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Identifying a Neurological Substrate for Body Image Investment Through Electroencephalography

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By

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ABSTRACT

Body image investment consists of the importance placed on appearance, and the behaviours utilized to maintain or improve appearance. Within body image investment, self-evaluative salience refers to the importance placed on appearance for self-definition. Body image investment may be conceptualized as a schema, which is a cognitive structure that organizes information. Schemata may impact how an individual reacts to stimuli. Such reactions may be viewed neurologically by recording the cortical activity of the frontal lobes with EEG, and interpreting asymmetric frontal lobe activity using the Motivational Direction Hypothesis. This hypothesis posits that greater left frontal activity is indicative of approach motivation, and greater right frontal activity is indicative of withdrawal motivation. In the present study, self-evaluative salience was investigated for a neurological substrate by recording frontal lobe activity with EEG while women viewed a slideshow of images depicting thin and overweight female celebrities. Female participants (N = 61) completed an online measure of body image investment, and then attended a laboratory session where they viewed the slideshow while having their frontal activity recorded. After controlling for BMI, only women with medium self-evaluative salience had greater left frontal activity when viewing thin images, and greater right frontal activity when viewing overweight images. Our results suggest that women low in self-evaluative salience may not process the images using an appearance schema, and women high in self-evaluative salience may experience conflicting reactions to the images based on contradicting appearance ideals. Women with medium self-evaluative salience may process the images using an appearance schema, and process the images using the most salient appearance ideal. Limitations and future directions are discussed.

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CHAPTER I.

INTRODUCTION AND LITERATURE REVIEW

1.1 General Introduction

The majority of body image research has focussed on body satisfaction, and very little literature exists on the investment component of body image. Body image investment is an important psychological construct related to several negative psychological factors (Cash & Prunzinsky, 1990, 2002). Although low body satisfaction is related to depression, anxiety, and low self-esteem (Rodgers, Sales, & Chabrol, 2010), a stronger association has been demonstrated between these negative psychological outcomes and an overvaluation of appearance (Cash et al., 2002). Additionally, an overvaluation of appearance is associated with lower appearance satisfaction (Cash & Labarge, 1996; Cash, Melnyk, & Hrabosky, 2004).

An overvaluation of appearance is associated with the development and maintenance of disordered eating (Cash & Prunzinsky, 2002; Cash et al., 2004; Stice, 2002, Stice & Shaw, 2002). Disordered eating is a central symptom of eating disorders, which are associated with significant psychological and physical ramifications (American Psychological Association, 2013). Further, an overvaluation of appearance is a central diagnostic criterion to Anorexia Nervosa, an eating disorder with a high mortality rate (American Psychological Association, 2013). Thus, appearance investment is a prevalent social concern, and further validation is warranted.

High appearance investment is associated with greater internalization of the thin ideal, the prominent appearance standard for women (Cash et al., 2002; Cash, Jakatdar, & Williams, 2004; Ip & Jarry, 2008). Exposure to the thin ideal has been associated with

negative psychological outcomes including decreased self-esteem, decreased body satisfaction, and increased negative affect. Despite the negative psychological ramifications, individuals highly invested in appearance for self-definition report greater internalization of the thin ideal after exposure to thin images (Ip & Jarry, 2008).

Body image investment may be conceptualized as an appearance schema, and appearance stimuli are processed by the schema in accordance with prominent appearance ideals, such as the thin ideal (Evans, 1967; Markus, 1977. Using the thin ideal to guide the processing of appearance stimuli, thinness may be processed as attractive, and being overweight may be processed as unattractive (Tiggemann, 2004), which may impact one's reactions to stimuli. Neurological reactions to stimuli may be recorded using electroencephalography (EEG) to record the cortical alpha band activity of the frontal lobes (Harmon-Jones, 2003).

Neurologically, asymmetric alpha band activity is associated with differences in motivational responses. Greater left cortical activity is associated with approach motivation, and greater right cortical activity is associated with withdrawal motivation (Harmon-Jones, 2003). Thus, processing appearance stimuli with schemata may impact frontal activity, with asymmetric frontal activity resulting from how the stimuli are processed by the schemata. Therefore, as an appearance schema, body image investment may have a neurological substrate visible by recording individuals' cortical frontal activity while they view appearance stimuli.

1.2 Body Image

Body image is a psychological construct consisting of an evaluative component and an investment component (Cash & Prunzinsky, 1990, 2002). The evaluative component consists of evaluating one's appearance or body shape and size (Cash et al., 2004). Such evaluation results in either positive or negative affect towards the body, thereby leading to body satisfaction or dissatisfaction (Cash et al., 2004). The investment component of body image, known as body image investment, consists of behaviours to either maintain or improve appearance, and the importance placed on appearance as a defining feature of the self (Cash et al., 2004).

Although disturbance in affect towards the body results in feelings of dissatisfaction with appearance, disturbance in appearance investment often results in an over-reliance on appearance for self-definition (Cash, 2002). Body satisfaction and body image investment are two conceptually distinct constructs but are highly correlated (Cash & Labarge, 1996; Cash et al., 2004). Higher investment in appearance for self-definition has been associated with lower satisfaction (Cash et al., 2004), suggesting that an over-reliance on appearance for self-definition has detrimental effects on overall appearance satisfaction.

1.3 Body Image Investment

Body image investment is comprised of two components. 'Motivational salience' consists of engaging in appearance enhancement behaviours to maintain appearance, or meet commonly agreed upon appearance standards (Cash et al., 2004). 'Self-evaluative salience' concerns the belief that appearance is a central component of one's identity and

that appearance is instrumental in positive social and emotional experiences (Cash, 2005; Cash et al, 2004). Self-evaluative salience is more strongly related to psychopathology than is motivational salience (Cash et al., 2004). Specifically, high self-evaluative salience is associated with lower self-esteem, and is more strongly correlated with body dissatisfaction, internalization of the thin-ideal, and disordered eating than is motivational salience (Cash et al., 2002; Cash, Jakatdar, & Williams, 2004; Ip & Jarry, 2008).

Individuals with high self-evaluative salience view appearance as an integral part of their identity, and see appearance as instrumental for positive life outcomes such as close relationships (Cash et al., 2004). For example, individuals high in this variable may believe that they must be attractive to find a partner. Thus, individuals high in self-evaluative salience place importance on meeting societal appearance norms. When exposed to ideal appearance standards in the media, individuals high in self-evaluative salience are more susceptible to body dissatisfaction resulting from viewing thin images than are individuals high in motivational salience (Ip & Jarry, 2008).

The relation between high investment and negative psychological functioning is a concern for the potential development of adverse mental health outcomes. High self-evaluative salience has been related to multiple psychological disorders such as depression, anxiety, and eating disorders (Cash et al., 2004). Indeed, an over-investment in appearance that is characteristic of high self-evaluative salience is a central criterion for anorexia nervosa and bulimia nervosa (American Psychological Association, 2013). Anorexia nervosa has one of the highest mortality rates of all mental disorders, due to high incidences of suicide and medical complications arising from the disorder itself. Eating disorders impair quality of life and have a prevalence rate ranging from 0.5 to 1.5

percent (American Psychological Association, 2013). To date, Body image investment is highly understudied compared to the evaluative component of body image. Indeed, the majority of existing literature on body image investment is authored by Dr. Thomas Cash after 2002, and few other researchers have published research on the construct. As body image investment is associated with negative psychological functioning and debilitating psychological disorders, further validation of this construct is an important area of study.

One's level of body image investment has implications for how they will process and internalize appearance-related information. Further, how appearance-related information is processed and internalized has implications for one's psychological well-being. As previously stated, body image investment may be conceptualized as a schema. Thus, the availability of one's appearance schema may impact how they will interpret appearance-related stimuli in their environment.

1.4 Schemata

A schema is a cognitive structure that organizes information and guides how that information is processed (Markus, 1977). Evans (1967) explains how schemata provide a set of guidelines for how a certain population of stimuli are processed and understood. For example, having a schema for what qualifies as a "dog" will allow each new animal to be correctly classified as either a dog or not a dog based on the animal's characteristics. Schemata allow for assimilation of information, with a vast array of information organized into schemata based on their categorical similarities. This allows for large amounts of stimuli to be perceived quickly and efficiently.

Schemata are anticipatory, meaning there is a readiness to seek and assimilate information relevant to the schema (Bem, 1981). Neisser (1976) explains that schemata construe perception according to a constructive process, with the perception of stimuli being a product of how the stimuli align with the schema's guidelines. A schema will be used to identify whether incoming information is congruent or incongruent with the schema's guidelines and affect how the individual reacts to the information. For example, whether an animal's characteristics are congruent with the schema of a "dog" will determine how an individual reacts; if their dog schema includes dogs being dangerous, a dog may be processed as a threat and result in a "fight or flight", withdrawal-oriented reaction. If the dog schema includes dogs being lovable and friendly, the individual may have a positive, approach-oriented reaction.

The anticipatory nature of the schema gives a general readiness to processing information relevant to that schema (Bem, 1981). Information associated with a schema will be identified and perceived quicker than other information. With schemata existing for all forms of information, the *cognitive availability* of the schema refers to the readiness to be evoked compared to other schemata (Nisbett & Ross, 1980). Individuals high in self-evaluative salience are highly appearance schematic, and as a result are more likely to internalize the valued appearance standards in their society than individuals low in self-evaluative salience. Additionally, their appearance schemata may have a high cognitive availability, and are readily evoked when appearance-related stimuli are present.

1.4.1. Appearance schematicity.

Appearance schemata organize appearance-related information and identify whether appearance information is congruent or incongruent with the schema. Highly appearance schematic individuals are more invested in their appearance, and believe appearance is important (Markus et al., 1985). Jung and Lennon (2003) investigated how being appearance schematic affected women's body image, self-esteem, and mood when exposed to attractive media images. College women (N = 168) were divided into either a schematic or an aschematic group based on their levels of appearance schematicity (measured with the Appearance Schemas Inventory-Revised) and completed measures of body satisfaction, self-esteem, and mood. Half of the women in each group were exposed to images of attractive women prior to completing the measures. Greater appearance schematicity was related to greater body dissatisfaction, lower self-esteem, and more negative mood than lower schematicity. These results were consistent regardless of media exposure, relating high appearance schematicity to poorer self-esteem, mood, and higher body dissatisfaction, regardless of acute exposure to appearance ideals.

Exposure to appearance ideals increases appearance schema activation, leading to increased body dissatisfaction. Hargreaves and Tiggemann (2003) exposed 257 adolescents (females = 160, males = 197) to either nonappearance commercials or commercials containing images of idealized thin women. Appearance-schema activation was measured with a word-stem completion task wherein participants could complete a word to make it into either an appearance-based or a non-appearance-based word. Results demonstrated that only females in the appearance condition reported significantly higher body dissatisfaction immediately following the commercials, and 15 minutes past

viewing. Both males and females formed more appearance-based words in the word-stem completion task in the appearance condition than in the nonappearance condition. These findings suggest that exposure to appearance-related information increases the cognitive availability of appearance schemata, which in turn impacts individuals' body image evaluation.

The anticipatory nature of appearance schemata results in a readiness to process appearance-related stimuli. In other words, appearance-related information is quickly processed and perceived as being either attractive or not attractive depending on that information's alignment with the schema. Additionally, appearance schemata are accommodating, and form depending on what is attractive for the current culture at a given time (Bem, 1981). In Western societies, the most endorsed female appearance schema is the thin ideal, which categorizes thinness as beautiful (Tiggemann, 2004).

1.5 The Thin Ideal

The ideal figure promoted by the thin ideal is conceptualized as having a small waistline and a low weight, which is desired by the majority of women, but remains unattainable for most. This ideal is reinforced through family and peers (Thompson & Stice, 2001), but most powerfully by the mass media (Boersma & Jarry, 2013; Chang, 2014; Groesz, Levine, & Murnen, 2002; Levine & Smolak, 1996, 1998; Tiggemann & McGill, 2004). Although men are subjected to societal appearance standards, the male ideal body is promoted as being lean and muscular as opposed to the thinness that is valued for the female body (Leit, Pope, & Gray, 2001; Tiggemann & Rothblum, 1997). The difference in ideal appearance standards for women and men, coupled with the larger

pool of existing research on female body image, made women the sole population of focus for the current study.

1.5.1. The thin ideal and body image investment.

Higher levels of body image investment are associated with a vulnerability towards the thin ideal (Ip & Jarry, 2008). In a study investigating the effects of thin images according to both dimensions of body image investment, female university students (N = 95) were exposed to images of advertisements with either thin women or products alone (Ip & Jarry, 2008). Women who were high on both motivational salience and self-evaluative salience experienced an increase in the value they place on body image, and a decrease in self-esteem after exposure to thin images. However, unlike those high in motivational salience, women high in self-evaluative salience reported greater body image dissatisfaction in addition to the increased importance placed on the body's appearance, and decreased self-esteem. Such findings suggest that even though highly appearance-invested women place importance on their appearance and experience a decrease in self-esteem after seeing thin images, only women who value appearance for self-definition also feel more dissatisfied with their own body after being exposed to images of thin women.

The relationship between body image investment and negative psychological functioning demonstrates a need for further validation of the construct. One potential method of validation is neurology, which is the study of the nervous system. Finding a neurological substrate for body image investment would further validate this psychological construct by demonstrating biological differences among individuals highly and lowly invested.

1.6 Neurology and Electroencephalography

Discovery of cortical activity that is unique to a certain disorder has assisted in validating the existence of psychological disorders and in recognizing potential vulnerabilities to these disorders. Neurological substrates, or underpinnings, have been discovered for several psychological disorders such as eating disorders (Frank et al., 2013), depression (Bruder et al., 1997; Schaffer, Davidson, & Saron, 1983), and anxiety (Blackhart et al., 2005). As Body Image Investment has been associated with the above psychological disorders, the construct may be further validated by investigating whether it has a neurological substrate of its own. Neurological substrates for depression, anxiety, and eating disorders have been identified by studying the neural activity of the brain and the locations where there is the most (or least) activity (Blackhart et al., 2005; Bruder et al., 1997; Frank et al., 2013). One common method of recording this activity is through electroencephalography (EEG).

EEG is the method of recording neural activity from the scalp (Harmon-Jones & Amodio, 2012). First discovered by Hans Berger in the late 1920's, EEG has become one of the most common methods for measuring brain function in studies of psychological dysfunction (Harmon-Jones & Amodio, 2012). EEG records the neural activity inside the brain, expressed as electrical voltage (Harmon-Jones & Amodio, 2012).

EEG is recorded with a cap on the scalp consisting of 32, 64, or 128 electrodes, which utilize the tissue between the neurons and the scalp as a volume conductor to record the brain's electrical activity (Harmon-Jones & Amodio, 2012). Within the study of EEG frequency bands, five bands have been related to psychology and behaviour: delta (1-4 Hz), theta (4-8 Hz), alpha (8-13 Hz), beta (13-20 Hz) and gamma (20+ Hz)

(Harmon-Jones & Amodio, 2012). Alpha bands account for a larger percentage of adult neural activity and are often utilized to investigate differences in motivational drives (Harmon-Jones & Amodio, 2012); thus, they will be the bands recorded for the present study. Motivational drives are commonly studied by investigating the difference in activity between the left and right frontal lobes of the brain in a method known as frontal asymmetry (Harmon-Jones & Amodio, 2012).

1.7 Frontal Asymmetry

Frontal asymmetry refers to the difference in cortical activity between the right and left frontal lobes (Harmon-Jones, 2003). Differences in dominant left or dominant right frontal activity have implications for emotion and motivation. An empirically supported theory of frontal asymmetry known as the Motivational-Direction Hypothesis suggests that greater left frontal activity is indicative of approach motivation, and greater right activity is indicative of withdrawal motivation (Harmon-Jones, 2003; Kelley, Hortensius, Schutter, & Harmon-Jones, 2017; Quaranta, Siniscalchi, & Vallortigara, 2007). Specifically, approach motivation orients the individual toward the stimuli, and withdrawal motivation orients the individual away from the stimuli. To use the previous example of a person reacting to a dog, a person with an approach motivation toward dogs may approach the dog; however, a person with a withdrawal motivation toward dogs may back away.

Studies investigating the Behaviour Inhibition System (BIS) and Behavioural Activation System (BAS; Gray, 1972) provide support for this hypothesis. According to Gray (1972), the BAS controls approach motivation and is sensitive to incentives and reward, prompting an individual to seek and pursue a stimulus. In contrast, the BIS

controls aversive or withdrawal motivation, and inhibits behaviour that may lead to punishment or negative outcomes. Consistent with the Motivational-Direction Hypothesis, the BIS has been found to correlate with greater right frontal activity and BAS with greater left frontal activity (Coan & Allen, 2003; Harmon-Jones & Allen, 1997; Sutton & Davidson, 1997).

Emotions such as optimism (De Pascalis, Cozzuto, Caprara, & Alessandri, 2013) and sensation seeking (Gapin, Etnier, & Tucker, 2009) relate to greater left frontal activity, consistent with approach motivation. Additionally, anger (Harmon-Jones & Sigelman, 2001; Harmon-Jones, 2003; Hortensius, Schutter, & Harmon-Jones, 2012) and jealousy (Harmon-Jones, Harmon-Jones, Abramson, & Peterson, 2009) are negative, approach-motivated emotions that are related to greater left frontal activity. Withdrawal-motivated emotions, such as fear or sadness (Mungee et al., 2014), are related to greater right frontal activity.

Recording cortical activity with EEG and utilizing the Motivational-Directional Hypothesis to interpret the asymmetry of the frontal lobe activity has assisted in discovering neurological substrates for psychological disorders (Allen, Iacono, Depue, & Arbisi, 1993; Kano et al., 1992; Nusslock et al., 2011). Clinical samples of individuals with bipolar disorder demonstrate greater right frontal activity at resting baseline during a depressive episode, indicating withdrawal motivation (Allen et al., 1993) and greater left frontal activity in an episode of mania, indicating approach motivation (Kano et al., 1992). Indeed, higher right frontal activity can predict a depressive episode. In a longitudinal study, baseline EEG recordings were gathered from undergraduate men and women (N= 40) and cognitive interviews were conducted every four months for three

years (Nusslock et al., 2011). Decreased left frontal activity was predictive of first depressive episodes.

Investigating cortical frontal activity with EEG may provide insight into how individuals high in body image investment orient themselves towards stimuli that are congruent or incongruent with societal beauty standards. Individuals high in self-evaluative salience have shown a predisposition to give additional attention to images depicting the thin ideal (Yamamiya, Cash, Melnyk, Posavac & Posavac, 2004). A motivational drive to approach such media images may be reflected in one's cortical activity, which can be measured using EEG. For example, a woman shown images depicting overweight women may experience the desire to withdraw from the image. This withdraw response may be validated with a corresponding increase in right frontal lobe activity. Images of thin women may induce an approach motivation with a corresponding increase in left frontal lobe activity. Therefore, EEG recording was utilized to identify potential neurological underpinnings that could further validate the body image investment construct.

1.8 The Present Study

The aim of this study was to expand on the literature of body image investment and investigate whether this construct has a neurological substrate. The study consisted of online questionnaires, followed by one in-lab session. Participants (N = 61) completed a battery of online questionnaires assessing demographics, body-mass index (BMI), depression, eating disorder symptoms, body image investment, and self-esteem. Participants then attended a lab session where they had their cortical activity at the frontal

lobes recorded by EEG and viewed a slide show consisting of images of overweight and thin women.

1.8.1. Study overview.

As previously discussed, research has shown that women high in self-evaluative salience are more susceptible to the thin ideal (Ip & Jarry, 2008). Additionally, differences in motivational states can be viewed by recording the asymmetry in activity between the left and right frontal lobes of the brain (Harmon-Jones, 2003). The current study was designed to test the possibility that body image investment may be validated by exposing women to images either congruent or incongruent with the thin ideal and recording their frontal lobe activity. The susceptibility to the thin ideal experienced by women high in self-evaluative salience should result in a motivational bias to approach stimuli that are congruent with the thin ideal, such as images of thin women, and to avoid stimuli that are incongruent with the thin ideal, such as images of overweight women.

Locating a neurological substrate for body image investment. To investigate whether there is a neurological substrate to body image investment, EEG was used to record the frontal lobe activity of participants while they were viewing images congruent and incongruent with the thin ideal. Cortical reactions were compared to each participant's baseline activity. Prior to viewing any images, a five-minute baseline recording was gathered with participants' eyes closed to have a recording of each participant's frontal lobe activity at rest.

Due to the mass media being the most prominent promoter of the thin ideal (Groesz et al., 2002; Tiggemann & McGill, 2004), participants were shown a slideshow

of thin and overweight female celebrities that were depicted in the media. Previous research using image exposure to study asymmetric frontal lobe activity showed images in blocks, with each individual image shown for five-to-ten seconds (Choi, Sekiya, Minote, & Watanuki, 2016; Chong, 2014; Harmon-Jones & Allen, 1998). Prolonged exposure using blocks of stimuli allow a larger recording of cortical activity, and more opportunity to identify differences in frontal activity. For this study, the images were compiled into a slideshow consisting of six blocks, each containing five images of women. Three blocks each contained five images depicting thin women, and three blocks each contained five images depicting overweight women. In total, the six blocks contained fifteen images of overweight women, and fifteen images of thin women. The blocks alternated between overweight and thin blocks, with each individual image being viewed for ten seconds

Covariates. Several covariates were measured due to their relation to cortical frontal activity: depression, self-esteem, eating pathology, and Body Mass Index (BMI). As previously stated, higher symptoms of depression have been associated with greater right frontal activity at baseline, with greater right frontal activity predictive of a later depressive episode (Nusslock et al., 2011). Additionally, low self-esteem explicitly measured by questionnaires has been related to greater right frontal activity as a mediator between depression and right frontal activity (De Raedt, Franck, Fannes, & Verstraeten, 2008). Binge eating has been associated with greater left frontal activity (Ochner et al., 2007), and highly restrained eaters have demonstrated greater right frontal activity (Silva et al., 2002). Lastly, differences in frontal activity have been implicated across different BMI classes. Obesity has been related to dysfunction in the right prefrontal cortex

(Alonso-Alonso & Pascual-Leone, 2007). Pannacciulli and colleagues (2006) found that compared to leaner individuals, individuals classified as obese displayed lower gray matter density in the right frontal lobe. Such findings suggest that differences in frontal lobe composition and functioning across BMI classes may alter the expected effect of image type on frontal activity. Thus, depression, eating pathology, self-esteem, and BMI were measured as covariates during the online questionnaire portion of the study.

1.8.2. Research question and hypotheses.

The proposed study was designed to explore one question: does body image investment have a neurological substrate? Based on the review of the literature presented above, the following hypothesis was formulated:

Hypothesis 1a. Consistent with the Motivational-Direction Hypothesis, participants will have greater *left than right frontal activity* in response to thin images compared to overweight images, and greater *right than left frontal activity* in response to overweight images compared to thin images (Figure 1).

Hypothesis 1b. This effect will be more pronounced for individuals high in s*elf-evaluative salience*, compared to individuals low in *self-evaluative salience* (Figure 1).

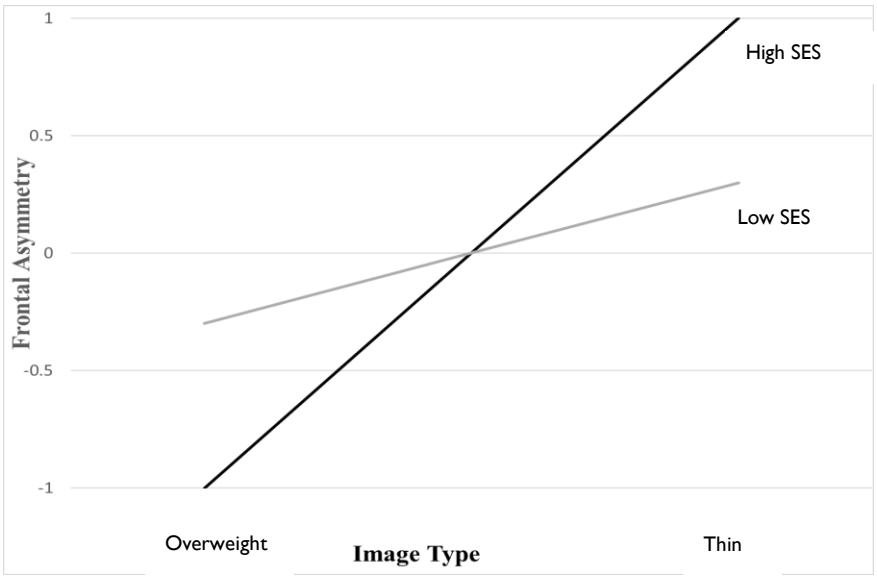

Figure 1. The proposed interaction between level of Self-Evaluative Salience and image type on frontal activity with -1 indicative of greater right frontal activity and 1 indicative of greater left frontal activity

CHAPTER II

METHODOLOGY

2.1. Design

This study was a controlled experiment and employed moderated repeated-measures analysis of variance (ANOVA) with planned contrasts to determine whether image type (within-subjects variable) had an effect on frontal activity, and whether this effect was more pronounced among participants high in self-evaluative salience (between-subjects variable), than participants low in self-evaluative salience.

2.2. A Priori Power Analysis

To determine the required sample size for the proposed research, a power analysis was conducted using G*power. As there is no past literature associating body image investment with neurological underpinnings, a moderate effect size was assumed to remain conservative. Using a moderate effect size (d = 0.3), 43 participants were

recommended to detect statistically significant effects. To account for attrition and missing or unusable data, 61 participants were recruited.

2.2.1. Participants. Participants were 61 female undergraduate students from the University of Windsor. Inclusion criteria were female sex, no past or current diagnosis of an eating disorder, and right-handedness. Only participants who identified as female were included in this study due to gender differences in ideal appearance standards. Specifically, the male ideal body promoted by the mass media is depicted as lean and muscular, and is distinct from the thinness that is valued for the female body (Leit et al., 2001; Tiggemann & Rothblum, 1997). Eating disorder symptoms often include severely disturbed body image not representative of the general population (Lewer, Nasrawi, Schroeder, & Vocks, 2016). Participants with clinical eating pathology may have been statistical outliers, and such outliers may reduce the generalizability of the results, thus lessening the external validity of the study. Therefore, participants with a current diagnosis of an eating disorder were excluded from this study. Left-handedness may involve a different dominant brain hemisphere compared to right-handedness (Cernacek & Podivinsky, 1971). Inclusion criteria questions were part of the Psychology Participant Pool screening procedures, and the study was invisible to those were indicated they were men, left-handed, or had a past or current eating disorder diagnosis. Participants signed up for the study through the online participant pool, and all received course credit for their taking part in the study. Approximately half were Caucasian (50.8%; Arab or West Asian = 13.1%, European = 11.5%, South Asian = 8.2%, Caribbean = 4.9%, Other = 4.9%, East Asian = 3.3%, African = 1.6%, South or Central America = 1.6%), their mean age was 21.51 years old (*SD* = 5.42), and their average BMI was 25.1 (*SD* = 5.1).

2.3 Procedure

Eligible participants were invited to take part in the study via an advertisement posted on the Psychology Participant Pool website (Appendix A). The online and laboratory portions of the study were advertised as two separate studies being conducted by the same researcher, and were offered together allegedly to facilitate recruitment. The study was advertised in this manner to minimize expectancy effects that could result from completing the online surveys.

Participants signed up for both components of the study at once. The online study took approximately thirty minutes, after which 0.5 bonus points was awarded. The laboratory component then was conducted in the laboratory within two weeks after completion of the online component. The laboratory component took approximately one hour, after which the participants were awarded 1.5 bonus points.

To minimize demand characteristics, body image was not mentioned in the advertisement. The online component was advertised as a study of the association between self-esteem and family size among female undergraduate students, and a question about number of siblings was included in the demographics questionnaire to further support the cover story. All questionnaires were only administered in the online component, which added support for the claim that the online and laboratory components were separate studies. Additionally, although low body satisfaction has been related to pressure from family members to conform to appearance ideals (Ata, Ludden, & Lally, 2007), neither body satisfaction, or body image investment have been consistently related to family size. Thus family size was used in the cover story to reduce the likelihood participants would suspect that the study was about body image, which could have

impacted responses to the measure of body image investment included in the online portion.

The laboratory component of the study was advertised as a study of the brain's reactions to images of celebrities. Participants were told the study was investigating cortical reactions to images of celebrities sensationalized in the media regardless of their specific talents (actress, model, or reality star). Additionally, to facilitate recruitment, the study was advertised as an opportunity to see neurological recording taking place using EEG.

Participants selected a time slot for their online session and their laboratory session. Upon receiving an e-mailed confirmation of their time slots, participants were e-mailed the hyperlink for the online survey. Before any questionnaires were administered, participants read the online Consent to Participate in Research form (Appendix B), which contained the purpose and procedures of the study, as well as any known risks and benefits. Participants indicated informed consent by selecting "I agree" at the bottom of the web page. After providing consent, participants continued the survey, which consisted of the following questionnaires: demographics, the Appearance Schemas Inventory-Revised, the Beck Depression Inventory-II, the Eating Pathology Symptom Inventory (Binge Eating and Restraint subscales), and the RSES. To prevent order effects, the last four questionnaires were randomized. BMI was assessed as a separate question at the end of the survey to prevent response biases that may occur from answering questions about height and weight.

To prevent attrition, participants were sent an e-mail reminding them of their timeslot one day before their laboratory session. When participants came into the

laboratory, each individual was guided into a separate room equipped with a computer and the EEG recording system. Participants were asked to read and sign the laboratory Consent to Participate in Research form (Appendix C). Prior to fitting participants with the EEG cap, the researcher displayed the cap, described how the conducting gel would be applied in a non-invasive manner, and addressed any questions or concerns. In preparation for collecting the EEG data, participants were instructed to scratch their head and smooth any hair back into a low ponytail to neutralize the scalp and better fit the cap. Participants were instructed to place the electrode cap ("Quick cap" containing 32 embedded electrodes) on their head with the assistance of the researcher. ElectroGel was then applied externally from the cap into each of the electrode openings using a specialized blunt-ended syringe. Using ElectroGel, efforts were made to bring impedance values below 25 kΩ. Once the participants were connected to the EEG system, the researcher informed them verbally of the upcoming task and that once the researcher had left the room the lights would be turned off to prevent cortical reactions from the sudden appearance of light.

First, participants were directed to remain seated with minimum movement and eyes closed for five minutes to maintain a baseline recording, at which time the researcher informed them they may open their eyes. Next, they were instructed to watch the five-minute slideshow, and were asked to refrain from any unnecessary movement that may distort the EEG signals. After the slideshow, the researcher assisted with the removal of the EEG cap. Participants were given the Post-Study Debriefing Form (Appendix D), which explained the purpose of the study. Participants signed the bottom of the debriefing form to indicate their consent to retain their data after being told the true

purpose of the study. After providing consent, participants were provided an additional consent form (Appendix E) to have their height and weight measured by the researcher to calculate a precise BMI.

To ensure all participants were debriefed about the true purpose of the study, participants who did not complete the laboratory portion of the study within two weeks of completing the online portion were e-mailed a post-study information letter (Appendix F). This post-study information letter contained an explanation of the purpose of the study, and how the online portion was part of a larger study investigating Body Image Investment. The primary investigator's contact information was included in the post-study information letter in case participants wished to withdraw their online data.

2.4 Measures

See Table 1 in the Results for descriptive statistics for all measures.

2.4.1. Demographics questionnaire. Participants completed a brief demographics questionnaire (see Appendix G) that asked about age, ethnicity, and family size.

2.4.2. Independent variable measure.

Image Slideshow. The slideshow (Appendix H) was comprised of thirty images of minor celebrities who were relatively unknown to avoid overexposure or personal bias. The thirty images were compiled into six image blocks. Three of the blocks each contained five images of a thin celebrity, and three of the blocks each contained five images of an overweight celebrity. Photographs were selected from online tabloid-style articles featuring minor celebrities. Each image featured a woman's full body and they

were alone in the photograph. The slideshow consisted of celebrities who are either overweight or thin, and thus respectively incongruent or congruent to the thin ideal. A panel comprised of members of The Studies in Yoga, Meditation, and the Psychology of Appearance Lab at the University of Windsor selected the thirty images based on a visual estimate of BMI. According to the World Health Organization (WHO; 2004) a BMI of 18.50-24.99 is considered a normal weight, and a BMI of 25-29.99 is considered overweight. For overweight images, BMI was estimated to be between 25-27 to ensure non-adherence to the thin ideal, but not include images of women who were significantly overweight and may elicit health concerns. Thin images had an estimated BMI in the low-normal range of 19-21 to avoid eliciting health concerns that are associated with being significantly underweight.

Each image was shown on a Dell PC with a Windows XP operating system for ten seconds. The slideshow alternated between thin and overweight image blocks. The total slideshow was five-minutes in length, equalling the length of the baseline recording.

2.4.3. Moderating variable measure

Appearance Schemas Inventory-Revised (ASI-R). The ASI-R (Cash et al., 2004; Appendix
I) is a 20-item measure of body image investment consisting of two subscales: Self-Evaluative
Salience (12 items) and Motivational Salience (8 items). The Self-Evaluative Salience subscale measures the importance of appearance for self-definition. The Motivational Salience subscale measures motivation to maintain appearance or enhance appearance to a certain esthetic standard. Items such as “I often check my appearance in the mirror just

to make sure I look

okay" or "[w]hat I look like is an important part of who I am" are answered using a 5-point scale ranging from 1 = strongly disagree, to 5 = strongly agree. Items are summed for each subscale, with higher scores reflecting higher levels of investment. In the present study, the ASI-R demonstrated good internal consistency, with a Chronbach's alpha coefficient of .84.

2.4.4. Dependent variable measure.

EEG system. Compumedics Neuroscan USA Ltd provided the electroencephalogram (EEG) system that was utilized for the study. The product was certified for use on humans and is considered non-invasive. It consists of four components from which only the electrode cap is visible and in direct contact with the participant. The electrode cap was sanitized before and after each use. The sanitation kit includes surface disinfectants, medical alcohol swabs, and a specialized skin cleaning gel (Nuprep) that is commonly used in EEG preparation. The conducting gel applied was ElectroGel.

2.4.5. Covariate measures. Four additional variables were measured to separate their effects on cortical frontal activity from the effects of the slide show. They are described below.

Beck Depression Inventory – Second Edition (BDI-II). The BDI-II (Beck, Steer, Ball, & Ranieri, 1996; Appendix J) is a 21-item measure of the severity of depressive symptoms. Items assess symptoms such as "sadness" and "loss of interest." Items are answered on a 4-point scale ranging from 0 = *absence of that symptom* to 3 = *severe level of that symptom.* Items are summed, and a higher score means higher depression. In the

present study, the BDI-II had a Chronbach's alpha of .88, indicating strong internal consistency.

Eating Pathology Symptoms Inventory (EPSI). The EPSI (Forbush, 2013; Appendix K) is a 45-item measure of eating pathology with eight subscales: Body Dissatisfaction, Binge Eating, Cognitive Restraint, Purging, Restricting, Excessive Exercise, Negative Attitudes toward Obesity, and Muscle Building. Items investigate attitudes and behaviours towards eating. Items such as "I ate when I was not hungry" are rated on a 5-point scale ranging from 0 = never, to 4 = very often. Items are summed to obtain a total and higher scores reflect higher eating pathology. As previously stated, binge eating and dietary restriction are related to resting cortical frontal activity. Thus, the Binge Eating and Restricting subscales were used in this study. In the present study, internal consistency for the Binge Eating and Restricting subscales were satisfactory, with Chronbach's alphas of 0.82 and .83 respectively.

Rosenberg Self-Esteem Scale (RSES). The RSES (L) is a 10-item measure of global trait self-esteem (Rosenberg, 1965). Items such as "[o]n the whole I am satisfied with myself" and "I take a positive attitude toward myself" are answered on a 4-point Likert-type scale ranging from 1 = strongly disagree to 4 = strongly agree. Items are summed to obtain a total and higher scores reflect higher trait self-esteem. In the present study, the RSES demonstrated good internal consistency with a Chronbach's alpha of .90.

Body Mass Index (BMI). BMI was calculated by dividing height in meters squared by body weight in kilograms (Appendix M). In the online component of the study, this information was collected using separate questions at the end of the survey. In the laboratory component of the study, this information was gathered by measuring the

height and weight of participants while they were in the laboratory. A standard tape measure was used to measure height and a scale (Kalorik EBS 39693 Precision Digital Glass Scale) was used to measure weight. Height and weight were actually measured, because although correlations between estimated and actual height and weight are high, (in the present study, r = .99), women have a tendency to over report their height and underreport their weight (Meyer, McPartlan, Sines, & Waller, 2009). Nevertheless, because of this high correlation, self-reported height and weight were collected in the online survey to be used to calculate BMI for participants who did not consent to have their height and weight measured in the laboratory.

CHAPTER III

RESULTS

3.1. Approach to Data Analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 23.0. The hypothesis for this study was analyzed using a repeated-measures analysis of variance (ANOVA). Prior to hypothesis testing, EEG data were inspected and a difference score calculated, validity of participants' responses was assessed, missing data were addressed, and then the assumptions of ANOVA were tested.

3.1.1. EEG data.

Cortical activity was continuously recorded from a 32 electrode EEG "Quick cap". The electrode placement complied with the International Electrode Placement System (Transcranial Technologies Limited, 2012), using the following electrodes: left (F3) and right (F4) frontal, and midline central (Cz). The Cz electrode served as the

reference electrode. The EEG signals were recorded using SCAN 4.5 Software from Neuroscan.

Artifacts resulting from eye blinks, movements, or muscle activity were visually inspected and removed using Advanced Source Analysis (ASA; Version 4.10.1), software from Advance Neuro Technology (2018). To prepare the EEG data for analysis, a high-pass filter was applied with a low cut-off frequency of 1 Hz. Subsequently, computerized artifact rejection was performed with a peak to valley amplitude criterion exceeding ±100 μV. Sweeps that uniformly moved in one extreme direction (up or down), had a large bump (above or below ±50 μV), or consisted of too much noise were rejected. Subsequently, the recording obtained during the slideshow was divided into six epochs, to represent each separate image block. To extract alpha-band activity, the Fast Fourier Transform filter was applied to derive power spectral densities with specific interest in the 8-13 Hz band. Alpha activity was averaged separately for the baseline recording, and the thin and overweight image blocks, and power spectral means were computed separately for the left (F3) and right (F4) electrodes (Allen, Coan, & Nazarian, 2004). These methods resulted in six separate scores: a left (F3) and a right (F4) variable for each of the baseline, thin image, and overweight image recordings.

A natural log transformation was applied to all EEG scores (EEG-B-F3, EEG-B-F4, EEG-Th-F3, EEG-Th-F4, EEG-O-F3, EEG-O-F4) to correct for moderately positive skewness and kurtosis (Allen et al., 2004). A natural log transformation is commonly utilized to correct for significant skewness in biological data, such as EEG data (Tabachnick & Fidell, 2013). After applying the natural log transformation, the data better approximated the normal curve and values of skewness and kurtosis were

improved to within acceptable ranges.

A difference score was then calculated by subtracting left from right recordings [ln(Right) – ln(Left)] for the pair of frontal (lnF4 – lnF3) electrodes for the baseline, thin image, and overweight image scores (Allen et al., 2004). In the interpretation of this metric, the assumption is that alpha power is the inverse of cortical activity, thus decreases in alpha power reflect increases in cortical activation. In this case, positive asymmetry difference scores indicate relatively greater left-sided cortical activation, zero difference represents symmetrical activity, and negative difference scores reflect greater right-sided activity. Using the natural log-transformed values to calculate this difference score provides some correction for individual differences in overall alpha power (Allen et al., 2004). This calculation resulted in three difference scores representing asymmetric cortical activity at baseline (EEG-B-FA), while viewing thin images (EEG-Th-FA), and while viewing overweight images (EEG-O-FA).

Lastly, a final difference score was computed to determine the difference in cortical activation from baseline when the participants were exposed to thin and overweight images. To do this, baseline frontal activity (EEG-B-FA) was subtracted from the frontal activity score for thin images (EEG-Th-FA) and overweight images (EEG-O-FA). These calculations resulted in two final, within-subjects variables: the difference from baseline in frontal activity scores while viewing the thin images (EEG-Th-B-FA), and while viewing the overweight images (EEG-O-B-FA).

3.1.2. Online survey data

Invalid responses.

Items intended as validity checks were inserted into the ASI-R and RSES, to evaluate random or inattentive responding. These items were: "[p]lease select agree" and "[p]lease select strongly disagree". If a participant answered incorrectly to both of these items, their data were considered invalid and removed from the data set. If participants answered only one of these items incorrectly, their responses on other scales were examined. If they seemed to carelessly respond on at least one measure, for example, if they selected response option 1 for all items, their data were considered invalid and they were removed from the data set.

In this study, zero cases were deemed to have provided invalid data by incorrectly responding to both validity checks. Seven cases incorrectly responded to one validity item, but after an inspection of their data sets only one was considered invalid due to careless responding; the final sample size was 61.

Missing Data.

Prior to analysis, the data were examined for missing values. Little's MCAR test was not significant, $p = .671$, indicating that values were missing entirely at random. Less than 0.01% ($n = 4$) of all possible values were missing. The percentage of missing values for each item ranged from 0 to 3.3%. Additionally, only 7.0% of participants ($n = 4$) did not consent to have their height and weight measured during the laboratory session. Self-reported BMI for participants who refused measurement was as follows: 19.43, 19.74, 20.55, and 22.67. Given the high correlation between self-reported BMI and objectively

measured BMI (r = .99, p < .001), self-reported values were substituted for all four participants who refused measurement. Expectation maximization was used to replace all remaining missing values for the covariates (BMI, BDI-II, EPSI-BE, EPSI-R, RSES), and the within-subjects variable (ASI-R-SES), given that when a very small proportion of the data is missing, similar results are produced from almost any procedure to replace missing values (Tabachnik & Fidell, 2007).

The within-subjects variable self-evaluative-salience (ASI-R-SES) was trichotomized utilizing percentile groups to indicate high, medium, and low self-evaluative salience. Self-evaluative salience was trichotimized such that 1 = low self-evaluative salience, 2 = medium self-evaluative salience, and 3 = high self-evaluative salience (TriSES).

3.2. Preliminary Analyses

Descriptive analyses were performed on each variable to check for univariate outliers, identified by standardized residuals with values greater than 3.29. A total of three univariate outliers were identified for EPSI-BE, and they were reduced using Winsorization (Tabachnik & Fidell, 2007). There were no multivariate outliers. Means, standard deviations, and internal reliability coefficients are presented in Table 1.

Next, each variable was assessed for normality by evaluating histograms, *q-q* plots, the Shapiro-Wilk (*SW*) statistic, and the values of skewness and kurtosis. Scores for the BDI, ASIR-SES, and the EPSI-BE approximated the normal distribution and the *SW* statistic was not significant (p's > .08). The *SW* statistic was significant for all remaining variables (RSES, EPSI-R, BMI, EEG-Base, EEG-Th, EEG-O; p's < .05). However, for RSES, EPSI-R, and BMI, plots approximated the normal distribution, skewness values

were within the acceptable range of ±2, and kurtosis values were within the acceptable range of ±3. Further, transformations applied to these variables did not result in improvements on any metric. Consequently, non-transformed values were used for each of these measures in all of the analyses.

Table 1

Descriptive Data for All Measures

Variable	*N*	Range	*M*	Median	*SD*	Cronbach's α
BMI	61	15.71 – 36.82	25.10	24.21	5.10	---
BDI-II	61	0.00 – 31.00	12.97	12.00	6.57	0.88
RSES	61	7.00 – 30.00	17.64	17.00	5.07	0.90
EPSI-BE	61	9.00 – 31.00	17.61	17.00	5.00	0.82
EPSI-R	61	6.00 – 27.00	13.56	13.00	5.07	0.83
ASI-R-SES	61	20.00 – 56.00	37.90	38.00	7.83	0.84
Low-SES	20	20.00 – 33.00	29.30	30.50	3.37	---
Med-SES	21	34.00 – 40.00	37.62	38.00	1.88	---
High-SES	20	41.00 – 56.00	46.80	45.50	4.12	---
EEG-Th-B-FA*	61	-2.48 – 2.67	0.11	0.05	0.95	---
EEG-O-B-FA*	61	-2.41 – 1.86	-0.09	0.08	1.12	---

Note: BMI = Body Mass Index; BDI-II = Beck Depression Inventory-II; RSES = Rosenberg Self-Esteem Scale; EPSI-BE = Eating Pathology Symptoms Inventory – Binge Eating Scale; EPSI-R = Eating Pathology Symptoms Inventory – Restraint Scale; ASI-R-SES = Appearance Schema Inventory-Revised –Self Evaluative Salience Subscale; Low-SES = Participants who scored in the bottom 33% of scores on the ASI-R-SES; Med-SES = Participants who scored in the middle 33% of scores on the ASI-R-SES; High-SES = Participants who scored in the top 33% of scores on the ASI-R-SES; EEG-Th-B-FA = Difference from baseline in cortical frontal activity while viewing thin images; EEG-O-B-FA = Difference from baseline in cortical frontal activity while viewing overweight images.

* Indicates the variable was transformed using a natural log transformation prior to further analyses, and the median is the more appropriate measure of central tendency.

3.2.1. Repeated measures ANOVA assumptions.

Repeated measures ANOVA assumes an absence of outliers among the predictor and outcome variables, as well as an absence of outliers in the solution (Tabachnick & Fidell, 2007). In the preliminary steps of analyses three univariate outliers were identified and reduced. Multivariate outliers were assessed through examining Mahalanobis distances. Cut-off values for multivariate outliers were determined using the Chi squared distribution (Tabachnick & Fidell, 2007). Analyses revealed no multivariate outliers.

The assumption of homogeneity of variance was assessed by examining the Box's M statistic and the Levene's statistic. Neither the Box's M (p = .89) nor the Levene's (p = .94) statistics were significant, indicating that the assumption had been met. Additionally, none of the variables had a correlation greater than |0.65| (see Table 2), suggesting that the variables were sufficiently distinct to use repeated measures ANOVA.

Table 2

Intercorrelations Between All Study Variables

Variables	1	2	3	4	5	6	7	8	9	10
1. BMI	-									
2. BDI-II	.01	-								
3. RSES	-.10	-.55**	-							
4. EPSI-BE	.05	.19	-.25*	-						
5. EPSI-R	-.25*	.29*	-.13	-.08	-					
6. ASI-R-SES	.07	.33*	-.37**	.09	.09	-				
7. Low-SES	-.21	-.06	.11	.11	-.33	-	-	-	-	-
8. Med-SES	.27	.02	-.13	-.06	.21	-	-	-	-	-
9. High-SES	-.17	-.10	-.21	-.28	-.18	-	-	-	-	-
10. EEG-O-B-FA	-.28*	-.24	.23	-.10	-.04	-.01	.42	-.16	.16	-
11. EEG-Th-B-FA	-.08	-.08	.23	.06	-.19	-.01	.34	-.39	.01	.46**

Note: $^{*}p<.05$, $^{**}p<.01$
BMI = Body Mass Index; BDI-II = Beck Depression Inventory-II; RSES = Rosenberg Self-Esteem Scale; EPSI-BE = Eating Pathology Symptoms Inventory – Binge Eating Scale; EPSI-R = Eating Pathology Symptoms Inventory – Restraint Scale; ASI-R-SES = Appearance Schema Inventory-Revised –Self Evaluative Salience Scale; Low-SES = Participants who scored in the bottom 33% of scores on the ASI-R-SES; Med-SES = Participants who scored in the middle 33% of scores on the ASI-R-SES; High-SES = Participants who scored in the top 33% of scores on the ASI-R-SES; EEG-Th-B-FA = Difference from baseline in cortical frontal activity while viewing thin images; EEG-O-B-FA = Difference from baseline in cortical frontal activity while viewing overweight images.

To be included as covariates, a variable must have a linear relationship with the dependent variable (Field, 2017). The proposed covariates (BMI, BDI-II, RSES, EPSI-BE, EPSI-R) were all assessed to determine whether they had a linear relationship with the within-subjects variables (EEG-Th-B-FA and EEG-O-B-FA). Among the covariates, only BMI had a linear relationship with cortical activity during overweight images (EEG-O-B-FA), demonstrated by a significant correlation (Table 2). No covariates had a linear

relationship with cortical activity during thin images (EEG-Th-B-FA). Thus, all other covariates were excluded from analyses.

3.3. Main Analyses

To test the hypothesis, a repeated measures ANOVA with planned contrasts was conducted using SPSS version 24.0. The within-subjects variables (EEG-Th-B-FA, EEG-O-B-FA), between-subjects variable (TriSES), and the covariate (BMI) were entered into the equation. Two linear contrasts were planned to test the specific hypotheses that comparted to participants low in self-evaluative salience, participants high in self-evaluative salience would have greater left frontal activity when viewing thin images, and greater right frontal activity when viewing overweight images. When conducting linear contrasts, a contrast coefficient of zero indicates that the condition should not be included in the contrast. Therefore, the conditions that are to be compared are coded as a combination of negative and positive integers that sum to zero. Thus, the relevant within-subjects variable, high or low self-evaluative salience, was assigned a contrast coefficient of 1, medium level of self-evaluative salience 0, and the remaining level of self-evaluative salience -1. Given that these contrasts were planned a priori, no adjustment was made to correct familywise error.

Contrary to the hypothesis, there was no significant main effect of image type on frontal activity, F (1, 58) = 1.85, p = .18, η_p^2 = .03 (Figure 2). Additionally, there was so significant interaction effect of self-evaluative salience and image type on frontal activity, F (2, 58) = 1.51, p = .23, η_p^2 = .05 (Figure 2). The overall model was underpowered at .31 (see Table 3 for a summary of results).

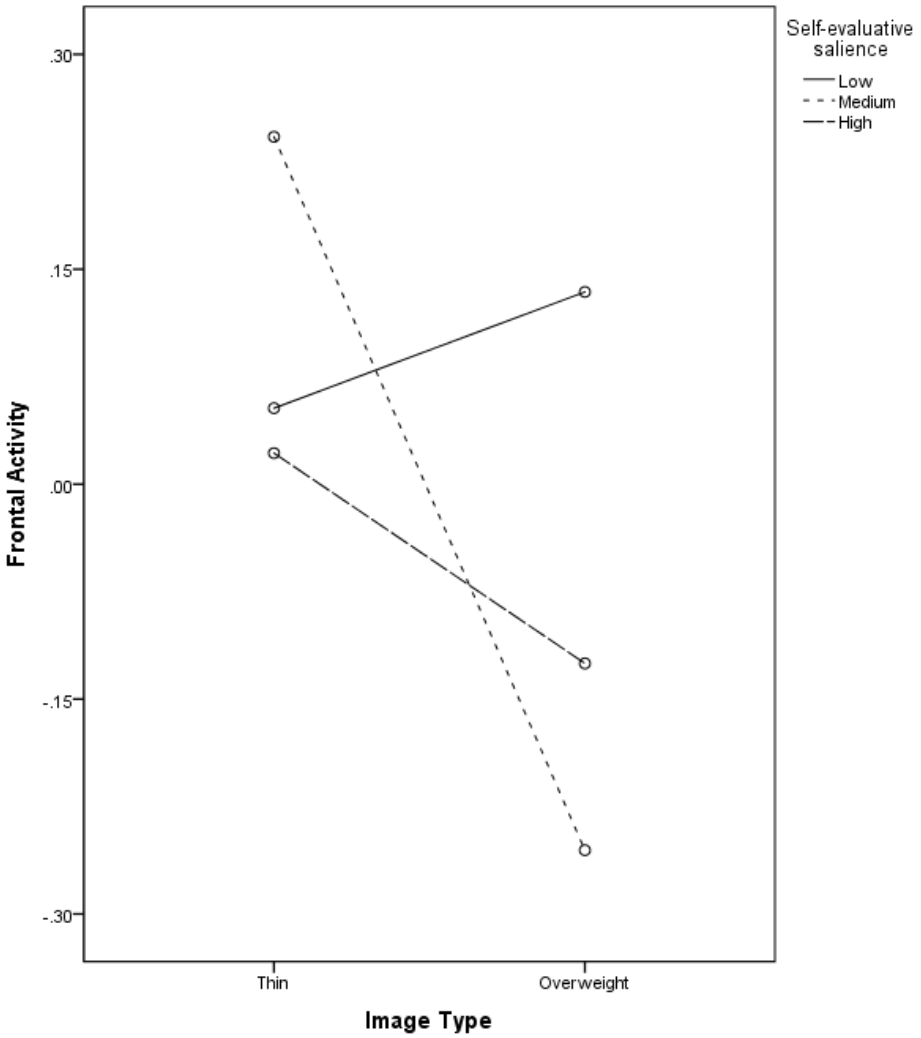

Figure 2. Cortical frontal activity by image type at low, medium, and high levels of self-evaluative salience. For frontal activity, positive values indicate greater left frontal activity, and negative values indicate greater right frontal activity.

Planned contrasts. Examination of results from planned contrasts revealed non-significant findings. While viewing thin images, participants high in self-evaluative salience did not have greater left frontal activity compared to participants low in self-evaluative salience, F (1, 58) = .01, p = .92, η_p^2 = .00, 95% CI [-.64, .58]. While viewing overweight images, participants high in self-evaluative salience did not have greater right frontal activity compared to participants low in self-evaluative salience, F (1, 58) = .53, p

= .47, η_p^2 = .01, 95% CI [-.46, .97].

Exploratory analyses. Although the interaction effect of self-evaluative salience and image type on frontal activity was non-significant, exploratory analyses were performed to investigate the effect of image type on frontal activity at the medium level of self-evaluative salience. Image type had a significant effect on frontal activity at medium levels of self-evaluative salience, F (1, 20) = 5.282, p = .03, η_p^2 = .21, such that exposure to thin images resulted in an increase in left frontal activity, and exposure to overweight images resulted in an increase in right frontal activity. Observed power for this effect was .59 (Table 3).

Table 3

Summary of Results: Repeated Measures ANOVA with Contrasts

Analysis	*F* (*df*)	*p*	η_p^2	Power	*95% CI*
Main effect of Image Type on Frontal activity	1.85 (1, 58)	.18	.03	.31	---
Interaction effect of Image Type X SES on Frontal Activity	1.51 (2, 58)	.23	.05	.31	---
Planned contrast: High SES vs. Low SES during Thin Images	0.01 (1, 58)	.92	.00	---	-.64, .58
Planned contrast: High SES vs. Low SES during Overweight Images	0.53 (1, 58)	.47	.01	---	-.46, .97
Effect of Image Type on Frontal Activity at Medium SES	**5.28 (1, 20)**	**.03***	**.21**	**.59**	---

Note: **Bold** indicates an exploratory analysis.

CHAPTER IV

DISCUSSION AND CONCLUSIONS

4.1 Summary of Findings

The aim of the present study was to investigate whether body image investment, specifically self-evaluative salience, has a neurological substrate. This was tested using EEG to record the cortical activity of the frontal lobes. The results of this study, as per planned analyses, did not support the hypotheses. Image type did not have a significant

effect on frontal activity, and levels of self-evaluative salience did not significantly moderate this effect. However, the results of an exploratory analysis revealed that, at medium levels of self-evaluative salience, image type had a significant effect on frontal activity. These findings are discussed below.

4.2 General Discussion

Hypothesis 1a.

It was hypothesized that participants would have greater left than right frontal activity in response to thin images compared to overweight images, and greater right than left frontal activity in response to overweight images compared to thin images. This hypothesis was partially supported. The effect of image condition on frontal activity was not statistically significant, which suggests that participants did not have a significant motivational reaction based on the type of image that they viewed. However, the model was underpowered at .31, and a post-hoc power analysis determined that 105 participants would have been required to detect a significant effect. Given that there were only 61 participants in the present study, effect size may be a more appropriate way to interpret the results. In the present study, the effect size for the main effect of image type on frontal activity was 0.03, which is between a small and medium effect size (Field, 2017). This suggests that participants did have an approach-oriented motivation to thin images, and a withdrawal-oriented motivation to overweight images, though this effect failed to reach statistical significance.

Apart from low power, there may be another explanation for these non-significant results. The fact that women were not significantly repelled by images of overweight

celebrities may represent a societal shift in female appearance standards, and a resulting shift in how appearance schemata are used to process images of overweight women. In recent years, numerous outlets have encouraged "body positivity" in an attempt to reduce "fat shaming" and promote a cultural appreciation for all body sizes (Lupton, 2017). One of the first major movements was the Dove Campaign for Real Beauty (CFRB, 2008). In 2004, Dove released several videos featuring diverse groups of women, and messages promoting beauty at any size, colour, or age. Since 2004, platforms encouraging body positivity have grown. For example, in 2013, the Association for Size Diversity and Health (ASDAH) introduced five principles that comprise the Health at Every Size (HAES) approach. The HAES approach is an inclusive, holistic approach that was developed to encourage a shift towards optimal health and happiness, and away from body size and weight (ASDAH, 2018). The first principle of the HAES approach is "Weight Inclusivity," accepting diverse body shapes and rejecting the idealization of specific weights.

This emphasis on health over size also has been noted in a growing platform of "fat activists" and body positive social media platforms (Lupton, 2017). Termed the "Fatosphere" by some (Pausé, 2016), many individuals have created platforms on social media sites to voice their dislike for fat shaming discourse. Social media sites such as Instagram and Facebook have become large platforms for the cause; there are numerous Instagram and Facebook pages on which overweight women display their bodies in an aesthetic manner to advocate body positivity. Indeed, the emergence of hashtags such as #fatpositive, #bodypositive, #thickspiration on social media has highlighted a group of (predominantly female) individuals who challenge the notion that overweight bodies are

unappealing, and that women need to conform to the thin ideal (Markus, 2016; Pausé, 2016).

It is possible that the numerous body positive platforms like the Dove campaigns, the HAES approach, and the Fatosphere may be contributing to a cultural shift in appearance ideals. As previously stated, schemata are accommodating (Nisbett & Ross, 1980) and can change to suit environmental inputs. Thus, if these body positive platforms are contributing to a cultural norm whereby being overweight is not viewed as unattractive, appearance schemata may change to accommodate these new views on body size. As a result, an image of an overweight celebrity may not be processed as repulsive, and not evoke a strong withdrawal reaction. As most body positive movements have emerged fairly recently, more research is required to understand the impact that these movements may be having on cultural appearance ideals.

Hypothesis 1b.

It was hypothesised that the effect of image type on frontal activity would be more pronounced for individuals high in self-evaluative salience, compared to individuals low in self-evaluative salience. Contrary to the hypothesis, overall, participants' level of self-evaluative salience did not interact with the image type to affect frontal activity. Specifically, compared to individuals low in self-evaluative salience, individuals high in self-evaluative salience did not have significantly greater left frontal activity when viewing thin images, or significantly greater right frontal activity when viewing overweight images.

As mentioned above, the overall model was underpowered at .31, so effect sizes may be a better indicator of the effect of image type on frontal activity. There was a small

to medium effect size associated with the interaction effect (partial eta = .05), suggesting that the interaction effect may reach significance with adequate power. However, the effect sizes for the planned contrasts comparing the frontal activity of participants high in self-evaluative salience to that of participants low in self-evaluative salience were negligible, and the confidence intervals for each contrast contained zero. Although with a larger sample size these contrasts could become significant, the present data suggests that individuals high in self-evaluative salience are not more attracted to thin images, or repelled by overweight images, than are individuals low in self-evaluative salience.

Overall, these findings suggest that although self-evaluative salience did interact with image type to affect frontal activity, participants high in self-evaluative salience did not differ from individuals low in self-evaluative salience. This indicates that women high in self-evaluative salience are no more motivated to approach thin images, or withdraw from overweight images, than are women low in self-evaluative salience.

High self-evaluative salience.

Individuals high in self-evaluative salience may not have demonstrated asymmetric frontal activity due to conflicting motivational responses to the images. Indeed, the asymmetric frontal activity of these individuals during thin images was near 0, suggesting that their frontal activity was near symmetrical. Symmetrical frontal activity suggests that these individuals were ambivalent and did not experience a clear either withdrawal-oriented reaction or approach-oriented reaction to the images.

Exposure to thin images has been related to an increase in negative affect (Dondzilo, Rieger, Palermo, & Bell, 2018; Harper & Tiggemann, 2008). Ip and Jarry (2008) found that compared to women high in motivational salience, women high in self-

evaluative salience reported an increase in body dissatisfaction after exposure to thin images. Further, body dissatisfaction is related to negative affect (Paxton, Neumark-Sztainer, Hannan, & Eisenberg, 2006; Walker, White, & Srinivaan, 2017).

It is plausible that participants high in self-evaluative salience may have experienced an increase in negative affect when they viewed the thin images. Negative affect has been associated with a withdrawal-oriented motivation, and an increase in right frontal activity (Harmon-Jones & Allen, 2003; Tomarken, Davidson, Wheeler, & Doss, 1992). Thus, individuals high in self-evaluative salience may have viewed the thin images as attractive, resulting in an increase in left frontal activity; however, they may simultaneously have experienced an increase in negative affect while viewing these images, which would result in an increase in right frontal activity. Thus, individuals high in self-evaluative salience may have experienced a motivation to approach images that are considered attractive, and a motivation to withdraw from the images due to negative affect, which may have resulted in frontal activity that was near symmetrical.

Another explanation for the individuals high in self-evaluative salience may be that conflicting messages regarding what is considered attractive could have impacted these individuals as they viewed both the thin and the overweight images. While viewing the overweight images, women high in self-evaluative salience experienced an increase in right frontal activity compared to the thin images, but this was non-significant and the effect size was negligible. As stated previously, numerous body positive platforms have emerged, with values that contradict the thin ideal and promote health over body size (Markus, 2016; Pausé, 2016). These platforms may be contributing to a cultural shift in appearance ideals, and this may alter one's appearance schema. However, even though

body positive platforms have emerged, the thin ideal continues to be depicted and highly valued in the media (Pausé, 2016). Thus, although many individuals are challenging the thin ideal, thinness continues to be associated with beauty.

Women high in self-evaluative salience may be impacted by these conflicting standards of beauty. As stated, women who are high in self-evaluative salience are highly appearance schematic, and view appearance as a defining part of their self (Cash et al., 2004). An appearance schema guides the processing of stimuli in accordance with cultural standards (Markus, 1977). Thus, if the cultural standards contradict one another, this may impact how a stimulus is processed through a schema. Women high in self-evaluative salience are more appearance schematic than women lower in self-evaluative salience, and therefore may have a heightened awareness of this conflict in female appearance standards. Further, even though women high in self-evaluative salience may be attracted to thinness and be repelled by larger body sizes due to the continued promotion of the thin ideal, they may feel pressured to reject the thin ideal and embrace all body sizes due to recent body positive movements. Thus, it is plausible that when women high in self-evaluative salience viewed thin images, they were both attracted to and repelled by the thin images due to conflicting appearance ideals, resulting in ambivalence and symmetrical frontal activity. When these women viewed the overweight images, they may have initially withdrawn from the images, but felt compelled to accept the larger body sizes, resulting in a non-significant increase in right frontal activity.

Low self-evaluative salience.

Compared to individuals high in self-evaluative salience, individuals low in self-evaluative salience do not view appearance as a defining feature of the self and they are

less appearance schematic (Cash et al., 2004). Therefore, they may not be as impacted by conflicting appearance ideals as are individuals high in self-evaluative salience, nor experience a significant increase in negative affect when exposed to thin images. Thus, individuals low in self-evaluative salience may not have experienced the expected increase in left frontal activity when viewing thin images, or the expected increase in right frontal activity when viewing overweight images, due to their lower appearance schematicity.

Further, the appearance schema of those low in self-evaluative salience may have a lower cognitive availability. As stated previously, the cognitive availability of a schema refers to the schema's readiness to be evoked, compared to other schemata (Nisbett & Ross, 1980). If the appearance schema of low self-evaluative salience women is less available, they may process images of thin and overweight celebrities in terms of appearance or body size to a lesser extent. Possibly, a schema with higher cognitive availability could be evoked to process the stimuli. For individuals low in self-evaluative salience, other qualities of the celebrities may have been more salient than their appearance, such as their profession, their lifestyle, or the participants' personal opinions of the celebrities. Thus, other schemata could have been evoked to process the images, instead of appearance schemata. Further, processing the images with a non-appearance schema may not result in a motivational reaction to the images, thus not resulting in asymmetric cortical activity. For instance, if participants attempted to identify the profession of the celebrities, they may not have a motivational response, which could result in comparable frontal activity during both thin and overweight images. Thus, utilizing different schemata to process the images could have influenced the participants'

frontal activity, and resulted in frontal activity unrelated to the appearance of the women in the images.

Exploratory Analysis

Although the predicted main and interaction effects were not statistically significant, an exploratory analysis was performed to investigate the effect of image type on frontal activity for individuals with medium levels of self-evaluative salience. At medium levels of self-evaluative salience, there was a significant effect of image type on frontal activity. That is, individuals with medium levels of self-evaluative salience had greater left than right frontal activity while viewing images of thin celebrities, compared to images of overweight celebrities. Additionally, they had greater right than left frontal activity while viewing images of overweight celebrities, compared to images of thin celebrities. These findings suggest that women who have intermediate levels of self-evaluative salience are attracted to images of thin women, and repelled by images of overweight women.

Image type effecting frontal activity only among women with intermediate levels of self-evaluative salience was an unexpected finding. This may be explained when considering the above rationale for high and low self-evaluative salience. Women high in self-evaluative salience may experience an increase in negative affect when viewing thin images that impacts their frontal activity, and the conflict between the thin ideal and body positive movements may impact how they processed both the thin and overweight images. Women low in self-evaluative salience may evoke non-appearance schemata to process the images. Women with medium levels of self-evaluative salience can be thought of as moderately appearance schematic. Compared to low self-evaluative

salience women, they do consider appearance to be more defining of their self, but less so than do women high in self-evaluative salience.

Compared to individuals high in self-evaluative salience, women with medium self-evaluative salience may be less impacted by negative affect and conflicting appearance standards when viewing images of women of various shape and size. Although women with medium self-evaluative salience may experience an increase in negative affect when viewing the thin images, the impact their cortical activity may be moderate. Further, only high self-evaluative salience is related to increased body dissatisfaction, which is associated with negative affect (Paxton et al., 2006; Walker et al., 2017), when viewing thin images (Ip & Jarry, 2008). Even though women with medium self-evaluative salience may have experienced increased negative affect when viewing the thin images, they may not have experienced an increase in body dissatisfaction that could further amplify their negative affect and impact their frontal activity.

Additionally, women with medium levels self-evaluative salience may be less impacted by conflicting appearance standards than women high in self-evaluative salience presumably are. As stated, although there is a growing body positive platform, the thin ideal is still widely promoted (Pausé, 2016). Because women with medium self-evaluative salience do not consider appearance to be as important as do women high in self-evaluative salience, they may be less aware of alternative appearance standards. Indeed, body positive platforms have emerged recently, and less appearance invested women may not be as aware of them. If women with medium self-evaluative salience are less aware of other appearance standards, they may predominantly interpret the images

using the thin ideal, as it has been the prominent appearance standard for decades and would likely remain highly salient to these women.

It is plausible that women with medium self-evaluative salience processed the images as they relate to the thin ideal, and were less impacted by alternative beauty standards, such as the body positive movements. Thus, these women would process the thin and overweight images congruently with the thin ideal, resulting in greater left frontal activity while viewing thin images and greater right frontal activity while viewing overweight images. Additionally, although women with medium self-evaluative salience may experience an increase in negative affect when viewing the thin images, they may do so to a lesser extent than women high in self-evaluative salience. Lower conflicting appearance standards coupled with less negative affect may explain why only women with medium levels of self-evaluative salience had a clear approach-oriented reaction to thin images, and a clear withdrawal-oriented reaction to overweight images.

Further, women with medium levels of self-evaluative salience are more appearance schematic than women low in self-evaluative salience. Thus, their appearance schema may have a higher cognitive availability than that of women low in self-evaluative salience, making it more likely to be evoked when viewing the images. As stated above, women low in self-evaluative salience may have processed the images based on qualities other than appearance. Because women with intermediate levels of self-evaluative salience are more appearance schematic than are women low in self-evaluative salience, they may have processed the images using their appearance schema. Taken together, these findings suggest that women with an intermediate level of self-evaluative salience are appearance schematic enough to process appearance-related

stimuli as congruent or incongruent with prominent appearance norms, without being overly influenced by recent alternative appearance standards, or impacted by a strong affective reaction to the images.

4.3. Strengths and Limitations of the Present Research

4.3.1. Research strengths

Overall, the present study had several strengths. First, utilizing lesser-known celebrities in the slide show decreased the potential for cortical reactions due to opinions about a celebrity rather than to the celebrities' body sizes. Second, by using visual estimates of BMI of 19-21 for thin celebrities and 25-27 for overweight celebrities to choose images, the two body sizes in the slideshow were visually distinct. Additionally, using these BMI ranges lessened the possibility that participants would experience cortical reactions due to health-related concerns, compared to BMI values in the underweight (< 18.50) or obese (> 29.99) categories.

The online and laboratory components of the study were advertised as separate studies. Participants completed the self-report measures online, prior to attending the laboratory component. Further, the participants did not know that the self-report measures were related to the slide show until they were debriefed after the study. This lessened the potential for expectancy effects that may have arisen if participants were aware of the true purpose of the study prior to beginning the surveys and prior to viewing the slide show.

The most notable strength of the present study was its experimental design. As previously stated, much of the existing body image research is correlational and cross-sectional, so cause-and-effect conclusions cannot be drawn. This study utilized an

experimental design and measured real-time neurological changes while participants were exposed to the images. As a result, causal inferences can be drawn from the results. Specifically, these results suggest that schematic processing occurs neurologically. When a stimulus is processed with a schema, the cortical activity in the frontal lobes may shift based on how that stimulus aligns with the schema's guidelines. Further, the individual's level of schematicity may impact this process, such that individuals who are highly schematic may be influenced by multiple personal and societal beliefs, resulting in conflicting reactions to a stimulus. In comparison, moderately schematic individuals may process stimuli utilizing the most salient schema guidelines, resulting in reactions to stimuli that are representative of the individual's internalized beliefs.

4.3.2. Research limitations

The present findings must be interpreted considering several limitations. First, as stated, the study was insufficiently powered. Future attempts to replicate these findings with a larger sample size may clarify the relationship between appearance schematicity and frontal activity. Second, although 51% of participants were Caucasian, which is a more diverse sample than other studies of body image (e.g., 67.5% in Chang & Jarry (2013) were Caucasian, 58% in Cash (2004) were European American), the sample size remained too small to conduct sub-analyses by ethic or cultural background. This limitation is prevalent in body image research, which is important as individuals of different ethnic backgrounds have different cultural ideals of feminine beauty (Talakoub & Wesley, 2009). Thus, women of different ethnicities may have different neurological reactions to images of thin and overweight celebrities due to differing cultural appearance ideals.

As stated above, the celebrities in the images had a visually estimated BMI of 19-21 for the thin images, and 25-27 for the overweight images. These ranges were chosen to reduce the possibility that participants may experience concern for the health of the women in the photos, which could influence participants' cortical activity. However, this may also be a limitation, as it is plausible that the women in the images were not visually thin and overweight enough to elicit the expected changes in cortical activity for women high and low in appearance schematicity. Indeed, a BMI between 19-21 is in the lower end of the normal range, yet many models and celebrities used in the media as beauty icons have a BMI that is below 19 (Luxury Activist, 2017). For example, the BMI of high-profile fashion models is commonly between 17-18. Although this BMI range is considered underweight (WHO, 2004), these women are promoted as the ideal standard of beauty. Thus, a BMI estimate between 19-21 may not equate to the degree of thinness that is depicted in the media as desirable, and may not elicit an increase in left frontal activity indicative of an approach-oriented response.

Furthermore, a BMI of 25-27 falls just outside of the normal range and on the lower end of the overweight range. By using this BMI range, the chosen celebrities may be too close to the normal BMI range to elicit the expected response. In Canada, approximately 30% of women aged 18-79 have a BMI classified as overweight, and approximately 24% have a BMI classified as obese (Statistics Canada, 2015). With approximately 54% of the female population in Canada being overweight, women may become desensitized to seeing overweight woman and thus may not experience a significant reaction when they do encounter one. Compared to being overweight, obesity is less common, so women may not become as desensitized to seeing obese women as

they are to seeing a moderately overweight woman. Thus, as women have less exposure to other women who are visually obese, compared to women who are overweight, using a higher BMI range for the overweight images may be necessary to elicit the hypothesized increase in right frontal activity. Additionally, obesity is more often associated with "fat shaming" than is being slightly overweight (Pausé, 2016). Using a higher visual BMI estimate for the overweight images may have elicited the expected increase in right frontal activity.

A further limitation is that all the chosen celebrity photos were taken while the women were dressed formally for an event. These images were chosen because they provided a clear, full-body view of the women with less obstructions or distractions in the photographs. However, at formal events attendees likely attempt to enhance their appearance to meet a higher standard. The enhanced appearance of the celebrities in the photographs may have impacted cortical reactions independently from the celebrities' body size. For instance, a participant may have viewed an overweight celebrity's photograph positively due to the additional effort invested in that celebrity's appearance. Future investigations using photographs of non-celebrity women, or of casually dressed celebrities, may address this concern.

A final noted limitation is the validity of participants' scores on the online survey measures. The online survey was completed from the participants' own devices prior to the laboratory component of the study. Thus, participants could have been distracted while completing the measures, which could impact the validity of their responses. If the scores on self-evaluative salience were not an accurate representation of the importance of appearance, this could impact the validity of the results. The online survey contained

validity measures to ensure valid data. However, there is no way to ensure compliance.

4.4. Implications and Future Directions

The results of this study may have implications for the field of body image research. As stated previously, the thin ideal has been the prominent appearance standard for decades (Tiggemann, 2004). Thus, much of the existing research on body image was conducted with the thin ideal as the ideal appearance standard. However, both the average female body size and the ideal appearance standards for women may be changing. Further, results of this study may be an indication that the current understanding of body image and appearance ideals does not align with the present appearance culture.

As stated previously, the BMI of women in the general population has been steadily increasing, and over half of the women in the general population have a BMI that is overweight or obese (Statistics Canada, 2015). Thus, the average body size of the current female population is larger than the average body size of the female population on which much of the body image literature was founded. Indeed, the average BMI in the present study was 25.10, which is classified as overweight. This BMI is slightly higher than the average BMI recorded in previous studies in The Studies in Yoga, Meditation, and the Psychology of Appearance Lab at the University of Windsor: 23.84 (Boersma & Jarry, 2013), 23.68 (Chang & Jarry, 2014), 24.00 (Chang, 2014), 23.31 (Dignard, 2017), 23.68 (Ip & Jarry, 2008), and 24.50 (Jarry & Kossert, 2007).

Because the majority of women are overweight, the thin ideal is becoming increasingly difficult to attain. In comparison to the thin ideal, the body positivity movement advocates that any healthy woman is beautiful, regardless of body size (Markus, 2016; Pausé, 2016). As there are no restrictions on acceptable body sizes, this standard is

more attainable than the thin ideal. Although the mass media continues to promote the thin ideal, an increasing number of people are beginning to advocate for the body positive movement over the thin ideal, including celebrities that have been used in the media as examples of the thin ideal (Markus, 2016; Pausé, 2016).

It is possible that Western culture is in the midst of a shift in appearance ideals. As the prevalence of overweight women continues to rise, being overweight may be viewed as common and expected, and thinness may be viewed as different. Further, as thinness becomes less common, the thin ideal may be viewed as unrealistic and the body positive movement may be an attainable alternative. This could result in a shift in appearance schemata, with appearance stimuli processed using the body positivity movement, and not the thin ideal, as a guideline. However, the body positive movement emerged recently, and most women matured into adulthood with the thin ideal as the ideal appearance standard. Thus, although the body positive movement may supersede the thin ideal in the future, these two standards may presently conflict.

Women may experience conflicting expectations on how to approach appearance. Specifically, their social background dictates that they should pursue thinness, but there is a growing societal expectation that if a woman is healthy, she should accept her body at any size. This conflict may impact how appearance schemata process appearance stimuli, as women may be unsure of which appearance ideal they endorse. Additionally, this conflict may impact the validity of the data gathered in body image research, as women's responses to appearance stimuli may be influenced by conflicting societal demands and may not be a reflection of their own beliefs. For example, an overweight woman may have a defensive response to a thin image because her body does not align with the thin ideal,

and because she has conflicting societal expectations that she should both strive for thinness and accept all body types.

Future research investigating women's responses to thin ideal and the body positive movement may elucidate the impact of the two appearance ideals. Specifically, researchers may investigate whether either the thin ideal or the body positivity movement is preferred by women in the general population, regardless of the mass media's promotion of the thin ideal. Additionally, in the future, researchers may investigate whether body size has an impact on appearance ideals, such as whether overweight women are more likely to endorse body positivity, and whether thin women are more likely to endorse the thin ideal. Such investigations could clarify the current appearance culture, and may identify shifts in appearance schemata and appearance ideals. Clarifying the current appearance culture may add incremental validity to the body image literature by identifying whether the current understanding of appearance ideals and body image are a valid representation of women in the general population today, or whether modifications should be made to the way body image research is conducted.

One plausible method to identify women's attitudes towards different body sizes, and their endorsement of the thin ideal, is an Implicit Association Task (IAT). An IAT is an implicit, computerized measure of response latencies designed to assess individual differences in automatic associations between attributes and concepts (Agerström & Rooth, 2011). In the investigation of appearance ideals, the Weight-Implicit Associations Test (W-IAT; Greenwald, McGhee, & Schwartz, 1998; Gumble & Carels, 2010) is designed to assess implicit attitudes towards thin and overweight body sizes. The stimuli used in the W-IAT include negatively valenced and positively valenced words, and images of obese

and thin silhouettes. Participants classify the images into "fat" versus "thin", and the words into "bad" versus "good", with two categories presented on the top left side of the screen and the other two presented on the top right side of the screen. The assumption is that participants will more quickly categorize stimuli when the categories are paired in a way that is consistent with their implicit attitudes (Greenwald et al., 1998). If women endorse the thin ideal more than the body positivity movement, they should more quickly associate "fat" with "bad", and "thin" with "good".

Additionally, using EEG to record the activity of the frontal lobes may be utilized in conjunction with the W-IAT. As both are implicit measures and are less likely to be influenced by social desirability, the frontal activity of participants should correlate with their implicit attitudes. Based on the current findings, when viewing appearance stimuli, if the cortical activity of highly appearance invested women is impacted by conflicting appearance ideals, they may not have an implicit bias toward either thin or overweight body sizes. Thus, they may not associate "thin" silhouettes with "good" more quickly than they associate "fat" silhouettes with "good". Further, women with intermediate levels of appearance investment had an approach-motivated reaction to thin images and a withdrawal-oriented reaction to overweight images. Should they more quickly associate "fat" with "bad", and "thin" with "good", this could suggest that their cortical reaction to thin and overweight images is due to an implicit bias towards the thin ideal. Thus, using multiple implicit measures may identify women's attitudes towards different body sizes, which may clarify how the thin ideal and the body positivity movements are impacting women's perception of appearance, and their opinions regarding their own bodies, and the bodies of other women.

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APPENDICES

Appendix A

Participant Pool Advertisement

Title: Two studies: (1) Family Size and Self-esteem among Women (2) Cortical Reactions to Images of Celebrities.

Researchers: Healey Gardiner, Dr. Josée Jarry

Duration: 30 minutes (Study 1 -online study: Family Size and Self-esteem among Women)
60 minutes (Study 2 -laboratory study: Cortical Reactions to Images of Celebrities)

Credits: 0.5 credits (Study 1 - online study: Family Size and Self-esteem among Women)
1.5 credits (Study 2 - laboratory study: Cortical Reactions to Images of Celebrities)
(2 credits total)

Description:

These are two separate studies being offered by the same researcher. They are being advertised together as a two-part study to make recruitment easier and more efficient for her.

The first study, "Family Size and Self-esteem among Women," is an online study. It will take no more than 30 minutes of your time and is worth 0.5 bonus points if you are registered in the pool and you are registered in one or more eligible psychology courses. You will be asked to complete a number of questionnaires alone in one sitting. Upon completion of this study, you will be e-mailed potential time slots for the second study, and asked to reply with your top 2 choices if you would like to participate in the second study.

The second study, "Cortical Reactions to Images of Celebrities," will take no more than 60 minutes of your time and is worth 1.5 bonus points if you are registered in the pool and you are registered in one or more eligible psychology courses. The in-lab portion will involve having your frontal cortex recorded using a non-invasive EEG cap, and watching a slideshow comprised of images of celebrities known for various talents including acting, singing, modeling, and reality stars. The EEG cap will require the application of a non-invasive gel. The gel is water-soluble and carries no known health risks or allergens. The gel will remain in your hair after the study, though a sink and shampoo will be provided if you would like to clean your hair after the study.

Appendix B

Online Research Consent Form

CONSENT TO PARTICIPATE IN RESEARCH

Family Size and Self-esteem among Women

You are asked to participate in a research study conducted by **Healey Gardiner** and **Dr. Josée Jarry** from the **Psychology Graduate Studies Department** at the University of Windsor**.**

If you have any questions or concerns about the research, please feel to contact Healey Gardiner at gardineh@uwindsor.ca, or Dr. Josée Jarry at jjarry@uwindsor.ca or 519 253-3000, ext 2237 .

PURPOSE OF THE STUDY

This study aims to examine the relation between the family size and self-esteem among undergraduate women.

PROCEDURES

By clicking the 'agree' box below you are indicating that you want to participate in this study. Once you have signed this consent form by typing your name, you will complete a survey that consists of several questionnaires in randomized order. Please complete the survey when you are alone in a quiet place where you can concentrate fully. The survey will take approximately 30 minutes to complete, and you are required to complete the questionnaires in one sitting. After completing the online survey, you will be directed to a page where you can fill in your personal information to obtain your bonus point credit. Additionally, upon completion of the online survey, you will be invited to participate in a separate study that is currently being conducted by Healey Gardiner that is worth 1.5 bonus points.

POTENTIAL RISKS AND DISCOMFORTS

During the course of your participation in this study, you may be asked to answer questions that are personal and may cause discomfort. If you experience any discomfort you may contact the primary investigator or the faculty supervisor directly to address your concerns. If you have any concerns you would like to discuss with an independent party, please feel free to contact the Student Counselling Centre at 519-252-3000 ext. 4616.

POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY

Participating in this study provides you the opportunity to contribute to psychological research and gain familiarity with online research procedures. Information provided by individuals participating in this study may expand upon the literature surrounding self-esteem among women.

COMPENSATION FOR PARTICIPATION

Participants will receive .5 bonus points for 30 minutes of participation towards the psychology participant pool, if registered in the pool and enrolled in one or more eligible courses.

CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential. Data will be de-identified for analysis after completion of the survey and no data will be associated with an individual. Consent forms will be stored separate from the data, keeping the data anonymous. The data will be acquired and stored online, using Qualtrix, which ensures complete confidentiality. Qualtrix does not record any information from the device accessing the website, except for the answers provided on the questionnaires. Once the questionnaires are completed, the data will be uploaded to an SPSS spreadsheet and stored on the principal investigator's computer and the lab computer. Only the principal investigator and the faculty supervisor will have password required to access the data file. Upon completion of the study, participant data will be kept for approximately nine years, and then all data will be destroyed. This is in compliance with psychology discipline guidelines of keeping data for seven years post publication.

PARTICIPATION AND WITHDRAWAL

Participation in this study will have no bearing on evaluation of your class performance. If you choose to withdraw at any point, you may do so. All you have to do is click "Withdraw" and your data will be discarded. Additionally, you may refuse to answer any questions you don't want to answer and still remain in the study. Consistent with Psychology Participant Pool guidelines, if you choose to withdraw bonus points will be awarded based on the amount of time spent participating in the study at a rate of 0.5 credits per half hour. The investigator may withdraw you from this research if appropriate circumstances arise. A valid response profile is required to receive compensation; an invalid response profile may be defined as a profile that is unlikely to occur by chance, such as all questions being given the same answer. If an invalid response profile arises, you will receive an e-mail inviting you to redo the study. If you decline or another invalid response profile is produced, you may not receive the bonus point. If you choose to withdraw, all incomplete data will be destroyed. If you would like to withdraw after completing the study, you may do so by contacting the primary investigator (Healey Gardiner) before April 6th, 2018 (gardineh@uwindsor.ca).

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE PARTICIPANTS

A summary of results is expected to be available on the Research Ethics Board Website after August 2018.

Web address: www.uwindsor.ca/reb

SUBSEQUENT USE OF DATA

These data may be used in subsequent studies, in publications and in presentations.

RIGHTS OF RESEARCH PARTICIPANTS

If you have questions regarding your rights as a research participant, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario, N9B 3P4; Telephone: 519-253-3000, ext. 3948; e-mail: ethics@uwindsor.ca

SIGNATURE OF RESEARCH PARTICIPANT/LEGAL REPRESENTATIVE

I understand the information provided for the study **Family Size and Self-esteem among Women** as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

Note: By clicking on the following button, you are indicating that you are 18 years of age or older, have read the Invitation to Participate, consent to participate and understand that you are free to withdraw from the study at any time.

I Agree

Appendix C

Laboratory Research Consent Form

CONSENT TO PARTICIPATE IN RESEARCH

Cortical Reactions to Images of Celebrities

You are asked to participate in a research study conducted by Healey Gardiner and Dr. Josée Jarry from the Psychology Graduate Studies Department at the University of Windsor. If you have any questions or concerns about the research, please feel to contact Healey Gardiner at gardineh@uwindsor.ca, or Dr. Josée Jarry at jjarry@uwindsor.ca or 519 253-3000, ext 2237.

PURPOSE OF THE STUDY
This study aims to examine the cortical reactions of women when exposed to images of celebrities known for different talents (acting, singing, modeling, reality star).

PROCEDURES

If you volunteer to participate in this study, you will be asked to enter an individual testing room with a researcher who will inform you of the details of the task. In brief, you will view a slideshow consisting of images of various celebrities. You will also be attached to a non-invasive EEG recording machine by wearing an EEG cap that records the electrical activity from the surface of your scalp while you view the slideshow. The study should take approximately 60 minutes of your time.

POTENTIAL RISKS AND DISCOMFORTS

During the course of your participation in this study, you will be fitted with an EEG cap and have gel applied to help the electrodes capture the cortical activity under the scalp. The gel is applied with a blunt-end syringe and is non-invasive. The gel is non-toxic, water-soluble, carries no known allergens or health risks, and is easily removed. However, the gel may feel cool on the scalp and cause discomfort. The gel will remain in your hair after the study is over, so you will be provided with a sink, towels, shampoo and a bow-dryer if you would like to clean your hair after the study. If you experience any discomfort you may contact the primary investigator, Healey Gardiner, directly to address your concerns. If you have any concerns you would like to discuss with an independent party, please feel free to contact the Student Counselling Centre at 519-252-3000 ext. 4616.

POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY

Participating in this study provides you with the opportunity to contribute to

psychological research and gain familiarity with laboratory research procedures. Information provided by individuals participating in this study may expand upon the knowledge of the neurological response to exposure of sensationalized celebrities, and whether the degree of talent and contribution to society made by a celebrity plays a role in the neurological response.

COMPENSATION FOR PARTICIPATION

Participants will receive 1.5 bonus points for 60 minutes of participation towards the psychology participant pool, if registered in the pool and enrolled in one or more eligible courses.

CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential. Data will be de-identified for analysis after completion of the study and consent forms will be kept separate from the data thus making the data anonymous. Data will be aggregated for analysis and no data will be associated with an individual. The data will be stored in a SPSS spreadsheet and stored on the principal investigator's computer and the laboratory computer. Only the principal investigator and the faculty supervisor will have password required to access the data file. Upon completion of the study, participant data will be kept for approximately nine years, and then all data will be destroyed. This is in compliance with psychology discipline guidelines of keeping data for seven years post publication.

PARTICIPATION AND WITHDRAWAL

You can choose whether you wish to participate in this study. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind and your data file will be deleted. All you have to do is inform the researcher you would like to withdraw, and your data will be discarded. Consistent with Psychology Participant Pool guidelines, if you choose to withdraw bonus points will be awarded based on the amount of time spent participating in the study at a rate of 0.5 credits per half hour and an additional 0.5 credits for arriving to the laboratory session. The investigator may withdraw you from this research if appropriate circumstances arise. If you choose to withdraw, all incomplete data will be destroyed. If you would like to withdraw after completing the study, you may do so by contacting the primary investigator (Healey Gardiner) before April 6th, 2018 (gardineh@uwindsor.ca).

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If you have questions regarding your rights as a research participant, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario, N9B 3P4; Telephone: 519-253-3000, ext. 3948; e mail: ethics@uwindsor.ca

SIGNATURE OF RESEARCH PARTICIPANT/LEGAL REPRESENTATIVE

I understand the information provided for the study Cortical Reactions to Images of Celebrities as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

_____

Name of Participant

_____

_____

Signature of Participant Date

Signature of Investigator

In my judgement, the participant is voluntarily and knowingly giving informed consent to participate in this research study. These are the terms under which I will conduct research.

_____

_____

Signature of Investigator Date

Appendix D

Post-Study Debriefing Form

POST-STUDY DEBRIEFING FORM

Identifying a Neurological Substrate for Body Image Investment through Electroencephalography

Thank you for your participation in our study. Before explaining the true purpose of this research, it is important that you understand why it is necessary for some psychological studies have names unrelated to the actual topic of interest and why we do not to tell people all about the purpose of the study at the very beginning. Participants may select studies that seem more interesting to them, and thus respond differently than people who are not as interested in a particular topic. In psychology we call this a self-selection bias, and often make up pseudo titles for our studies to avoid this. Aside from the title, telling people what the purpose of the experiment is and what we predict about how they will react under particular conditions, might cause participants to deliberately do whatever they think we want them to do, just to help us out and give us the results that they think we want. Alternatively, people might deliberately not do what we predict to show us that we can't figure them out. Either outcome would make the results invalid, because people would be responding to is what they thought we were looking for rather than responding naturally

Earlier, you completed an online survey in which you completed several self-report questionnaires. Although you were told that this study was unrelated to the study you just completed, these studies were actually two parts of a larger study. Combined these studies were designed to investigate whether body image investment has a neurological underpinning by monitoring frontal lobe activity with EEG while viewing images of thin and overweight female celebrities.

In conjunction with the online survey, this laboratory session was part of a study investigating whether body image investment has a neurological substrate. Body image investment is comprised of the investment behaviours used to maintain or improve appearance, and the importance placed on appearance (Cash et al., 2004). Body image investment consists of two components. Motivational salience pertains to investing in appearance to maintain or enhance appearance to a certain standard (Cash et al., 2004). Self-evaluative salience pertains to investing in appearance for self-definition, and the belief that appearance is an integral part of positive social and emotional experiences. High self-evaluative salience is associated with low self-esteem, and higher symptoms of depression and eating disorders (Cash et al., 2002). Additionally, self-evaluative salience is associated with a greater vulnerability to the thin ideal, or the Westernized belief that thin is beautiful (Ip & Jarry, 2008). Using EEG, we hope to further validate body image investment by investigating whether women higher in investment

have different cortical reactions to images of thin and overweight celebrities than less invested women. The online survey was the first part of the study that was used to gather measures of body image investment and related constructs. The laboratory session was the second part of the study where you had your cortical activity measured with EEG while watching a slideshow of female celebrities that were either thin or overweight.

The online questionnaires were used to gather trait measures of body image investment and related constructs: depressive symptoms, self-esteem, eating pathology, and body mass index (BMI). In the laboratory session, the slideshow was comprised of female celebrities that were adhering to the Thin Ideal, and those that could be viewed as being overweight. Your cortical activity was recorded using EEG for five minutes with your eyes closed to obtain a baseline recording, and again while you viewed the slide show. The cortical activity recorded in the laboratory is interpreted using a hypothesis known as the Motivational-Direction Hypothesis of frontal asymmetry, which posits that greater left frontal activity is associated with approach motivation, and greater right frontal activity is associated with withdrawal motivation (Harmon-Jones, 2003). Body image investment may have a neurological underpinning that can be observed by recording asymmetries in the frontal lobe activity when women high and low in self-evaluative salience are exposed to images of overweight and thin women. Individuals high in self-evaluative salience may have greater left frontal activity in response to images of thin women compared to individuals low in self-evaluative salience, due to a stronger approach motivation. Additionally, individuals high in self-evaluative salience may have greater right frontal activity in response to images of overweight women compared to individuals low in self-evaluative salience, due to a stronger withdraw motivation. Results from this study may further validate body image investment as a construct. As body image investment is associated with eating disorders and depression, validating potential risk factors is an important area of study.

I want you to know that I recognize that some of the questionnaires I asked you to complete were personal in nature. Some people might feel uncomfortable answering these questionnaires, others would not be uncomfortable at all. Additionally, viewing the images in the slide show may have been uncomfortable. These responses are perfectly normal. If you have any concerns, I encourage you to contact the primary investigator, Healey Gardiner. You may also contact the Student Counselling Centre at 519-253-3000, ext. 4616, if you wish to discuss your concerns with someone outside the study. If you have any concerns or questions at all about the study, or are interested in receiving more information, please feel free to contact the primary investigator, Healey Gardiner, Department of Psychology, at gardineh@uwindsor.ca or the faculty supervisor Dr. Jarry at jjarry@uwindsor.ca or 519-253-3000 ext. 2237.

As in most psychological research, we are interested in how the average person reacts in this situation. We need to test many people and combine their results to get a good indication of how the average person reacts under the different conditions. In order for us to draw any conclusions, we have to combine the data we got from you with data we get from other people so that we have enough data to draw conclusions. What this means is that there will be many people participating in this study. It is going to be necessary for us to ask you not to say anything about the study to anyone else. If you talked to someone else about the study and told them all the things I just told you and then they were in the study, their reactions wouldn't be spontaneous and natural, and their results couldn't be used and combined with your data and those from other people. If that happened, we wouldn't have enough data to make conclusions about the average person, so the whole study really would be for nothing. I hope you can see why it is extremely important that I ask you not to say anything about the study. You might think that it won't make a difference if you talk to your roommate about it because they'll never be in the study, but your roommate might say something to someone else who might be in the study. Thus, I would like to ask you not to say anything about the study, other than you completed some questionnaires until the end of the study, when results are posted on the Research Ethics Board website.

If you consent below, the data you have provided in both studies will be used. You are free to decide not to consent without having to give a reason and without penalty. If you do not consent, your data will be destroyed. You are encouraged to keep a copy of this form. You may withdraw at any time prior to April 6th, 2018. Final results will be available online at www.uwindsor.ca/reb by August 2018.

_____

I have read and understand the information above and any questions I have asked have been answered to my satisfaction. I agree to allow my data from both studies to be used in this research, knowing that I can withdraw from further participation in the research at any time prior to April 6th, 2018 without consequence. I have been given a copy of this form to keep.

- o I consent to the use of my data
- o I do NOT consent and wish that my data be destroyed.

_____
Name of Participant

_____
_____
Signature of Participant Date

Signature of Investigator
In my judgement, the participant is voluntarily and knowingly giving informed consent to participate in this research study. These are the terms under which I will conduct research.

_____
_____
Signature of Investigator Date

Appendix E

Consent to Measure BMI

CONSENT TO PARTICIPATE IN RESEARCH

Locating a Neurological Substrate for Body Image Investment

You have just participated in a research study conducted by Healey Gardiner, supervised by Dr. Josée Jarry, from the Department of Psychology at the University of Windsor entitled: Locating a Neurological Substrate for Body Image Investment.

As a final component of the larger study you have just completed, you are asked to allow this investigator to obtain a measure of your height and weight, so that your body mass index (BMI) can be calculated. The information you provide will remain confidential. Any information you provide will be used for research purposes only, which may include subsequent research or the publication of a research article.

Taking part in this final component of the study is completely voluntary. If you do not wish to be weighed and/or have your height measured, you are free to refuse without any penalty or loss of bonus points.

Again, if you have any questions or concerns about the research, please feel to contact the primary investigator, Healey Gardiner, or the faculty supervisor, Dr. Josée Jarry at (519) 253-3000, extension 2237. If you have questions regarding your rights as a research participant, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario N9B 3P4; Telephone: 519-253-3000, ext. 3948; e-mail: ethics@uwindsor.ca

If you are willing to participate in this component of the study and understand all that will be asked of you in participating, please sign your name following this consent statement: I am willing to allow the investigator to measure my weight and height. I understand that all information I provide will be used for research purposes only and that my confidentiality will be assured. I also realize I am free to withdraw from this study at any time prior to April 6th, 2018 without penalty.

SIGNATURE OF RESEARCH SUBJECT/LEGAL REPRESENTATIVE

_____

Name of Participant

_____ _____

Signature of Participant Date

SIGNATURE OF INVESTIGATOR

_____ _____

Signature of Investigator Date

Appendix F

Online Post-Study Debriefing Letter

POST-STUDY DEBRIEFING LETTER

Identifying a Neurological Substrate for Body Image Investment through Electroencephalography

Hello,

My name is Healey, and I am the primary investigator for a study you completed recently entitled 'Family Size and Self-esteem Among Women'. I am contacting you today to provide some more information about the study you just completed and to offer you some resources, in case you have any lingering concerns resulting from your participation.

Thank you for your participation in our study. Firstly, the true purpose of this study was more specific than initially disclosed. Before explaining the true purpose of this research, it is important that you understand why it is necessary for some psychological studies have names unrelated to the actual topic of interest and why we do not to tell people all about the purpose of the study at the very beginning. Participants may select studies that seem more interesting to them, and thus respond differently than people who are not as interested in a particular topic. In psychology we call this a self-selection bias, and often make up pseudo titles for our studies to avoid this. Aside from the title, telling people what the purpose of the experiment is and what we predict about how they will react under particular conditions, might cause participants to deliberately do whatever they think we want them to do, just to help us out and give us the results that they think we want. Alternatively, people might deliberately not do what we predict to show us that we can't figure them out. Either outcome would make the results invalid, because people would be responding to is what they thought we were looking for rather than responding naturally

Earlier, you completed an online survey in which you completed several self-report questionnaires. Although you were told that this study was unrelated to the second study you were offered, these studies were actually two parts of a larger study. Combined these studies were designed to investigate whether body image investment has a neurological underpinning by monitoring frontal lobe activity with EEG while viewing images of thin and overweight female celebrities. In conjunction with the laboratory session, the online survey was part of a study investigating whether body image investment has a neurological substrate. Body image investment is comprised of the investment behaviours used to maintain or improve appearance, and the importance placed on appearance (Cash et al., 2004). Body image investment consists of two components. Motivational salience pertains to investing in appearance to

maintain or enhance appearance to a certain standard (Cash et al., 2004). Self-evaluative salience pertains to investing in appearance for self-definition, and the belief that appearance is an integral part of positive social and emotional experiences. High self-evaluative salience is associated with low self-esteem, and higher symptoms of depression and eating disorders (Cash et al., 2002). Additionally, self-evaluative salience is associated with a greater vulnerability to the thin ideal, or the Westernized belief that thin is beautiful (Ip & Jarry, 2008). Using EEG, we hope to further validate body image investment by investigating whether women higher in investment have different cortical reactions to images of thin and overweight celebrities than less invested women. The online survey was the first part of the study that was used to gather measures of body image investment and related constructs. The laboratory session was the second part of the study where cortical activity is measured with EEG while watching a slideshow of female celebrities that were either thin or overweight.

The online questionnaires were used to gather trait measures of body image investment and related constructs: depressive symptoms, self-esteem, eating pathology, and body mass index (BMI). In the laboratory session, a slideshow is shown that is comprised of female celebrities that were adhering to the Thin Ideal, and those that could be viewed as being overweight. Cortical activity is recorded using EEG for five minutes with a participant's eyes closed to obtain a baseline recording, and again while she views the slide show. The cortical activity recorded in the laboratory is interpreted using a hypothesis known as the Motivational-Direction Hypothesis of frontal asymmetry, which posits that greater left frontal activity is associated with approach motivation, and greater right frontal activity is associated with withdrawal motivation (Harmon-Jones, 2003). Body image investment may have a neurological underpinning that can be observed by recording asymmetries in the frontal lobe activity when women high and low in self-evaluative salience are exposed to images of overweight and thin women. Individuals high in self-evaluative salience may have greater left frontal activity in response to images of thin women compared to individuals low in self-evaluative salience, due to a stronger approach motivation. Additionally, individuals high in self-evaluative salience may have greater right frontal activity in response to images of overweight women compared to individuals low in self-evaluative salience, due to a stronger withdraw motivation. Results from this study may further validate body image investment as a construct. As body image investment is associated with eating disorders and depression, validating potential risk factors is an important area of study.

The procedure used in this study was not intended to produce any long-term negative effects but I hope you can understand why it was necessary to present the study in this manner. If you would like more information, please feel free to contact the primary investigator, Healey Gardiner. I would like to take this opportunity to offer you some additional resources that you may contact if you wish to speak with someone who is not a part of this study. Online, the National

Eating Disorders Information Centre (NEDIC; www.nedic.ca) website offers information on body image, eating disorders, and pro-eating disorder websites. You can also call NEDIC toll free at 1-866-633-4220. Locally, the Bulimia and Anorexia Nervosa Association (BANA) offers information and resources and can be contacted online (info@bana.ca), by phone at 519-969-2112. You also are welcome to contact the Student Counselling Centre on campus to discuss any feelings or issues that may have arisen from your participation. I want you to know that I recognize that some of the questionnaires I asked you to complete were personal in nature. Some people might feel uncomfortable answering these questionnaires, others would not be uncomfortable at all. These responses are perfectly normal. If you have any concerns, I encourage you to contact the primary investigator, Healey Gardiner. You may also contact the Student Counselling Centre at 519-253-3000, ext. 4616, if you wish to discuss your concerns with someone outside the study. If you have any concerns or questions at all about the study, or are interested in receiving more information, please feel free to contact the primary investigator, Healey Gardiner, Department of Psychology, at gardineh@uwindsor.ca or the faculty supervisor Dr. Jarry at jjarry@uwindsor.ca or 519-253-3000 ext. 2237.

While you only completed the online portion of the study, your data is still very valuable to enhance existing data on body image investment and related constructs. As in most psychological research, we are interested in how the average person reacts in this situation. We need to test many people and combine their results to get a good indication of how the average person reacts under the different conditions. In order for us to draw any conclusions, we have to combine the data we got from you with data we get from other people so that we have enough data to draw conclusions. What this means is that there will be many people participating in this study. It is going to be necessary for us to ask you not to say anything about the study to anyone else. If you talked to someone else about the study and told them all the things I just told you and then they were in the study, their reactions wouldn't be spontaneous and natural, and their results couldn't be used and combined with your data and those from other people. If that happened, we wouldn't have enough data to make conclusions about the average person, so the whole study really would be for nothing. I hope you can see why it is extremely important that I ask you not to say anything about the study. You might think that it won't make a difference if you talk to your roommate about it because they'll never be in the study, but your roommate might say something to someone else who might be in the study. Thus, I would like to ask you not to say anything about the study, other than you completed some questionnaires until the end of the study, when results are posted on the Research Ethics Board website.

Because you were not fully informed about this study you participated in when you consented you are able to withdraw your data now that you know about the true topic of this study. If you would like to withdraw your data, please send me an e-mail at gardineh@uwindsor.ca. Withdrawing your data will not result in any penalties. You will

be able to keep the 0.5 credits you were awarded, and it will not affect your standing with the University of Windsor. If I do not hear back from you I will assume that you do not wish to withdraw your data. You may withdraw at any time prior to April 6th, 2018. Final results will be available online at www.uwindsor.ca/reb by August 2018. If you have any questions regarding this study or would like more information before deciding whether or not you would like to withdraw your data, please feel free to contact me.

Appendix G

Demographics Questionnaire

Age:_____
Gender: _____

Ethnic Background:

- Aboriginal
- African
- East Asian
- South Asian
- European
- South or Central America
- Arab or West Asian
- Caribbean
- Other (please specify): _____

School Enrolment

- Part-Time
- Full-Time

Years in University:
(Select current year)

- First year
- Second year
- Third year
- Fourth year
- More than 4 years

Do you have any siblings? If so, how many?

- 0
- 1
- 2
- 3
- 4
- 5+

Appendix H

Celebrity Image Slideshow

Thin images.


CBS
AWARDS
PEOPLE'S
CHOICE


FUJIFILM
VICTORIA'S SECRET
BEACHWAVER
TAO
ROSA REGALE
SWAROVSKI


FANDANGO


VISA
LONE RANGER
Time Warner Cable
ITAH


MATERIAL GIRL


GRAMMY AWARDS


SAG-AFT


ACURA
Canon
Don Julio
GEN ART

Overweight images.


ACM
AWARDS


ORGANIC
LIAISON


NETFLIX
ORANGE
BLACK


SiriusXM
JUST
JARED


Hairspray
LIVE!
NBC
American
Airlines

Appendix I

Appearance Schemas Inventory-Revised

The statements below are beliefs that people may or may not have about their physical appearance and its influence on life. Decide on the extent to which you personally **disagree or agree** with each statement and enter a number from 1 to 5 in the space on the left. There are no
right or wrong answers. Just be truthful about your personal beliefs.

1	2	3	4	5
Strongly Disagree	**Mostly Disagree**	**Neither Agree or Disagree**	**Mostly Agree**	**Strongly Agree**

_____ 1. I spend little time on my physical appearance.

_____ 2. When I see good-looking people, I wonder about how my own looks measure up.

_____ 3. I try to be as physically attractive as I can be.

_____ 4. I have never paid much attention to what I look like.

_____ 5. I seldom compare my appearance to that of other people I see.

_____ 6. I often check my appearance in a mirror just to make sure I look okay.

_____ 7. When something makes me feel good or bad about my looks, I tend to dwell on it.

_____ 8. If I like how I look on a given day, it's easy to feel happy about other things.

_____ 9. If somebody had a negative reaction to what I look like, it wouldn't bother me.

_____ 10. When it comes to my physical appearance, I have high standards.

_____ 11. My physical appearance has had little influence on my life.

_____ 12. Dressing well is not a priority for me.

_____ 13. When I meet people for the first time, I wonder

what they think about how I look.

_____ 14. In my everyday life, lots of things happen that make me think about what I look like.

_____ 15. If I dislike how I look on a given day, it's hard to feel happy about other things.

_____ 16. I fantasize about what it would be like to be better looking than I am.

_____ 17. Before going out, I make sure that I look as good as I possibly can.

_____ 18. What I look like is an important part of who I am.

_____ 19. By controlling my appearance, I can control many of the social and emotional events in my life.

_____ 20. My appearance is responsible for much of what's happened to me in my life.

Appendix J

Beck Depression Inventory-II

This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the **one statement** in each group that best describes the way you have been feeling during the **past two weeks, including today.** Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).

1. Sadness
0 I do not feel sad.
1 I feel sad much of the time.
2 I am sad all the time.
3 I am so sad or unhappy that I can't stand it.

2. Pessimism
0 I am not discouraged about my future.
1 I feel more discouraged about my future than I used to be.
2 I do not expect things to work out for me.
3 I feel my future is hopeless and will only get worse.

3. Past Failure
0 I do not feel like a failure.
1 I have failed more than I should have.
2 As I look back, I see a lot of failures.
3 I feel I am a total failure as a person.

4. Loss of Pleasure
0 I get as much pleasure as I ever did from the things I enjoy.
1 I don't enjoy things as much as I used to.
2 I get very little pleasure from the things I used to enjoy.
3 I can't get any pleasure from the things I used to enjoy.

5. Guilty Feelings
0 I don't feel particularly guilty.
1 I feel guilty over many things I have done or should have done.
2 I feel quite guilty most of the time.
3 I feel guilty all of the time.

6. Punishment Feelings
0 I don't feel I am being punished.
1 I feel I may be punished.
2 I expect to be punished.
3 I feel I am being punished.

7. Self-Dislike
0 I feel the same about myself as ever.
1 I have lost confidence in myself.
2 I am disappointed in myself.
3 I dislike myself.

8. Self-Criticalness
0 I don't criticize or blame myself more than usual.
1 I am more critical of myself than I used to be.
2 I criticize myself for all my faults.
3 I blame myself for everything bad that happens.

9. Suicidal Thought or Wishes
0 I don't have any thoughts of killing myself.
1 I have thoughts of killing myself, but I would not carry them out.
2 I would like to kill myself.
3 I would kill myself if I had the chance.

10. Crying
0 I don't cry anymore than I used to.
1 I cry more than I used to.
2 I cry over every little thing.
3 I feel like crying, but I can't.

11. Agitation

0 I am no more restless or wound up than usual.
1 I feel more restless or wound up than usual.
2 I am so restless or agitated that it's hard to stay still.
3 I am so restless or agitated that I have to keep moving or doing something.

12. Loss of Interest

0 I have not lost interest in other people or activities.
1 I am less interested in other people or things than before.
2 I have lost most of my interest in other people or things.
3 It's hard to get interested in anything.

13. Indecisiveness

0 I make decisions about as well as ever.
1 I find it more difficult to make decisions than usual.
2 I have much greater difficulty in making decisions than I used to.
3 I have trouble making any decisions.

14. Worthlessness

0 I do not feel I am worthless.
1 I don't consider myself as worthwhile and useful as I used to.
2 I feel more worthless as compares to other people.
3 I feel utterly worthless.

15. Loss of Energy

0 I have as much energy as ever.
1 I have less energy than I used to have.
2 I don't have enough energy to do very much.
3 I don't have enough energy to do anything.

16. Changes in Sleeping Pattern

0 I have not experienced any change in my sleeping pattern.
1a I sleep somewhat more than usual.
1b I sleep somewhat less than usual.
2a I sleep a lot more than usual.
2b I sleep a lot less than usual.
3a I sleep most of the day.
3b I wake up 1-2 hours early and can't get back to sleep.

17. Irritability

0 I am no more irritable than usual.
1 I am more irritable than usual.
2 I am much more irritable than usual.
3 I am irritable all the time.

18. Changes in Appetite

0 I have not experienced any change in my appetite.
1a My appetite is somewhat less than usual.
1b My appetite is somewhat greater than usual.
2a My appetite is much less than before.
2b My appetite is much greater than usual.
3a I have no appetite at all.
3b I crave food all the time.

19. Concentration Difficulty

0 I can concentrate as well as ever.
1 I can't concentrate as well as usual.
2 It's hard to keep my mind on anything for very long.
3 I find I can't concentrate on anything.

20. Tiredness or Fatigue

0 I am no more tired or fatigued than usual.
1 I get more tired or fatigued more easily than usual.
2 I am too tired or fatigued to do a lot of the things I used to do.
3 I am too tired or fatigued to do most of the things I used to do.

21. Loss of Interest in Sex

0 I have not noticed any recent change in my interest in sex.
1 I am less interested in sex than I used to be.
2 I am much less interested in sex now.
3 I have lost interest in sex completely.

Appendix K: EPSI

Eating Pathology Symptoms Inventory

Below is a list of experiences and problems that people sometimes have. Read each item to determine how well it describes your recent experiences. Then select the option that best describes **how frequently** each statement applied to you **during the past four weeks, including today**.
Use this scale when answering:

0	1	2	3	4
Never	**Rarely**	**Sometimes**	**Often**	**Very Often**

1. I did not like how clothes fit the shape of my body 1._____
2. I tried to exclude “unhealthy” foods from my diet 2._____
3. I ate when I was not hungry 3._____
4. People told me that I do not eat very much 4._____
5. I felt that I needed to exercise nearly every day 5._____
6. People would be surprised if they knew how little I ate 6._____
7. I used muscle building supplements 7._____
8. I pushed myself extremely hard when I exercised 8._____
9. I snacked throughout the evening without realizing it 9._____
10. I got full more easily than most people 10._____
11. I considered taking diuretics to lose weight 11._____
12. I tried on different outfits, because I did not like how I looked 12._____
13. I thought laxatives are a good way to lose weight 13._____
14. I thought that obese people lack self-control 14._____
15. I thought about taking steroids as a way to get more muscular 15._____

16. I used diet teas or cleansing teas to lose weight 16._____

17. I used diet pills 17._____

18. I did not like how my body looked 18._____

19. I ate until I was uncomfortably full 19._____

20. I felt that overweight people are lazy 20._____

21. I counted the calories of foods I ate 21._____

22. I planned my days around exercising 22._____

23. I thought my butt was too big 23._____

24. I did not like the size of my thighs 24._____

25. I wished the shape of my body was different 25._____

26. I was disgusted by the sight of an overweight person wearing tight clothes 26._____

27. I made myself vomit to lose weight 27._____

28. I did not notice how much I ate until after I had finished eating 28._____

29. I considered taking a muscle building supplement 29._____

30. I felt that overweight people are unattractive 30._____

31. I engaged in strenuous exercise at least five days per week 31._____

32. I thought my muscles were too small 32._____

33. I got full after eating what most people would consider a small amount of food 33._____

34. I was not satisfied with the size of my hips 34._____

35. I used protein supplements 35._____

36. People encouraged me to eat more 36._____

37. If someone offered me food, I felt that I could not resist eating it 37._____

38. I was disgusted by the sight of obese people 38._____

39. I stuffed myself with food to the point of feeling sick 39._____

40. I tried to avoid foods with high calorie content 40._____

41. I exercised to the point of exhaustion 41._____

42. I used diuretics to lose weight 42._____

43. I skipped two meals in a row 43._____

44. I ate as if I was on auto-pilot 44._____

45. I ate a very large amount of food in a short period of time (e.g., within 2 hours) 45._____

Appendix L

Rosenberg Self-Esteem Scale

Please record the appropriate answer per item, depending on whether you strongly agree, agree, disagree, or strongly disagree with it.

There are no right or wrong answers. Just give the answer that is the most accurate for you. Remember, your responses are confidential, so please be completely honest and answer all items.

4	**3**	**2**	**1**
Strongly Agree	Agree	Disagree	Strongly Disagree

_____1. I feel that I am a person of worth, at least on an equal plane with others.

_____2. I feel that I have a number of good qualities.

_____3. All in all, I am inclined to feel that I am a failure.

_____4. I am able to do things as well as most people.

_____5. I feel that I do not have much to be proud of.

_____6. I take a positive attitude toward myself.

_____7. On the whole, I am satisfied with myself.

_____8. I wish I could have more respect for myself.

_____9. I certainly feel useless at times.

_____10. At times I think that I am no good at all.

Appendix M

Body Mass Index Questions

What is your current height (in inches)?

What is your current weight (in pounds)?

VITA AUCTORIS

NAME: Healey Malvina Gardiner

PLACE OF BIRTH: Thunder Bay, ON

YEAR OF BIRTH: 1992

EDUCATION: Hammarskjold High School, ON, 2010

Lakehead University, H.B.A., Thunder Bay, ON, 2016