or more locations to display calorie amounts on menus and menu boards next to the price of each option.²² Similar federal regulations have been announced across the United States. Currently, in Canada, there are no regulations on the provision of nutrition information in restaurants. The Province of British Columbia has a volunteer program called Informed Dining, in which some participating restaurants provide nutrition information to consumers.²³ The initiative does not require calories to be displayed on menus; rather nutrition information is available upon request in brochure or pamphlet form. Other voluntary programs include the Heart and Stroke

Foundation's Health Check program, in which participating restaurants provide nutrition information on menus of choices deemed to be healthy.²⁴

In 2012, a bill was introduced in Ontario to amend the Health Protection and Promotion Act that would require restaurants with five or more chains (or \$5 million in revenue) to display calorie amounts on menus. However, with prorogation of the government in October, the bill was shut down. Additionally, in 2012, Bill C-460 was introduced which centered on sodium reduction, but had some menu labelling implications. The bill had its second reading in early 2013 and did not go through.²⁴ Recently, Toronto Public Health recommended to the Toronto Board of Health that the display of calorie and sodium information should be required at restaurants in the city of Toronto. If the law passes, it would affect chain restaurants with 10 or more locations or that have \$10 million in annual sales.²⁴

Figure 1. Example of Menu Labelling



The evidence regarding the behavioural impact of menu labelling is mixed. A review in 2008 by Harnack & French found six relevant studies that evaluated calorie labels in restaurants or

cafeterias. Five of the studies found that calorie labels affected food selection in a positive way, either through intentions to order a healthier item, or the actual behaviour of ordering lower calorie items; however, the effects in all five studies were modest. One study in the review found no effect on ordering choices with the provision of calorie information.²⁵ An updated review was published in 2011 by Swartz, Braxton & Viera, and identified seven new studies published between 2006 and 2011 that used a quasi-experimental or experimental design. Two of the studies found calorie labels to be effective in decreasing calories in purchased meals; three studies reported no effect on calories; one reported a slight increase in calories, and one found a reduction in calories purchased at some food locations, but not at others.²⁶

Research in Canada on menu labelling is limited. One study examining 635 adults found that when calorie information was added to the menu for Subway restaurant, 42% of people said the information influenced what they ordered, and those who saw nutrition labels ate less of their food.²⁷ Another Canadian study surveyed over 3,000 participants and found that when calorie and sodium amounts were added to the menu after participants ordered, about a quarter of people wanted to change their menu choice. Of those who changed their orders, meals decreased by an average of 209 calories.²⁸ A recent Canadian study examining a menu labelling intervention in two hospital cafeterias found that patrons of the cafeteria that added nutrition information to menu boards noticed the information more often, and consumed less calories, sodium, and saturated fat than patrons at a control cafeteria where no menu labelling took place.²⁹

Differences in results may reflect the use of various methodologies in studies. The way calorie information is presented and the location of it varies between studies which may affect the salience of nutrition information and therefore the effectiveness.

Support for menu labelling is high with 83% of people surveyed in Toronto wanting calorie information displayed on menus.²⁴ In the U.S. approximately two-third of Americans support the presentation of calorie information at restaurants.³⁰

Although menu labeling has the potential to promote healthier eating among subsets of the population, there is little or no research on potential unintended effects of displaying calorie information at restaurants and quick-service locations.³¹⁻³³ In particular, it is unclear how calorie labelling may impact individuals with eating disorders or those trying to recover from them. Traditionally, obesity prevention and eating disorder prevention have been separate fields. The issues were thought to involve separate etiologies and require distinct prevention efforts. More recently, efforts have been made to bridge the two fields, by working towards prevention of all weight-related disorders. Evidence suggests that individuals can have co-occurring weight-related disorders, or may cross over from one to the other, and that the development of weight-related disorders involves shared risk factors.^{34,35} Economic efficiency, and a reduced risk of trying to prevent one disorder while inadvertently causing another, are cited as the main reasons for joint prevention.³⁴ Some dietitians and researchers have expressed concerns that menu labelling has the potential to exacerbate eating disorder symptoms. Currently, no research has been conducted to examine these concerns.

1.2 Eating Disorders

1.2.1 Prevalence

Eating disorders are a serious health concern in Canada. Approximately 3% of women will be affected by an eating disorder in their lifetime.³⁶ The three most common ones are anorexia nervosa (AN), bulimia nervosa (BN), and binge eating disorder (BED). More women than men

are affected by these disorders; however, 5-15% of AN and BN and 35% of BED cases are in males.³⁷ Development usually occurs in adolescence or young adulthood. The prevalence of AN is estimated at 0.3% for young women, and the incidence rate is 8 cases per 100 000 per year. BN has a prevalence of 1% for women, and an incidence rate of 12 cases per 100 000 per year. BED has a prevalence of approximately 1%.³⁸ Certain populations demonstrate higher rates of eating disorders, such as college students (transition into college has been identified as a high-risk time for development).³⁹ Eating disorders are secretive illnesses and many people do not seek help for fear of stigmatization or because they are ambivalent about changing the course of the disease. The result is an underestimation in both prevalence and incidence of these diseases. Additionally, eating pathology exists on a continuum ranging from mild eating concerns to clinically diagnosable eating disorders. Prevalence and incidence data only include individuals that meet clinical diagnosis guidelines for eating disorders. The result is an underestimation of people in the population who have issues surrounding eating patterns, but do not meet stringent clinical diagnosis guidelines. These people are classified as having an eating disturbance and estimates suggest that the prevalence ranges from 3%-5% among adult women, and up to 15% among adolescent females.^{40,41}

1.2.2 Diagnosis and Health Outcomes

Anorexia nervosa, bulimia nervosa, and binge eating disorder are characterized by different symptoms. AN has the highest mortality rate of any mental illness, with 10% of people dying within 10 years of disorder onset.⁴² Death often results from cardiac arrest, starvation, or suicide.⁴³ The disorder, according to the Diagnostic and Statistical Manual of Mental Disorders IV (DSM-IV) is characterised by a refusal to maintain at least 85% of expected body weight for

age and height, an intense fear of gaining weight, a disturbance in the way one experiences their body shape/weight, and amenorrhea (the absence of three menstrual cycles in a row).⁴⁴ The mean age of onset for this disorder is 17.⁴⁴ Individuals with AN are pre-occupied with controlling eating, and will often starve themselves of food. Signs of starvation include hair loss, yellowing palms, frequent bloated feelings, and the appearance of fine, white hair on the body.⁴³ Individuals with AN also have a greater risk of bone fractures and osteoporosis.⁴⁵

BN is characterised by cycles of bingeing and purging. The DSM-IV criteria for diagnosis of BN involves six features. An individual consumes large amounts of food in a short time, they lack control during the binge episode, they engage in inappropriate compensatory behaviours (e.g., laxatives, vomiting, or excessive exercise), the binges occur at least two times/week for three months, their self-worth is focused heavily on body shape and weight, and the symptoms do not only occur during a period of restricting AN.⁴⁴ BN can occur in a purging way in which one uses laxatives or vomiting techniques to rid the body of excess food, or can also occur in a non-purging way which involves excessive exercise or fasting to compensate for the extra intake of calories.³⁶ BN usually begins in late adolescence, and health problems associated with BN include electrolyte imbalances, enlarged salivary glands, and erosion of tooth enamel.⁴⁶

BED falls under the DSM-IV category of eating disorders not otherwise specified, but has been proposed as a separate category for the next version of the DSM. BED is similar to BN, but no compensatory measures are used after the binge. Binge episodes must be associated with three or more of the following five items: eating quicker than normal; eating until uncomfortably full; eating a lot when not hungry; eating alone because of embarrassment regarding the amount of food consumed, and feelings of guilt/depression/disgust after a binge. The binges must also occur at least two days/week for six months in order to meet the criteria set by the DSM-IV.⁴⁴

Reasons for bingeing include an attempt to numb feelings, or because of hunger after episodes of extreme dieting.⁴³ Individuals who have BED are often obese, or larger than the average person.^{36,43} Approximately one in five individuals who is obese engages in binge eating.⁴³ Health concerns associated with BED include high blood pressure, diabetes, increased risk of heart disease and certain types of cancer.⁴⁷

1.2.3 Determinants of Eating Disorders

The etiology of eating disorders is complex and involves the interaction of biological, psychological, developmental, and social factors. Biological risk factors include sex, and genetic predisposition. Psychological risk factors include body image issues, poor eating attitudes, or inadequate coping mechanisms. Developmental risk factors include traumatic experiences, parents or relatives inappropriate focus on appearance, and neglect from family.³⁶ Research has examined various social factors that may lead to the development of disordered eating. The media has garnered a lot of attention, with accusations of focusing too much on a thin-ideal resulting in females becoming dissatisfied with their bodies at a very young age leading to development of AN or BN.^{48,49} A review of the evidence by Levine & Murnen (2009) determined that media exposure is a variable risk factor and the association is weak to moderate in its' link to negative body image and eating disorders among females.⁵⁰ Females are more likely than males to idealize thinness which may be in part why eating disorders are more prevalent among females.⁴⁸ Peer influences have also been cited as a social factor affecting the development of eating pathology.^{1,48} Individuals learn dieting behaviours and eating attitudes from their peers. Research shows that females in the same clique share the same body image concerns, dietary restraint, and extreme weight-loss behaviours.⁵¹

1.2.4 Menu Labelling and Eating Disorders

To date, there has been no research conducted regarding the effects of calorie labelling on menus on people with eating disorders. However, there has been some research regarding people's perceptions of how menu labels could affect those with an eating disorder or those at risk for one. At a university in the U.S., where dining halls provided nutritional information for prepared foods, students completed a survey on their perceptions of those labels. Ninety-eight percent of students thought it was a good idea to make nutrition information available online or in dining halls, and 91% of students thought that nutrition cards would have little/no effect on the development of an eating disorder. However, 29% percent thought that displaying nutrition information would increase the risk of exacerbating existing disorders and 34% thought that it would make recovery from one more difficult.⁵² In another U.S. study, half of those interviewed thought that talking about calories could have potential dangers if not done in an appropriate way, and half thought that presentation of calorie information could lead to an eating disorder.⁵³

To date, only one study has examined perceptions of menu labels in restaurants among those with eating pathologies. Roberto, Haynos, Schwartz, Brownell & White (2013) conducted an online survey examining nutrition knowledge and menu labelling support among those with eating disorders (based on self-report measures), and those without. They found no differences between groups on calorie estimations of restaurant foods. All groups performed quite poorly, with an average of 25% of questions correct. The study also found that 92% of participants wanted restaurants to display calorie information, and there was no difference for support between those that had an eating disorder, and those that did not.⁵⁴ The study did not examine actual ordering and consumption behaviours.

Patterns of eating out among people with eating disorders or disturbances are unclear. They may not want to consume food without knowing the nutritional content of it (assuming they were monitoring/restricting intake), and therefore may avoid restaurant environments. Additionally, eating disorders are secretive illnesses, and evidence suggests that at least among those with BN, a private area is more common when bingeing.⁵⁵ While the actual prevalence of eating out among people with eating disorders is not known, it is most likely quite low, as recovery often involves nutritional counselling and practicing eating in a wide range of potentially stressful situations, such as a restaurant.⁵⁶

1.3 Eating Disturbance Outcomes Affected by Food Presentation

Various outcomes have been examined regarding eating disorders and exposure to food. While no studies to date have examined the effect of displaying calorie information on people with eating disorders, past literature has identified that people with eating concerns (including eating disturbances) experience changes in body satisfaction, anxiety, mood, calorie consumption and engagement in certain behaviours, in response to food.

1.3.1 Body Image

Adding calorie labels to menus in restaurants or quick-service establishments may help people make healthier choices, but it is unclear how the presentation of that information makes people feel about themselves. Body image is especially salient to those with eating concerns and no research has been done on how it may fluctuate in response to menu labels. Cash and colleagues (2002) define body image as a “multifaceted construct that refers to individuals’ perceptions of and attitudes toward their own body, especially its appearance.”^{57(p103)} Body image issues are a

core feature of all eating disorders. The diagnostic criteria for the diagnosis of AN and BN include a disturbance in the way one views their body.⁴⁴ While body image dissatisfaction is not a requirement for diagnosis of BED, there is evidence to suggest that those with BED experience negative body image symptoms as well.^{58,59}

Body image dysfunction has been divided into two categories: body image distortion, and body dissatisfaction. Body image distortion is an inaccuracy in the perception of one's size and shape, and body dissatisfaction is the degree that a person dislikes the size and shape of their body, and is the difference between their preferred body size and perceived body size.⁶⁰ A meta-analysis in 1997 concluded that women with a diagnosed eating disorder had greater body image distortion and body dissatisfaction than women without one, with moderate to very large effect sizes.⁶¹

Traditionally, body image was thought of as a steady perception about oneself; however, recently research has emerged that body image may change depending on the context. Tiggemann (2001) demonstrated that satisfaction regarding parts of the body change depending on situations. He found that having female undergraduates imagine body-focused situations, such as going to the beach, or changing in a dressing room, lowered their body self-esteem compared to imagining non body-focused situations, such as eating with a friend, or getting ready for school.^{62,63}

Research has also demonstrated that cognitive rumination decreases state body image, as does viewing media displaying an ideal body size.^{64,65} While temporary fluctuations may occur in state body image, state and trait levels of body image satisfaction are positively correlated.

Body image can also be affected by experimental mood manipulations. Kulbartz-Klatt, Florin and Pook (1999) induced participants into either a positive or negative mood state by using memory reflections, and music induction. Participants with BN estimated their body width as

larger (body distortion) when induced into a negative mood compared to controls. When induced into a positive mood, BN patients estimated their body size as smaller than control groups.⁶⁶ This study sheds light on the fact that body image can change, and is linked to mood.

There has been some research surrounding body image concerns and food intake. Thompson, Covert, Pasman & Robb (1993) found that perceived calorie content of food affects body size estimations. When women were told they received a higher calorie milkshake they overestimated their body size compared to those who were told they had a lower calorie one.⁶⁷ Consumption of food in general has been shown to increase body dissatisfaction and body distortion, and is moderated by restrained eating patterns and weight and shape concerns. Those with greater restraint, and shape and weight concerns experience more negative outcomes.⁶⁸ Interestingly, not just consumption, but exposure to food has demonstrated an effect on body satisfaction. In one study, bowls of food were presented that were either high-calorie (chocolate, chips and brownies), or low-calorie (cucumbers, carrots and peppers). Exposure to high calorie foods was associated with a decrease in weight satisfaction and the effect was greater for those who were high in restraint, and those with a BMI less than 25 kg/m².⁶⁹

Virtual reality environments have also been explored as a way to expose participants to a wide range of scenarios involving food. Participants put on a virtual reality helmet, and navigate through a scene with a joystick. Research using virtual reality environments has found that people with eating disorders showed greater body image distortion and body dissatisfaction after visiting virtual environments involving food compared to controls. In addition, among the eating disordered group, environments involving high calorie food resulted in greater reports of distortion and dissatisfaction compared with low-calorie food environments.⁷⁰ One hypothesis for the link between food exposure and body satisfaction is that exposure to food activates people's

schemas about the consequences of eating, such as weight gain, which in turn decreases people's satisfaction with their bodies.⁶⁹ In a qualitative study, interviews with AN patients revealed that eating food was a trigger for body image fluctuations. Some women were concerned about the thought of losing control if they did eat, which could lead to weight gain, and others described how eating could trigger negative emotional reactions of shame, and disgust.⁷¹

To date, there have been no studies examining the effect that calorie information on menus has on body image; however, a study of Taiwanese females found that those who were dissatisfied with their body, and dieting, read nutrition information more frequently than those who were not dissatisfied with their body and who were not dieting. Interestingly, all groups ranked the same in terms of nutrition knowledge. The researchers explain this finding by saying that these people are preoccupied with creating a negative energy balance to help them lose weight and that behaviours such as that could potentially lead to development of an eating disorder.⁷²

Issues with body image are a core feature of both AN and BN and are implicated in BED as well. Exposure to food seems to affect body image in individuals with eating pathologies. Adding calorie labels to menus may make individuals more aware of the nutritional profile of food, but it could potentially be harmful for body image satisfaction.

1.3.2 Anxiety

Individuals with eating disorders and disturbances often experience anxiety in response to food. It is unclear whether the presentation of calories on menus will lead to an increase in anxiety by increasing focus on the number of calories, leading to a fear of weight gain, or will lead to a

decrease in anxiety because the individual would be better able to estimate calorie intake and could potentially avoid high calorie foods if restricting calories.

Some anxiety is expected in everyday life; however, in people with eating concerns, anxiety levels can be heightened and interfere with daily functioning. It is common for an individual with an eating disorder to also present with another mental illness, such as a mood, personality, or anxiety disorder.^{1,48} Approximately two-thirds of individuals with eating disorders have an accompanying anxiety disorder; the most common types being obsessive compulsive disorder and social phobia.⁷³

While anxiety may already be heightened among people with an eating disturbance, certain situations can lead to a further increase. Aime, Cotton & Bouchard (2009) exposed women who were concerned about their weight and shape and those that were not, to three virtual reality environments; an office, a restaurant buffet, and a swimming pool. They found that anxiety levels and weight, shape and food preoccupations increased in the restaurant and swimming pool conditions among the women who were concerned about weight and shape.⁷⁴ These situations are thought to produce an emotional reaction among these individuals because they represent a fear of weight gain, and possible judgement by others. One characteristic of individuals with AN is a fear of gaining weight, and individuals undergoing in-patient treatment for an eating disorder often experience anxiety, fear, tension, and disgust during meal-time.^{75,76} Research suggests that seeing food can lead to anxiety in those with eating pathologies. One study exposed people with AN and controls to two low calorie foods (an apple and lettuce salad with no dressing) and two high calorie foods (a bagel with cream cheese, and iced cake). Participants with AN had an elevated heart rate in response to the high calorie foods compared to the low calorie foods, and the control group showed no such increase. Participants also completed an internal state analog

scale and those with AN compared to the control group showed increased anxiety, fear, disgust, nausea, guilt and decreased happiness when exposed to the high calorie food.⁷⁷ Exposure to real food has been shown to evoke anxiety, but so has exposure to high-calorie food via pictures and virtual reality environments among those with AN and BN.^{78,79}

To our knowledge there is no research on how people with eating disorders or eating disturbances react to menu labels in terms of anxiety. Seeing calorie information may seek to confirm estimations about the nutritional content of foods thereby lowering anxiety, or seeing it may raise anxiety levels due to fear of weight gain.

1.3.3 Mood

Individuals with eating disorders often struggle with mood fluctuations and have difficulty regulating strong emotions.^{80,81} At present, it is unclear how presenting calories on menus will affect mood.

Eating disorders have a high comorbidity with mood disorders. Individuals with AN are 2.4 times more likely to have a mood disorder (defined by DSM-IV criteria) than those without AN, those with BN are 7.8 times more likely, and individuals with BED are 3.1 times more likely to have a mood disorder than those without BED.⁸² Individuals with eating disorders, and those at high-risk of developing one are also more likely to exhibit negative affect compared to healthy controls.⁸³

Individuals with eating disorders often have maladaptive strategies for dealing with emotions. Binges are a key component of BN and BED and certain types of AN, and are thought to occur as the result of poor regulation of strong emotions.^{81,84} In an experimental manipulation, female

obese binge eaters were induced into a negative mood or a neutral mood through the use of a film, and then chocolate was consumed under the guise of a taste test. It was confirmed that negative mood promoted overeating, especially among those who scored high in dietary restraint. A meta-analytic review found that negative affect is a causal maintenance factor for bingeing, and a risk factor for eating pathology in general.⁸⁵⁻⁸⁷ Research is inconsistent on the effect of binges on mood. In some studies, the effect of a binge seems to be cathartic and mood improves, in other studies mood is more negative immediately following a binge.^{85,86} One concern regarding menu labelling is that if presenting calorie information induces those with eating disturbances/disorders into a negative mood then a binge might ensue as a way to deal with that emotion. A cycle could potentially be formed with seeing calorie labels and bingeing. Currently, no evidence exists on the effect of displaying calorie information on mood.

1.3.4 Calorie Consumption

To date, no research has been conducted on the effect that menu labels have on calorie consumption among those with eating disturbances or eating disorders. In some cases eating pathology involves a severe caloric deprivation and in other cases binges or an overconsumption of food occurs.⁴⁴ Currently, it is unclear how calorie labels would affect food consumption because eating patterns are so diverse depending on the goal of the individual to restrict or binge on food.

Calorie labels on menus may decrease food consumption among those with eating disturbances. One possible reason is that dieting is positively correlated with eating disturbance.⁸⁸ If individuals are trying to restrict calories as part of their eating pathology, then adding calorie

amounts to menus would theoretically draw attention to the number and facilitate reductions in calorie intake.

Alternatively, calorie labels on menus may increase food consumption for those with eating disturbances or disorders. For individuals who are bingeing, high-calorie food at restaurants provides an appropriate venue to do just that. Studies have shown that among binge eaters between 35-50% of all binges occur at restaurants.^{89,90} While eating at restaurants (compared to eating at home), calorie consumption is increased an average of 226 calories among binge eaters.⁹¹

Another possibility is that calorie labels on menus may have no effect on food consumption among those with eating disorders, due to already accurate estimations regarding the caloric quantity of foods. Previous research suggests that those with clinical eating disorders have higher nutrition knowledge than those without disorders.⁹²⁻⁹⁵ Elevated nutrition knowledge may only apply to those with a clinical diagnosis of an eating disorder. One study found no differences between those with subclinical eating concerns (eating disturbances) and controls with respect to nutrition knowledge or diet composition.⁹³ Additionally, treatment for both eating disturbances and eating disorders often involves nutritional counselling or therapy.⁹⁶ Based on existing evidence, menu labels may have little effect on those with clinical eating disorders as they would already be aware of the nutritional value of food.

Furthermore, it is unclear how often people with eating disturbances would eat at restaurants, as presentation of food (especially high-calorie food) evokes feelings of anxiety and guilt,⁷⁹ and restaurants seem to evoke anxiety among those with weight and shape concerns.⁷⁴ For those reasons, people with eating concerns may avoid restaurants. It is unclear how the presence of

calorie labels on menus affects food intake among those with eating disturbances or eating disorders. Labels may decrease food consumed due to stricter monitoring of intake, or they may increase calories consumed if individuals are intentionally trying to binge, or they may have no effect as individuals are already aware of what they are consuming.

1.3.5 Unhealthy Behaviours

Engaging in certain unhealthy behaviours (usually as a way to lose/control weight) have been associated with eating pathology; they range in severity from mild behaviours such as thinking about weight, to extremely harmful behaviours such as using laxatives, or vomiting. No research has been conducted on the effect that menu labels have on the prevalence of engaging in these behaviours. It is clear from the literature that weight management techniques such as vomiting, using laxatives, diet pills or diuretics, engaging in excessive exercise and restricting calories are more common among those with eating disorders and disturbances.^{44,88,97-99} It is unclear how calorie labels may affect these behaviours, although if presentation of food and exposure to restaurant situations increases anxiety and decreases mood,^{74,79} then prevalence of these behaviours may increase as a way to deal with unpleasant emotions.

2.0 Rationale

Obesity is an important public health concern in Canada. Recent estimates are that 25% of Canadians are obese and an additional 37% are overweight.¹ Obesity has been linked with incidence of type 2 diabetes, asthma, gallbladder disease, osteoarthritis, chronic back pain, certain types of cancer, and cardiovascular disease.¹ Adding calorie labels at restaurants and quick-service establishments represents one population intervention aimed at decreasing obesity. The rationale behind menu labelling is that providing consumers with information can promote informed and potentially healthier choices. While menu labels may help people make healthier choices, the potential unintended effects on people with eating disorders/eating disturbances are unclear. The current study aims to address an important evidence gap and investigate the effect on outcomes that are particularly relevant to a population with disturbed eating attitudes.

2.1 Research Questions

The current study examined how calorie information on menus affects a female University population, including those at high risk for eating disturbances. Specifically, the study addressed the following research questions:

- 1) How does the presentation of calorie information affect body satisfaction?
- 2) How does the presentation of calorie information affect state anxiety?
- 3) How does the presentation of calorie information affect mood?
- 4) How does the presentation of calorie information affect food choices?
- 5) How does the presentation of calorie information affect the prevalence of engaging in unhealthy weight related behaviours?

3.0 Methods

3.1 Study Protocol

The study was conducted on the University of Waterloo campus, as part of a larger pre-post study examining menu labelling in a student residence cafeteria. Eligible undergraduate students over the age of 16 completed a 10-minute exit survey one month before (October 2012) and one week after (November 2012) calorie amounts were displayed on cafeteria menu boards. Calorie labels were added as part of the larger study's objective to examine the effect of displaying nutritional information on consumer behaviour. Calorie labels were added next to the food item description for most items in the cafeteria, a detailed description can be found below, and examples of calorie labels used in the study can be found in **Appendix A**. The exit survey collected socio-demographic measures, an assessment of food selection, consumption, and awareness, recall, and use of calorie information.

Upon completion of the exit survey, female participants were approached to complete a 10-minute paper-based survey that assessed eating disturbance, body image satisfaction, state anxiety, mood, perceived stress and engagement in certain behaviours. The same survey was administered pre and post-calorie labelling. The research assistant who administered the survey was always a female, and followed a script. The paper-based survey was linked with the participants' initial exit survey using a unique set of identifying questions.

3.1.1 Calorie Label Intervention

The student residence cafeteria had multiple stations with various food offerings. There was a sandwich bar, a salad bar, a hot entree station, a station with rotating specials, and a dessert area. Additionally, there were fountain drinks available, and multiple drink fridges. The intervention

in the current study involved adding calorie labels for almost all the food items in the cafeteria. Foods that were not labelled included pre-packaged items such as chips and chocolate bars which already had nutrition facts tables on them. The labels that were posted in the cafeteria were of three different types. The first type was a “large sign” (on an 8 ½ by 11 inch sheet of paper) that was used for items such as bagels, ice cream, and sandwiches/salads, see Figure 13 in **Appendix A**. The second type of sign added to the cafeteria was a “small sign” (on a 5 by 7 inch sheet of paper). “Small signs” were used for such items as hot entrees and sides, fountain drinks, the salad bar, and the dessert station, see Figure 14 in **Appendix A**. The “large sign” and “small sign” both had the food description on the left side, such as “Whole Wheat Bagel” and then a dotted line leading to the right side of the page where the calorie information was listed “190 cal”. All signs had size 24 font and had multiple items per page. If the serving size was not clear from the item name then it was listed next to the item in size 14 font. The only difference between the large sign and the small sign was the size of paper used for printing. The third type of label used was a “shelf tag”. “Shelf tags” were used for items in the beverage fridges, cereals, soups, bulk candy, sushi, and yogurt, see Figure 15 in **Appendix A**. These signs displayed size 24 font and were 1 by 4 ½ inches. The “shelf tags” were located directly below the corresponding food item.

All calorie labels used the font Candy Script to match other Waterloo Food Services materials. All food item descriptions were in black ink and the calorie information and title of the sign (if applicable) was in red ink. Calorie labels were placed next to menu items, or at the station where the food was located (either on the wall or in a frame located on the counter). Labels were checked daily for visibility and accuracy.

3.2 Study Participants

The sample size of the larger study was 1,085: 510 at baseline and 575 and follow-up. Response rates were calculated using the American Association for Public Opinion Research's standard definitions manual for calculating response rates (formula 2 was used).¹⁰⁰ The response rate for the larger study was 49.3%, see **Appendix B** for calculations.

Female undergraduate students over the age of 16 were then invited to complete a paper-based survey by a research assistant immediately after completing an exit interview. Female undergraduate students are considered a high-risk group for developing eating disorders which is why they were chosen for this study.^{101,102} Overall, 325 participants completed the survey: 144 at baseline and 181 at follow-up. The response rate of the second survey was 60.5% see **Appendix B** for calculations. Twenty-six participants were deleted due to missing data on key variables, or because a match could not be identified between the main electronic survey and the paper-based survey.

The final sample size was 299 participants. Participants who completed the survey at baseline were eligible to complete the survey at follow-up. The correlation data for these respondents is addressed by the analysis plan, described below. Participants received \$5 remuneration for each study they participated in. Both studies received ethics approval from the University of Waterloo Office of Research Ethics.

3.3 Measures

Several previously-developed instruments were used to assess eating disturbance, body image, anxiety, mood, perceived stress, and engagement in certain behaviours. In addition, "state"

measures of body satisfaction, anxiety and mood were used to examine changes in response to a specific experimental manipulation (the presentation of calorie information) and not stable, trait measures. Demographic information and food selection were drawn from the electronic survey as part of the larger study, as described below. A copy of the survey including all measures can be found in **Appendix C**.

3.3.1 Demographic Information

Participants' responses were linked with the initial exit survey. The initial survey collected demographic information including gender, race, education level, and self-reported height and weight. Additionally, the exit survey asked participants about "weight perceptions," by asking, "do you consider yourself now to be: overweight, underweight, or about the right weight?" The survey also asked about "weight aspirations," the question stated, "which of the following are you trying to do about your weight: lose weight, gain weight, stay the same weight, or are you not trying to do anything about your weight?" The exact wording of all demographic questions can be found in **Appendix D**. BMI was calculated from self-reported height and weight and categorized into underweight, normal weight, overweight, and obese using the WHO guidelines.⁵ Additionally, a category titled, "not stated" was added in the analysis stage for those who did not provide this information. The categories of overweight and obese were collapsed, as there were very few participants in each category (25 and three respectively).

3.3.2 Calorie Consumption

Food selection was collected as part of the initial exit survey completed by participants. All available menu items were programmed into the electronic survey to ensure accurate reporting

and coding. Questions were asked examining what each participant ordered and how much of it they ate during the previous meal. Questions included any main entrees, sides, beverages, desserts and any modifications made to items ordered. For exact wording of questions see **Appendix D**.

Nutrition information for food was provided by Waterloo Food Services, or calculated using nutrient analysis software, The Food Processor (version 10.10.2), from *esha* Research. The Canadian Nutrient File (version 2007) within The Food Processor was used to calculate missing information, unless available options did not match the food item, in which case an alternate file was used from the program. Approximately one third of nutrition information was calculated using The Food Processor.

3.3.3 Eating Disturbance

Eating disturbance was measured using the Eating Attitudes Test, which is one of the most accepted measures of symptoms and concerns relating to eating disorders.^{103,104} The EAT-26 was adapted from the EAT-40 and is predictive of the EAT-40 ($r=0.98$, $p<0.001$).¹⁰⁴ There are 6 response options for each of the 26 questions, ranging from *always* to *never*. The response options *never*, *rarely* and *sometimes* received zero points in scoring, *often* received one point, *usually* received two points, and *always* received three points. Scores were calculated as the sum of coded responses, and scores above 20 are indicative of an eating disturbance.¹⁰⁴ One study examined the relationship between EAT-26 scores and DSM-IV criteria for diagnosis of an eating disorder and found an accuracy rate of 90% for classification, using the cut-off score of 20.¹⁰⁵ In a non-clinical population, it is estimated that between 10-35% of people would score above the cut-off of 20 and be in the high risk group.¹⁰⁶⁻¹⁰⁸ The EAT-26 can also be used as a

continuous variable with higher scores indicating greater eating disturbance.¹⁰⁵ In the current study the EAT-26 was scored as a continuous measure. Responses over time are fairly stable with a test-retest reliability co-efficient between 0.84 to 0.89.¹⁰⁹ An administrative error occurred at baseline during survey administration in which a question from the EAT-26 survey assessing eating disturbance was left out. Therefore, during analysis only 25 questions were included to calculate the total EAT-26 scores both at baseline and at follow-up. Since the EAT-26 was used as a continuous variable, it had no effect on classification into a high-risk or low-risk group.

3.3.4 Body Image

Body image was measured using the Body Image States Scale (BISS). Developed by Cash, Fleming, Alindogan, Steadman & Whitehead (2002), the BISS is a six-item questionnaire used to detect short-term fluctuations in body image satisfaction. The six questions address: 1) satisfaction with overall appearance, 2) satisfaction with body size/shape, 3) satisfaction with weight, 4) feelings of attractiveness, 5) current feelings about looks, and 6) an evaluation of one's appearance compared to thoughts about an average person. Participants were instructed to answer how they felt at that very moment, capturing present feelings. Each question had nine possible responses, ranging from extremely positive to extremely negative body image responses. Response options were coded from one to nine and three questions were reverse scored. The mean of the responses was used, with higher scores indicating greater body satisfaction.⁵⁷

The BISS has been validated on a sample of college students.⁵⁷ The scale was selected as a measure in the current study because responses have been shown to fluctuate in experimental situations, and are therefore a state measure of body image as opposed to a trait measure.^{57,67} In

the current study, body image satisfaction/dissatisfaction was measured and used as a proxy for perception of body image. Body image distortion was not measured as it was not feasible with available time and equipment.

3.3.5 Anxiety

Anxiety was measured using a shortened version of Spielberger's State-Trait Anxiety (STAI) Scale. The original STAI consists of two 20-item scales and was developed as a way to measure both temporary state levels and more stable trait measures of anxiety.¹¹⁰ The state anxiety subscale used in the current study measured apprehension, tension, nervousness and worry. A six-item version was created by Marteau & Becker (1992) using question items 1,3,6,15,16 and 17.¹¹¹ Each question had four response options ranging from *not at all* to *very much*, with higher scores indicating greater anxiety. The STAI-6 was evaluated by Tluczek, Henriques and Brown (2009) and was found to have alpha co-efficients ranging from 0.79 to 0.81 at various time points. In addition, the STAI-6 was found to be correlated with the original 20-item state subscale of the STAI at all time points with an r value above 0.9.¹¹² In the current study the STAI was scored as a continuous variable with scores ranging from 6-24.

3.3.6 Mood

Mood or affect was measured using the Positive and Negative Affect Schedule (PANAS). Watson, Clark & Tellegen (1988) developed the 20 question scale with 10 questions pertaining to positive affect, and 10 to negative affect. The questionnaire involves words that describe feelings and emotions. Participants were instructed to indicate the extent that they felt each of the feelings or emotions at the present moment, thereby capturing a state measure of affect. Responses were based on a five-point rating scale ranging from *very slightly or not at all (1)* to

extremely (5). Scoring was separate for positive and negative affect and was calculated by adding up the values of responses for each dimension with scores ranging from 10-50 for each dimension. A higher score on the positive affect dimension was indicative of a better mood, and a higher score on the negative affect dimension was indicative of a worse mood (i.e., greater negative affect). The scale has been validated on a sample of college students and had internal consistencies of 0.89 and 0.85 for positive and negative dimensions, respectively. The test-retest reliabilities during an 8-week retest interval were 0.54 on the positive affect scale and 0.45 on the negative affect scale when instructions for participants were to rate how they felt in the moment. Test-retest reliabilities increased as instructions for the test were to rate how one felt over a longer period of time.¹¹³

3.3.7 Perceived Stress

Research has demonstrated that life stress and eating disorder symptomology are positively correlated.¹¹⁴ The timing of the proposed study coincided with midterms and/or exams which could produce a potential confound of greater stress at one data collection point. Stress was measured in order to control for this potential confound. Measurement of this occurred via the Perceived Stress Scale which was developed by Cohen, Kamarck & Mermelstein (1983) as a way to examine the extent that situations in one's life are appraised as stressful. The scale has demonstrated its' reliability and validity and appropriateness for use in a young population as a measure of stress.¹¹⁵ Originally developed as a 14-item scale, a 10-item version was developed which was used in the current study. The questions instructed participants to answer how they felt during the past month and response options were *never, almost never, sometimes, fairly often, and very often*. Questions included 4 positively framed items and 6 negatively framed

ones. Scoring was done by assigning a numerical value to each response option, and reverse scoring was done for the positively framed questions. A final score was obtained by summing the responses from all 10 questions, and scores could range from zero to 40.¹¹⁶

3.3.8 Engaging in Unhealthy Behaviours

Certain behaviours have been linked to eating disorder symptoms, and therefore frequency of participation in these behaviours was assessed in the current study. The paper-based survey inquired how often (in the past week) participants went on binges where they felt they couldn't stop, exercised more than 60 minutes a day to lose or control weight, ate less than they wanted to as a way to control calorie intake, thought about their weight, made themselves sick (vomited) to control weight or shape, and how often they used laxatives, diet pills, or diuretics to control weight or shape in the past week. The response options for those questions ranged from *never*, to *five or more times* in the past week. These questions were adapted from the behavioural questions that accompany the EAT-26 scale.¹⁰⁴

3.4 Hypotheses

The specific hypotheses for the current research project were as follows:

- 1) Body image satisfaction will decrease from baseline to follow-up among those with higher eating disturbance scores.
- 2) Anxiety will increase from baseline to follow-up among those with higher eating disturbance scores.
- 3) Positive affect will decrease and negative affect will increase from baseline to follow-up among those with higher eating disturbance scores.

- 4) The presentation of calorie information will result in lower calorie meals consumed and will not be associated with eating disturbance score.
- 5) The frequency of engaging in health-related behaviours (binging, excessively exercising, restricting calories, thinking about weight, vomiting, and using laxatives, diet pills or diuretics) will increase from baseline to follow up among those with higher eating disturbance scores.

4.0 Analysis

All data analysis was conducted using SPSS Version 21.

Since participants that completed the survey at baseline were eligible to complete the survey again at follow-up, the final sample consisted of participants who completed the survey at one time point and those that completed at both time points. This design generated samples that could be analysed in three different ways: 1) *All Participants*, in which analyses were conducted using all available respondents at baseline and follow-up, 2) *Baseline/follow-up Only*, in which analyses only included participants that completed one survey, either at baseline or at follow-up, and 3) the *Cohort* group, which only included participants that completed the baseline and follow-up survey. Each of the sample “types” serves a different analytical purpose: the *Cohort* group allows for longitudinal analyses, but is also subject to survey effects from participating in the baseline survey, which may have altered behaviour at follow up; the *Baseline/follow-up Only* group does not provide changes within individuals over time, but is free from any survey effects at follow-up; whereas the *All Participants* group provides the largest sample available for analysis. Results are provided for the *All Participants* group, but the pattern of findings was fairly consistent between the three subgroups and any inconsistencies will be addressed.

Analyses examined 11 primary outcomes: body image, anxiety, positive affect, negative affect, calorie consumption, and the frequency of bingeing, engaging in excessive exercise, restricting calories, thinking about weight, vomiting, and using laxatives, diet pills or diuretics.

First, unadjusted means were tested for differences between subsamples (*All Participants*, *Baseline/follow-up Only*, and the *Cohort* group). Second, generalized estimating equations (GEE models) were run on the all participants sample (N=299) to model outcomes. All models included an indicator variable for “wave”, which was coded as 1=baseline or 2=follow-up.

Models also included eating disturbance, a continuous variable. A two-way interaction between wave and eating disturbance was entered in the models. If the interaction was not significant it was removed. Other covariates in the models were: BMI, race, perceived stress level, weight perceptions, and weight aspirations.

GEE models take into account the correlated nature of a persons' data among those that completed the survey at two time points, and also allows for data among participants who only completed the survey once.¹¹⁷ In other words, models include the entire study sample.

Analysis for the *Baseline/follow-up Only* subsample was conducted using linear regressions for continuous variables, or binary logistic regression for dichotomous variables (N=205). The sample size of the *Cohort* group was very small and the only analyses that could be run were regressions using only the wave indicator variable (N=100). The *Cohort* group analysis did not include any covariates other than the wave indicator variable, therefore participants who were removed from the *All Participants* analysis due to a missing eating disturbance variable were added back in.

5.0 Results

Sample characteristics are shown in Tables 1 and 2. All characteristics were tested for differences between groups using t-tests for continuous variables (perceived stress and eating disturbance), and chi squared tests for categorical variables (BMI, race, weight perception, and weight aspiration). The only significant difference that emerged was for the variable of eating disturbance between the *Baseline/follow-up Only* group and the *Cohort* group (see Table 2). The variable of eating disturbance is presented two ways in the sample tables, both as a continuous variable and as a categorical variable. The categorical variable assigns participants to a high-risk or a low-risk group using the standard cut-off score of 20 on the EAT-26.¹⁰⁴

Table 1. Sample Characteristics for All Participants (N=299)

	All Baseline (n=131)	All Follow-up (n=168)	Test Statistics
Eating Disturbance			F= 1.631
Mean Score (SD)	8.4 (7.8)	9.6 (8.8)	p= 0.203
Low Risk ^a	90.8% (119)	88.7% (149)	X ² =0.366
High Risk	9.2% (12)	11.3% (19)	P=0.545
Perceived Stress Level			F= 0.550
Mean (SD)	20.6 (5.9)	21.0 (5.9)	p=0.358
BMI			
Underweight	9.9% (13)	9.5% (16)	
Normal weight	71.0% (93)	73.8% (124)	X ² =2.734
Overweight and obese	12.2% (16)	7.1% (12)	p=0.435
Not stated	6.9% (9)	9.5% (16)	
Race			
White	51.1% (67)	47.0% (79)	X ² =0.500
All Others	48.9% (64)	53.0% (89)	p=0.479
Weight Perception			
Overweight	13.0% (17)	13.7% (23)	X ² =0.621
Underweight	6.9% (9)	4.8% (8)	p=0.733
About right	80.2% (105)	81.5% (137)	
Weight Aspiration			
Lose weight	45.0% (59)	42.3% (71)	X ² =2.978
Gain weight	2.3% (3)	2.4% (4)	p=0.395
Stay same weight	26.0% (34)	34.5% (58)	
Not trying to do anything	26.7% (35)	20.8% (35)	

^a Low Risk < 20 on EAT-26. High Risk ≥ 20

Table 2. Sample Characteristics for Baseline/Follow-up Only and Cohort (N=299)

	Baseline Only (n=84)	Follow-up Only (n=121)	Cohort (n=94)	Test Statistics
Eating Disturbance				F=6.394
Mean Score (SD)	9.3 (8.8)	10.8 (9.6)	6.7 (5.4)	p=0.002
Low Risk ^a	88.1% (74)	85.1% (103)	96.8% (91)	X²=8.069
High Risk	11.9% (10)	14.9% (18)	3.2% (3)	P=0.018
Perceived Stress Level				F=1.066
Mean (SD)	20.9 (6.1)	21.3 (5.7)	20.1 (5.8)	p=0.346
BMI				
Underweight	8.3% (7)	9.1% (11)	11.7% (11)	
Normal weight	69.0% (58)	74.4% (90)	73.4% (69)	X ² =6.096
Overweight and obese	15.5% (13)	6.6% (8)	7.4% (7)	p=0.412
Not stated	7.1% (6)	9.9% (12)	7.4% (7)	
Race				
White	54.8% (46)	47.1% (57)	45.7% (43)	X ² =1.685
All Others	45.2% (38)	52.9% (64)	54.3% (51)	p=0.431
Weight Perception				
Overweight	13.1% (11)	15.7% (19)	10.6% (10)	
Underweight	7.1% (6)	5.0% (6)	5.3% (5)	X ² =1.634
About right	79.8% (67)	79.3% (96)	84.0% (79)	p=0.803
Weight Aspiration				
Lose weight	46.4% (39)	43.8% (53)	40.4% (38)	
Gain weight	3.6% (3)	2.5% (3)	1.1% (1)	X ² =5.172
Stay same weight	22.6% (19)	32.2% (39)	36.2% (34)	p=0.522
Not trying to do anything	27.4% (23)	21.5% (26)	22.3% (21)	

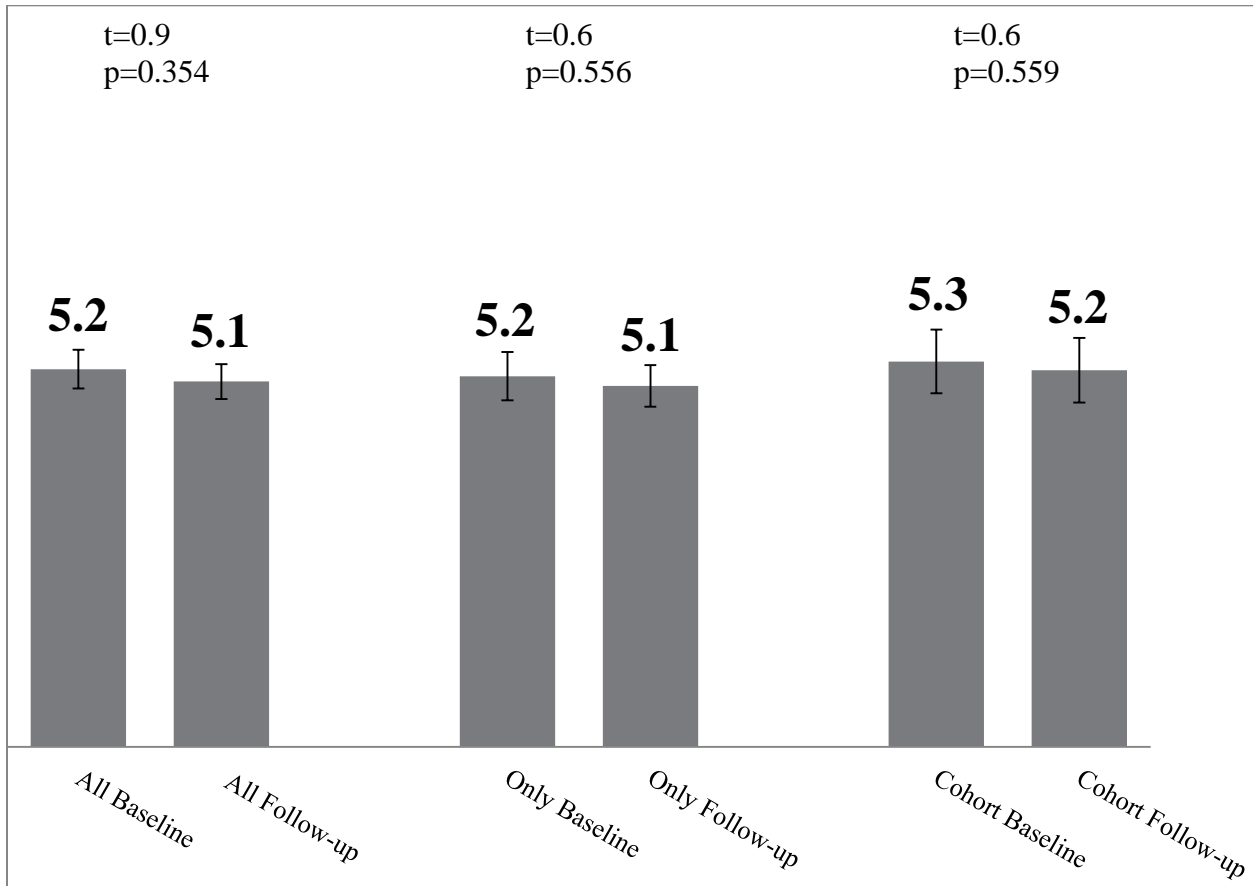
^a Low Risk < 20 on EAT-26. High Risk ≥ 20

5.1 Body Image Satisfaction

Body image satisfaction was measured using the body image state scale (BISS). Figure 2 shows mean scores on the BISS (scores range 1 – 9) at baseline and at follow-up. The mean BISS score for all participants at baseline was 5.2 (SD=1.26) and all participants at follow-up was 5.1 (SD=1.30). There were no significant differences between baseline and follow-up values, either

for participants that completed the survey at one time point, or those that completed it at both time points.

Figure 2. Body Image State Scale Means (BISS)



A GEE model was run to examine changes in body image satisfaction between waves, adjusting for eating disturbance, BMI, race, perceived stress level, weight perception, and weight aspiration, and an interaction term of wave and eating disturbance (wave*eating disturbance). Table 3 shows results from the model. There was no significant effect of wave. Body satisfaction was lower among those scoring higher on the eating disturbance scale ($p < 0.001$) and those with higher perceived stress ($p < 0.001$). Weight perception was significant ($p < 0.001$). People who reported themselves as underweight or about the right weight had a higher body satisfaction than

those who thought they were overweight (both $p < 0.001$). Weight aspiration was also significant in the model ($p = 0.010$). Participants who were trying to stay the same weight had higher body image satisfaction than those who were trying to lose weight ($p = 0.001$). The two-way interaction between wave and eating disturbance was not significant in the model.

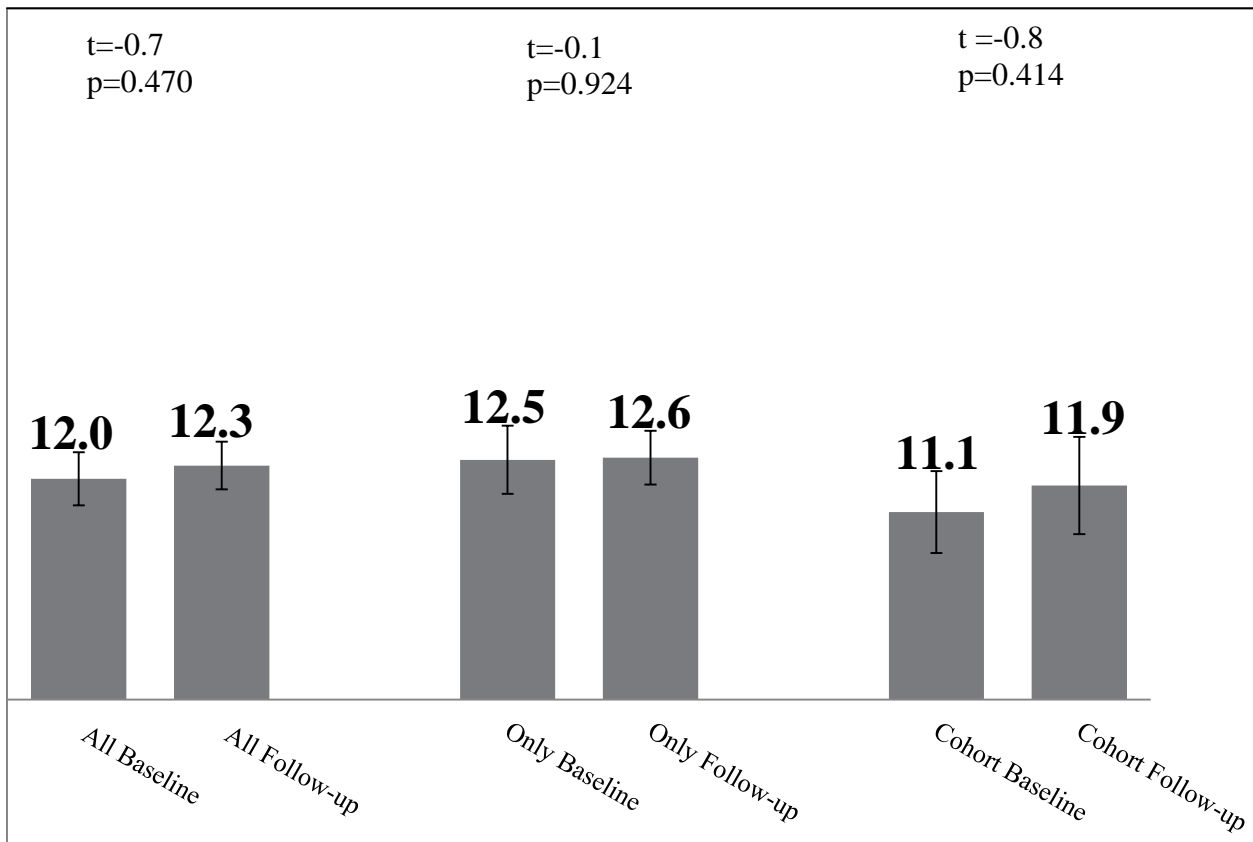
Table 3. GEE Model-Body Image Satisfaction (n=298)

	Beta	95% CI	P value
Wave			
Baseline (ref) vs. Follow-up	0.08	(-0.13, 0.30)	0.447
Eating Disturbance			
	-0.04	(-0.05, -0.02)	< 0.001
Perceived Stress Level			
	-0.05	(-0.02, 14.43)	< 0.001
BMI			
			$X^2=3.989$
			$p=0.263$
Underweight vs. Normal Weight	0.02	(-0.49, 0.53)	0.934
Underweight vs. Overweight/Obese	-0.16	(-0.82, 0.51)	0.507
Underweight vs. Not Stated	-0.35	(-0.96, 0.25)	0.253
Normal Weight vs. Overweight/Obese	-0.18	(-0.65, 0.29)	0.457
Normal Weight vs. Not Stated	-0.38	(-0.75, 0.01)	0.052
Overweight/Obese vs. Not Stated	-0.20	(-0.75, 0.36)	0.492
Race			
White vs. All Others	0.09	(-0.17, 0.35)	0.478
Weight Perception			
			$X^2=26.534$
			$p= <0.001$
Overweight vs. Underweight	0.39	(0.682, 2.102)	< 0.001
Overweight vs. About Right	1.02	(0.622, 1.420)	< 0.001
Underweight vs. About Right	-0.38	(-0.954, 0.212)	0.212
Weight Aspiration			
			$X^2=11.421$
			$p=0.010$
Lose weight vs. Gain weight	0.07	(-1.11, 1.24)	0.912
Lose weight vs. Stay same	0.52	(0.21, 0.82)	0.001
Lose weight vs. Not doing anything	0.33	(-0.01, 0.67)	0.053
Gain weight vs. Stay same	0.45	(-0.71, 1.61)	0.447
Gain weight vs. Not doing anything	0.27	(-0.89, 1.42)	0.652
Not doing anything vs. Stay same	0.18	(-0.15, 0.51)	0.276

5.2 Anxiety

Anxiety was measured using a shortened version of the State-Trait Anxiety Inventory (STAI). Figure 3 shows mean scores on the STAI (scores range 6-24) at baseline and follow-up. The mean on the STAI at baseline for all participants was 12.0 (SD=4.19) vs. 12.3 (SD=4.24) for all participants at follow-up. There were no significant differences between baseline and follow-up values, either for participants that completed the survey at one time point, or those that completed it at both time points.

Figure 3. Anxiety Means (STAI)



A GEE model was run to examine changes in state anxiety between waves, adjusting for eating disturbance, BMI, race, perceived stress level, weight perception, and weight aspiration, and an

interaction term of wave and eating disturbance. Table 4 shows results from the model. There was no significant effect of wave. Anxiety was higher among those with higher perceived stress ($p < 0.001$). The two-way interaction between wave and eating disturbance was not significant in the model.

Table 4. GEE Model-Anxiety (n=296)

	Beta	95% CI	P value
Wave			
Baseline (ref) vs. Follow-up	0.22	(-0.59, 1.03)	0.595
Eating Disturbance			
	0.05	(-0.01, 0.11)	0.090
Perceived Stress Level			
	0.31	(0.23, 0.39)	<0.001
BMI			
			$X^2=2.071$ $p=0.558$
Underweight vs. Normal Weight	1.24	(-0.47, 2.95)	0.154
Underweight vs. Overweight/Obese	1.01	(-1.20, 3.23)	0.370
Underweight vs. Not Stated	1.04	(-0.96, 3.03)	0.308
Normal Weight vs. Overweight/Obese	-0.23	(-1.79, 1.33)	0.774
Normal Weight vs. Not Stated	-0.20	(-1.48, 1.07)	0.754
Overweight/Obese vs. Not Stated	0.03	(-1.84, 1.89)	0.979
Race			
White vs. All Others	0.18	(-0.76, 1.12)	0.711
Weight Perception			
			$X^2=1.514$ $p=0.469$
Overweight vs. Underweight	1.70	(-1.44, 4.83)	0.288
Overweight vs. About Right	0.78	(-0.67, 2.22)	0.292
Underweight vs. About Right	-0.92	(-3.67, 1.83)	0.510
Weight Aspiration			
			$X^2=1.130$ $p=0.770$
Lose weight vs. Gain weight	1.02	(-3.11, 5.15)	0.628
Lose weight vs. Stay same	-0.48	(-1.67, 0.71)	0.433
Lose weight vs. Not doing anything	-0.44	(-1.59, 0.72)	0.459
Gain weight vs. Stay same	-1.50	(-2.73, 5.73)	0.488
Gain weight vs. Not doing anything	-1.46	(-5.62, 2.72)	0.494
Not doing anything vs. Stay same	-0.04	(-1.27, 1.18)	0.948

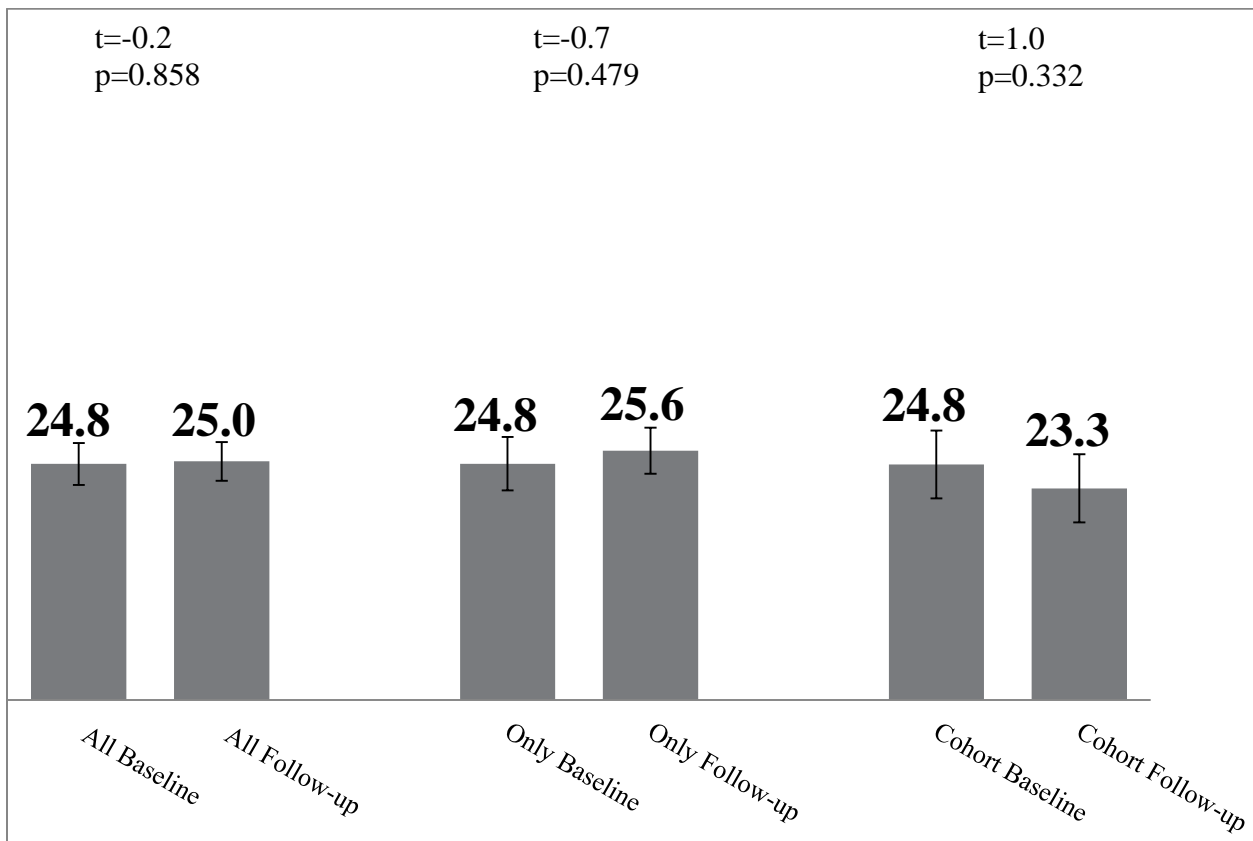
5.3 Mood

Mood was measured using the Positive and Negative Affect Schedule (PANAS). As discussed, the scale assessed positive and negative affect separately. Scores on each scale range from 10-50.

5.3.1 Positive Affect

Figure 4 shows mean scores on the PANAS positive dimension for baseline and follow-up. At baseline, the mean was 24.8(SD=7.55) for all participants, and at follow-up, the mean score was 25.0 (SD=7.90). There were no significant differences between baseline and follow-up values, either for participants that completed the survey at one time point, or those that completed it at both time points.

Figure 4. Positive Affect Means (PANAS)



A GEE model was run to examine differences in positive affect between waves, adjusting for eating disturbance, BMI, race, perceived stress level, weight perception, and weight aspiration, and an interaction term of wave and eating disturbance. Table 5 shows results from the model. There was no significant effect of wave. Those with higher perceived stress had less positive affect ($p=0.038$). The two-way interaction between wave and eating disturbance was not significant in the model.

Table 5. GEE Model-Positive Affect (n=291)

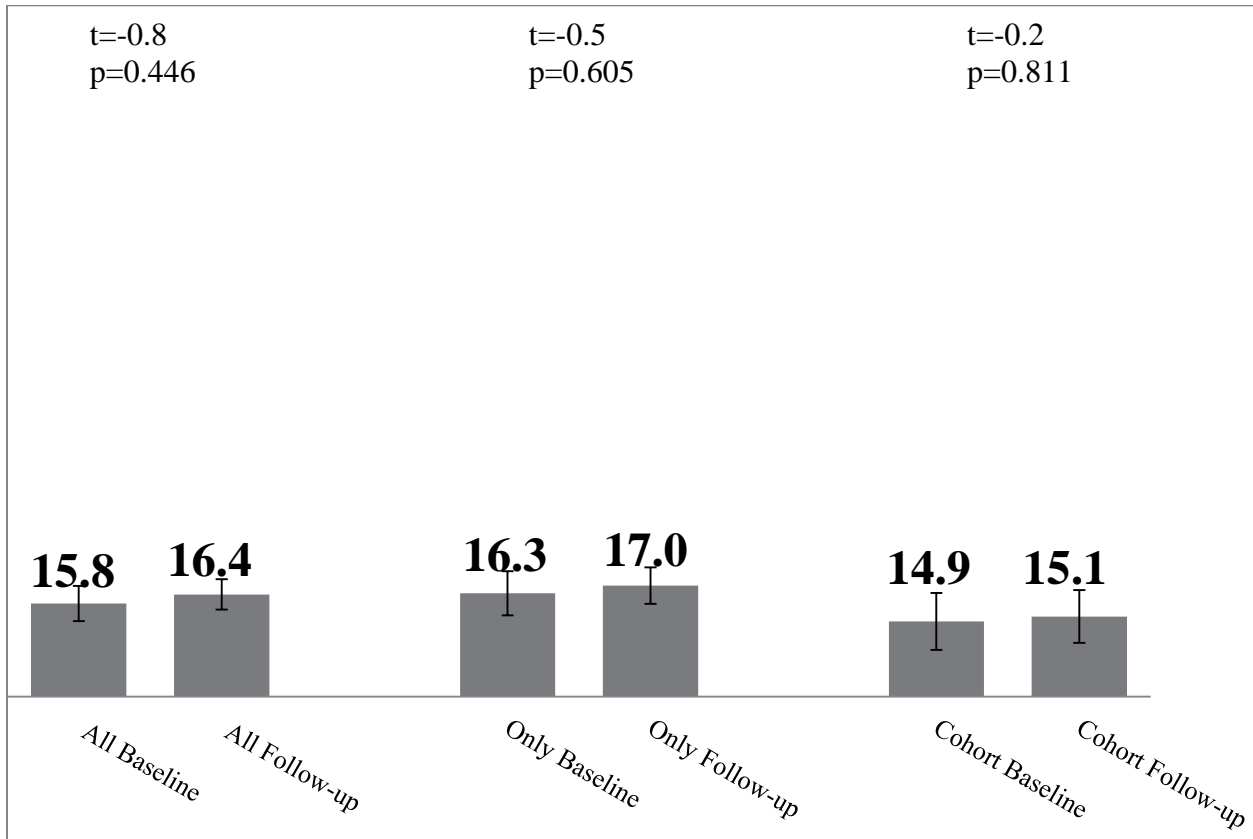
	Beta	95% CI	P value
Wave			
Baseline (ref) vs. Follow-up	-0.04	(-1.63, 1.56)	0.966
Eating Disturbance			
	0.04	(-0.10, 0.17)	0.595
Perceived Stress Level			
	-0.17	(-0.33, -0.01)	0.038
BMI			
			X ² =0.900
			p=0.825
Underweight vs. Normal Weight	1.53	(-3.14, 6.21)	0.520
Underweight vs. Overweight/Obese	0.33	(-5.21, 5.87)	0.906
Underweight vs. Not Stated	0.95	(-4.81, 6.70)	0.746
Normal Weight vs. Overweight/Obese	-1.20	(-4.46, 2.05)	0.469
Normal Weight vs. Not Stated	-0.59	(-4.05, 2.88)	0.741
Overweight/Obese vs. Not Stated	0.62	(-3.37, 4.61)	0.762
Race			
White vs. All Others	0.659	(-1.35, 2.67)	0.520
Weight Perception			
			X ² =1.296
			0.523
Overweight vs. Underweight	-4.03	(-11.20, 3.13)	0.270
Overweight vs. About Right	-0.52	(-3.72, 2.68)	0.750
Underweight vs. About Right	3.51	(-2.68, 9.71)	0.266
Weight Aspiration			
			X ² =2.517
			p=0.472
Lose weight vs. Gain weight	2.18	(-5.08, 9.43)	0.556
Lose weight vs. Stay same	2.00	(-0.52, 4.51)	0.120
Lose weight vs. Not doing anything	1.06	(-1.67, 3.79)	0.445
Gain weight vs. Stay same	-0.18	(-7.41, 7.05)	0.961
Gain weight vs. Not doing anything	-1.11	(-8.35, 6.12)	0.763
Not doing anything vs. Stay same	0.93	(-1.75, 3.62)	0.496

5.3.2 Negative Affect

Figure 5 shows mean scores on the PANAS negative dimension for baseline and follow-up. At baseline, the mean was 15.8 (SD=6.34) for all participants, and at follow-up, the mean score was 16.4 (SD=6.16). There were no significant differences between baseline and follow-up values,

either for participants that completed the survey at one time point, or those that completed it at both time points.

Figure 5. Negative Affect Means (PANAS)



A GEE model was run to examine differences in negative affect between waves, adjusting for eating disturbance, BMI, race, perceived stress level, weight perception, and weight aspiration, and an interaction term of wave and eating disturbance. Table 6 shows results from the model. There was no significant effect of wave. Those scoring higher on the eating disturbance scale ($p=0.017$) and those reporting higher perceived stress ($p<0.001$) had greater negative affect. The two-way interaction between wave and eating disturbance was not significant in the model.

Table 6. GEE Model-Negative Affect (n=298)

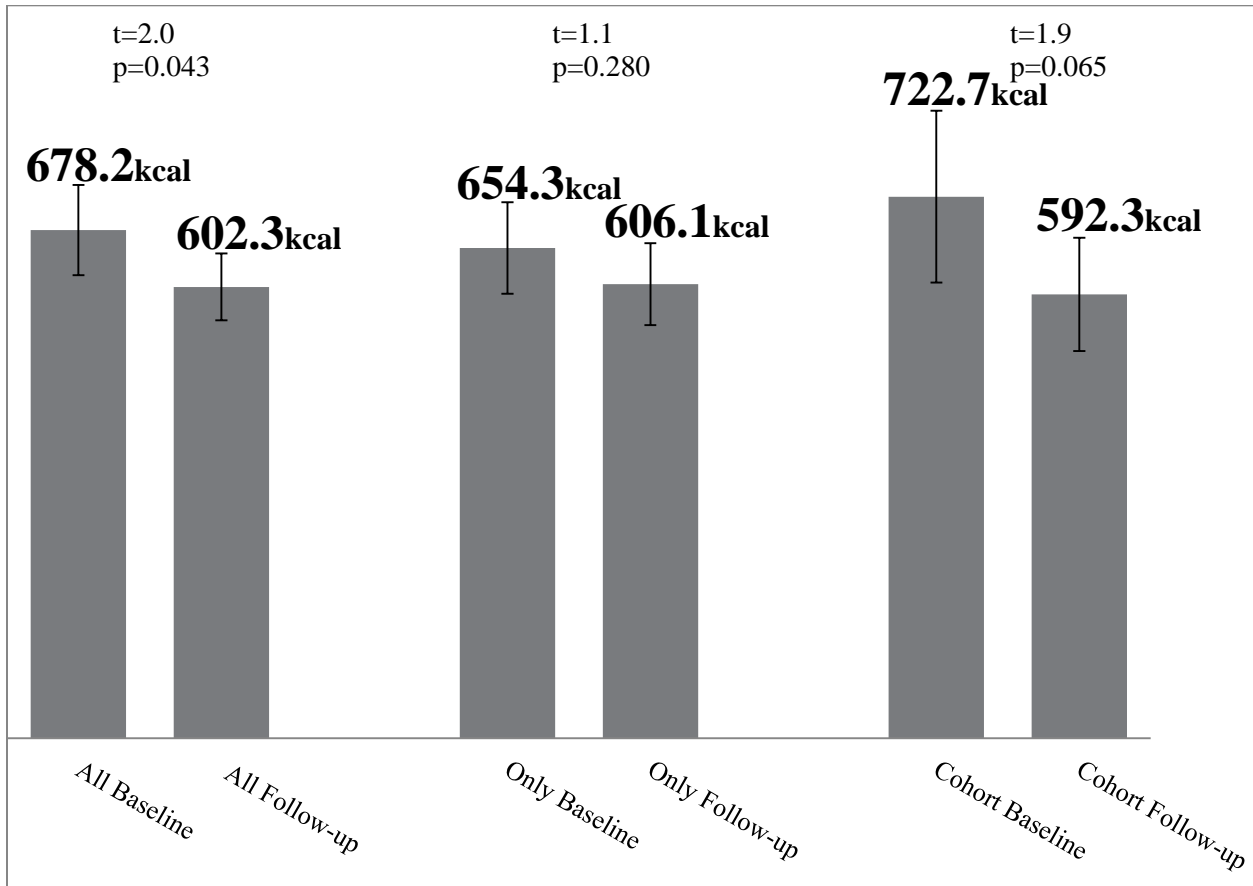
	Beta	95% CI	P value
Wave			
Baseline (ref) vs. Follow-up	0.36	(-0.89, 1.60)	0.576
Eating Disturbance	0.11	(0.02, 0.20)	0.017
Perceived Stress Level	0.42	(0.28, 0.56)	<0.001
BMI			X ² =5.123
			p=0.163
Underweight vs. Normal Weight	1.96	(-0.18, 4.10)	0.072
Underweight vs. Overweight/Obese	1.69	(-1.15, 4.53)	0.243
Underweight vs. Not Stated	0.61	(-1.90, 3.12)	0.635
Normal Weight vs. Overweight/Obese	-0.27	(-2.42, 1.88)	0.808
Normal Weight vs. Not Stated	-1.35	(-3.02, 0.32)	0.113
Overweight/Obese vs. Not Stated	-1.08	(-3.44, 1.27)	0.367
Race			
White vs. All Others	0.132	(-1.26, 1.52)	0.853
Weight Perception			X ² =0.953
			p=0.621
Overweight vs. Underweight	1.95	(-2.03, 5.9)	0.337
Overweight vs. About Right	0.49	(-1.25, 2.24)	0.578
Underweight vs. About Right	-1.45	(-5.07, 2.16)	0.431
Weight Aspiration			X ² =0.361
			p=0.948
Lose weight vs. Gain weight	0.83	(-4.05, 5.70)	0.739
Lose weight vs. Stay same	-0.28	(-1.92, 1.37)	0.739
Lose weight vs. Not doing anything	0.18	(-1.64, 2.01)	0.845
Gain weight vs. Stay same	-1.11	(-5.99, 3.77)	0.657
Gain weight vs. Not doing anything	-0.65	(-5.38, 4.09)	0.789
Not doing anything vs. Stay same	-0.46	(-2.29, 1.37)	0.621

5.4 Calorie Consumption

Figure 6 shows mean scores of calorie consumption for baseline and follow-up. At baseline, the mean was 678.2 kilocalories (SD=336.18) for all participants, and at follow-up, the mean score

was 602.3 kilocalories (SD=286.96). There was a significant difference between the means at baseline and follow-up when the entire sample was included, see Figure 6 below.

Figure 6. Calorie Consumption of Meal Means (kcal)



A GEE model was run to examine differences in calorie consumption between waves, adjusting for eating disturbance, BMI, race, perceived stress level, weight perception, and weight aspiration, and an interaction term of wave and eating disturbance. Table 7 shows results from the model. There was a significant effect of wave: calorie consumption decreased from baseline to follow-up (p=0.049). The two-way interaction between wave and eating disturbance was not significant in the model.

Table 7. GEE Model-Calorie Consumption (n=279)

	Beta	95% CI	P value
Wave			
Baseline (ref) vs. Follow-up	-77.64	(-155.02, -0.26)	0.049
Eating Disturbance			
	-2.17	(-7.42, 3.08)	0.418
Perceived Stress Level			
	6.15	(-1.0, 13.37)	0.095
BMI			
			X ² =1.303 p=0.728
Underweight vs. Normal Weight	-60.77	(-203.65, 82.11)	0.404
Underweight vs. Overweight/Obese	-7.31	(-205.55, 190.94)	0.942
Underweight vs. Not Stated	-35.70	(-235.77, 164.37)	0.727
Normal Weight vs. Overweight/Obese	53.47	(-84.56, 191.49)	0.448
Normal Weight vs. Not Stated	25.07	(-120.22, 170.26)	0.735
Overweight/Obese vs. Not Stated	-28.40	(-212.46, 155.66)	0.762
Race			
White vs. All Others	72.03	(-4.67, 148.74)	0.066
Weight Perception			
			X ² =1.376 p=0.503
Overweight vs. Underweight	-138.05	(-384.94, 108.85)	0.273
Overweight vs. About Right	-67.59	(-203.84, 68.65)	0.331
Underweight vs. About Right	70.45	(-131.54, 272.45)	0.494
Weight Aspiration			
			X ² =3.178 p=0.365
Lose weight vs. Gain weight	139.86	(-93.43, 373.16)	0.240
Lose weight vs. Stay same	-1.84	(-77.98, 74.30)	0.962
Lose weight vs. Not doing anything	49.21	(-34.11, 132.52)	0.247
Gain weight vs. Stay same	-141.70	(-374.62, 91.22)	0.233
Gain weight vs. Not doing anything	-90.66	(-332.74, 151.43)	0.463
Not doing anything vs. Stay same	-51.05	(-135.56, 33.47)	0.236

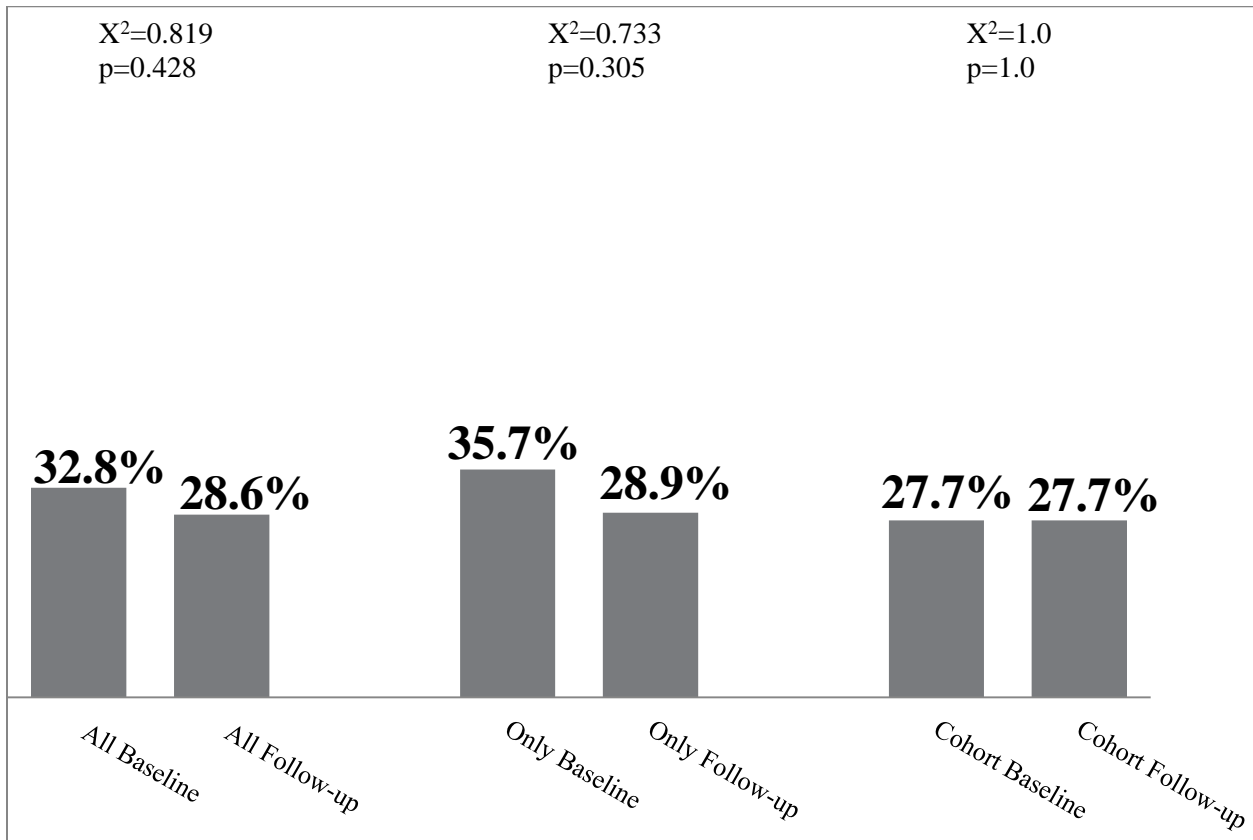
5.5 Engaging in Unhealthy Behaviours

5.5.1 Binging Behaviour

To assess the prevalence of engaging in binging behaviour where participants felt they were unable to stop, this outcome was recoded into a binary variable. The variable was re-categorized into no binges in the past week (coded as 0) versus any binges in the past week (coded as 1).

Figure 7 shows the frequency of participants engaging in binging behaviour. At baseline, 32.8% of participants reported binging at least once in the past week, and at follow-up 28.6% of participants reported this behaviour. There were no significant differences between baseline and follow-up values, either for participants that completed the survey at one time point, or those that completed it at both time points.

Figure 7. Percentage of People Engaging in Binging Behaviour at Least Once in the Past Week



A binary logistic GEE model was run to assess differences in engaging in binging behavior between waves, adjusting for eating disturbance, BMI, race, perceived stress level, weight perception, and weight aspiration, and an interaction term of wave*eating disturbance. There was no significant effect of wave. Table 8 shows results from the model which found that those scoring higher on the eating disturbance scale ($p < 0.001$), and those with higher perceived stress ($p = 0.043$) were more likely to report binging in the past week. The two-way interaction between wave and eating disturbance was not significant in the model.

Table 8. GEE Model-Binging Behaviour in the Past Week (n=299)

	OR	95% CI	P value
Wave			
Baseline (ref) vs. Follow-up	0.75	(0.44, 1.25)	0.268
Eating Disturbance	1.07	(1.03, 1.11)	<0.001
Perceived Stress Level	1.05	(1.00, 1.11)	0.043
BMI			X ² =0.985 p=0.805
Underweight vs. Normal Weight	1.74	(0.52, 5.84)	0.368
Underweight vs. Overweight/Obese	2.28	(0.38, 13.72)	0.367
Underweight vs. Not Stated	1.54	(0.32, 7.35)	0.588
Normal Weight vs. Overweight/Obese	1.31	(0.35, 4.96)	0.691
Normal Weight vs. Not Stated	0.88	(0.28, 2.83)	0.836
Overweight/Obese vs. Not Stated	0.68	(0.12, 3.73)	0.652
Race			
White vs. All Others	0.80	(0.43, 1.51)	0.497
Weight Perception			X ² =2.151 p=0.341
Overweight vs. Underweight	1.12	(0.18, 7.11)	0.908
Overweight vs. About Right	1.97	(0.67, 5.76)	0.218
Underweight vs. About Right	1.76	(0.40, 7.68)	0.450
Weight Aspiration			X ² =6.747 p=0.080
Lose weight vs. Gain weight	1.55	(0.33, 7.32)	0.584
Lose weight vs. Stay same	0.41	(0.19, 0.89)	0.025
Lose weight vs. Not doing anything	0.59	(0.29, 1.21)	0.151
Gain weight vs. Stay same	0.27	(0.05, 1.33)	0.106
Gain weight vs. Not doing anything	0.38	(0.08, 1.93)	0.244
Not doing anything vs. Stay same	0.70	(0.29, 1.69)	0.421

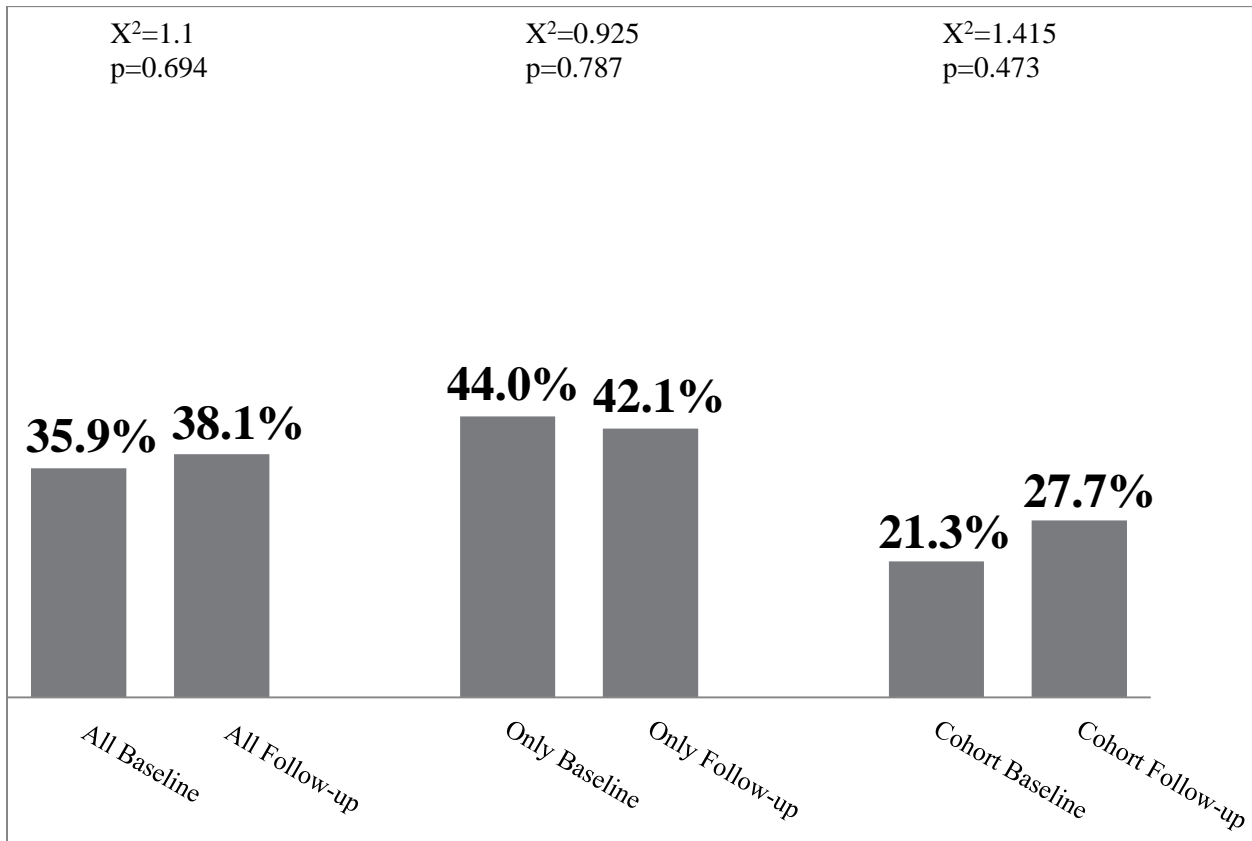
5.5.2 Exercising Excessively

To assess the prevalence of engaging in excessive exercise (more than 60 minutes per exercise bout) to lose or control weight, this outcome was recoded into a binary variable. The variable

was re-categorized into exercising excessively no times in the past week (coded as 0) versus any times in the past week (coded as 1).

At baseline, 35.9% of participants reported engaging in excessive exercise at least once in the past week, and at follow-up 38.1% of participants reported this behaviour, see Figure 8. There were no significant differences between baseline and follow-up values, either for participants that completed the survey at one time point, or those that completed it at both time points.

Figure 8. Percentage of People Engaging in Excessive Exercise at Least Once in the Past Week



A binary logistic GEE model was run to assess differences in engaging in excessive exercise between waves, adjusting for eating disturbance, BMI, race, perceived stress level, weight perception, and weight aspiration, and an interaction term of wave*eating disturbance. Table 9

shows the results of this model. There was no significant effect of wave. The model showed that those scoring higher on the eating disturbance scale were more likely to report exercising excessively in the past week ($p=0.005$). The two-way interaction between wave and eating disturbance was not significant in the model.

Table 9. GEE Model-Exercising Excessively in the Past Week (n=299)

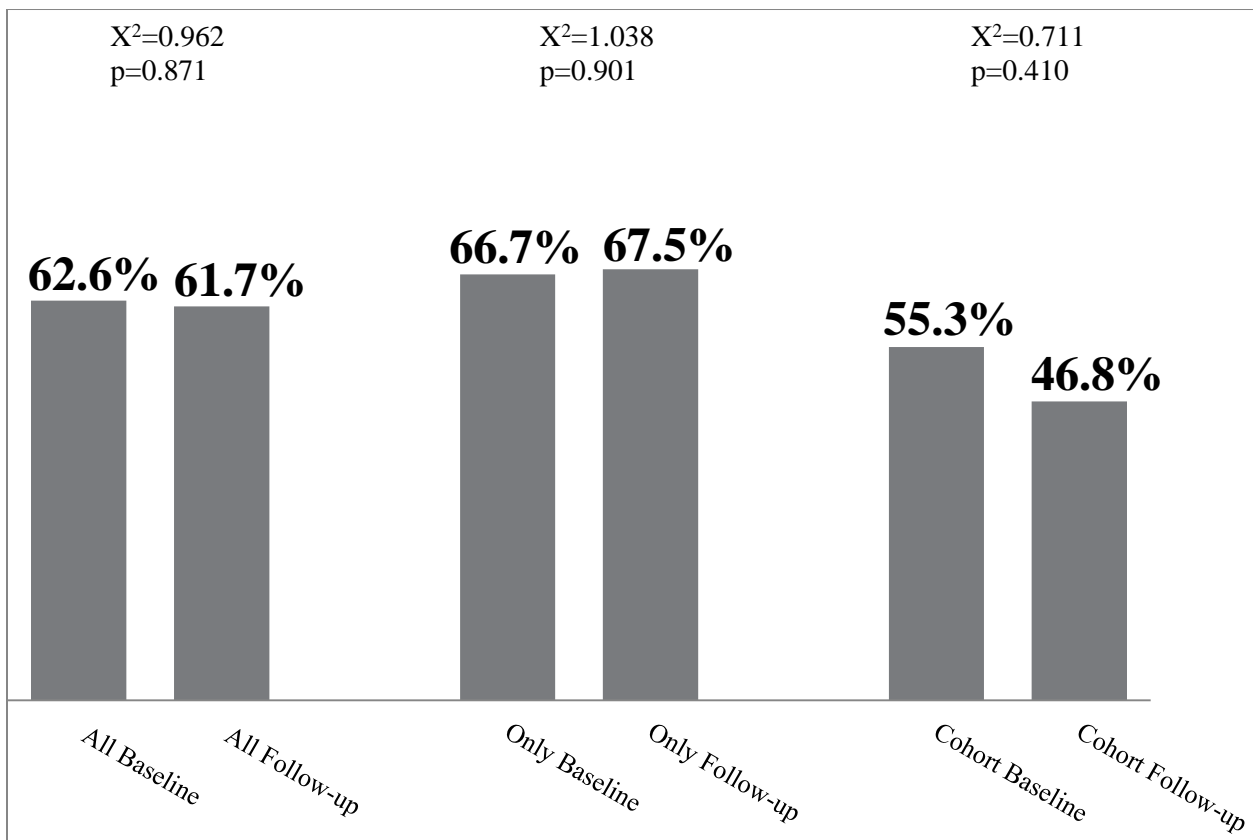
	OR	95% CI	P value
Wave			
Baseline (ref) vs. Follow-up	1.05	(0.64, 1.70)	0.847
Eating Disturbance	1.05	(1.02, 1.09)	0.005
Perceived Stress Level	0.99	(0.94, 1.04)	0.609
BMI			
			$X^2=5.203$ $p=0.157$
Underweight vs. Normal Weight	5.43	(1.24, 23.82)	0.025
Underweight vs. Overweight/Obese	5.13	(0.88, 29.96)	0.069
Underweight vs. Not Stated	6.12	(1.10, 33.91)	0.038
Normal Weight vs. Overweight/Obese	0.95	(0.36, 2.52)	0.912
Normal Weight vs. Not Stated	1.13	(0.42, 3.00)	0.810
Overweight/Obese vs. Not Stated	1.19	(0.32, 4.39)	0.792
Race			
White (ref) vs. All Others	1.00	(0.57, 1.77)	0.991
Weight Perception			
			$X^2=0.926$ $p=0.630$
Overweight vs. Underweight	0.33	(0.03, 3.31)	0.344
Overweight vs. About Right	0.95	(0.41, 2.20)	0.901
Underweight vs. About Right	2.90	(0.32, 26.40)	0.345
Weight Aspiration			
			$X^2=3.081$ $p=0.379$
Lose weight vs. Gain weight	0.38	(0.04, 3.30)	0.381
Lose weight vs. Stay same	0.82	(0.43, 1.54)	0.527
Lose weight vs. Not doing anything	0.55	(0.27, 1.13)	0.103
Gain weight vs. Stay same	2.14	(0.25, 18.35)	0.489
Gain weight vs. Not doing anything	1.45	(0.16, 12.73)	0.739
Not doing anything vs. Stay same	1.49	(0.70, 3.14)	0.310

5.5.3 Restricting Calories

To assess the prevalence of restricting calories as a way to control weight or shape, this outcome was recoded into a binary variable. The variable was re-categorized into no calorie restriction in the past week (coded as 0) versus any times in the past week (coded as 1).

Figure 9 shows the frequency of participants engaging in this behaviour. At baseline, 62.6% of participants reported restricting calories at least once in the past week, and at follow-up 61.7% of participants reported this behaviour. There were no significant differences between baseline and follow-up values, either for participants that completed the survey at one time point, or those that completed it at both time points.

Figure 9. Percentage of People Restricting Calories at Least Once in the Past Week



A binary logistic GEE model was run to assess differences in engaging in calorie restriction between waves, adjusting for eating disturbance, BMI, race, perceived stress level, weight perception, and weight aspiration, and an interaction term of wave*eating disturbance. When the model was run initially, there were not enough people in one of the categories of the covariate “weight aspiration”. The two categories “gain weight” (which had seven participants), and “stay the same weight” (which had 92 participants) were collapsed into one category. These two categories were chosen for merging because they both involve an active attempt surrounding weight status. No other GEE models had this issue and therefore the two categories were only collapsed for this outcome.

Table 10 shows the results of this model. There was no significant effect of wave. The model showed that those who scored higher on eating disturbance were more likely to report engaging in calorie restriction in the past week ($p < 0.001$). The covariate weight aspiration was significant in the model ($p = 0.001$). Those who wanted to lose weight were more likely to engage in calorie restriction than those who wanted to gain weight/stay the same weight ($p < 0.001$), and those who were not trying to do anything about their weight ($p = 0.003$). The two-way interaction between wave and eating disturbance was not significant in the model.

Table 10. GEE Model-Restricting Calories in the Past Week (n=298)

	OR	95% CI	P value
Wave			
Baseline (ref) vs. Follow-up	0.84	(0.51, 1.40)	0.504
Eating Disturbance	1.12	(1.06, 1.19)	<0.001
Perceived Stress Level	1.20	(0.96, 1.08)	0.521
BMI			$X^2=0.159$ p=0.894
Underweight vs. Normal Weight	0.90	(0.35, 2.32)	0.822
Underweight vs. Overweight/Obese	1.05	(0.25, 4.37)	0.944
Underweight vs. Not Stated	0.81	(0.20, 3.32)	0.770
Normal Weight vs. Overweight/Obese	1.17	(0.39, 3.51)	0.774
Normal Weight vs. Not Stated	0.90	(0.28, 3.00)	0.868
Overweight/Obese vs. Not Stated	0.77	(0.14, 4.2)	0.762
Race			
White vs. All Others	0.99	(0.53, 1.86)	0.810
Weight Perception			$X^2=5.879$ p=0.053
Overweight vs. Underweight	0.11	(0.02, 0.69)	0.019
Overweight vs. About Right	0.43	(0.11, 1.63)	0.211
Underweight vs. About Right	9.46	(1.45, 61.49)	0.019
Weight Aspiration			$X^2=13.365$ p=0.001
Lose weight vs. Gain weight/Stay same	0.27	(0.13, 0.56)	< 0.001
Lose weight vs. Not doing anything	0.29	(0.13, 0.65)	0.003
Gain weight/Stay same vs. Not doing anything	1.08	(0.54, 2.13)	0.834

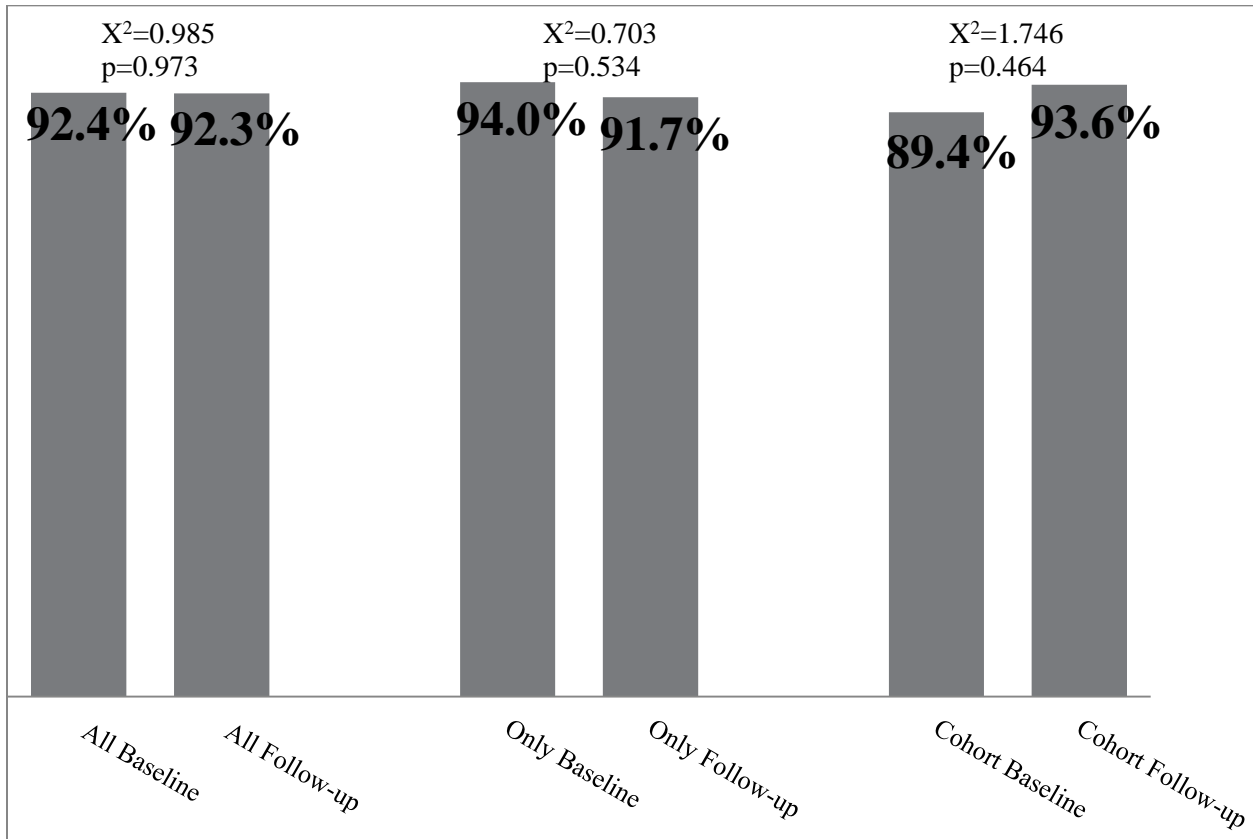
5.5.4 Thinking About Weight

Thinking about weight was recoded into a binary variable with an occurrence of zero times in the past week (coded as 0) versus any times in the past week (coded as 1). Figure 10 shows the frequency of participants thinking about their weight at least once in the past week. At baseline, 92.4% reported thinking about their weight at least once, at follow-up, 92.3% reported performing this behaviour. There were no significant differences between baseline and follow-up

values, either for participants that completed the survey at one time point, or those that completed it at both time points.

A GEE model could not be run with this outcome variable because a quasi-complete separation of the data existed. Essentially, this outcome led to a separation of the covariates in the model such that there were not enough participants in different levels to run the model. When the data was made into a binary variable using different cut-off points, the same problem existed.

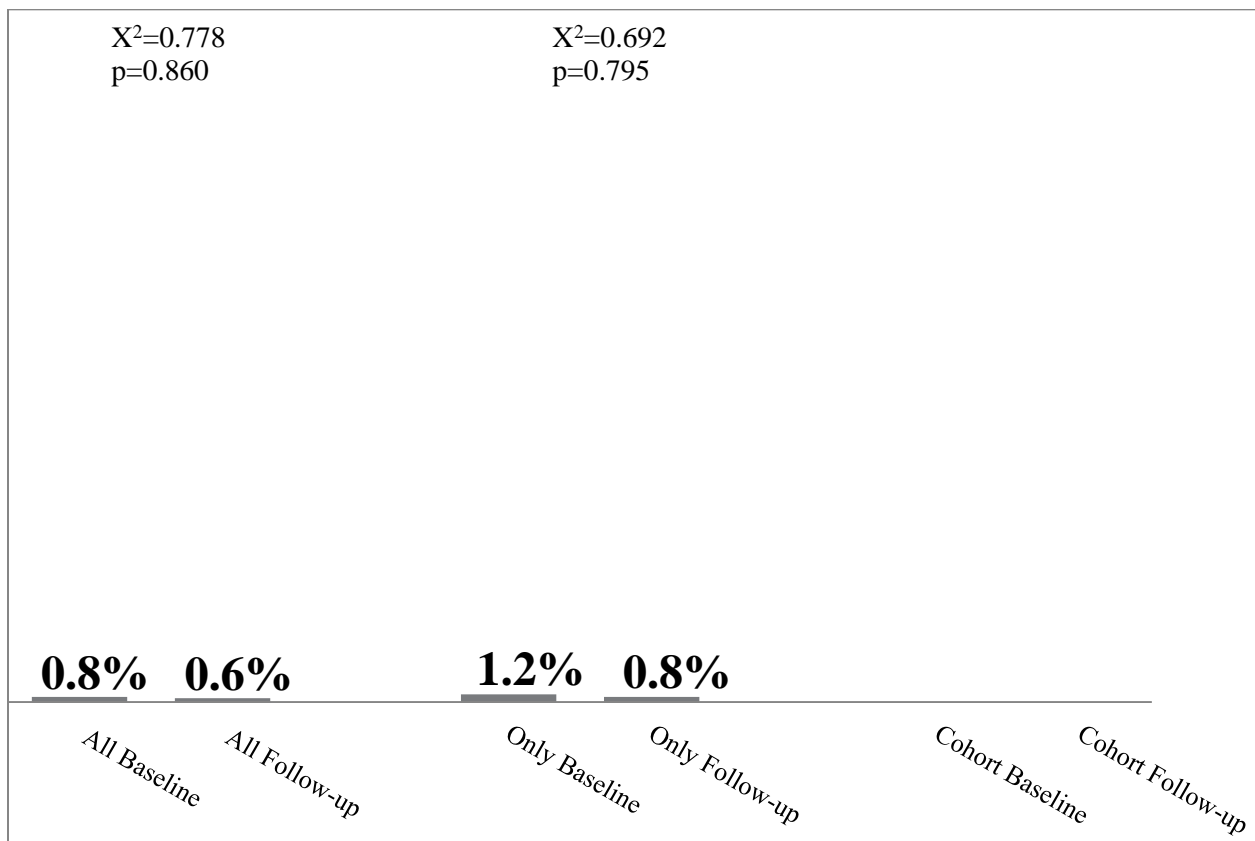
Figure 10. Percentage of People Thinking About Weight at Least Once in the Past Week



5.5.5 Vomiting

The behaviour of making yourself sick (vomiting) as a way to control weight or shape, was recoded into a binary variable of zero times in the past week (coded as 0), and one or more times (coded as 1). Figure 11 shows the frequency of participants engaging in this behaviour at least once in the past week. At baseline, 0.8% of people reported vomiting in the past week at least once, and at follow-up, 0.6% of people reported this behaviour. There were no significant differences between baseline and follow-up values. There were no people in the *Cohort* group that reported engaging in this behaviour. A GEE model could not be run with this outcome as there were too few people in each category to perform the analysis properly.

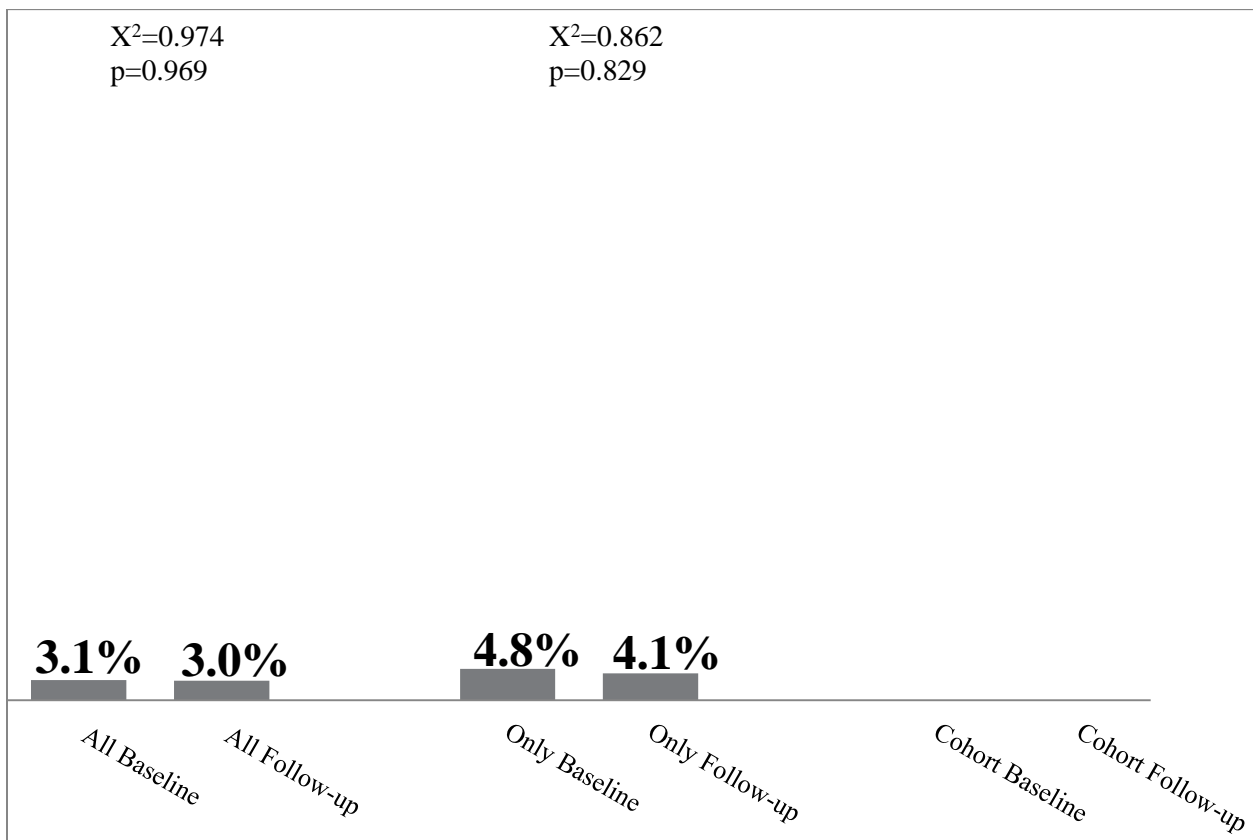
Figure 11. Percentage of People Engaging in Vomiting at Least Once in the Past Week



5.5.6 Use of Laxatives, Diet Pills, or Diuretics

The behaviour of using laxatives, diet pills, or diuretics as a way to control weight was recoded into a binary variable of zero times in the past week (coded as 0), and one or more times (coded as 1). Figure 12 shows the frequency of participants engaging in this behaviour at least once in the past week. At baseline, 3.1% of people reported using laxatives, diet pills or diuretics in the past week at least once, and at follow-up, 3.0% of people reported this behaviour. There were no significant differences between baseline and follow-up values. There were no people in the *Cohort* group that reported engaging in this behaviour. A GEE model could not be run with this outcome as there were too few people in each category to perform the analysis properly.

Figure 12. Percentage of People Using Laxatives/Diet Pills/Diuretics at Least Once in the Past Week



6.0 Discussion

To date, no studies have examined the effects of calorie labels in restaurants among those with eating disturbances. Concerns have been raised that calorie labels at restaurants may exacerbate existing symptoms for those with disordered type eating.³¹⁻³³ The current study sought to fill this evidence gap and test the effects in a “real-world” setting on young females, a group that have demonstrated a high prevalence of eating concerns. Overall, there were no adverse effects of calorie labels observed for any of the outcomes tested.

6.1 Calorie Consumption

The current study hypothesized that calorie consumption would decrease from baseline to follow-up and would not be associated with the eating disturbance score. The study found that calorie consumption decreased from baseline to follow-up with an average decrease of 78 calories. In the literature, results have been mixed regarding calorie consumption following menu labelling. Some studies have found a decrease in calories consumed, others have found no effect on calories, and others have found an increase.^{25,26} The literature shows that certain subpopulations are more likely to use menu labelling. Females, those with higher levels of education, and those in younger age groups report that they would be more likely to use nutrition information if it were made easily available.^{24,118} Males are less likely to use menu labelling for the purpose of decreasing calories, and may use it to increase calories consumed, or may not use it at all.^{31,119} Studies have found that females are more likely to use calorie information in general, and use it to decrease calorie intake.^{24,118,119} Education level may also play a role as studies have shown that those with higher education levels are more likely to use nutrition information.^{24,118,120} Overall, the sample of the current study may represent a subpopulation that

is more likely to use calorie labels than the general population. Additionally, past studies surrounding menu labelling have varied in their presentation of calorie labels by changing the size and location of labels. The current study labelled almost all items in the cafeteria, and ensured the labels were in plain sight of all patrons. Past studies may not have seen an effect if customers did not notice nutrition information.

There was no effect of eating disturbance level on the amount of calories consumed, both in general, and in response to calorie labels. Concerns have been raised that calorie labels may affect food consumption levels among those with disturbances. Calorie labels may decrease food intake among those with higher eating disturbances as dieting has shown to be associated with eating disturbance level.⁸⁸ On the other hand, calorie labels may increase food intake among those with higher eating disturbances as restaurants may provide a venue to engage in bingeing activity.⁹¹ The current study observed no significant increase or decrease in calorie consumption as eating disturbance level increased.

Given that the current study is the first to examine the impact of calorie labeling and eating disturbance there are no other studies with which to directly compare the current findings. However, a recent study examined support for menu labelling among those with and without eating disorders, and found a high level of support among both groups. It is unclear whether the support for menu labelling among those with eating disorders represents a desire to continue pathology by using menu labels in a negative way, or an attempt to improve eating outcomes using menu labels. No studies have examined the impact of calorie labels on emotional states, and behavioural outcomes among those with eating pathologies.

6.2 Body Image Satisfaction

It was hypothesized that body image satisfaction would decrease from baseline to follow-up among those with higher eating disturbance scores. The study found that those with higher eating disturbance scores reported a lower body image satisfaction in general, but this did not change from baseline to follow-up. No studies have examined body image satisfaction in response to calorie labels, but it has been demonstrated that those with eating pathologies report worse body satisfaction in response to food (especially high calorie food). The current study anticipated that calorie labels would make the effect of food more salient, and therefore a decrease in body satisfaction would be reported among those with greater eating disturbance scores. One possible reason for the stability of body image satisfaction from baseline to follow-up may be that those with higher eating disturbance scores were already aware of the calorie content of foods and so the calorie labels did not add any additional information.

The current study found that those with higher eating disturbance scores reported lower body image satisfaction. Previous studies have found the same association between EAT-26 scores and body image satisfaction.^{63,121,122} These results were expected as issues with body image are a core feature of eating disorders. Various studies have found that longitudinally, body dissatisfaction predicts eating pathology.¹²³⁻¹²⁵

The study sample was fairly typical with slightly lower body satisfaction than is seen in the literature. The mean at baseline on the BISS was 5.2 (SD=1.2), and at follow-up was 5.1 (SD=1.3). In previous studies that used the same measurement scale with a similar sample, scores ranged from 5.4-5.6 (SD=1.1-1.4).^{57,63,121}

6.3 Anxiety

It was hypothesized that anxiety would increase from baseline to follow-up among those with higher eating disturbance scores. The results of the current study show no support for this hypothesis; anxiety was not higher at follow-up, regardless of eating disturbance level. Previous literature suggests that people with diagnosed eating disorders, as well as people with less severe weight and shape concerns exhibit heightened levels of anxiety in response to food compared with control groups.^{74-79,126} Even though no research has examined the effect of calorie labels on anxiety, the study thought that calorie labels might have made the presence of food (potentially high-calorie food) more salient to those with eating disturbances. It is possible that those with eating disturbances had a general idea about the calorie content of food and seeing calorie information may have confirmed their estimations. However, some evidence suggests that those with eating disorders but not eating disturbances are more accurate at estimating calorie content of foods.⁹²⁻⁹⁵

The lack of association between eating disturbance level and state anxiety in response to calorie labels may be due to the timing of the study. Participants' anxiety was measured after they consumed food; however, there may be an even shorter window to capture changes in state anxiety in response to food. It is possible that fluctuations in anxiety only occur as patrons are inside the cafeteria looking at calorie labels.

Additionally, anxiety may not have been higher among those with higher eating disturbance scores as participants were exposed to a variety of foods in the cafeteria setting, both low-calorie and high-calorie. Perhaps the mix of foods did not lead to heightened anxiety because a multitude of options were available. Another plausible explanation is that calorie labels were up

for a week prior to data collection at follow-up, therefore participants may have had time to habituate to the calorie labels and thereby lower their anxiety.

6.4 Mood

The current study hypothesized that positive affect would decrease, and negative affect would increase from baseline to follow-up among those with higher eating disturbance scores. There was no observed effect of calorie labels on mood. While no studies have examined the effect of calorie labels on participants' mood, past literature suggests that exposure to food (especially high-calorie food) can lead to a decrease in mood among those with eating disorders.^{77,79} It's possible that similar to anxiety, the timing of our study did not lead to changes in mood among those with higher eating disturbance scores due to a habituation to the calorie labels, or because the survey was conducted after participants ate, not as they were seeing calorie labels. It is also possible that calorie labels do not produce short-term fluctuations in mood. Participants with eating disturbances may have had a stable mood in response to calorie labels because knowing the caloric content of food takes out the uncertainty of a cafeteria setting.

The study did find that those scoring higher on eating disturbance had more negative affect than those scoring lower, a finding that is consistent with past literature. In the literature, those at risk of an eating disorder have greater negative affect than those scoring low on eating disturbance, and in general, negative affect is a risk factor for eating pathology.^{83,87} Additionally, those with diagnosed eating disorders are more likely to have mood disorders than healthy controls.⁸²

The study sample was fairly typical with mean scores on the PANAS just slightly below what is seen in the literature. Scores vary depending on instructions for mood ratings. The current study

asked participants to rate how they felt at that very moment, thereby capturing a state mood. When the PANAS scale was developed, Watson & Tellegen (1988) found an average score for positive affect of 29.7 (SD=7.9) using those instructions.¹¹³ In the current study, the mean at baseline for positive affect was 24.8 (SD=7.6) and at follow-up was 25.0 (SD=7.9). Those values are slightly lower, indicating a less positive mood among the group in the current study. Mean scores for negative affect in the current study were 15.8 (SD=6.3) at baseline and 16.4 (SD=6.2) at follow-up. Watson & Tellegen (1988) found an average score of 14.8 (SD=5.4) on the negative affect dimension.¹¹³ Slightly higher scores in the current study are indicative of greater negative affect in our sample.

6.5 Engaging in Unhealthy Behaviours

6.5.1 Binging Behaviour

The study hypothesized that binging behaviour would increase from baseline to follow-up among those with higher eating disturbance scores. The results indicate that this was not the case, those with higher eating disturbance scores did not demonstrate greater binging in response to calorie labels. However, those with higher levels of eating disturbance were more likely to report binging. This finding is consistent with the literature as the criteria for diagnosis of bulimia nervosa and binge eating disorder involve binging;⁴⁴ therefore, it is intuitive that those with greater eating disturbance levels would show an increased likelihood to binge.

Approximately one third of participants at baseline and at follow-up reported engaging in binging behaviour at least once in the past week. Estimates of binging vary in the literature due to different measurement scales and operational definitions of binging. A study using female undergraduate students found the prevalence of engaging in binging at least once a week to be

17% -20%, depending on timing throughout the semester.⁹⁹ Another study found that among a large sample of Canadian females aged 20-40, 14% engaged in subclinical bingeing (bingeing between 1-8 days in the previous month).¹²⁷ In a study with undergraduate students, 20% of females admitted to engaging in bingeing behaviour (where they felt they were unable to stop) at least once in the past six months.¹²⁸ Higher estimates in the current study may be due to question wording. The question, “how often in the past week have you gone on eating binges where you feel that you may not be able to stop?” offers no explanation of bingeing; therefore, participants’ definitions of bingeing may differ without a clear description. The sample used in the current study (primarily first-year undergraduate students) may also present with a higher prevalence of bingeing than other sub-sets of the population. Additionally, the question in the current study assessed bingeing in the previous week; however, estimates may differ if no time frame is provided. For example, in a study by Katzman, Wolchik & Braver (1984) in which they asked “do you binge eat”, 49% of undergraduate females responded, “yes”. The prevalence of bingeing seems to increase when the question is worded more broadly.

6.5.2 Exercising Excessively

The hypothesis of the current study was that the likelihood of engaging in excessive exercise would increase from baseline to follow-up among those with higher eating disturbance scores. The results show that those with higher eating disturbance scores were more likely to engage in excessive exercise, however the presence of calorie labels did not change this relationship. In the literature, excessive exercise is related to eating pathology.⁹⁷ The association between exercise and eating pathology is significant on a clinical level as well. Among those with eating disorders, exercise may be used as a way to burn up excess calories to avoid weight gain. In patients with

diagnosed eating disorders, 55% of those with anorexia nervosa (purging type) were classified as excessive exercisers compared to 20% of those with bulimia nervosa (purging type), and 21% of those with eating disorders not otherwise specified.¹²⁹

In the current study, the prevalence of engaging in excessive exercise to control weight at least once in the past week was 36% at baseline and 38% at follow-up. One study surveying undergraduate females at two time points during the semester found that 30% of females at baseline, and 22% at follow-up engaged in excessive exercise at least once per week.⁹⁹ In another study, 31% of undergraduate women reported engaging in excessive exercise (defined as exercising vigorously as a way to control weight, or change shape, or burn calories) at some point within the last four weeks. Only 6% of women in the same study reported exercising vigorously for an average of five times/week over the past four weeks.¹³⁰ The difference in the current study may be due in part to our definition of excessive exercise (over 60 minutes, but intensity level is unclear). The wording of the question in the current study cited controlling or losing weight as the reason for exercise. In the literature, 9% of adult females report weight or shape concerns as their main reason for engaging in excessive exercise.¹³¹

It is difficult to compare the prevalence of engaging in excessive exercise in the current study to that in the literature as definitions for excessive exercise vary widely throughout the literature. The current study did find that almost a third of people used exercise as a means to control weight and that those with higher eating disturbance levels were more likely to exercise.

6.5.3 Restricting Calories

The current study hypothesized that the likelihood of restricting calories would increase from baseline to follow-up among those with higher eating disturbance scores. The study did not find support for this hypothesis. Results indicate that those with higher eating disturbance scores were more likely to engage in calorie restriction, but this did not differ depending on timing of baseline or follow-up. The literature is mixed concerning the relationship between caloric restriction and eating pathology. Prospective studies indicate that dieting can lead to binge eating, negative affect, an increase in bulimic symptoms, and eating pathology in general.⁸⁷ However, other studies have found that assignment to a long-term low-calorie diet resulted in fewer bulimic symptoms among non-obese individuals, and a decrease in binges among obese people.⁸⁷ Evidence differs based on type of dieting indicated (ie. self-reported caloric deprivation, or experimental assignment into a low-calorie condition). In the current study, self-reported measures were used, which may be why an association was seen between eating disturbance level and calorie-restriction.

The frequency of participants restricting calories at least once a week as a way to control weight or shape was just over 60% at baseline and follow-up. The frequency in the current study was higher than is seen in the literature. Calorie restriction is a broad term and may involve slightly reducing intake, or severe calorie restriction involving fasting (for extended periods) which has both psychological and physical repercussions.¹³² While calorie restriction may be beneficial to those trying to lose weight, many people that engage in calorie restriction fall within the “normal” BMI range and do not need to restrict calories. In the current study, 38% of “underweight” people and 62% of those falling in the “normal” BMI range engaged in calorie restriction at least once in the past week. Past estimates indicate that 45% of women falling in the

“normal” BMI range engage in dieting behaviour as a way to lose weight.¹³³ One possible explanation for a higher frequency in the current study is that those who diet are generally younger than those who do not diet,¹³³ and the sample population in the current study is young females.

6.5.4 Thinking About Weight

The hypothesis in the current study was that the likelihood of thinking about weight would increase from baseline to follow-up among those with higher eating disturbance scores. A model was not run with this outcome due to data issues, so the hypothesis could not be directly tested.

The prevalence of thinking about weight in the past week was very high in the current study, with 92% of people thinking about weight at least once in the past week. While no studies have examined the frequency using the same wording as the current study, some research has been conducted in the surrounding field. One study examined how often females think about weight on a five point likert scale, ranging from never to always. The mean was almost four, suggesting a high prevalence of thinking about weight.¹³⁴ In the current study, weight preoccupation is likely prevalent due to the sample population of young females. Transition into University has been identified as a vulnerable time for the development of eating concerns, and thinking about weight is related to eating pathology. Preoccupation with weight is common among those with eating disorders. The diagnostic criteria for anorexia involve a fear of weight gain, and for bulimia involve one’s self-worth being highly influenced by weight and/or body shape.⁴⁴ Thoughts about weight might also be prevalent in first-year University as concern regarding the “Freshman 15” sets in. While research suggests that weight gained during the first-year of

University is substantially less than 15 lbs,^{39,102} females might be concerned about weight gain during this vulnerable time.

6.5.5 Engaging in Vomiting

The hypothesis in the current study was that likelihood of engaging in vomiting would increase from baseline to follow-up among those with higher eating disturbance. The hypothesis could not be directly tested due to data issues, however frequency data will be discussed.

The frequency of females engaging in vomiting to control weight or shape at least once in the past week was less than 1% at both baseline and follow-up. In a study using a large sample of undergraduate females, 4% engaged in vomiting at least once per week for the previous month.¹³⁰ In another study following females over a semester at University, prevalence of engaging in self-induced vomiting at least once a week decreased from 10% to 5%.⁹⁹ Other studies indicate rates of vomiting or binge-purge behaviours to be as high as 25-35%.^{135,136} The estimates in the current study were lower than seen in the literature. One possible reason may be due to a displacement of behaviours. Vomiting as a way to control weight or shape is an extreme behaviour, and it's possible the sample in this study chose to engage in less extreme measures.

6.5.6 Engaging in Laxative Use, Diet Pills or Diuretics

The hypothesis in the current study was that the likelihood of engaging in laxatives, diet pills, or diuretics would increase from baseline to follow-up among those with higher eating disturbance scores. Due to data issues, the model with this outcome could not be run.

In the current study, roughly 3% of participants reported using laxatives, diet pills or diuretics to control weight or shape at least once in the previous week. In the literature, estimates range from 2-12% of undergraduate females using laxatives, diet pills or diuretics at least once in the previous month to lose or control weight.^{98,99,137} The estimates in the current study are consistent with the literature.

It is interesting to note that the frequency of participants reporting using laxatives, diet pills or diuretics was higher than the number reporting vomiting. One possible reason is that the former involves three behaviours, and it is unclear if one behaviour is driving the response. For example, it is possible no one was using laxatives, and all participants were using diet pills. It is also possible that participants felt more comfortable admitting they engaged in these behaviours over vomiting.

6.6 Eating Disturbance

The sample of the current study was quite similar to other groups of undergraduate females in terms of eating disturbance. The mean in the current study of eating disturbance score at baseline was 8.4 (SD=7.8) and at follow-up was 9.3 (SD=8.8). When the EAT-26 was first developed, it was tested on a group of individuals with anorexia nervosa, and also on a control group of undergraduate females. The mean score of undergraduate females was 9.9 (SD=9.2).¹⁰⁴ Means from the current study match quite closely with what is seen in the literature.^{104,138} Young females have been identified as a vulnerable group for developing eating disorders,³⁸ which is why they were chosen for the current study. Additionally, eating disturbances can transition into eating disorders, making them a large concern.⁴⁰ Mean scores on the EAT-26 may be lower than true values due to a lack of honesty by participants. Eating disorders are secretive illnesses, and

often go underdiagnosed.³⁸ To try and avoid this, a research assistant told participants to go to a private, quiet, area to complete the survey, and seal it in an opaque envelope before returning it. Participants were also assured about the confidentiality of their data.

6.7 Sociodemographics, and Perceived Stress

In all the outcomes that were run, a few other covariates appeared significant. Those with higher perceived stress had lower body image satisfaction, more anxiety, less positive affect, greater negative affect, and were more likely to report bingeing. The literature supports the association between stress and body image. Johnson & Wardle (2005) found that among adolescent girls, those who were dissatisfied with their body had higher stress levels both cross-sectionally and longitudinally, 10 months later.¹³⁹ The current study also found that those higher in perceived stress had less positive affect and greater negative affect. In the literature, negative affect (but not positive affect) is positively correlated to level of stress in one's life.^{113,140} The inconsistency between perceived stress and positive affect may be due to a difference in measurement scales, or to the fact that state mood was measured and not more stable, trait mood. Additionally, the findings are consistent with respect to stress and bingeing. Studies have shown that stress is positively correlated to bingeing behaviour.^{123,141}

Means in the current study on the Perceived Stress Scale match quite closely with what is seen in the literature. A study validating the 10-item version of the scale (the same that was used in the current study) found the mean for undergraduate women to be 18.4 (SD=6.5).¹⁴² The current study found a mean of 20.6 (SD=5.9) at baseline, and 21.0 (SD=5.9) at follow-up.

Another covariate that was significant was “weight perception” for the outcome of body image satisfaction. Those who rated themselves as “underweight” or “about the right weight” had higher body image satisfaction than those who said they were “overweight”. Additionally “weight aspiration” was significant for the outcome of body image satisfaction and calorie restriction. Those who wanted to “stay the same weight” had higher body image satisfaction than those who wanted to “lose weight”. For the outcome of calorie restriction, those who wanted to “lose weight” were more likely to engage in calorie restriction compared to those who wanted to “stay the same weight/gain weight” or who “weren’t trying to do anything about their weight”.

The covariate of BMI was not significant in any of the models. Previous studies have been mixed regarding the effect of BMI on menu labelling. Some studies have shown that those who fall into the “obese” BMI category are more likely to use menu labels to order fewer calories, and other studies have found no effect of weight on use of labels.^{143,144}

BMI has been linked to body satisfaction in previous literature. Those with a heavier BMI are less satisfied with their bodies.^{63,121} The current study found no association between BMI and body image satisfaction; there was however an association between weight perception and body image satisfaction. This finding suggests that perceptions of weight are more important than actual weight when determining satisfaction with one’s body.

The prevalence of overweight and obesity in the current study was lower than expected. Other studies have reported the prevalence of overweight and obesity among University students to be 23%.³ The current study found the prevalence to be 9%, and the majority of those are overweight and not obese. The location of the survey at a first-year Residence Cafeteria means that the majority of students were just entering University. Research shows that weight gain throughout

first-year University, and University in general is common due to changing dietary patterns and increased sedentary behaviour.^{145,146} It is therefore possible that the lower rates of overweight and obesity in the current sample are related to sampling in a first-year residence cafeteria.

Race has been examined in the literature as a factor affecting menu label use. Previous studies found that non-white participants (Hispanic and Black descent) were more likely to use menu labels to decrease calories.^{118,143} The current study found no association between race and use of calorie labels. The variable of race was binary in the current study (white vs. all others). If there were enough people in other categories (Hispanic, black, etc.), then certain races could be examined for an effect.

6.8 Limitations & Strengths

The current study has several limitations and strengths. The first limitation is that the study lacks a true control group. The design of the study would be stronger if the same pre-post design was used in a different cafeteria without manipulating calorie labels on the menu, which would control for secular trends. Due to time and resources, this was not possible. The current study did, however, incorporate measures that assessed important factors that may have produced secular trends over time and the academic calendar, such as perceived stress, so that they could be controlled for during statistical analysis. It is possible that there were other confounding factors throughout the semester that led to a decrease in calorie consumption. The majority of the existing literature has demonstrated that diet quality deteriorates throughout first-year University, and University in general.¹⁴⁷ One study, however, found that caloric consumption decreased among first-year University females. The authors offer no explanation for this trend, but cite that weight changes varied across participants with some losing weight and others gaining weight.¹⁴⁸

It is possible that females are concerned about weight gain during this transition time and so they decrease calorie intake in an attempt to avoid it. In the current study calorie labels may have helped participants monitor their intake which led to decreased calorie consumption.

The second limitation is that the current study only included University educated females. Therefore, the results cannot be generalized to males, or to those of various ages or education levels. The prevalence of eating disorders and eating disturbances are high among young females^{101,102} which justifies the use of this population. Additionally, transition into University is a vulnerable time for the development of eating issues,³⁹ making the study sample relevant in this context. If the study was conducted with other populations, it is unclear how the results may differ (i.e. calorie labels may be less or more effective). It is demonstrated in the literature that females are more likely to use calorie labels.^{24,25} Additionally, if another population was used (such as males), the prevalence of eating disturbances in the study sample would have been less, making it harder to evaluate the effect of calorie labels on relevant outcomes for people with eating pathologies. The current study was based on a convenience sample and benefited from the consistent population (first year students) and the repeat of the cycle menu, supporting the comparability of food offerings pre and post. The design feature of matching participants pre and post is strong because of the increased power of paired data and the reduction in potential bias. Nevertheless, this sub-sample lacked power. Moreover, the sensitive nature of the study may have accounted for the relatively low percentage of participants in the high risk group for eating disturbances within the *Cohort Only* group. The *All Participants* group allowed for greater power to detect differences due to the intervention and a broader spectrum of EAT26 scores.

The third limitation is that data were collected using self-reported measures. Eating disturbances and disorders are secretive illnesses and participants may have been reluctant to admit engaging in certain behaviours (such as bingeing or vomiting). To address this limitation, research assistants assured participants of the confidentiality of their data, and instructed them to self-complete the survey in a private location, and then seal the survey in an opaque envelope before returning it.

The fourth limitation is self-selection bias. All female participants that completed the first exit survey were asked if they wanted to complete another one. Due to the secretive nature of eating disturbances, people with disturbances may not want to participate in a survey surrounding food. When potential participants were given the information letter to read prior to participation they may have declined once they learned the survey centered around eating disturbances. Due to ethical considerations, participants had to be told the true nature of the study, and so if they had an eating disturbance/disorder they may have chosen not to participate. A few strategies were used to account for this. Firstly, the current study was part of a larger study; participants already completed the initial exit survey and were then asked if they wanted to complete another survey. Sixty-one percent of females who completed the first survey went on to complete the second survey, which is a fairly high response rate. Secondly, participants were informed before agreeing to participate that the study was self-completed, thereby avoiding fear of any personal questions being asked by an interviewer. Thirdly, the location of the survey at a student residence cafeteria provided a unique sample where meal plans are mandatory, and therefore individuals with eating disturbances are more likely to eat there. Looking at the sample characteristics from the current study, mean eating disturbance scores match quite closely with

what is seen in the literature for young females.^{104,138} This suggests our sample was fairly representative in that respect.

The fifth limitation is that due to an error during data collection, a question was missing from the EAT-26 assessment tool. The 24th statement “I like my stomach to be empty” was inadvertently left out of baseline surveys. The statement was added at follow-up, but when calculating participants total eating disturbance score, this question was left out for everyone. Not including the question may have lowered participant’s EAT-26 score; however, since it was left out for everyone we were able to compare eating disturbance level at baseline and follow-up. The study did initially analyze the EAT-26 variable as a categorical measure (assigning participants to a high-risk or low-risk group for eating disturbance), and found that even by awarding the maximum number of points for the missing question, participants membership to their respective group did not change.

The sixth limitation is that participants’ EAT-26 score is being used as a proxy to represent eating disturbance level. There was a distribution of EAT-26 scores, however when categorized into high-risk and low-risk groups, only 10.4% of the sample was in the high-risk group. Ideally, clinicians would assess/diagnose eating pathology level, however due to time and resources this could not be accomplished. Past literature suggests the EAT-26 to be a valid and reliable measure,¹⁰⁴ and it has a 90% accuracy rate of classifying eating disorders.¹⁰⁵

The study also has several strengths. The current study is the first to examine the unintended effects of calorie labels in restaurants. Anecdotal evidence has suggested that calorie labels may be harmful to those with eating disorders or disturbances,³¹⁻³³ however to date, the current study is the first to empirically examine the issue.

Additionally, the study used a naturalistic design to display calorie labels. Participants actually ordered, and ate the meals from the cafeteria; the study was not conducted in a laboratory. We chose to carry out the study in this manner so that it would mimic the real-world and have higher external validity.

Another strength of the study was the range of outcome measures used. The study examined outcomes that may fluctuate in response to calorie labels, and behavioural outcomes ranged from severe (vomiting, or using laxatives) to more moderate (restricting calories, or thinking about weight). By assessing many outcomes the study hoped to capture the spectrum of compensation techniques used in response to food.

Additionally, the study design incorporated three different subsamples of participants: *All Participants*, *Baseline/follow-up Only*, and the *Cohort* group. Some differences emerged when the analysis was conducted on the three different subsamples. When the models were run on the *Baseline/follow-up Only* group, perceived stress was no longer significant for the outcome of positive affect. Additionally, eating disturbance was no longer significant for the outcome of negative affect. Finally, the effect of wave (baseline to follow-up) was no longer significant for the outcome of calorie consumption. When the models were run for the *Cohort* group, wave was no longer significant for the outcome of calorie consumption. The change in significance is most likely due to decreased power in these subsamples as less people were in each group for analysis. The trend in point estimates decreasing from baseline to follow-up was still the same in both cases.

6.9 Future Research

The current study was conducted on a student University population, and measured level of eating disturbance. The conclusions drawn from the data can only be applied to a high-risk female University population, including those with eating disturbances. Future research may focus on those with diagnosed eating disorders to examine if outcomes differ in response to calorie labels. It would also be interesting to conduct a qualitative study among those with eating disorders to help understand their perceptions of calorie labels and get a better understanding of their concerns.

Future research could also focus on the timing of participation in the survey. The current study surveyed participants after they ate; it would be interesting to see if certain emotional measures fluctuate while viewing calorie information, or immediately after viewing. Additionally, the study could be conducted on first-time exposure to calorie labels, instead of after a week's time.

7.0 Conclusions

This is the first study to examine the effects of calorie labels on adverse outcomes associated with eating disturbances. The study suggests that menu labels may not lead to negative outcomes for those in an at-risk population including those with higher levels of eating disturbance.³¹⁻³³

The results have potential implications for menu labelling legislation. One potential barrier to menu labelling is that calorie labels on menus may be an issue for individuals dealing with eating pathologies. This should be a high priority research area as no one has examined those with clinical eating disorders, to our knowledge. The current study only examined the association between eating disturbance level and adverse outcomes among undergraduate females; work should continue in the surrounding field to see if results differ among various populations.

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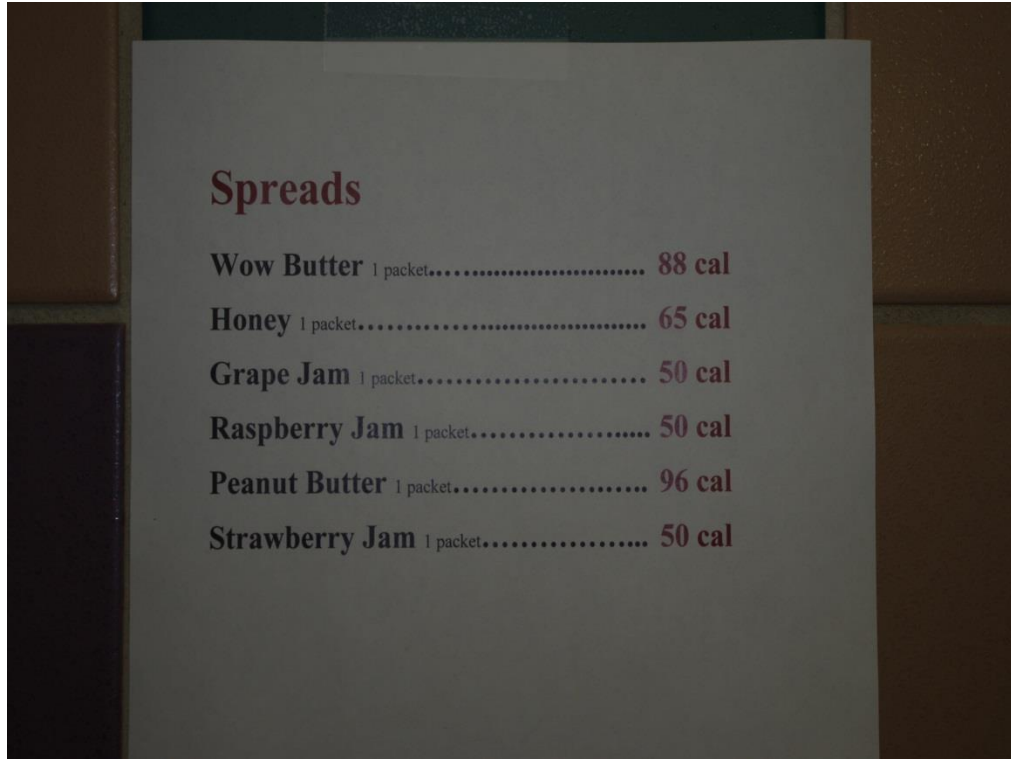
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Appendices

Appendix A: Examples of Calorie Labels

Figure 13. Example of Calorie Label 1



The image shows a menu board with the following items and calorie counts:

Spreads	
Wow Butter 1 packet.....	88 cal
Honey 1 packet.....	65 cal
Grape Jam 1 packet.....	50 cal
Raspberry Jam 1 packet.....	50 cal
Peanut Butter 1 packet.....	96 cal
Strawberry Jam 1 packet.....	50 cal

Figure 14. Example of Calorie Label 2

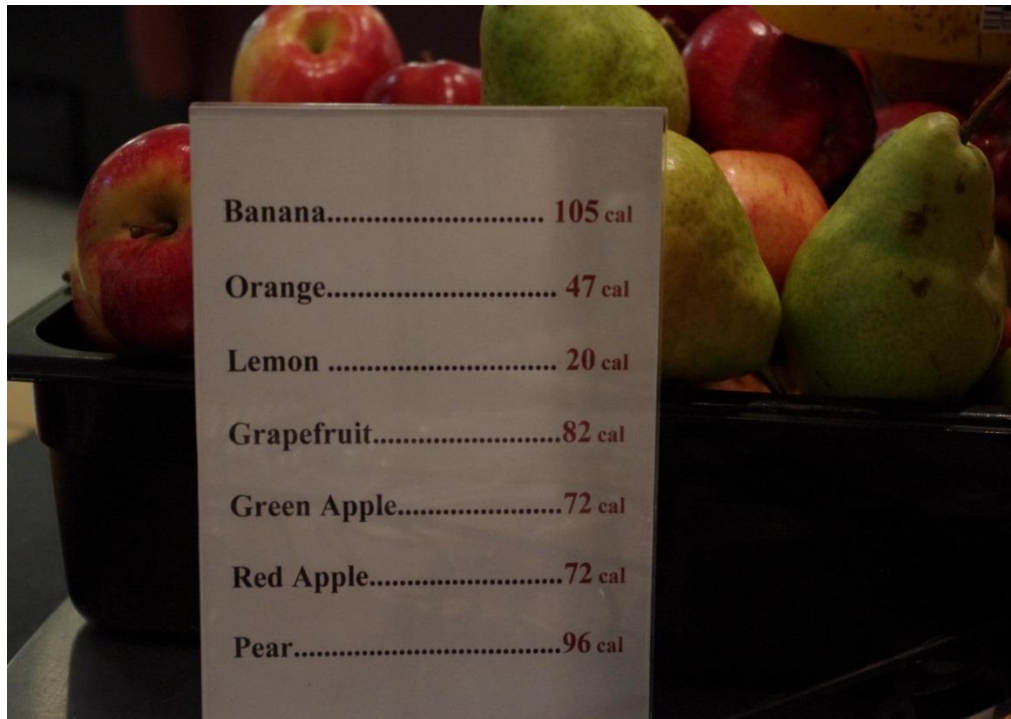


Figure 15. Example of Calorie Label 3



Figure 16. Example of Calorie Label 4



Appendix B: Response Rate Calculations

$$RR2 = \frac{(I + P)}{(I + P) + (R + NC + O) + (UH + UO)}$$

First exit survey

refusals = 1114

completed surveys = 1085

$1085 / (1085 + 1114)$

49.3% response rate

Second exit survey:

eligible = 537

completed surveys = 325\

$325 / 537$

60.5% response rate

Appendix C- Survey Materials

Script

Hello, my name is _____ from the University of Waterloo School of Public Health & Health Systems. We are conducting a 10-minute survey on eating attitudes and behaviours and would like to ask you a few questions about your general eating patterns and disturbed eating. To thank you for your participation in the survey we will give you \$5. Are you interested in participating?

If *yes* → Great, I would like to go over this information letter with you [*hand information letter to participant*] You are being asked to participate in a research study examining food choices in restaurants.

- The study will take approximately 5-10 minutes and is paper-based.
- You will receive \$5 for your participation.
- You will be asked questions about your eating attitudes and behaviours, body-satisfaction, stress levels, mood and basic demographic information.
- Some people may experience discomfort and/or mild anxiety due to the sensitive nature of questions asked.
- You are free to decline any questions you wish and can withdraw from the study at any time, and you will still receive \$5.
- Certain information will be collected (such as day of birth) to link this survey with the one you just completed, and to make sure you have not already done this survey. However, no personal identifying information is collected.
- This study has been reviewed and received ethics clearance from the University of Waterloo Office of Research Ethics.
- Contact information is available in the information letter.

Do you have any questions about any of that information, or would you like to go over the information letter in more detail?

If *yes* → Okay, I can give you time to sit down and review the letter, and I can answer any questions you may have.

If *no* → Based on the information you received, do you agree to take part in this research study?

If *yes* → Give participant survey, have them go sit in a private area to complete survey, and give them a sealable envelope in which to put their survey once completed. Tell them where you will be if they have any questions, and that once completed they should immediately return the sealed envelope to you.

If *no* → Okay, thank you for your time.

*Note to Research Assistant. If a participant wants to withdraw from the study they will rip up their questionnaire, put it in the sealed envelope, and you will shred it after. They will still receive the \$5 for participating.

AFTER: GIVE FEEDBACK LETTER, \$5, AND HAVE PARTICIPANT SIGN TRACKING SHEET.

Information Letter-Baseline



Title of Project: Study of Eating Patterns and Eating Disturbances

Faculty Supervisor: Dr. David Hammond, School of Public Health & Health Systems
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University of Waterloo, Canada
(519) 888-4567, Ext. 31066 hlillico@uwaterloo.ca

You are being asked to participate in a research study examining eating patterns and eating disturbances among female University students. Approximately 200 people will take part in the 10-minute survey. If you choose to participate in this study, we will ask you questions about your eating attitudes, body-satisfaction, mood, and basic demographic information. Some participants may experience mild anxiety or discomfort due to the sensitive nature of questions asked. You will be asked to complete the survey privately, in a private area of the cafeteria.

In appreciation of your time, you will be offered five dollars. The amount received is taxable. It is your responsibility to report the amount received for income tax purposes.

By participating in this study, you will help us to better understand the relationship between the food environment, eating attitudes, and patterns of disturbed eating. Of course, you are free to decline responding to any questions that you wish. You can withdraw from participation in the survey at any time by advising the interviewer and ripping up your survey, and placing it in the envelope for the researcher to confidentially destroy. If during the study you decide to withdraw, you will still receive the \$5 as remuneration for your time.

All of your responses will be kept confidential. Certain identifying information (such as day of birth) will be asked and used to link this survey with the one you just completed. No personal identifying information is requested. Additionally, we plan to conduct another study in approximately 5 weeks. If you complete the follow up survey, we will use some of the information in your current survey, such as your day of birth, to link your data. Paper copies of the survey will be destroyed upon study completion. Electronic copies of your survey data will be stored indefinitely on a password protected computer at the University of Waterloo, however personally identifying information will be removed, and a unique participant code will be assigned. The results of the study may be published for scientific purposes but will only be presented in aggregate.

This study has been reviewed and received ethics clearance through the Office of Research Ethics at the University of Waterloo. Should you have any comments or concerns resulting from your involvement in this study, please contact Dr. Maureen Nummelin, the Director, Office of Research Ethics

at (519) 888-4567, ext. 36005 or maureen.nummelin@uwaterloo.ca. If you have any questions after you leave today, require additional information about the study, or you are interested in receiving a copy of study findings, please feel free to contact one of the researchers listed at the beginning of this information letter.

Information Letter-Follow-up



Title of Project: Study of Eating Patterns and Eating Disturbances

Faculty Supervisor: Dr. David Hammond, School of Public Health & Health Systems
University of Waterloo, Canada
(519) 888-4567, Ext. 36462 dhammond@uwaterloo.ca

Student Investigator: Ms. Heather Lillico, School of Public Health & Health Systems
University of Waterloo, Canada
(519) 888-4567, Ext. 31066 hlillico@uwaterloo.ca

You are being asked to participate in a research study examining eating patterns and eating disturbances among female University students. Approximately 200 people will take part in the 10-minute survey.

If you choose to participate in this study, we will ask you questions about your eating attitudes, body-satisfaction, mood, and basic demographic information. Some participants may experience mild anxiety or discomfort due to the sensitive nature of questions asked. You will be asked to complete the survey privately, in a private area of the cafeteria.

In appreciation of your time, you will be offered five dollars. The amount received is taxable. It is your responsibility to report the amount received for income tax purposes.

By participating in this study, you will help us to better understand the relationship between the food environment, eating attitudes, and patterns of disturbed eating. Of course, you are free to decline responding to any questions that you wish. You can withdraw from participation in the survey at any time by advising the interviewer and ripping up your survey, and placing it in the envelope for the researcher to confidentially destroy. If during the study you decide to withdraw, you will still receive the \$5 as remuneration for your time.

All of your responses will be kept confidential. Certain identifying information (such as day of birth) will be asked and used to link this survey with the one you just completed. No personal identifying information is requested. Additionally, some respondents completed this survey 5 weeks ago. If you were one of those people, we will use some of the information in your current survey, such as your day of birth, to link your data. Paper copies of the survey will be destroyed upon study completion. Electronic copies of your survey data will be stored indefinitely on a password protected computer at the University of Waterloo, however personally identifying information will be removed, and a unique participant code will be assigned. The results of the study may be published for scientific purposes but will only be presented in aggregate.

This study has been reviewed and received ethics clearance through the Office of Research Ethics at the University of Waterloo. Should you have any comments or concerns resulting from your involvement in this study, please contact Dr. Maureen Nummelin, the Director, Office of Research Ethics at (519) 888-4567, ext. 36005 or maureen.nummelin@uwaterloo.ca. If you have any questions after you leave today, require additional information about the study, or you are interested in receiving a copy of study findings, please feel free to contact one of the researchers listed at the beginning of this information letter.

Survey

Resp. Number: _____

Study on Eating Patterns and Eating Disturbances

Please follow the instructions above each set of questions. Please answer all the questions as honestly and accurately as you can. All responses are kept strictly confidential.

After you have completed the survey, please place it in the sealed envelope and return to the research assistant.

The following **three questions** are asked to ensure that each participant completes the survey only once, and as a way to link this survey with the one you just completed. Additionally, we were surveying approximately 5 weeks ago. The next three questions will be used to link your data, if you completed the survey at that time. You may decline to answer any questions you wish.

1. What **day** of the month is your birthday? (i.e., 1 to 31) _____
2. What is the **first letter** in your mother's first name? _____
3. What is the **first letter** of the city in which you were born? _____
4. Not including today, **in the past week** how many meals have you eaten at this cafeteria?

No Meals	A Few Meals	Some Meals	Most Meals	All Meals
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. For the following six questions, check the box beside the one statement that best describes how you feel **right now at this very moment**. Read the items carefully to be sure the statement you choose accurately and honestly describes how you feel right now.

Right now I feel...

- Extremely dissatisfied** with my physical appearance
- Mostly dissatisfied** with my physical appearance
- Moderately dissatisfied** with my physical appearance
- Slightly dissatisfied** with my physical appearance
- Neither dissatisfied nor satisfied** with my physical appearance
- Slightly satisfied** with my physical appearance
- Moderately satisfied** with my physical appearance
- Mostly satisfied** with my physical appearance
- Extremely satisfied** with my physical appearance

Right now I feel . . .

- Extremely satisfied** with my body size and shape
- Mostly satisfied** with my body size and shape
- Moderately satisfied** with my body size and shape
- Slightly satisfied** with my body size and shape
- Neither dissatisfied nor satisfied** with my body size and shape
- Slightly dissatisfied** with my body size and shape
- Moderately dissatisfied** with my body size and shape
- Mostly dissatisfied** with my body size and shape
- Extremely dissatisfied** with my body size and shape

Right now I feel . . .

- Extremely dissatisfied** with my weight
- Mostly dissatisfied** with my weight
- Moderately dissatisfied** with my weight
- Slightly dissatisfied** with my weight
- Neither dissatisfied nor satisfied** with my weight
- Slightly satisfied** with my weight
- Moderately satisfied** with my weight
- Mostly satisfied** with my weight
- Extremely satisfied** with my weight

Right now I feel . . .

- Extremely** physically attractive
- Very** physically attractive
- Moderately** physically attractive
- Slightly** physically attractive
- Neither** attractive nor unattractive
- Slightly** physically unattractive
- Moderately** physically unattractive
- Very** physically unattractive
- Extremely** physically unattractive

Right now I feel . . .

- A great deal worse** about my looks than I usually feel
- Much worse** about my looks than I usually feel
- Somewhat worse** about my looks than I usually feel
- Just slightly worse** about my looks than I usually feel
- About the same** about my looks as usual
- Just slightly better** about my looks than I usually feel
- Somewhat better** about my looks than I usually feel
- Much better** about my looks than I usually feel
- A great deal better** about my looks than I usually feel

Right now I feel that I look . . .

- A great deal better** than the average person looks
- Much better** than the average person looks
- Somewhat better** than the average person looks
- Just slightly better** than the average person looks
- About the same** as the average person looks
- Just slightly worse** than the average person looks
- Somewhat worse** than the average person looks
- Much worse** than the average person looks
- A great deal worse** than the average person looks

6. For the following twenty emotions, indicate **to what extent you feel this way right now, that is, at the present moment** by checking the appropriate circle.

	Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
Interested	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Distressed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Excited	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Upset	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Strong	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Guilty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scared	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hostile	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enthusiastic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Proud	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Irritable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Alert	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ashamed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inspired	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nervous	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Determined	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attentive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jittery	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Active	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Afraid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. Read each statement below, and check the circle for each question that describes **how you feel right now, at this present moment.**

	Not at all	Somewhat	Moderately	Very much
I feel calm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am tense	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel upset	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am relaxed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel content	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am worried	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. The next set of questions asks you about your **feelings and thoughts during the last month**. Please check the appropriate circle for each statement.

	Never	Almost Never	Sometimes	Fairly Often	Very Often
How often have you been upset because of something that happened unexpectedly?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often have you felt that you were unable to control the important things in your life?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often have you felt nervous and “stressed”?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often have you felt confident about your ability to handle your personal problems?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often have you felt that things were going your way?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often have you found that you could not cope with all the things that you had to do?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often have you been able to control irritations in your life?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often have you felt that you were on top of things?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often have you been angered because of things that were outside of your control?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often have you felt difficulties were piling up so high that you could not overcome them?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. Please check a circle for each of the following 26 statements.

	Never	Rarely	Sometimes	Often	Usually	Always
I am terrified about being overweight	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I avoid eating when I am hungry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find myself preoccupied with food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have gone on eating binges where I feel that I may not be able to stop	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I cut my food into small pieces	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am aware of the calorie content of foods that I eat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I particularly avoid food with a high carbohydrate content (i.e. bread, rice, potatoes, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that others would prefer if I ate more	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I vomit after I have eaten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel extremely guilty after eating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am preoccupied with a desire to be thinner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think about burning up calories when I exercise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other people think I am too thin	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am preoccupied with the thought of having fat on my body	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I take longer than others to eat my meals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I avoid foods with sugar in them	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I eat diet foods	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that food controls my life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I display self-control around food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I feel that others pressure me to eat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I give too much time and thought to food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel uncomfortable after eating sweets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I engage in dieting behaviour	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like my stomach to be empty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have the impulse to vomit after meals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoy trying new rich foods	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. For the following five statements, please indicate the frequency of the behaviour **in the past week** by checking the appropriate circle.

	Never	One Time	Two Times	Three Times	Four Times	Five or More Times
Gone on eating binges where you feel that you may not be able to stop?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ever made yourself sick (vomited) to control your weight or shape?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ever used laxatives, diet pills or diuretics (water pills) to control your weight or shape?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exercised more than 60 minutes a day to lose or to control your weight?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Thought about your weight?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ate less than you wanted to as a way to control your calorie intake?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. Please fill-in the time you finished this survey: _____

Feedback Letter



Study of Eating Patterns and Eating Disturbances

Feedback Letter

Thank you for participating in our study. The study will help us to better understand eating patterns among female University students. We are particularly interested in the impact of the food environment, and information presented on foods on patterns of eating, food choices, and eating disturbances. Some cities in North America have redesigned, or are in the process of redesigning their menus to include nutrition information for food items such as the calorie levels. Certain jurisdictions will be implementing new laws that require this information to be posted on menus in 2013. Our study is examining whether this information has any impact on body satisfaction, mood, or lifestyle behaviours among female University students.

Due to the sensitive nature of some of the questions in the study, some resources are provided below should you feel you need further information or assistance.

On-Campus: Health Services, University of Waterloo (519) 888-4096
www.healthservices.uwaterloo.ca

Off-Campus: National Eating Disorder Information Centre Toll Free 1-866-NEDIC-20
www.nedic.ca

EatRight Ontario 1-877-510-510-2
www.eatrightontario.ca

If you have any questions about the study please feel free to contact Dr. David Hammond, anytime at (519) 888-4567, ext. 36462 or dhammond@uwaterloo.ca, or Ms. Heather Lillico, at (519) 888-4567, ext. 31066 or hlillico@uwaterloo.ca. Also please feel free to contact Dr. Maureen Nummelin, the Director, Office of Research Ethics at (519) 888-4567, ext. 36005 or maureen.nummelin@uwaterloo.ca, if you have concerns or comments resulting from your participation.

As a reminder, all the information you provided during the survey will be kept strictly confidential. Student identification numbers will be deleted upon study completion and you will be assigned a unique identifier. Paper copies of this survey will be destroyed. This project has been reviewed by, and received ethics clearance through the Office of Research Ethics at the University of Waterloo. If you would like any further information about the study, including a copy of our findings when they become available, please contact us at the number below. Findings will likely be available in spring 2013.

Thank you again for your help,

Sincerely,

Dr. David Hammond
dhammond@uwaterloo.ca
School of Public Health and Health Systems
University of Waterloo
(519) 888-4567, Ext. 36462

Ms. Heather Lillico
hlilico@uwaterloo.ca
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Appendix D: Questions from Electronic Survey

Sociodemographic Variables

Education

Question

Are you a:

Response Options

1. Undergraduate student
2. Graduate student
3. Visitor
4. Staff
5. Other: Specify

Ethnicity

Question

People in Canada come from many racial and cultural groups. Do you consider yourself to be...

[Read and check all that apply]

Response Options

1. White
2. South Asian (e.g., East Indian, Pakistani, Sri Lankan)
3. Chinese
4. Black
5. Filipino
6. Latin American
7. Arab
8. Southeast Asian (e.g., Vietnamese, Cambodian, Malaysian, Laotian)
9. West Asian (e.g., Iranian, Afghan)
10. Korean
11. Japanese
12. Aboriginal (e.g., First Nations, Métis, Inuk/Inuit)
13. Other → Specify:_____ [open-ended text]

Weight Perception

Question

Do you consider yourself now to be:

Response Options

1. Overweight
2. Underweight, or
3. About the right weight

Weight Aspiration

Question

Which of the following are you trying to do about your weight?

Response Options

1. Lose weight
2. Gain weight
3. Stay the same weight, or are you
4. Not trying to do anything about your weight

Weight

Question

How much do you weigh without clothes or shoes?

Response Options

Any number in either kilograms or pounds

Height

Question

How tall are you without shoes?

Response Options

Any number in either centimeters or feet and inches

Food selection

Question

Did you order any main food items or entrees?

Response Options

All food items were in a drop-down menu and multiple items could be selected. Alternatively, research assistants could type in meal choices.

Question

Did you make any modifications to this item?

Response Options

Common modifications were listed in a drop-down menu and a blank box was provided for research assistants to add in any additional ones.

Question

Did you order any sides?

Response Options

All food items were in a drop-down menu and multiple items could be selected.

Question

Did you make any modifications to this item?

Response Options

Common modifications were listed in a drop-down menu and a blank box was provided for research assistants to add in any additional ones.

Question

Did you order any beverages?

Response Options

All food items were listed in a drop-down menu and multiple items could be selected.

Question

Did you make any modifications to this item?

Response Options

Common modifications were listed in a drop-down menu and a blank box was provided for research assistants to add in any additional ones.

Question

Did you have any desserts?

Response Options

All food items were listed in a drop-down menu and multiple items could be selected.

Question

Did you make any modifications to this item?

Response Options

Common modifications were listed in a drop-down menu and a blank box was provided for research assistants to add in any additional ones.