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The Effect of Intra-Sexual Competition and Restraint Status on the Eating Behaviour of
Single Females: An Experimental Investigation

by

Sara L. Robillard, M.A.

A Dissertation
Submitted to the Faculty of Graduate Studies
through the Department of Psychology
in Partial Fulfilment of the Requirements for
the Degree of Doctor of Philosophy at the
University of Windsor

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ABSTRACT

This study tested an evolutionary model (Abed, 1998) suggesting that eating disorders arise through female intra-sexual competition for desirable males. According to this theory, females strive to present themselves as evolutionarily desirable to males, which can lead to the adoption of restrained eating patterns. This is important as restraint is a precursor of disordered eating. According to Abed's model, women who have not yet found a mate are expected to eat less when exposed to evolutionarily desirable males and even less when competing with evolutionarily desirable females for access to these males. As restrained eaters are more weight schematic, this effect is expected to be even more pronounced in restrained women. Because trait competitiveness is associated with disordered eating, competitive females were also expected to eat less. Under the pretense of participating in a dating agency study, 125 single females were exposed to descriptions of either two evolutionarily desirable or two evolutionarily undesirable males, either in a competitive or a non-competitive situation. Participants were asked to choose between these two males and offered a bowl of pre-weighed, M&Ms to snack on. Although restrained eaters appear to have maintained their cognitive restraint strategies, unrestrained eaters were most reactive and ate less when exposed to evolutionarily desirable males and when in competition with other women. Trait competitiveness was not a predictor of food consumption. Unrestrained eaters's eating behaviour was interpreted in terms of impression management and restrained eaters' maintained cognitive restraint was attributed to their high self-awareness induced by the experimental manipulation.

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Chapter I

INTRODUCTION

Overview

Context of the Problem

Eating disorders are one of the most common psychiatric problems faced by women and girls and are characterized by both chronicity and relapse (Stice, 2002). A review of the current literature reveals that eating disorders (ED) have only recently received the attention they warrant (Stice, 2002). Recent research has found such an increase in the incidence of eating disorders that some are suggesting there is an ‘epidemic’ (Hoek, 1993). This increase is serious given that eating disorders have the highest mortality rates of all mental disorders. A review by Herzog, Keller, and Lavori (1988) showed mortality rates ranging from 0-22%, with 50% of the deaths attributable to Anorexia Nervosa or its medical complications, and 24% attributable to suicide. Thus, for the successful treatment of EDs, it seems imperative to research reasons that might account for the rising rates of EDs and develop solutions informed by the identified causes. Evolutionary theory has proposed one possible explanation (Abed, 1998).

*Definitional/Conceptual Issues**Evolutionary Definitions*

This research is concerned with evolutionary explanations of eating disorders. Evolutionary explanations focus on *why* behaviours occur. This is called “ultimate causation.” Proximate explanations, on the other hand, provide an understanding of the mechanisms of behaviour, such as *how* the behaviours occur (Scheib, 2001).

One of the key processes discussed by evolutionary theorists is sexual selection. Sexual selection consists of two primary components: inter-sexual selection and intra-sexual competition. Specifically, inter-sexual selection involves the preferential choice of members of one sex for members of the opposite sex who possess certain 'attractive' qualities (Buss, 1988). On the other hand, intra-sexual competition refers to the competition between members of the same sex for mating access to members of the opposite sex (Buss, 1988). These terms are conceptually related in that mate choice preferences exerted by one sex creates intra-sexual competition in the other sex for desired resources or characteristics (Buss, 1988).

Theoretical Models and Issues

Evolutionary Theory and Sexual Selection

Sexual selection, or the choosing of mates, is a main facet of evolutionary theory and was a key adaptive problem faced by our ancestors (Buss, 1999). There are two main propositions within sexual selection. The first is that in species where the sexes differ in parental investment, the higher investing sex will be more selective in its choice of mating partners. The second proposition argues that in species where males contribute resources to offspring, females will, in part, select males based on their ability and willingness to contribute these resources (Buss, 1999). A key difference in the mating strategies of high and low investing parents relates to the process of evolution as it naturally selects for individuals who are successful at passing on their genes. Both genders' mating strategy is geared toward maximal gene transmission and survival.

Because of the long gestation period for many species, female mammals have

fewer opportunities and less time to reproduce and subsequently pass on their genes, which makes them much more selective than males. Equally important as the long gestation period is the consideration of risks that females face in birth and parental care giving (Townsend & Levy, 1990). A female who exercises caution and patience in choosing a mate maximizes her chances of combining her genes with those of a male of good quality, which also increases her chances of producing good quality offspring who, in turn, have better chances of surviving and passing on her genes (Symons, 1995). If females choose poorly, their chances of successfully passing on their genes in the limited time available are greatly diminished (Buss, 1995; Symons, 1995). These sexual selection strategies are particularly true of humans. Human women invest a great deal in child rearing due to the burden of long pregnancies and the long commitment to nursing and childcare thereafter.

Secondly, women select males based on their willingness to contribute resources, such as time, as it provides them with an advantage in raising offspring. According to evolutionary theory, sexual selection strategies are enforced through the manifestation of an unconscious motivation to enter into dyads with males who can provide such resources (Scheib, 2001). It follows that women have evolved mate preferences for males who are both able and willing to contribute resources to them and their children. This has been overwhelmingly supported in past research (Scheib, 2001; Wade, 2003). Therefore, the more resources a man has, the more likely women are to compete for his attention (Barash & Lipton, 2002). In sum, human females' best reproductive strategy is to choose a male who can contribute high quality genetic material and physical resources. Research has demonstrated that female preferences for commitment of resources is best assessed through

the social status, older age, ambition, dependability, and health of potential male mates (Buss, 1999; Coghlan, 2004).

On the other hand, males' conception of evolutionary desirability is based on different characteristics, as they do not have the burden of pregnancy and nursing. The best reproduction strategy for males is to distribute their genes as widely as possible by mating as often as possible with different women who look physically healthy, which signals fertility. For males, women's reproductive allure is based on, "facial and bodily characteristics that signal fecundity (capacity to produce many offspring), successful mothering potential (ability to successfully raise offspring independent of the ability to become pregnant), and femininity" (Wade, 2003, p.125). Thus, a successful reproductive strategy for males is to mate as often as possible with women of good genetic quality (Barash & Lipton, 2002). Women's resources are relatively unimportant for males whose evolutionary goal is to pass on their genes as frequently as possible. For males, the physical attributes of females are scrutinized and women who have small hips, waists, and buttocks are generally considered more attractive, healthy, feminine, fertile, and better potential mothers (Symons, 1995; Wade, 2003). Also, Gatward (2001) posited that ancestral females with the ability to tolerate starvation as a trait were more successful at surviving famine and thus more attractive to males, which gave them increased chances of being selected for mating and of perpetuating their genes in the population. Those women who could demonstrate 'anorexic qualities' as a survival mechanism, which reflects hardiness, may have been widely sought after as mates. In sum, females' reproductive value is best assessed through the characteristics of youth, physical attractiveness and

relative thinness, which serve as good indicators of fertility and the capacity to survive hardship. Attractive physical qualities influence men's evaluation of women, and for women, good resource advertisement is paramount to choosing a male.

Sexual Selection Characteristics and Other Species

Similar to the extensive research which has provided clear evidence for human sexual selection strategies, there is much evidence for the evolutionary origin of sex roles in our primate relatives. From an evolutionary standpoint, regardless of species, sex is the prime reason for society (Buss, 1999). It is important to note the similarities across species in parental investment, which can be defined roughly as the time, energy, and risk to survival that are involved in producing, feeding, and otherwise caring for offspring (Buss, 1999).

Trivers (1972) put forth a theory regarding species with unequal parental investment whereby the more parentally invested sex will be more vigorously competed for than the other, and more discriminating than the other when choosing mates. Evidence supporting Triver's theory is seen across many species. For example, a doe is thought to choose carefully the male stag because if her offspring fails to live she will have lost an entire breeding season, whereas the stag's loss of time and some easily regenerated sperm cells is minimal (Trivers, 1972). In species in which the male is the more heavily invested parent such as the sea horse, the male exhibits greater sexual caution and discrimination than the female. This is because he carries the brood from the copulation within a pouch and is more responsible for their survival (Williams, 1966; Crawford, 1998). Moreover, in species such as the sea lion and most species of elephants, the females will look for and

only accept large, older, males who can protect them and whose size and old age vouch for their longevity and power (Williams, 1966; Trivers, 1972). Copulating with such male partners ensures a female that her genes will be combined with that of a male who is strong and long lived, in turn ensuring that her subsequent offspring will live longer, have more chances of reproducing, and passing on her own genes (Trivers, 1972). In sum, it becomes quite clear that across many species, the higher investing parent is generally more discerning and cautious due to the large reproductive costs they incur.

These parental investment differences between males and females are manifested in outward displays of specific behaviours. Female chimpanzees display many outward behaviours that are consistent with parental investment and male chimpanzees demonstrate characteristic mate attraction strategies. Prior studies in Africa (Kortlandt, 1983; McGrew, Baldwin, & Tutin, 1981) found clear evidence that male chimpanzees engage in evolved dominant sex roles such as hunting other animals, protecting community territory by patrolling the borders, and engaging in more violent defensive behaviours such as hurling foliage and rocks at enemies. Conversely, female chimps adopt stereotypical female roles of resource gathering, devote more time to social grooming, and spend considerable time interacting with their young in soft vocalizations (McGrew et al., 1981). Female vocalizations promote affiliation and are in direct contrast to the male chimpanzee's barking, growling, and strident aggressive vocalizations. Based on these observations, McGrew (1981) concluded that the similarity between ancestral humans and chimps is direct evidence of the continuing importance of past sex roles on today's sex differences in that males are still demonstrating dominant behaviours to attract females.

Across bird species, attractiveness has been shown to affect mating and spousal choices, due in part to the phenotypic qualities signalling health status and disease resistance (Scheib, 2001). Research with female blue tits (a bird species) has revealed that attractive individuals gain double benefit: first, through mate choice advantages and second, because their mates show increased investment in their offspring (Vince, 2004). As well, male Cockerel fowl will release more sperm to an attractive hen than they will to a less attractive female (Bhattacharya, 2003a). A hen was considered attractive if she had a large comb adorning her head, a physical characteristic signalling genetic quality and good reproductive potential (Bhattacharya, 2003a). Thus, the females who were reproductively superior had certain phenotypical characteristics that were selected for as a result of their increased capacity to reproduce. These females became reproductively superior to other hens, producing more eggs with more yolks (Bhattacharya, 2003a). Males who preferred this characteristic would also be more successful at passing on their genes, thus, slowly increasing the proportion of the species population who both possess the characteristic and prefer it. Thus, the importance of female attractiveness for her ability to reproduce is seen in other species.

Sexual Selection Characteristics Across Cultures and Time

A key component that supports evolutionary theory of behaviour is the demonstration of cross-cultural consistency. Miller devised a model to support a cross-cultural viewpoint on sexual selection based on Darwin's theories. Miller proposed a cultural courtship model arguing that sexual selection through mate choice by both our male and female ancestors was a major evolutionary force in shaping human culture

(Miller, 1999). Miller's major premise is that human culture is mainly a set of adaptations for courtship in that culture subsumes a variety of specific human behaviours such as telling stories, wearing clothes, dancing, making music and decorating artefacts, expressing belief in certain ideas, and so on. These actions are all self-expressive, costing time and energy, are unique to our species, and most of them have no immediate survival benefits (Miller, 1999). However, these behaviours show individual differences in skill, require intelligence, display creativity and health, and amplify perceivable differences between individuals, to make heritable differences and other traits more apparent and easier to judge during mate choice (Miller, 1999). Miller contends that this is why, during courtship, people tell new stories using old words, rather than expecting a sexual prospect to be impressed with a string of newly invented words; standardized cultural elements allow easy comparisons of creativity.

While there is ample research supporting the overall evolutionary sexual selection theory (Davis, 1990; Gilbert, 2001; Scheib, 2001), there has been less research generated in the area of cultural comparisons of mate selection criteria. However, one particularly comprehensive study compared international preferences for mates across 37 cultures (Buss et al., 1990). Consistent gender differences were found *across culture*; men mostly wanted females who were younger, demonstrated healthier appearance and behaviour, and were considered physically attractive and women valued earning capacity, ambition, and hard work in males.

A study comparing attitudes about marriage and sexual behaviour in China and the United Kingdom revealed that Chinese husbands consider an ideal wife as one who is

beautiful, healthy, gentle, and good at housekeeping (Higgins, Zheng, Liu, & Hui Sun, 2002). They expressed displeasure with the idea of their wives being better educated, more intelligent, and having higher career status than themselves. Across both cultures, women preferred an older husband, though the tendency was greater in China (71.8%) than in the United Kingdom (43.6%) (Higgins et al., 2002). Similar to Buss' results, men in both cultures valued appearance more than did women while women cared more about their spouse's income.

A cross-cultural comparison of mate preferences among university students was conducted to examine the differences between American and Chinese students (Sprecher & Toro-Morn, 2003). Chinese and American men expressed a strong preference for a physically attractive, sexy looking partner, while women desired high earning potential, high social status, and wealth in their male partners (Sprecher & Toro-Morn, 2003).

The other important component to support an evolutionary theory is the repeated evidence of certain behaviours and traits over time. The determination of cultural standards becomes arduous when one is trying to accurately assess standards and preferences across time. Gottschall, Martin, Quish, and Rea (2004) assessed evolutionary sex differences in mate choice criteria by dissecting folktales from around the world and historical European literature. The collections included tales from 48 different cultural areas from all inhabited continents and were assumed to reflect the traditional attitudes and life ways of the populations that produced them (Gottschall et al., 2004). Data collected on preferences for physical attractiveness, wealth, status, and kindness revealed cross-cultural regularities in the substance of male and female mate preferences that are consistent with

Buss' proposal (Gottschall et al., 2004). More specifically, male characters were significantly more likely than were females to be portrayed as prizing physical attractiveness as their main criterion in mate selection across time periods (Gottschall et al., 2004). Female characters were portrayed as placing greater emphasis on a potential male's wealth and social status (Gottschall et al., 2004). This serves as convincing evidence that the observed similarity in cross-cultural patterns of mate preference is due to convergent evolution and not to cultural transfer as information was derived from band, tribal, and pre-industrial state populations. In sum, the sex differences in mate preferences were observed across regions of the world, across culture, and across time (Gottschall et al., 2004).

Evolutionarily Desirable Male Characteristics - Empirical Support

Attractiveness

As our ancestors evolved and social structures replaced the need for physical fighting for resources, the ability to attract a female mate through good looks may have become more important in the mating stakes than the ability to physically compete with male rivals (Coghlan, 2004). This is due in large part to the fact that good genes are communicated through symmetry which often contributes to attractiveness (Jones et al., 2001). A recent study has shown that men with the healthiest, fastest sperm were rated as the most facially attractive by women, providing the first direct evidence to suggest that a man's reproductive quality correlates with his facial characteristics (Bhattacharya, 2003b). A cautious interpretation of these very preliminary results would indicate that although attractiveness is not as important as factors like social and economic status in affecting

women's final choice of a partner, attractiveness may play a part in women's overall choices as they do consider it to be an indicator of health (Bhattacharya, 2003b).

Resources

While attractiveness is important, the willingness to commit resources has been shown to be more sought after by women. Past research on mate selection and evolution examined personal advertisements, more specifically the characteristics that females and males offer and seek (Buss, 1989; Buss, 1995; Buss et al., 1990; Davis, 1990). This research has revealed that men seek information about women's physical attributes and attractiveness, and offer information about their financial stability and resources. Conversely, women primarily offered information regarding their physical attractiveness and sought out information about men's financial security and resources (Davis, 1990; Symons, 1995).

A laboratory study by Townsend and Levy (1990) demonstrated the influence of potential partners' costume and physical attractiveness on partner selection. They manipulated Social Economic Status (SES) visually by photographing individuals in either a Burger King uniform (low SES) or designer clothes and a Rolex watch (high SES). Participants were told that they were participating in a study examining how people choose partners for dating and marriage and were asked to examine these pictures, rate them, and indicate their willingness to enter various types of relationships with them. Congruent with evolutionary theory, men sought out physically attractive women, whereas women sought high levels of potential parental investment, evidenced by the perceived financial resources of the high SES males. As Townsend and Levy (1990) argue, compared to male

subjects, female subjects apparently needed information about more than physical attractiveness to decide whether they would be interested in pursuing a relationship with a given person. The researchers hypothesized that the more cues revealed potential partners' ability to invest the time, material resources, and emotions expected in serious relationships and marriage, the more easily women were able to evaluate mens' marriage potential (Townsend & Levy, 1990). Thus, the theory which has been substantiated by much research argues that when females choose mates, they typically seek men who are more likely to invest in the family and in their offspring, and to make a long-term commitment and investment in the relationship (Davis, 1990; Dotinga, 2004; Wiederman, 1993).

Evidence Against the Evolutionary Theory of Mate Selection and Alternative Explanations for Abed's Theory

Just as there is much supporting evidence for evolutionary concepts, specifically, sexual selection characteristics, some evidence minimizes the importance and validity of evolution theory. One particular aspect that defies the law of evolution is homosexuality, a common orientation that is unexplained by Darwin. Over 300 vertebrates, including monkeys, flamingos, and sheep, engage in homosexuality. Homosexuality in some species appears to play a social role. For instance, bonobos (pygmy chimpanzees) will have sex with same-sex partners to calm tensions after a squabble, or to make sure that a large amount of food is shared. For some species, including humans, homosexual orientation may have no evolutionary adaptive value. Schafer maintains that attempting to find any single conceptual framework to explain homosexual orientation is an unattainable goal

(1971). Unfortunately, the evolutionary standpoint has been severely challenged by homosexuality and many critics argue that differences in sexual attitudes are a product of society rather than of biological predispositions, and reflect a cultural rather than an evolutionary mechanism (Schafer, 1971).

Critics regard males' desire for sexual variety as a product of early training where boys are taught that sexual conquests are a reflection of 'manliness' and females are taught to value home and family and to seek a single partner (Schafer, 1971). Research into the sexual practices of gay men and lesbians revealed that gay men are much more interested in sexual variety, engage in briefer, more casual sex, and have many more partners than do lesbians (Schafer, 1971). Schafer (1971) polled 151 lesbians and 581 gay men in West Germany and found that only one percent of the women reported having had sexual relations with more than ten partners, while 61 percent of the men had done so.

As Schafer (1971) argues, the interpretation of these results rests on the assumption that persons who have rejected the cultural norms for the gender of sex partners are unlikely to have succumbed to a culturally induced standard for the number of partners. In sum, the presence of homosexuality within our species is in opposition to the concept of sexual selection strategies. However, gay males engage in more partner seeking and sexual variety than lesbians who tend to settle with very few partners which is congruent with evolutionary theory; although homosexual males and females prefer partners of the same sex, they are still unconsciously driven by the same reproductive behaviours as heterosexual people. Further, relative to the world population, only a small proportion of individuals are homosexual (Rahman & Wilson 2003). Homosexuality may have persisted

through evolution simply because it does not disturb the overall survival of the species, and thus it is not selected against. Finally, many homosexual individuals do produce offspring, thus they do not constitute an obstacle to the survival of the species (Kirby, 2003).

Summary

Across time, culture and species, there has been evidence of the link between parental investment and mate selection. As well, research has reflected the key differences between male and female criteria for their choice of mating partners based on parental investment. Further, evidence in the literature on human parental investment has shown that females choose partners on the basis of resources combined with good genes while males feel that appearance is the ultimate reflection of mate suitability. These evolutionary theories, strongly supported by research, can be examined for their impact on females' eating behaviour.

History and Diagnostic Criteria of Eating Disorders

The DSM-IV-TR includes three main categories to cover the broad spectrum of disordered eating (APA, 2000): Anorexia Nervosa (AN), Bulimia Nervosa (BN), and eating disorder not otherwise specified (EDNOS). Evidence of disordered eating is chronicled as early as the 14th century. Specifically, manuscripts and printed works from the 14th to the 20th century demonstrate widespread usage of the term 'bulimia' and variants of bulimia such as 'canine appetite' and 'morbid hunger' (Parry-Jones & Parry-Jones, 1995). Similarly, the term anorexia first appeared in a medical textbook in 1689 which outlined the disease as a wasting of body tissue and 'nervous consumption' caused

by sadness and anxiousness (Lasègue, 1873). It is just recently that specific criteria have been proposed to address the symptoms and manifestations of disordered eating. Specifically, AN is characterized by a body weight 85% or less than that desired for age and height, an intense fear of gaining weight, denial of the seriousness of the current low body weight, and an absence of menstrual cycles for three consecutive months in post menarcheal females, although this criterion is to be abandoned in the next edition of the DSM (APA, 2000). BN is characterized by an average of twice weekly episodes of binge eating for at least three months with a lack of control over eating during binges (APA, 2000). The other key symptom necessary for a diagnosis of BN is the engagement in inappropriate compensatory behaviours following a binge, such as self-induced vomiting, misuse of laxatives, diuretics, fasting, or excessive exercise (APA, 2000). Also, an intense fear of gaining weight and body image concerns must be present for a diagnosis of either AN or BN. Finally, the category of EDNOS is for disorders of eating that do not meet the criteria for any specific eating disorder. Two of the most common EDNOS diagnoses include females who meet all the criteria for AN, but continue to menstruate, and Binge Eating Disorder (BED), which includes excessive overeating but is not associated with the regular use of inappropriate compensatory behaviours (APA, 2000).

Etiology of Eating Disorders

The etiology of eating disorders appears to involve multiple factors, many of which may also be responsible for the maintenance of the disorders (Brownell & Fairburn, 1995). The most prevalent and widely accepted theories include media/sociocultural theories, peer theories, biological, and psychological theories.

Media/Sociocultural Theories of Eating Disorders

Perhaps the most widely known etiological explanation of disordered eating is the Sociocultural theory of eating disorders. This theory states that societal influences play a role in the cause and/or maintenance of eating disorders, mainly through the promotion of an unrealistic idealized thin physique. Exposure to the thin ideal for women can occur directly via family and peers or through the media and is thought to be at least partly responsible for body dissatisfaction in females. Balaam and Haslam (1998) have stated that the “be thin to be beautiful” message in women’s magazines is ubiquitous and is manifested in many different forms by a variety of sources of information which are considered credible by women. Magazines promote their ‘cutting edge’ information about the path to thinness and most females consider them to be a valid source of information. For women, exposure to this message creates doubt about their own body image (Balaam & Haslam, 1998). Past empirical research has revealed that social norms do play a role in adolescent decision-making about eating and that females eat less when confronted with social norms of femininity (Wood Baker, Little, & Brownell, 2003). These social norms can lead to body dissatisfaction and eventually, to eating pathology (Stice & Whitenton, 2002). Other research has identified a preference for thinness among children of increasingly younger ages, and found that girls as young as 5-years old were aware of perceptions of bodily attractiveness, and expressed a desire to be thin (Davison, Markey, & Birch, 2000).

The young are not the only individuals influenced by the media’s portrayal of women. In the past forty years, the public at large has been exposed to gradual changes in

the body shape of female fashion models, Playboy Centerfolds, and Miss America contestants, from a full figure to a thin, more waif-like figure (Garner, Garfinkel, Schwartz, & Thompson, 1980). Furthermore, research throughout North America over the past four decades has revealed strong support for partiality to the thin female figure across all age groups and gender, which could be indicative of how attitudes have followed media presentations (Markey, Tinsley, Ericksen, Ozer, & Markey, 2002; Thompson & Chad, 2002). These findings have direct relevance to the rising number of females who experience disordered eating.

The media has been demonstrated to have a large impact on females' body image dissatisfaction, dieting behaviour, and ED symptom development. Stice and colleagues (1994) exposed women to magazine images of either thin models, average models or neutral images of furniture or products with no models present. They found that directly exposing women to magazine images containing thin models produced depression, stress, guilt, shame, insecurity, and body dissatisfaction (Stice & Shaw, 1994). Furthermore, a multiple regression analysis revealed that the negative affect and body dissatisfaction that arose from viewing the pictures predicted bulimic symptoms (Stice & Shaw, 1994). Also, Stice, Schupak-Neuberg, Shaw, and Stein (1994) assessed the relation of media exposure to eating disorder symptomatology and found that women directly imitate disordered eating behaviour such as fasting and purging presented in the media.

Follow-up research by Stice and colleagues examined the longitudinal effect of exposure to media portrayed thin ideals. They found that long-term exposure to these images over 15 months adversely affected vulnerable youth characterized by perceived

pressure to be thin, body dissatisfaction, and deficits in social support (Stice, Spangler, & Agras, 2001). A meta-analytic review of nearly thirty studies was conducted by Stice and examined risk and maintenance factors for eating pathology (2002). Acute effects of exposure to media-portrayed thin-ideal images, a ubiquitous form of pressure to be thin, was evident across studies where exposure resulted in immediate increases in body dissatisfaction (Stice, 2002). The combined experimental findings suggest that exposure to media thin messages is a causal risk factor for body dissatisfaction, dieting, negative affect, and bulimic pathology (Stice, 2002). These studies demonstrate the clear impact of the media on body image dissatisfaction, dieting behaviour, and ED symptom development.

More so, research assessed the effect of television commercials on adolescents' body dissatisfaction by either exposing them to thin ideal commercials or non-appearance commercials (Hargreaves & Tiggemann, 2003a). Providing further evidence for the negative impact of media on body image, Hargreaves and Tiggemann found that females who viewed the thin ideal appearance commercials reported significantly higher body dissatisfaction. At two-year follow-up, initial feelings of body dissatisfaction in response to viewing the thin ideal commercials significantly predicted subsequent body dissatisfaction and drive for thinness (Hargreaves & Tiggemann, 2003b). Finally, a meta-analytic review of 25 studies assessing the effect of exposure to thin media images on body satisfaction found that body image was significantly more negative after viewing thin media images than after viewing images of either average size models, plus size models, or inanimate objects (Groesz, 2002). Thus, the pervasive negative impact of the media on women's body image has been abundantly documented.

Peer Influence Theories of Eating Disorders

Social pressure and peer influence to be thin are considered major contributors to disordered eating (Pliner & Chaiken, 1990; Stice & Whitenton, 2002). Specifically, girls who viewed themselves from the perspective of their peers believed that if they were thinner and more attractive, they would be popular with both opposite and same-sex peers. Furthermore, girls who were nominated by their peers as “popular” had lower body esteem and engaged in more disordered eating (Lieberman, Gauvin, Bukowski, & White, 2001). These findings reveal that females experience pressure to be thin from their peers, realize that thinness is attractive, and feel that attractive females have greater chances of finding a mate.

Prior research demonstrated a clear association between restrictive eating attitudes and a fear of others’ negative evaluation of one’s eating habits. Specifically, Gilbert and Meyer (2003) investigated the relationship between social anxiety, social comparison, and bulimic and restrictive eating attitudes among non-clinical women and found that heightened social anxiety predicted drive for thinness, while levels of social comparison predicted bulimic attitudes. Gilbert and Meyer (2005) replicated this finding and extended the research to directly test the fears of negative evaluation (FNE) from close friends and relatives. As with the original study, the results showed that females’ negative evaluation fears from both strangers and close peers were significantly and positively correlated with restrictive attitudes such as drive for thinness and body dissatisfaction.

With a desire to appear attractive comes the natural inclination for an individual to compare themselves with others. Body comparisons are a likely mechanism through

which sociocultural pressures for thinness contribute to body dissatisfaction (Durkin & Paxton, 2002; Schutz, Paxton & Wertheim, 2002). Past research has shown that because most girls do not have a body shape meeting the current societal ideal they tend to engage in upward social comparisons with these ideals, which often results in feelings of distress or negative affect (Durkin, Paxton & Wertheim, 2005). Furthermore, for some individuals, comparisons can result in feelings of competitiveness. The competitive feelings vary according to different personality characteristics and include, but are not limited to, anxiousness, self-esteem, and confidence (Durkin, Paxton & Wertheim, 2005).

More empirical research conducted with adolescents revealed that both males and females internalized peer conversations about appearance and peer appearance criticism, which contributed directly to their subsequent body dissatisfaction (Jones, Vigfusdottir, & Lee, 2004). Meyer and Waller (2001) conducted a longitudinal study to examine whether social proximity results in increased disturbed eating patterns over time for women living together. Women completed the Eating Disorder Inventory (EDI) at three time points and their responses at each time reflected an increase in drive for thinness, restrictive attitudes, and body image concerns the longer the women lived together (Meyer & Waller, 2001). Also, research revealed that the use of extreme weight loss behaviours (EWLB) by a friend actually predicted an individual's own use of EWLBs (Paxton, Schutz, Wertheim, & Muir, 1999). Participants were asked to complete questionnaires that assessed body image concerns, eating, friendship relations, and psychological, family, and media consumption variables. Results revealed that similarities were observed within friendship cliques for body image concerns, dietary restraint, and EWLBs, and that cliques high in body image

concerns and dieting manifested these concerns in ways consistent with a high weight / shape-preoccupied subculture (Paxton et al., 1999).

Other research examining the impact of pathological eating attitudes within females' intimate peer groups has found that unhealthy attitudes about weight control exist within peer groups and are also reflected in school-wide prevalence rates for dieting (Eisenberg, Neumark-Sztainer, Story & Perry, 2005). Using data from females in 31 schools regarding school-wide dieting behaviours, Eisenberg et al. (2005) found that females with higher body mass index (BMI) were more likely to engage in unhealthy weight control behaviours (UWCB) and were more influenced by their peers' dieting behaviour than were females with lower BMI. This points to the continued significance and pressure of unhealthy social norms within one's peer group (Eisenberg et al., 2005). More importantly, school-wide prevalence of trying to lose weight was significantly related to higher UWCBs for average weight girls. In sum, there is much empirical research that draws direct links between peer pressure for thinness and eating disorders.

Biological Theories of Eating Disorders

Biological theories have suggested that factors such as early feeding difficulties and pre-morbid obesity explain why some females develop eating disorders, primarily as predisposing factors for AN (Cooper, 1995). One controlled study revealed that 47% of individuals with early feeding histories of severe gastrointestinal difficulties later developed anorexia nervosa (Rastam, 1992). As well, other studies have established connections between obesity and disordered eating revealing that pre-morbid obesity often leads to dieting, which increases vulnerability to the development of disordered eating

(Haines, Neumark-Sztainer, 2006; Johnson, Cohen, Kasen, & Brook, 2002).

As well, research has demonstrated that there is likely a genetic contribution to eating disorders, further supporting the growing evidence for biological explanations. Specifically, AN and BN appear to be several times more common among biological relatives of AN and BN patients than in the general population, a finding that implicates the existence of some genetic mechanism of transmissibility (Strober, 1995). Studies of twins have shed light on the relative contribution of genes and environment. Research with anorexic twins raised together revealed that concordance rates were substantially greater for MZ twins than for DZ twins, which suggests a strong etiological role for genetic factors (Strober, 1991). Also, research on MZ and DZ twins using genetics testing suggested that up to 80% of variance in AN could be accounted for by genetic factors (Holland, Sicotte, & Treasure, 1988). Similarly, results of four studies of both MZ and DZ bulimic twins reared together revealed evidence of genetic factors (Kendler et al., 1991; Klump, McGue, & Lacona, 2003; Strober, 1992; Woodside, 1993). The largest of the four studies was completed with over 2,000 bulimic twins revealing evidence for additive gene action and 50% heritability (Kendler et al., 1991). Further, a study conducted with 1132 twins who were raised in the same environment found that genetic factors accounted for 54% of the variance of disordered eating behaviours in pubertal twins aged 11 to 17, suggesting that genetic influence is activated during puberty (Klump, McGue, & Lacona, 2003).

Psychological Theories of Eating Disorders

Finally, psychological theories of eating disorders have also been formulated but

have received only moderate empirical support. Some suggest that women with eating disorders use food and their bodies to gain a sense of mastery and competence (Jarry, 1998). Research has revealed that some women feel that food intake and weight are the only areas that they can control in a life otherwise dictated by an overly involved family, which may include a parent who is unduly concerned with weight or appearance (Gordon, 2001). There is much evidence for the existence of a relationship between a need for control and other facets of women's life. It has been demonstrated that women who are involved in negative romantic relationships restrict their food intake as a means of control (Cooper, 1995). Further, interpersonal difficulties, such as familial problems, co-worker problems, or friendship problems, also seem to trigger restricted eating as a means to control at least one life area (Mond, Hay, Rodgers, Owen, & Beumont, 2004). Finally, research has indicated that individuals who are experiencing reduced functioning in work or school environments also restrict their eating in order to control something in their lives (Zelley, 2001).

Other psychological theories suggest that stressful life events serve as predisposing factors for both AN and BN sufferers. These events could have positive, neutral, or negative connotations such as the onset of puberty, leaving home, the beginning of new relationships, the death or illness of a loved one, or the loss of a job (Cooper, 1995).

As well, the relationship between perfectionism and subsequent disordered eating is well established. Recent research has shown that manipulating personal standards, a central feature of perfectionism, influenced eating attitudes and behaviour such that participants assigned to a high personal standards (high perfectionism) condition ate fewer

high calorie foods, made more attempts to restrict the overall amount of food eaten, and had significantly more regret after eating (Shafran, Lee, Payne, & Fairburn, 2006).

Another psychological theory regarding the development of eating disorders pertains to the association between obsessive compulsive behaviours and subsequent disordered eating. Specifically, research conducted by Anderluh, Tchanturia, Rabe-Hesketh, & Treasure (2003) revealed that childhood obsessive-compulsive personality traits showed a high predictive value for the development of eating disorders, with the estimated odds ratio for eating disorders increasing by a factor of 6.9 for every additional trait present. As well, within that same study, females with eating disorders who reported perfectionism and rigidity in childhood had significantly higher rates of obsessive-compulsive personality disorder and OCD comorbidity later in life, compared with eating disorder subjects who did not report those traits (Anderluh et al., 2003).

Finally, in terms of psychological theories for eating disorders, personality traits have been implicated in the onset, symptomatic expression, and maintenance of eating disorders (Cassin & Von Ranson, 2005). Both Anorexia and Bulimia Nervosa are consistently characterized by perfectionism, obsessive-compulsiveness, neuroticism, negative emotionality, harm avoidance, low self-directedness, low cooperativeness, and traits associated with avoidant personality disorder (Cassin & Von Ranson, 2005).

In sum, empirical research on the development and maintenance of eating disorders provides strong evidence and support for each of the competing sociocultural, biological, and psychological theories. Unfortunately, at present there is not enough supporting evidence to deem one of these competing theories superior over another. In other words,

research has not adequately demonstrated why any one of these theories alone should be considered the primary reason for EDs and at present researchers are concluding with increasing frequency that EDs are multiply determined, due to a variety of social, interpersonal, psychological, and biological factors with no one factor explaining the whole phenomenon (Van den Berg, Thompson, Obremski-Brandon & Coover, 2002). In fact, the bio-psycho-social theoretical model is currently being touted as the most accurate and fitting explanation for etiology of eating disorders (Cooper, 1995; Van den Berg et al., 2002; Southgate, Tchanturia, & Treasure, 2005).

According to Abed, the many current and competing theories are proximal, that is, concerned with the 'how' of behaviour. These theories are concerned with environmental stimuli and internal characteristics that trigger disordered eating behaviour, and none provide evidence of ultimate causation, or evolutionary significance, the 'why' in the behaviour. However, these proximal causes for eating disorders are ultimately compatible with the Sexual Competition Hypothesis for Eating Disorders (Abed, 1998), which according to Abed, is the ultimate explanation for eating disorders.

Eating Disorders and Evolution - Abed's Sexual Competition Theory for Eating Disorders

Although the proximal explanations definitely elucidate some aspects of eating disorders, each theory on its own fails to offer an ultimate explanation for the development and maintenance of eating disorders. Abed's (1998) Sexual Competition Theory for eating disorders is based on the contention that changing norms for female physical attractiveness in modern industrialized societies have arisen from the interaction of an ancient biological strategy and a novel environment. He posits that our human ancestors survived because

they possessed the sexual selection strategies outlined by Buss, and passed these mating strategies onto future generations. Thus, armed with the strategies from our ancestors to attract evolutionary desirable mates, males will advertise resources and females will advertise physical attractiveness and youthful characteristics, thereby increasing their odds of reproducing (Buss, 1999). Therefore, Abed (1998) hypothesized that eating disorders originate in human females' psychological concern about physical attractiveness, which is an important component of female 'mate attraction' and 'mate retention' strategies.

Historically, women's bodies provided visual evidence of both age and child bearing capacity. However, recent developments in the fitness and beauty industry have allowed older women to maintain a shape that demonstrates high reproductive potential for longer periods of time (Abed, 1998). Women now have increasing control over their body shape and size through surgical procedures and fitness training (Abed, 1998). Moreover, modernization has brought people to large cities and out of segregated tribes. This urbanization of human culture (particularly in North America) has increased women's exposure to other women, both through increased interaction and the media (Abed, 1998). Furthermore, in ancestral times, women had little control over their mate choices by virtue of arranged marriages or daughter guarding (Abed, 1998). Currently, most Western women have control over their dating behaviour and marriage choices, but also face increasing instability of long-term mateships with increasing rates of divorce (Abed, 1998; Peck, 1993). In fact, in today's society approximately half of all marriages end in divorce, the stability of long-term relationships has disintegrated, leaving more males and females looking for partners (Low, 2005). When a relationship ends, it is hypothesized that an

individual will evaluate their life, process their feelings, and eventually prepare themselves to re-engage in dating activity, another element that increases competition between women (Abed, 1998; Low, 2005). Newly single females develop a desire for a thinner shape and engage in restrained eating patterns, which appear to be important precursors to dating new individuals (Lieberman, 2000). Finally, recent research has found that married women are dieting more now than they did in the past. It is argued that for these married women, weight loss may be a prelude to divorce as they ready themselves to reemerge into the “marriage market” (Bending, 2004).

Taken together, all of these factors are hypothesized to have led to a progressive increase in the importance of body shape within the process of female intra-sexual competition. Now, young women not only find competition with their peers, but also with older women who still have the capacity to compete and who also may be looking for males (Abed, 1998). Even in adolescence, research has demonstrated that the convergence of pubertal fat accumulation and increasing romantic interest can result in a struggle with weight that is fuelled by concerns with physical attractiveness and not health (Halpern, Udry, Campbell, & Suchindran, 1999). As well, being at a school where there are older girls has been found to be associated with identifying a thinner ideal shape, feelings of being overweight, higher incidences of dieting, and lower self-esteem in younger girls (Wardle & Watters, 2004). Thus, Abed (1998) posits that young women who want to attract evolutionarily desirable males partake in increased intra-sexual competition and therefore, may set their body template at an abnormally thin shape in an attempt to more effectively compete with other females. Due to the novel environment that females in this

generation face (increased ability to control size/shape, increased female independence, increased instability of long term mateships, etc) when taken to the extreme, this strategy may result in pathological eating, and ultimately, the development of an eating disorder (Abed, 1998). Presumably, these females do not have a conscious awareness of their actions, because evolution would utilize powerful emotions such as anxiety, guilt, and depression to ensure the implementation of this mating strategy (Abed, 1998).

Further, a body of research indicates that this female preference for being thin is more reflective of female desires and not male preferences. Research completed by Fallon and Rozin (1985) has revealed that females prefer a thinner figure than their current figure and they presume that males would prefer them to be thinner and closer to their own ideal than to their actual current shape. In this study, females overestimated how thin males expected them to be, as males actually preferred a larger female figure than what women deemed attractive to men. More importantly, the size that women considered ideal for themselves was much thinner than what they thought that men wanted. A replication study conducted with women with sub-threshold disordered eating further showed that the divide between the smaller size that they deemed ideal for themselves and what they thought that men preferred was even greater (Zellner, Harner, and Adler, 1989). Zellner et al.'s research could be reflective of Abed's specific hypothesis regarding the thin strategy spiralling out of control for eating disordered women in that the one group endorsing high levels of eating pathology preferred a significantly thinner shape for themselves than what they thought men desired. Finally, Rozin and Fallon (1988) conducted a follow-up study, examining misperceptions of figure preferences in family pairs of father/son and

mother/daughter that revealed with the exception of the sons, all groups considered their current body shape to be heavier than their ideal, and mothers and daughters believed that men of their own generations preferred much thinner women than what men actually preferred.

This suggests that women's pursuit of thinness cannot be entirely accounted for by their conscious perception of what men desire, and could actually be attributed to motives compatible with the evolutionary theory of intra-sexual competition. Perhaps these women recognize that men prefer a certain size and engage in competition with other women to achieve that size, but the intra-sexual competition may fuel 'runaway' dieting that leads to anorexia nervosa (Abed, 1998). Research conducted using the female body silhouettes assessed perceived preference of the opposite sex as well as same sex peers (Cohn & Adler, 1992). The silhouette that females selected as most attractive to other females was significantly thinner than the silhouette that women actually selected as most desirable (Cohn & Adler, 1992). Ultimately, the intra-sexual competition hypothesis provides an argument for how eating disorders may arise in our current environment. Specifically, women engage in thinness seeking to advertise their reproductive value, but as a result of the novel environmental conditions, actually take it to an extreme, which interferes with their original goals of appearing reproductively appealing.

Definition of Restraint

The term restraint is defined as replacing internally regulated or hunger-driven eating with planned, cognitively determined eating or dietary restraint, with the goal of weight loss or preventing weight gain (Polivy & Herman, 1995). Thus, a restrained eater,

or dieter, is operationally defined as one who ignores internal cues of hunger and satiety to adhere to a calorically reduced eating plan that will presumably lead to weight loss or prevent weight gain (Polivy & Herman, 1995).

Eating Disorders and Restraint

As Polivy and Herman (1995) point out, the eating behaviour of restrained eaters has repeatedly been shown to differ in important respects from that of unrestrained eaters. Restrained eaters monitor their food intake cognitively instead of tuning into their internal hunger states. Compared to unrestrained individuals, they also seem to be insecure and uncertain of themselves which makes them more likely to be influenced by external norms regarding thinness and beauty. This then prompts them to diet to achieve these norms, which could lead to dependence on external factors for assessing their hunger states (Polivy & Herman, 1995).

The link between dieting and the development of an eating disorder in susceptible individuals is widely recognized. A longitudinal study conducted by Stice and Whitenton (2002) found that perceived pressure to be thin, the internalization of the thin-ideal, and dieting all function as risk factors for the subsequent development of eating disorders. Through structural equation modelling, Stice and colleagues found that women observe disordered eating in the media and emulate these behaviours such as fasting and purging (Stice et al., 1994). Polivy and Herman (1995) also point out that many of the behaviours characteristic of dieters, such as restrictive eating, bingeing, excessive exercise, apply in a more extreme form, to patients with eating disorders. The evolutionary mate selection theory of eating disorders may also apply to restrained eaters. Like those with eating

disorders, dieters are weight schematic, meaning that they tend to interpret information from a weight perspective (King, Polivy, & Herman, 1991). Therefore, they are more likely to be highly invested in interpersonal strategies that rely on thinness and attractiveness.

Abed's Sexual Competition Hypothesis and Restraint

One of the key claims of Abed's Sexual Competition Hypothesis is that females' intra-sexual competition under more recent ecological conditions (e.g., increased female independence, short-term mating strategies) leads to a drive for relative thinness (Abed, 1998). This is because, for women, the display of high mate value and of their reproductive potential is evidenced by a thin, hour glass shape. Thus, females engage in dietary restraint to achieve this shape, which demonstrates their reproductive value. According to Abed, females engage in dieting which, for some, may spiral into an extreme form of food restriction and eventually, in eating disorders (Abed, 1998). Given that dieters are more weight schematic than are non-dieters (Vitousek & Hollon, 1990), they *may* be more susceptible to this force of evolution, however the factors that lead to restrained eating are different than the factors that contribute to an eating disorder.

Social Influence on Food Consumption

Eating can obviously be done alone, but it is often considered a social activity. Several studies have demonstrated that social situations have an effect on eating behaviour (Chaiken & Pliner, 1987; Clendenen, Herman, & Polivy, 1994; Copeland, Woods, & Hursey, 1995; De Luca & Spigelman, 1979; Herman, Polivy, & Silver, 1979; Mooney, DeTore, & Malloy, 1994; Mori, Chaiken, & Pliner, 1987). By extension, eating may also

be affected by competition with others.

Clendenen, Herman and Polivy (1994), showed that participants ate less dessert when paired with a stranger than when eating with friends, indicating that the nature of one's relationship with dining companions is an important factor contributing to social facilitation/inhibition of eating. Also, Chaiken and Pliner (1987) demonstrated that women are judged by the amount of food that they consume. Specifically, both males and females considered a female target who ate smaller meals to be significantly more feminine, less masculine, more concerned about her appearance, better looking, and more likely to possess stereotypical feminine personality traits. These findings suggest that women may be motivated to restrict their food intake and chronically maintain a low body weight to appear feminine (Chaiken & Pliner, 1987).

Krantz (1979) observed that overweight individuals purchased less food in a university cafeteria when accompanied by others, a finding he attributed to weight consciousness and perceived social pressures. Similarly, a study by Lee and Goldman (1979) revealed that being 'stared at' while eating resulted in obese individuals departing from the room significantly faster than did non-obese individuals.

Similar results have been found for individuals who are eating with members of the opposite sex. In particular, Pliner and Chaiken's (1990) had male and female participants eat a meal in the presence of an attractive male or female confederate, and found an overall effect where participants ate less in the presence of a partner of the opposite sex. Similarly, a study by Mori, Chaiken, and Pliner (1987) revealed that in the presence of an attractive male, females ate less than females paired with an unattractive male or a same

sex partner. Neither restraint nor evolutionarily desirable qualities were examined in these studies.

Finally, a study by Copeland, Woods, and Hursey (1995) found that women who engage in average levels of restrained eating significantly decrease their eating following interaction with a partner whom they considered physically attractive. No studies have been found that examined the effect of mate desirability on restrained and unrestrained eaters' eating behaviour beyond physical attractiveness.

Taken together, these studies point to a relationship between an individual's food consumption and their social situation. Of more importance, there is evidence that restrained and unrestrained women, when placed in the presence of an attractive male, will restrict their eating. However, the studies described above do not provide a complete test for the evolutionary explanation because they did not manipulate evolutionarily meaningful variables in males beyond physical attractiveness.

Competition

Competition is thought to reflect the act of contending with others for a desirable end result or goal which could simply be supremacy, but also involve a position, or a prize (Garcia, Tor, & Gonzales, 2006). Competition can be fostered in many ways but it is often induced when there is a desired outcome or prize of limited quantity (competition with others) or when individuals want to improve upon their past performance (competition with self; Garcia, Tor, & Gonzales, 2006). Research by Ryckman, Libby, van den Borne, Gold & Lindner (1997) focused on two types of competition; hypercompetitiveness, as defined by Horney, and personal development.

Horney (1937) defined hypercompetitiveness as an indiscriminate need by individuals to compete and win (and to avoid losing) at any cost as a means of maintaining or enhancing feelings of self-worth. She suggested that the characteristics of manipulation, aggressiveness, exploitation, and derogation of others across a myriad of situations have been demonstrated in those with a hypercompetitive nature (Horney, 1937). Personal development competitiveness is defined as an attitude in which the primary focus is not on the outcome (i.e., on winning), but more on enjoyment and mastery of the task (Ryckman, Hammer, Kaczor, & Gold, 1996).

Current research has revealed that competition is more complex and not limited to one goal, but usually involves both aspects of desiring self-improvement and competition with others. In other words, competition goes beyond self improvement only, and incorporates a desire to be better than others. This means that if a female made an attractiveness comparison that turned out to be unfavourable to herself, it may be an even more powerful motivator to take action in the way of dieting (Huon, Piira, Hayne, & Strong, 2002). The same researchers found that competitiveness with peers concerning one's body, appearance and eating has negative consequences as it is related to more pathological levels of dieting behaviour (Huon et al., 2002). With the current preoccupation with slenderness, it is hardly surprising that adolescents' comparisons with their peers often focus on body, or appearance related aspects of themselves (Paxton, 1996). In one Japanese study, researchers found that social pressure to be thin from female friends, rather than from mothers, was most associated with subsequent eating disorder tendencies in female participants (Matsumoto, Kumano, & Sakano, 1999). As well, a

study examining risk factors for body dissatisfaction found that only perceived pressure to be thin from peers, and not family, predicted increases in body dissatisfaction (Presnell, Bearman & Stice, 2004).

Intra-Sexual Competition and Eating Behaviour

Competition is very salient in our society and Abed argues that it is a pivotal feature for the development of eating disorders in single females, because they compete for evolutionarily desirable males. Of course, competitive relationships are contingent on the fact that the human species has the mental facility (module) to detect potential threats to their relationship status (Gilbert, 2001). Gilbert's module is used for identifying same sex threats of other females who may compete for a mate and is based on social comparison and prime defensive behaviours such as fighting for the relationship. Past research has revealed that the desire to be attractive to others has played a major role in human evolution, and our competitive mentality is focussed on winning approval of the opposite sex, appreciation, and acceptance (Gilbert, 2001).

Of the different types of competition, only the hypercompetitive component, defined as the desire to win in interpersonal situations, correlated significantly with disordered eating (Burckle, Ryckman, Gold, Thornton, & Audesse, 1999). In one study, eating disordered women reported feeling more competitive with their closest female friend compared to women who did not engage in disordered eating (Zelley, 2001).

Burckle et al. (1999) found that hypercompetitiveness was related strongly to eating disorder symptoms, but that personal development competitiveness was unrelated. Moreover, disordered eating was associated positively with the need to achieve in

appearance (Burckle et al., 1999). Past research makes it obvious that appearance is a major weapon in female-against-female competition (Brownmiller, 1984; Buss, 1988). For hypercompetitive females, appearance, not accomplishment, is the feminine demonstration of desirability and worth (Brownmiller, 1984).

Anxiety and Eating Behaviour

Research has revealed a relationship between anxiety and dieting (Abramson & Wunderlich, 1972; Godart, Flament, Lecrubier, & Jeammet, 2000; Herman, Polivy, Lank, & Heatherton, 1987; Polivy, Herman, & McFarlane, 1994; Schachter, 1968) and researchers have long viewed the effects of anxiety on eating as depending primarily on the type of person involved. Non-obese, non-dieting people, who are presumably responsive to their physiological state, are expected to react to anxiety or stress by eating less, whereas expectations regarding the effect of stress on overweight people are more variable (Herman et al., 1987). Herman et al. (1987), found that anxiety, a variable they state reduces hunger, reduced eating in hungry non-dieters, and to a lesser extent, in satiated non-dieters. Further findings from that study revealed that for dieters, anxiety increased eating only when the participants were initially hungry (Herman et al., 1987). Other research found no effect of anxiety on the eating behaviour of obese subjects (Abramson and Wunderlich, 1972). However, Schachter (1968), who used slightly different anxiety manipulations, found that average weight subjects ate substantially less when anxious and that obese subjects ate more although their amount consumed was not significant. It is thought that anxiety makes overweight dieters more responsive to environmental cues and that they consume food to shift their anxiety to the less serious crime of overeating away from a

potentially larger stress (Polivy et al., 1994). Researchers found that when confronted with an anxiety-producing threat, dieters increased their food consumption regardless of whether the food was considered palatable (Polivy et al., 1994). Also, they found that dieters ate more unpalatable food when they were anxious than when they were calm (Polivy et al., 1994). In short, when confronted with an anxiety provoking-producing threat to their self-esteem, restrained eaters increased their food consumption indicating that eating serves some functional purpose for distressed dieters (Polivy et al., 1994). In reviewing, anxiety appears to decrease eating in non-dieters, whereas in dieters, it either does not affect them or it makes them eat more.

Other research has demonstrated that exposure to thin-ideal females in the media decreased body satisfaction and reduced womens' confidence in their bodies (Copeland et al., 1995; Lin & Kulik, 2002). Of particular importance, in one study, exposure to thin women raised anxiety in females who did not have a boyfriend (Lin & Kulik, 2002). Also, highly restrained women displayed a tendency towards disinhibition of eating following interaction with an attractive individual, male or female (Copeland et al., 1995). Given that some single women feel anxious when exposed to thin images, that some women modify their eating behaviour while in the presence of others, and that intra-sexual competition raises anxiety, it would be important to examine women's anxiety regarding dating competition in relation to their eating.

The important issue is that, although inconclusive, there is a relationship between anxiety, dieting behaviour and eating (Godart et al., 2000). When women engage in intra-sexual competition, anxiety could be a moderating factor because the competition can, in

itself, be anxiety provoking. Given that the relationship between anxiety and the eating behaviour of dieters is unclear, anxiety is an important variable to consider when researching female eating behaviour. Specifically, anxiety should be measured to assess whether potential differences in participants' eating may be occurring due to state anxiety regarding the overall experimental manipulation in that it may make dieters more anxious than non-dieters, thereby representing an alternative explanation for the differential eating.

Self-Esteem, Eating Behaviour, and Body Dissatisfaction

Although the relationship between disordered eating behaviour and low self-esteem is evident, the strength of that relationship is not clear and is often moderated or influenced by body dissatisfaction. Research has shown that exposure to fashion magazine content and images depicting thinness may lead to short term reductions in self-esteem and decreased body satisfaction (Irving, 1990 ; Martin & Gentry, 1997). Other research has found that body dissatisfaction is itself a source of distress and is associated with low self-esteem (Durkin, Paxton, & Wertheim, 2005). What has been clearly established is that individuals with higher self-esteem are more resilient to factors that can negatively influence their body image such as peer judgment and media/sociocultural influences (McCaulay, Mintz, & Glenn, 1988).

Trottier, Polivy, and Herman (2005) found that restrained eaters had significantly lower appearance, social, and total self-esteem and marginally lower performance self-esteem than did unrestrained eaters. This relationship between low self-esteem and disordered eating patterns held over a four-year prospective study where 11-year old females with low self-esteem developed more severe signs of eating pathology at age

fifteen (Button, Sonuga-Barke, Davies, & Thompson, 1996). An additional study revealed that females who endorsed abnormal eating behaviour and significant eating pathology had low overall self-esteem scores on a measure of self-esteem (Button, Loan, Davies, & Sonuga-Barke, 1997).

In a study conducted by Wilksch & Wade (2004), unrestrained eaters had significantly lower shape and weight concerns and higher self-esteem than did restrained females, demonstrating that low self-esteem is associated with dietary restriction. In that same study, depressed females with anorexia had significantly higher shape and weight concerns and lower self-esteem than did restrained eaters. High levels of self-esteem were protective against developing an eating disorder in an 18-month longitudinal study as females with lower self-esteem met more DSM-IV criteria for disordered eating. This provided prospective evidence supporting the role of low self-esteem as a major determinant of disordered eating (Cervera et al., 2003). Also, studies revealed that restrained eaters with low self-esteem actually disinhibited, and ate more after ingesting a high calorie preload compared to both restrained eaters with high self-esteem who ate slightly less, and unrestrained eaters who ate less regardless of self-esteem status (Heatherton, Polivy, Herman, 1990; Polivy, Heatherton, & Herman, 1988).

In sum, there are clear connections between an individual's reported level of self-esteem, eating behaviour, and body dissatisfaction. This connection could be further influenced by females engaging in social comparison as a means to assess their own desirability from which they may draw conclusions that influence their self-esteem. This makes self-esteem an important variable to consider when researching female eating

behaviour.

Purpose of the Proposed Research

Rationale and Background

A number of hypotheses can be derived from Abed's (1998) explanation of eating disorders. Broadly, Abed posits that AN arises from increased intra-sexual competition between females for evolutionarily desirable males. Specifically, he stated that current conditions have increased females' ability to both control their body shape and their mating behaviour, creating a more competitive environment where ultimately, some females succumb to the competitive pressures and develop AN (Abed, 1998).

Abed's (1998) theory includes two main postulates. The first one is that the pursuit of thinness and the advertisement of thinness is a "mate attraction" strategy for women. A recent study of Abed's (1998) theory directly tested an evolutionary model of restrained eating by manipulating evolutionarily desirable mate characteristics such as possessing resources and being willing to share them (Robillard, 2004). Under the pretence of conducting research on dating, 59 single and 62 committed women were randomly assigned to be exposed to either two desirable or two undesirable male descriptions. Physical attractiveness was controlled for by using the same two pictures to accompany the desirable and undesirable male descriptions. Both pictures were pilot tested and found to be equivalent in attractiveness: both were considered to be average to above average in attractiveness. The desirable males had lucrative and successful careers, owned their own homes and enjoyed children. The undesirable males worked at minimum wage jobs, were financially unsuccessful, lived with their parents, and disliked children. Participants were

asked to choose which of the two desirable or undesirable males they would prefer as a long-term mate. They were also asked to indicate what characteristics were important to them when choosing a mate. During this time they were offered M&Ms to snack on. Unbeknownst to the participants, the M&Ms were pre-weighed and pre-counted so that participants' food consumption could be measured. Results revealed that single women ate significantly less ($M = 12$ grams) when exposed to the desirable males than when exposed to the undesirable males ($M = 29$ grams). Single women also ate significantly less than did committed women ($M = 33$ grams) when exposed to the desirable males. The eating behaviour of committed women was uninfluenced by the desirability of the male description. The prediction that restrained eaters would eat less was unsupported, the results revealed that they actually appeared to have broken their cognitive restraint as they ate more across all conditions. This suggests that restrained eaters became disinhibited when viewing both desirable and undesirable males. The reasons for this are unclear and need to be further examined. Nevertheless, overall, the results of this study offered preliminary support for Abed's Sexual Competition Hypothesis of Eating Disorders in that only the single women's eating was significantly suppressed when exposed to a desirable male description. Presumably, single women pursue thinness at least in part to attract a suitable male. Perhaps when they are confronted with evolutionarily desirable potential males, they eat less, possibly in the hope of communicating that they too are evolutionarily desirable by engaging in a behaviour consistent with remaining or becoming thin. Thus, restrained eating may be a strategy of mate attraction.

The second postulate of this model pertains to intra-sexual competition. Abed

(1998) hypothesized that when single females are led to believe that they are competing with other females for an evolutionarily desirable male, they will engage in competitive strategies to attract the male. Because of research showing that for males, female attractiveness is best evaluated through physical attractiveness and a thin hour-glass shape, it stands to reason that females would restrict their eating behaviour while being induced to believe they are competing with other females for a desirable male (Abed, 1998; Buss, 1989; Davis, 1990; Dijkstra & Buunk, 2002; Townsend & Levy, 1990). This finding should further be moderated by restraint status, such that while competing for males, dieters would be expected to eat less than would non-dieters because they pursue and value thinness to a greater extent. Although the preliminary study completed in 2004 (Robillard) found that restrained eaters ate more when exposed to both desirable and undesirable males, these results would need to be replicated as both restraint theory and research on restrained eaters is more reflective of maintained cognitive restraint strategies. Furthermore, how restrained eaters would react in a competitive situation remains an empirical question. Past research suggests that restrained eaters are more likely to restrict their eating in the presence of a desirable male, and are more likely to see thinness as a necessary condition for romantic success compared to unrestrained eaters (Jarry, Polivy, Herman, Arrowood, & Pliner, 2006). As well, research shows that female dieters' eating is more susceptible to social influence than is that of unrestrained eaters (Copeland et al., 1995; Polivy, Herman, Younger, & Erskine, 1979). Therefore, when induced to compete with other women for a desirable male, female restrained eaters should show this pattern of diminished eating to a greater extent than unrestrained eaters.

The Research Question

As previously noted, females want to communicate to potential males their relative physical attractiveness and fitness because it serves as a signal for reproductive capacity (Abed, 1998). Past research has demonstrated that single females' eating is affected by the evolutionary desirability of the males to whom they are exposed, while committed women's eating is not (Robillard, 2004). Therefore, the current study will only examine single (not currently dating) females. Abed argues that competition between females for potential males results in reduced food consumption. If this is true, women placed in a situation of competition for a desirable male should decrease their eating relative to women exposed to undesirable males and/or, who are not competing, and dieters exposed to these conditions should eat even less.

Hypothesis 1 (Predicted three-way interaction)

The main prediction is that restrained females who are exposed to descriptions of evolutionarily desirable males and induced to feel competitive toward other women will eat the least of all groups.

Hypothesis 2 (Predicted two-way interaction - Competition Status X Male Status)

A significant interaction will occur whereby single females who are exposed to descriptions of evolutionarily desirable males and induced to feel competitive toward other women will eat less than other groups, regardless of restraint status.

Hypothesis 3 (Male Status = Desirable vs. Undesirable)

Based on previous research showing that single females ate less when exposed to evolutionarily desirable males, it is expected that the same effect will be replicated and that

single females exposed to desirable males will eat significantly less than single females exposed to undesirable males.

Hypothesis 4 (Competition = Competition vs. No-Competition)

Single females exposed to the competition condition will eat significantly less than single females in the no-competition condition.

Hypothesis 5 (Competitiveness Status = Hypercompetitive vs. Personal Development)

Hypercompetitiveness will be a better predictor of M&M consumption than personal development competitiveness.

Hypothesis 6 (Dieting Peer Competitiveness and Motivation to Achieve in Appearance)

M&M consumption will be better predicted by the combined effect of dieting peer competitiveness and motivation to achieve in appearance than by either of these alone.

Hypothesis 7 (Rating of Evolutionary Desirability of the Males)

Participants' ratings of the evolutionary desirable males will be significantly more favourable than participants' ratings of the undesirable males.

Chapter II

METHOD

Participants

A power analysis was conducted to determine how many participants were needed to have a reasonable chance of obtaining significant results with a meaningful effect size. A power level of .80 is considered desirable and was utilized along with an alpha of .05 to determine sample size (Cohen, 1996). Finally, sample size estimates were based on a prior similar study utilizing Cohen's model and 130.24 participants were needed in order to detect a moderate to large effect size (Cohen, 1996). Due to pre-qualifiers and selection criteria, only 125 students were available to be recruited from the undergraduate participant pool of the University of Windsor. The participant pool is comprised of undergraduate psychology students who have registered on-line to participate in research for bonus points toward their final grade in an approved psychology undergraduate course of their choice. Although registration within the pool is open to all students enrolled in undergraduate psychology courses, students are able to obtain the same number of bonus points toward their final grade by completing alternative assignments. From the initial eligible list of participants who chose to earn bonus points through the pool, screening questions were utilized to exclude or include certain participants. These questions were: "Have you ever had or do you currently have a diagnosis of an eating disorder?", "Do you consume a large amount of food in a short period of time that would be considered abnormal by others?", "Do you feel a loss of control while eating during that time?", "Are you currently single, not involved in a relationship?", and "Are you exclusively

homosexual (prefer members of the same sex)?” Because application of the evolution theory to homosexual individuals is not clearly delineated, only heterosexual, single females between the ages of 18-27 years of age who denied a current or past diagnosis of an eating disorder were invited to participate in the study. Only participants who met the above criteria were granted access to the study description and given the opportunity to participate. Using these criteria, a computer list was randomly generated. The age restriction for participants included in the study is related to the age of the males they would be choosing from during the experimental manipulation. Evolutionary theory clearly states that females look for males who are older and demonstrate health and longevity (Buss, 1990; Symons, 1995). The males in this study were aged 26 and 27 to appropriately reflect the descriptions and believability of employment. For the purposes of this study, single was defined as “currently not in a relationship.” In terms of sexual preference, the demographic questionnaire contained a question asking participants to indicate whether they were heterosexual, homosexual, or bisexual, which served as a final check to ensure the heterosexuality of participating individuals.

As well, the Eating Disorder Examination Questionnaire (EDEQ) was used as a screening tool to ensure that only women who did not endorse eating pathology were retained in the study. Excluding women who endorse eating pathology allows a test of the evolutionary theory that would reflect a general population of women.

The mean age of participants was 20.50 years ($SD = 1.72$). The age of participants ranged from 18 to 27 years of age. Participants identified themselves as follows: 77.4% were Caucasian, 8.9% were Asian, 4.8% were African, 2.4% were Hispanic or Latino, and

0.8% were Native Canadian. Finally, a small proportion (5.6%) endorsed the category labelled 'other.' Of the 125 participants tested, 83.7% spoke English as their first language. In terms of years in University, the majority of participants were enrolled in their third year (30.6%), 29.8% were in second year, 25.8% were in first year, and 13.7% were enrolled in fourth year. The majority of participants self-reported that they were undertaking an Arts degree (58.9%), with 19.4% taking a Science degree, 4.8% Health Studies, 0.8% Business, and 16.1% identified themselves in the 'other' category which included such programs as dramatic art, engineering, and human kinetics. Of the 125 participants, 37.9% identified psychology as their major whereas 62.1% identified other subjects as their primary major. One hundred twelve participants reported 'single' status on the demographic questionnaire, one participant indicated she was divorced, and 12 participants endorsed 'dating' relationships under four weeks in length. Finally, none of the participants endorsed bi-sexuality or homosexuality.

Exclusion Criteria

At the time of actual participation in the study, 12 participants self-identified as having engaged in a relationship since registering into the pool and one participant reported being divorced. The length of the new relationships varied from one to four weeks and these participants were excluded temporarily to conduct the statistical analysis. When these newly 'dating' participants were excluded there was no discernable difference in the results from the analyses that included all participants. Therefore, these 12 participants were retained in the analysis. Although five participants exhibited scores on the EDEQ reflective of clinical severity, closer examination of each individual's responses

revealed that not one participant met criteria for a clinical diagnosis of an eating disorder and thus they were retained in the analyses. Finally, one participant was excluded from the analyses due to the fact that she was quadriplegic, breathing through a tracheotomy, and the experimenter was unable to determine whether the participant was able to consume normal foods. The final participant population consisted of 124 undergraduate female participants, 63 unrestrained individuals and 61 restrained individuals, between the ages of 18 and 27.

Group Assignment

All participants were randomly assigned to both competition status and male desirability. Competition was manipulated by exposing one half of the participants to the competition condition where they were presented with attractive, evolutionarily desirable female descriptions, and one half of the participants to the no-competition condition where they were exposed solely to the male descriptions. Male desirability was manipulated by exposing one half of the participants to evolutionarily desirable male descriptions, and one half of the participants to evolutionarily undesirable male descriptions. The third independent variable “restraint” is a subject variable that was measured with the Revised Restraint Scale (RRS, Herman & Polivy, 1980). Similar to prior studies (Ogden, 1993; Polivy & Herman, 1995), the RRS was administered after the experimental procedure so the participants did not anticipate the purpose of the study.

Materials

Consent Forms and Letter of Information

Each participant signed a consent form (Appendix A). Included in the consent was

information for participants about the risks and benefits of participating in psychological research as well as confidentiality information. They were also given a Letter of Information that contained the same information but did not require their signature (Appendix A). During the debriefing, each participant was asked to have their weight and height measured and to sign an additional consent form for this (Appendix B).

Male Descriptions and Questionnaires - Experimental Manipulation

The materials consisted of two packages, each containing two male descriptions. These packages were used in a prior study (Robillard, 2004) that confirmed that these descriptions accurately reflect either desirable or undesirable evolutionary qualities in males. Also, these descriptions proved to be reasonable analogues of the hypothetical construct that was being measured as the presentation of these males impacted the participants' eating behaviour. Package A contained two desirable male descriptions and Package B contained two undesirable male descriptions (Appendix C). The pictures remained the same for both the desirable and undesirable male conditions, as appearance was not an independent variable in this study.

Participants were also asked to complete two questionnaires related to their choice of male (Appendix D). The first questionnaire consisted of 21 items, and assessed participants' ratings of importance for a list of mate characteristics. Ratings were made on a 5-point Likert scale where 1 indicates "Not at all Important" and 5 indicates "Extremely Important." The second questionnaire also consisted of 21 items and contained specific ratings about their mate choice on the same list of mate characteristics, as well as a question asking how happy they would be in a long-term relationship with their choice.

Robillard (2004) showed these questionnaires to have good reliability (Cronbach's Alpha = .76 for the first questionnaire and .92 for the second). Also attached to the mate desirability questionnaires were two pages on which participants were asked to describe themselves. Instructions varied according to whether participants had been assigned to the no-competition condition or to the competition condition. In the latter, instructions were designed to promote feelings of competitiveness.

Female Descriptions - Competition Manipulation

The female descriptions (Appendix E) were designed for the current study. The descriptions and accompanying photographs were pilot tested with a small sample. Results of the pilot testing revealed that the females accurately represented evolutionarily desirable women possessing both physical attractiveness and a thin physique. Both females have a calculated body mass index of 20, which was the lower end of what is considered normal weight at the time that these data were collected (Brownell & Fairburn, 1995). The descriptions were designed to make salient the fact that these females were attractive both physically and evolutionarily. Both endorsed activities or hobbies that reflect a physically active lifestyle.

Demographic Questionnaire

The demographic questionnaire (Appendix F) was designed for the current study. Participants were asked to respond to questions about their age, education, ethnic background, marital status, sexual orientation, and allergies or dietary restrictions.

Eating Disorder Examination Questionnaire (EDEQ)

The 4th edition of the Eating Disorder Examination Questionnaire (EDEQ;

Appendix G; Fairburn & Beglin, 1994; Fairburn & Cooper, 1993) was used due to its diagnostic capabilities for assessing current eating pathology. This 36-item self-report measure generates four subscale scores (Restraint, Eating Concern, Shape Concern & Weight Concern), as well as an overall score. The four subscales provide information about the severity of aspects of psychopathology of eating disorders such as body image concerns and eating pathology. The restraint subscale asks questions such as, “Have you gone for long periods of time (8 hours or more) without eating anything in order to influence your shape and weight?” The eating concern subscale asks questions such as “Have you eaten in secret?” The shape concern subscale poses questions such as “Has thinking about food or its caloric content made it much more difficult to concentrate on things you are interested in, for example, read, watch TV, or follow a conversation?” Finally, the weight concern subscale addresses issues such as “How much would it upset you if you had to weigh yourself once a week for the next four weeks?” Participants have to indicate on a 7-point Likert scale the number of days they engage in specific behaviours in the last 28 days, acknowledge the presence or absence of certain eating behaviours, and the frequency of eating behaviours. An endorsement of 0 means no days, and an endorsement of 6 means everyday. Items are rated on a 7-point Likert scale (0-6) and scores between four and six inclusively indicate clinical severity. Cronbach’s alpha coefficients for the four subscales ranged from 0.78 to 0.93 and Pearson correlation coefficients for the reliability ranged from 0.81 to 0.94 across the subscales (Luce & Crowther, 1999).

Revised Restraint Scale (RRS)

The RRS (Appendix H; Polivy, Herman & Heatherton, 1988), was used to assess restrained eating. It consists of 12 items, scored on a Likert scale that taps diet, weight history, and concerns with food and eating (Herman & Mack, 1975). The RRS has two subscales: Weight Fluctuation and Concern for Dieting. Sample items of the concern for dieting subscale include “How often are you dieting?” and “Do you have feelings of guilt after overeating?” A sample item from the Weight Fluctuation subscale is “In a typical week, how much does your weight fluctuate (in pounds)?” Similar to past studies, individuals who score less than 15 on the questionnaire were classified as “unrestrained” eaters and individuals who score 15 or above were classified as “restrained” eaters (Allison, Kalinsky, & Gorman, 1992; Drewnowski, Risky, & Desor, 1982; Heatherton et al., 1988; Klem, Klesges, Bene, & Mellon, 1990). The RRS has high test-retest reliability and internal consistency, .95 and .82, respectively (Allison et al., 1992).

Motivation to Achieve in Appearance Scale

The Motivation to Achieve in Appearance scale (MAA, Appendix I) is a 5-item scale designed to assess participants’ level of motivation to be attractive (Burckle et al., 1999). Scores can range from 5 to 25 with higher scores indicating greater motivation to achieve in appearance. A sample item is, “I spend a lot of time working to improve my appearance.” This scale has strong internal consistency and good test-retest reliability, .86 and .70 respectively (Burckle et al., 1999).

Hypercompetitive Attitude Scale

The Hypercompetitive Attitude scale (HCA, Appendix J) assesses individual

differences in hypercompetitive attitudes (Ryckman et al., 1996; Ryckman, Thornton, & Butler, 1994). This scale contains 26 items and scores can range from 26 to 130 with higher scores indicating that individuals engage in more outward comparison with others. Sample items include “Losing in competition has little effect on me,” and, “If I can disturb my opponent in some way in order to get the edge in competition, I will do so.” The Hypercompetitive Attitude scale has good internal consistency and test-retest reliability, .91 and .81 respectively (Ryckman, Hammer, Kaczor, & Gold, 1990).

Personal Development Competitive Attitude Scale

The Personal Development Competitive Attitude scale (PDCA, Appendix K) includes 15 items created to assess individual differences in competitive attitudes based on personal development goals (Ryckman et al., 1996; Ryckman et al., 1997). Scores can range from 15 to 75, with higher scores indicating that participants engage in an inward style of comparison and personally compete with themselves. Sample items include, “Competition can lead to the formation of friendship with others,” and, “I value competition because it helps me to be the best that I can be.” The PDCA scale has been demonstrated to have strong internal consistency and adequate test-retest reliability, .90 and .70 respectively (Ryckman et al., 1996).

Dieting Peer Competitiveness Scale

The Dieting Peer Competitiveness scale (DPC, Appendix L) consists of 9 items assessing dieting-related competitiveness among females (Huon et al., 2002). Scores can range from 9 to 45 with scores higher than 33 indicating pathological dieting attitudes (Huon et al., 2002). Sample items include, “When I look at my slim friends I wish I could

look just like them,” and, “I feel happier about my figure when I am with someone who is larger than myself.” The Dieting Peer Competitiveness Scale has been demonstrated to have good internal consistency and test-retest reliability, .76 and .72 respectively (Huon et al., 2002).

Rosenberg’s Self-Esteem Scale

The Rosenberg Self-Esteem Scale (RSES, Appendix M) is a 10 item scale created to assess individuals’ self reported levels of trait self-esteem (Rosenberg, 1979). Scores are determined on a 4-point Likert scale where 1 is “strongly disagree” and 4 is “strongly agree.” Higher scores are indicative of greater levels of self-esteem. A sample item would be, “On the whole, I am satisfied with myself.”

State Trait Anxiety Inventory

The State Trait Anxiety Inventory (STAI, Appendix N) is a global evaluation tool designed to measure anxiety proneness (A-Trait, 20 items) and current level of tension and apprehension (A-State, 20 items; Spielberger, 1983). State Anxiety is a measure of an individual’s current level of anxiety and Trait Anxiety assesses an individual for anxiety as a stable personality trait. Responses on the A-State are rated on a 4-point Likert scale ranging from 1 (not at all) to 4 (very much so) to express current levels of anxiety. Responses on the A-Trait are rated on a 4-point Likert scale ranging from 1 (almost never) to 4 (almost always) to express general levels of anxiety. Ten of the A-state items, and 9 of the A-Trait items are reverse scored. High scores on either of the two STAI scales mean higher levels of anxiety. The ranges, means, and standard deviations for the participants’ descriptive information and all measures are displayed in Table 1.

Table 1.

Descriptive Data for Participants, Study Measures, and Dependent Variable (N = 124)

Variable	Range	Mean	Standard Deviation	Cronbach's Alpha
M&M (gm)	0-79	25.07	19.13	
- Unrestrained		23.92	19.14	
- Restrained		26.26	19.21	
Age	18-27	20.50	1.72	
Program Year	1-4	2.31	1.02	
BMI	17.5 - 44.6	23.82	5.16	
RRS	0-27	13.48	5.83	.79
EDEQ	0-4.90	1.61	1.12	.88
MAA	5-25	14.28	4.68	.87
PDCA	15-74	51.84	13.14	.94
HCA	30-98	64.87	12.54	.86
DPC	9-40	24.11	7.09	.78
RSES	20-40	32.16	4.54	.86
STAI - State	44-56	50.56	2.29	.90
STAI - Trait	22-67	39.11	9.06	.91
PQ1	59-96	79.09	7.14	.82
PQ2	34-92	68.61	14.09	.93

Note. BMI = Body Mass Index, RRS = Revised Restraint Scale, EDEQ = Eating Disorder Examination Questionnaire, MAA = Motivation to Achieve scale, PDCA = Personal Development Competitive Attitude scale, HCA = Hypercompetitive Attitude scale, DPC = Dieting Peer Competitiveness scale, RSES = Rosenberg's Self-Esteem Scale, STAI - State = State Trait Anxiety Inventory, STAI - Trait = State Trait Anxiety Inventory, PQ1 = Partner Questionnaire One, PQ2 = Partner Questionnaire Two.

Dependent Variable

M&Ms were used to assess eating behaviour and were measured in grams pre and post manipulation. In previous studies, M&M consumption has been shown to be sensitive to experimental manipulations (Cavallo & Pinto, 2001; Copeland et al, 1995). A study by Copeland, Woods, and Hursey (1995) examined the relationship between social interaction variables and eating disinhibition among restrained eaters utilizing M&M consumption as the dependent variable. As well, unpublished studies conducted at the University of Windsor have utilized M&Ms and candy as the dependent variable with significant results (Aubie, 2005; Robillard, 2004). A correlation table between the dependent variable, M&M consumption, and all measures is included in Table 2.

Procedure

This procedure and data collection method was consistent with that of a prior study by Robillard (2004). Because participants were expected to eat M&Ms, they were booked for the study between the hours of 11:00 am and 5:30 pm, Monday to Friday. Upon arriving at the lab, participants were told that market research for a dating agency was being conducted to determine how people choose mates, and what qualities they look for in a mate. Under the pretense that these males were clients of the dating agency, participants were asked to look at two pictures and descriptions, and hypothetically choose which male they would prefer as a long-term partner. In order to ensure anonymity, participants were asked not to write their name on any of the materials provided.

Table 2.

Correlation table for dependent variable of M&Ms and all measures

	M&M	RRS	EDEQ	RSES	STAI-S	STAI-T	MAA	PDCA	HCA	DPC	PQ1	PQ2
M&M												
RRS	.03											
EDEQ	-.02	.75**										
RSES	.05	-.24*	-.42**									
STAI-S	.07	-.09	-.14	.29*								
STAI-T	-.03	.30*	.44**	-.73**	-.31*							
MAA	-.11	.40**	.53**	-.19*	-.09*	.30*						
PDCA	-.07	.06	-.15	.26*	.17	-.24*	.02					
HCA	.06	.14	.08	-.21*	-.06	.25*	.18	.38**				
DPC	.03	.63**	.76**	-.32**	-.02	.34**	.49**	-.10	.15			
PQ1	.11	.02	.07	.11	.06	.03	.21*	.19*	.19*	.05		
PQ2	-.28*	.03	.07	.05	.05	-.02	.18*	.04	.07	.05	.38**	

Note. RRS = Revised Restraint Scale, EDEQ = Eating Disorder Examination Questionnaire, RSES = Rosenberg’s Self-Esteem Scale, STAI-S, State Trait Anxiety Inventory-State, STAI-T = State Trait Anxiety Inventory - Trait, MAA = Motivation to Achieve in Appearance scale, PDCA = Personal Development Competitive Attitude scale, HCA = Hypercompetitive Attitude scale, DPC = Dieting Peer Competitiveness scale, PQ1 = Partner Questionnaire One, PQ2 = Partner Questionnaire Two

* $p < .05$, ** $p < .001$

For the mate selection portion of the study, participants sat at a table on which there were some pens, the consent form, and a small bell. Participants were asked to read the consent form while the experimenter prepared the materials for the study. The experimenter then reentered the room carrying a bowl, an open bag of pre-weighed M&Ms, and a pair of scissors. The scissors were meant to give the impression that the bag of M&Ms had just been cut open to prevent any hygiene concerns in the participants. The same two photographs were paired with either the evolutionarily desirable or the evolutionarily undesirable male descriptions. Participants were handed the male descriptions with pictures and corresponding questionnaires. In the desirable male condition, these descriptions depicted evolutionarily desirable traits. In the undesirable male condition, two different descriptions depicted undesirable males. Participants were instructed to read each male description carefully and decide who they would choose for a long-term mate.

Along with completing the mate questionnaire, participants in the no-competition condition were asked to write approximately one page at the end of the questionnaire about themselves (Appendix D). They were told that this would simply provide information about why they made the choice that they made. Participants in the competition condition were told that part of the study also concerned how the men that they had just rated choose women. They were told that these men would also be choosing among potential female partners and that they (the participants) would be among the women from which they would choose. It was explained to participants that these men would go through the same procedure as they had just completed to choose a female mate. They were asked to write a

one-page summary describing themselves and told that the men would read these to assist them in making their choice (Appendix D). Participants were further told that due to the novelty of this style of dating advertisement, the agency is interested in pilot testing both descriptions with and without a picture, and that it is now testing the 'no picture' option so no picture would have to be taken today. Participants were told that this is because many people prefer to not use a picture in their dating ads. These participants were then given an envelope addressed to the "Perfect Match Toronto Dating Agency" and told that there was a randomly numbered sheet inside the envelope for them to write their one-page summary about themselves. They were told that the envelope would be sent directly to the dating agency in Toronto as "I am just processing the information regarding how females choose males." In the no-competition condition, participants were also told that the summary regarding themselves will be sent along to the dating agency because the agency would like to have some global demographic information to help them understand choices.

Upon completion of their description, participants in both conditions were asked to enclose it in the envelope, seal the envelope, date the envelope across the flap, and toss it in a bin that was labelled "To Toronto" with the address of the dating agency on the outside. This bin included twenty other envelopes all similarly addressed to the dating agency to induce believability in the cover story. Participants were told that this procedure is necessary as "I was only asked to gather and analyse information regarding female choices and I am not supposed to know anything about the male choice part of the study." They were reminded not to put their names on their description paper as confidentiality is very important in that we did not want to be able to link up the participants and

descriptions. As well, these precautions were taken so that participants would have no concerns about the experimenter knowing what they wrote about themselves and thus, minimize any anxiety unrelated to the purpose of the study.

Allegedly in order to facilitate their writing task, participants in the competition condition were provided with two pictures and accompanying descriptions of females from the same dating agency. This served as the competition manipulation and participants were told that these women agreed to have their descriptions utilized as examples in order to help participants write their one page summary of qualities that they have to offer. The experimenter then went over the questionnaires with the participants to ensure that they understood the task of both choosing a male, explaining their choice and describing themselves.

At this point, the experimenter casually grabbed the open bag of 201 M&Ms and poured them into a bowl telling the participant that “the M&Ms were going to be used in an experiment on taste preference that was cancelled yesterday, so now we have a lot of them and you are welcome to help yourself.” The experimenter then nonchalantly took one M&M still left in the bag, and ate it while informing the participant that they have to take the full 20 minutes to complete their task.

Exactly twenty minutes later, the experimenter reentered the room with the remainder of the questionnaires. The experimenter gathered the male descriptions, the explanation sheet, the questionnaires, and the M&Ms and told the participant, “I’m just going to get everything out of your way.” Participants were asked to put their sealed and dated envelope in the bin themselves. All participants were told to ring the bell when they

were finished filling out the second set of questionnaires which included the demographic information sheet as well as the EDEQ, MAA, HCA, PDCA, DPC, RSES, STAI and the RRS. These questionnaires were presented in a counterbalanced order over the course of the study. Included with the questionnaires were two questions that served as a manipulation check for competition. They were given at the beginning of the second set of questionnaires and asked the participants how strongly they compared themselves to other females on a five point Likert scale with '1' meaning not at all, and '5' meaning extremely. The second question used the same Likert scale and asked how much they felt competitive with the particular females in the study. In the no-competition condition, the second question was not asked (Appendix O). After participants completed their second set of questionnaires, they were debriefed (Appendix P) and informed of the true nature of the study. No participants guessed the true nature of the study, and despite receiving the information that the males and accompanying descriptions were made up, continued to verbally compare the qualities of the males to the experimenter. Participants were then asked if they would mind having their weight and height measured and were reminded that everything is confidential. Of the 125 participants tested, three declined to be weighed, in which case their self-reported weight on the RRS was utilized for calculations of BMI. At completion of the session, participants were asked if they had any questions, and told when the results of the study would be made available.

Approach to Data Analyses

All analyses were performed using the Statistical Package for the Social Sciences (SPSS) for Windows, Version 14.0. Reliability analyses were conducted on the Revised

Restraint Scale (RRS), the Eating Disorder Examination Questionnaire (EDEQ), the Motivation to Achieve in Appearance (MAA) scale, the Personal Development Competitiveness Attitude (PDCA) scale, the Hypercompetitive Attitude (HCA) scale, the Dieting Peer Competitiveness (DPC) scale, the Rosenberg Self-Esteem Scale (RSES), the State Trait Anxiety Inventory (STAI), the Importance of Characteristics Questionnaire (PQ1), and the Characteristics of Partner Choices (PQ2). Descriptive analyses were performed on all variables included in the study.

The data pertaining to the main dependent variable of M&M consumption was analysed with a 2 x 2 x 2 between subjects experimental design with restraint status as a two-level factor (restrained, unrestrained), competition as a two-level factor (competition, no-competition), desirability of male as a two-level factor (evolutionarily desirable, evolutionarily undesirable). This ANOVA was tested for homogeneity of variance and lack of fit and neither achieved significance. Participants' rating of the males was assessed with independent *t*-tests to serve as a replication of previous studies that have demonstrated that females prefer evolutionarily desirable males. Regression analyses were conducted to examine the relationship between endorsement of competitive attitudes and M&M consumption. Finally, regression analyses were completed to assess whether participants' levels of competitiveness and motivation to achieve in appearance could predict their M&M consumption.

Multivariate Outliers

Multivariate outliers within each group were examined using SPSS REGRESSION and identified using the Mahalanobis distance, which tends to yield very conservative

estimates (Tabachnick & Fidell, 2001). A second indicator, Cook's D, was used in addition to the Mahalanobis distance to identify influential multivariate outliers (Tabachnick & Fidell, 2001). An influential multivariate outlier is defined as a case whose inclusion or exclusion from the analysis results in significant changes in one or more of the regression co-efficients (Stevens, 2002), and is indicated by a Cook's D of 1.0 or greater. For the purpose of this study, a multivariate outlier was defined as a case with a significant Mahalanobis distance and a Cook's D > 1.0. No multivariate outliers were found for any of the independent variables or the dependent variables utilized in the ANOVA and one multivariate outlier was identified in the variables utilized in the regression analyses and was removed for the regression analyses.

Consistency Analyses

Prior to further analyses, the internal consistency of all the measures was assessed. The overall consistency analysis revealed Cronbach alpha coefficients ranging from .78 to .94. It has been recommended that reliability for measures used for research purposes be above .70 (Kaplan & Saccuzzo, 1997), thus, all measures were in an acceptable range.

Descriptive Information and Scoring of the Measures

Independent Variables

The Eating Disorder Examination Questionnaire (EDEQ) was used as a diagnostic measure to confirm that no participants qualified for a diagnosis of an eating disorder. Both the overall score of the EDEQ and the four subscales of the EDEQ: restraint, eating concern, shape concern, and weight concern were calculated. A comparison with community norms provided by the author of the EDEQ (Fairburn & Beglin, 1994) revealed

no significant differences. The EDEQ also contains diagnostic questions, which when endorsed and evaluated together, reveal the extent to which participants are actively engaging in eating disorder symptomatology. No participants were excluded as none met diagnostic cut-offs for a diagnosis of an active eating disorder. Using the Revised Restraint Scale (RRS), 63 participants (50.81 %) were classified as unrestrained eaters and 61 (49.19 %) were classified as restrained eaters.

Dependent Variable and Predictor Variables

Diagnostic Information

The dependent variable was quantified utilizing grams of M&Ms consumed by each participant. Prior to conducting further analyses, the data was explored and normality of M&M consumption distribution was assessed using a Q-Q plot, a histogram of participants' scores, and the Kolmogorov-Smirnov (KS) statistic (Field, 2000). A visual inspection of the histogram revealed that participants' scores were positively skewed. Similarly, the Kolmogorov-Smirnov (KS) statistic revealed that there was a significant deviation from normality, $KS(1,124) = .11, p = .01$. A square root transformation is among the recommended suggestions for data that are moderately positively skewed (Tabachnick & Fidell, 2001). The transformation was performed and the data more closely approximated a normal distribution, $KS(1,124) = .07, p = .20$.

The predictor variables, PDCA, HCA, DPC, MAA were explored and normality of each variable was assessed using a Q-Q plot, a histogram of participants' scores, and the Kolmogorov-Smirnov (KS) statistic (Field, 2000). A visual inspection of the histograms for the HCA and the DPC revealed that participants' scores were normally distributed and

the Kolmogorov-Smirnov (KS) statistic revealed that there was no significant deviation from normality for either the HCA, $KS(1,124) = .08, p = .09$, or the DPC, $KS(1,124) = .06, p = .20$. A visual inspection of the histogram for the PDCA revealed that participants' scores were negatively skewed. Similarly, the Kolmogorov-Smirnov (KS) statistic revealed that there was a significant deviation from normality, $KS(1,124) = .10, p = .01$. A reflection of scores and then a square root transformation is among the recommended suggestions for data that are negatively skewed (Tabachnick & Fidell, 2001). The transformation was performed and the data more closely approximated a normal distribution, $KS(1,124) = .05, p = .20$. Finally, a visual inspection of the MAA histogram revealed a flat distribution with negative kurtosis which did not require further transformation (Tabachnick & Fidell, 2001).

Chapter III

Results

Manipulation Check

A manipulation check was performed to determine to what extent participants did feel competitive with other females in the competition condition. An independent sample *t*-test showed that women exposed to the competition condition reported comparing themselves with other women ($M = 2.73$, $SD = .85$) more than did women in the no-competition condition ($M = 1.85$, $SD = .97$), $t(122) = 5.30$, $p < .001$, $d = .96$. Females in the competition condition were also asked how much they felt competitive with the female examples in the study. The overall mean was above the midpoint of the scale ($M = 3.35$, $SD = 1.19$, range = 1 to 5), indicating that participants appeared to feel competitive with the females presented in the competition condition. Interestingly, participants' reported feelings of social comparison were significantly different based upon whether they were exposed to the undesirable or the desirable males. Participants reported engaging in more social comparison when exposed to the desirable males ($M = 2.68$, $SD = .98$) than when they were exposed to the undesirable males ($M = 1.89$, $SD = .88$), $t(122) = -4.77$, $p < .001$, $d = .39$. This was true for feelings of competitiveness as well, participants reported feeling more competitive when exposed to the desirable males ($M = 3.79$, $SD = .99$), than when exposed to the undesirable males ($M = 2.67$, $SD = 1.27$), $t(64) = -4.00$, $p < .001$, $d = .98$. As well, females' preference for evolutionarily desirable males over evolutionarily undesirable males was hypothesized, however, it may also serve as a manipulation check. Considered this way, it was proven that participants exposed to the evolutionarily desirable

males rated them as desirable ($M = 4.00$, $SD = .67$), and indicated that they would be happy with their mate choice while participants exposed to the evolutionarily undesirable males did not rate them as desirable ($M = 1.62$, $SD = .58$), $t(122) = 21.03$, $p < .001$, $d = 3.80$, and indicated that they would be unhappy with their mate choice.

Group Equivalence

Separate analyses of variances (ANOVA) were conducted utilizing participants' BMI, Rosenberg Self-Esteem scale (RSES) total, and their trait anxiety total on the State Trait Anxiety Inventory (STAI-T) as dependent variables, to ensure that there were no systematic differences between groups on these variables. Significant differences were found between the eight conditions for participants' scores on the RSES and the STAI-T. Specifically, for RSES, there was a significant interaction between male status, restraint status, and competition status, $F(1,116) = 3.84$, $p = .05$, $\omega^2 = .02$. As well, for the STAI-T, there was a significant interaction between male status, restraint status, and competition status, $F(1,116) = 4.16$, $p = .04$, $\omega^2 = .03$. Thus, these variables were explored as potential covariates for the main analyses utilizing two separate ANCOVAs with M&Ms grams as the dependent variable. Neither RSES $F(1,114) = .25$, $p = .62$, nor STAI-T $F(1,114) = .37$, $p = .54$ were significant covariates. Furthermore, the RSES and STAI-T anxiety total scores were uncorrelated with the dependent variable of grams of M&Ms (both $ps > .60$). Finally, for greater sensitivity, the data was split by group and 8 correlation matrixes were produced to assess the relationship between the potential covariates and the dependent variable of M&M grams consumed. Only one of the eight groups revealed a significant correlation. In the no competition condition, where restrained females were looking at

evolutionarily desirable males, there was a significant correlation between STAI-T anxiety scores and M&Ms, $r(16) = .46, p = .04$. However, the overall correlation pattern was variable demonstrating both positive and negative correlations in different cells. Finally, given that neither the RSES nor the STAI-T met assumptions for ANCOVA, these measures were not utilized as covariates for the analyses.

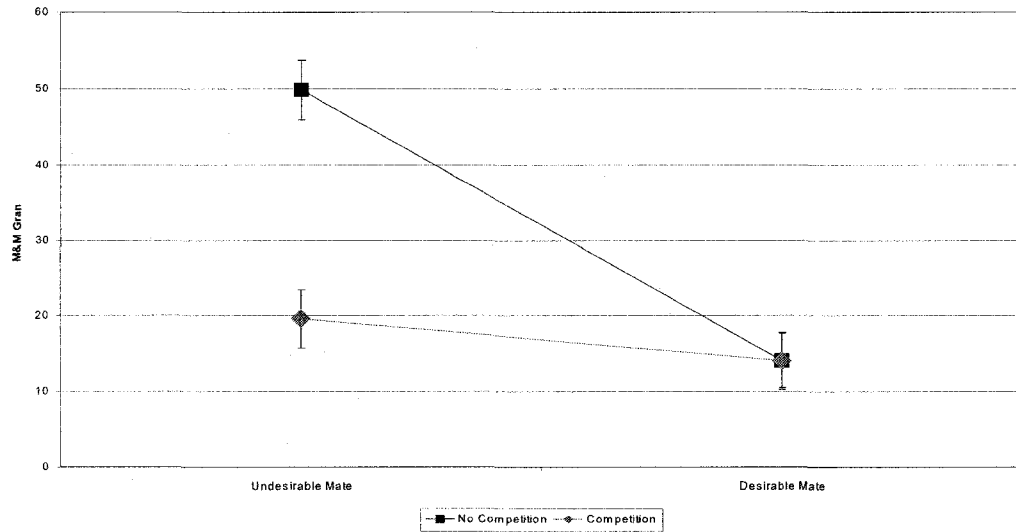
Hypothesis 1 (Predicted 3-way interaction)

A 2 x 2 x 2 between-groups factorial analysis of variance (ANOVA) was used to investigate the effects of male exposure (evolutionarily desirable male vs. evolutionarily undesirable male), competition status (competition vs. no-competition condition), and restraint status (unrestrained vs. restrained), on the participants' eating behaviour. There was a significant three-way interaction between male desirability, competition status, and restraint status, $F(7,116) = 10.79, p < .001, \eta^2 = .08$. However, the means within each condition were such that the hypothesis was not verified (See Figure 1 for a visual illustration of the results separated by restraint status and Figure 2 for the results separated by competition condition).

To understand the interaction, post-hoc analyses were conducted with eight pair-wise contrasts to identify the significant effects. These specific eight contrasts were necessary to verify our hypothesis. A Bonferroni correction was used to control for family-wise error rate using a statistical significance of .05 which resulted in a p value of 0.006 as the critical cut-off. A hand calculation formula was used with the mean square of the error from the ANOVA (225.421); $X_1 - X_2$ over the $MSw * (\sum C_1^2/n + C_2^2/n)$. A t distribution table was utilized for significance. Three of the pair-wise contrasts were significant and

Figure 1. Three-way interaction between male desirability, competition status and restraint status separated by restraint status.

1a. Unrestrained Eaters



1b. Restrained Eaters

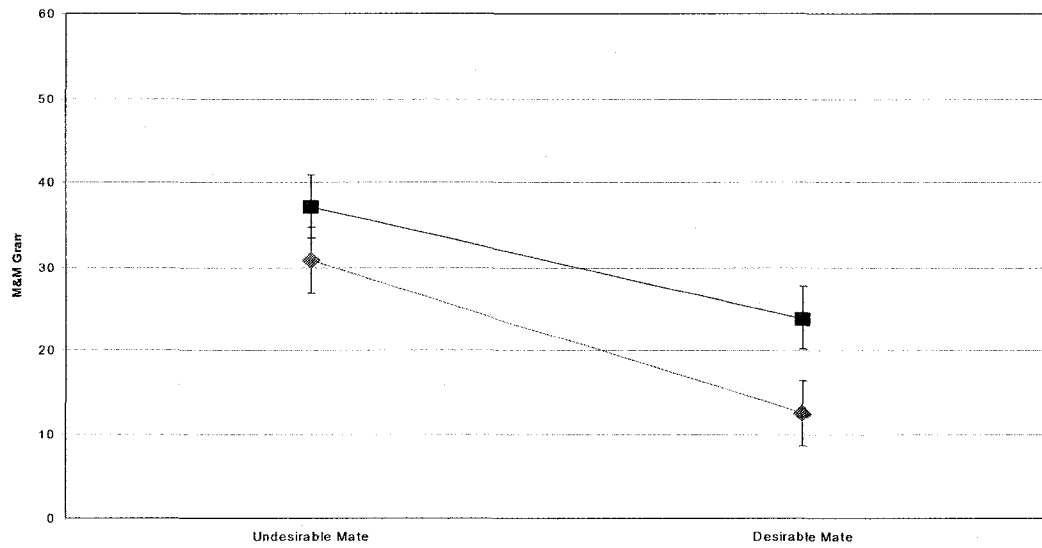
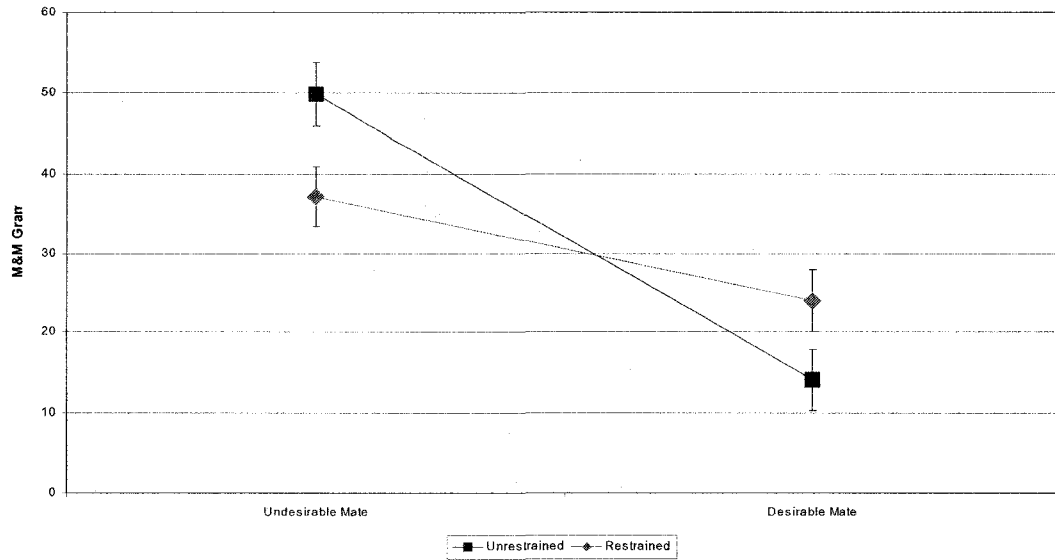
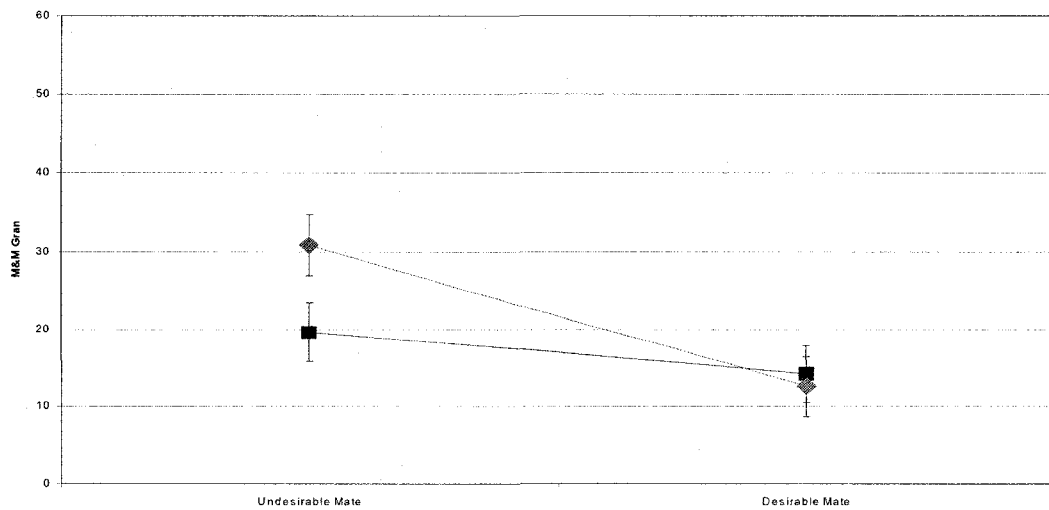


Figure 2. Three-way interaction between male desirability, competition status and restraint status separated by competition status.

2a. No Competition Condition



2b. Competition Condition

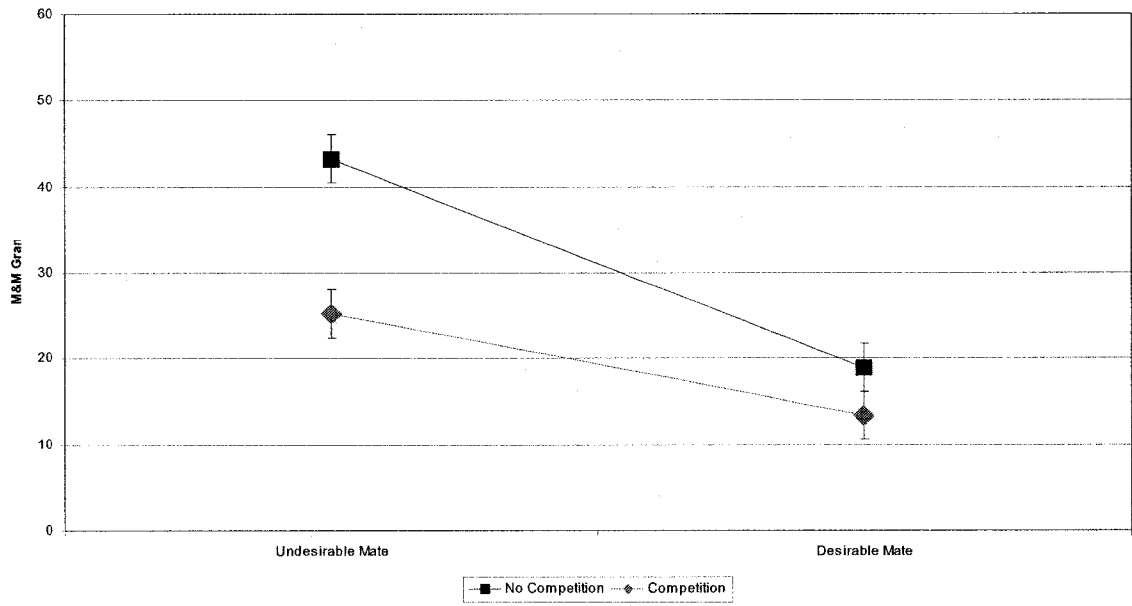


five were not. Analyses revealed a significant difference in the no competition condition where unrestrained eaters' M&M consumption was higher when exposed to undesirable males ($M = 49.87$, $SD = 15.53$) than when exposed to the desirable males ($M = 14.06$, $SD = 11.48$), $t(116) = 6.53$, $p < .006$, $d = 2.62$. Further, in the undesirable male condition, unrestrained eaters M&M consumption was higher in the no competition ($M = 49.87$, $SD = 15.53$) than in the competition condition, ($M = 19.60$, $SD = 9.91$), $t(116) = 5.52$, $p < .006$, $d = 2.32$. Finally, in the competition condition, restrained women ate fewer M&Ms when exposed to desirable males ($M = 12.47$, $SD = 16.47$) than when exposed to undesirable males ($M = 30.80$, $SD = 20.92$), $t(116) = 3.35$, $p < .006$, $d = .97$. None of the remaining contrasts were significant (all $p > .006$).

Hypothesis 2 (2 way interaction = Competition Status X Male Status)

The ANOVA revealed a two way interaction such that females who were exposed to descriptions of evolutionarily desirable males and induced to feel competitive toward other women ate less, regardless of restraint status, $F(1, 116) = 5.44$, $p < .05$, $\eta^2 = .05$ (see Figure 3 for a visual illustration of the results). Simple effects tests showed that participants in the competition condition who were exposed to the evolutionarily desirable males ate significantly fewer M&Ms ($M = 13.34$, $SD = 14.17$) than those exposed to the evolutionarily undesirable males ($M = 25.20$, $SD = 17.06$), $t(60) = 2.98$, $p < .01$, $d = .76$. As well, in the no competition condition, participants exposed to the evolutionarily desirable males ate significantly fewer M&Ms ($M = 18.84$, $SD = 15.56$) than those exposed to the evolutionarily undesirable males ($M = 43.29$, $SD = 15.48$), $t(60) = 6.20$, $p < .001$, $d = 1.58$. Participants exposed to the evolutionarily desirable males did not differ in their M&M

Figure 3. Two way interaction between male desirability and competition condition



consumption across the levels of competition, $t(61) = 1.47, p = .15$. However, participants exposed to the evolutionarily undesirable males in the no competition condition ate significantly more ($M = 43.29, SD = 15.48$) than participants in the competition condition ($M = 25.20, SD = 17.06$), $t(59) = 4.34, p < .001, d = 1.11$.

Hypothesis 3 (Male Status = Desirable vs. Undesirable)

The same analysis revealed a main effect for male status such that women exposed to the evolutionarily desirable males ate less ($M = 16.05, SD = 15.01$) than did women exposed to the undesirable males ($M = 34.39, SD = 18.54$) regardless of competition or restraint status, $F(7, 116) = 45.48, p < .001, d = 1.09$. The hypothesis was verified.

Hypothesis 4 (Competition = Competition vs. No-Competition)

The same analysis also revealed a main effect of competition status such that women in the competition condition ate less ($M = 19.08, SD = 16.62$) than did women exposed to the no-competition condition ($M = 31.06, SD = 19.72$) regardless of male exposure or restraint status, $F(7, 116) = 19.77, p < .001, d = .66$. The hypothesis was supported.

Hypothesis 5 (Competitiveness = Hypercompetitiveness vs. Personal Development)

Based on prior research on styles of competitiveness, it was expected that hypercompetitiveness would be a better predictor of eating behaviour than personal development competitiveness (Ryckman et al, 1997). A stepwise regression was attempted with M&M gram consumption as the outcome variable (DV) and total scores on the Hypercompetitive Attitude scale and the Personal Development Competitive Attitude scale as predictor variables (IVs). All methods of regression analyses are most appropriately

utilized when each IV is strongly correlated with the DV but uncorrelated with other IVs (Tabachnick & Fidell, 2001). Examination of the correlation table revealed that the dependent variable did not correlate highly with either independent variable of hypercompetitiveness, $r(124) = .06, p = .24$, or personal development competitiveness, $r(124) = .07, p = .22$, which explains why SPSS did not produce an equation for the stepwise regression. A confirmatory standard multiple regression analysis was performed with M&M gram consumption as the outcome variable (DV) and total scores on the Hypercompetitive Attitude scale and the Personal Development Competitive Attitude scale as predictor variables (IVs). Analysis were performed using SPSS REGRESSION and SPSS FREQUENCIES and revealed that neither hypercompetitiveness, ($B = 0.16, SE = 0.15, t = 1.09, p = .28$) nor personal development competitiveness, ($B = -0.16, SE = 0.14, t = -1.13, p = .26$) were significant predictors of participants' M&M consumption, $F(2,121) = .90, p = .41$. The results of the regression equation can be found in Table 3. The hypothesis was not verified.

Hypothesis 6 (Dieting Peer Competitiveness and Motivation to Achieve Components)

A stepwise regression was attempted with M&M gram consumption as the outcome variable (DV). Total scores on the motivation to achieve in appearance scale and the peer dieting competitiveness scale as well as an interaction term obtained by multiplying motivation to achieve in appearance and dieting peer competitiveness were included as the predictor variables (IVs). Again, SPSS did not produce a stepwise equation and a standard multiple regression analysis was performed to gain information. Analyses were performed using SPSS REGRESSION and FREQUENCIES and revealed that neither dieting peer

Table 3.

Regression Analyses Results for Hypotheses Five, Six, and the Supplementary Analyses

Regression Variable	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>F</i>	<i>p</i>
Hypothesis Five						
Hypercompetitive (HCA)	0.16	0.15	1.09	0.28	.90	0.41
Personal Development (PDCA)	-0.16	0.14	-1.13	0.26	.90	0.41
Hypothesis Six						
Dieting Peer Competitiveness (DPC)	-0.38	0.78	-0.49	0.63	1.16	0.33
Motivation to Achieve (MAA)	-1.78	1.27	-1.41	0.16	1.16	0.33
DPC X MAA	0.05	0.05	0.94	0.35	1.16	0.33
Supplementary Analyses						
Male Status X Competition Status*	10.90	5.36	2.03	0.04	25.78	0.00

Note. * For all four scales; the Personal Development Competitive Attitude scale, the Motivation to Achieve in Appearance scale, the Dieting Peer Competitiveness scale, and the Hypercompetitive Attitude Scale, the experimental conditions of Male Status and Competition Status significantly interacted only with each other, and the equation removed the variables of PDCA, MAA, DPC, and HCA for lack of correlation with the dependent variable.

competitiveness, ($B = -0.38$, $SE = 0.78$, $t = -0.49$, $p = .63$), nor motivation to achieve in appearance, ($B = -1.78$, $SE = 1.27$, $t = -1.41$, $p = .16$), nor the interaction between dieting peer competitiveness and motivation to achieve in appearance, ($B = 0.05$, $SE = 0.05$, $t = 0.94$, $p = .35$) were significant predictors of participants' M&M consumption, $F(3,120) = 1.16$, $p = .33$. The hypothesis was not supported.

Supplementary Exploratory Analysis

Because the initial two regression analyses investigating the impact of trait competitiveness on eating were not significant, analyses were conducted to examine whether the predictor variables were interacting with the experimental conditions. Four regression analyses were performed with built-in interaction terms between the experimental conditions and each of the four scales. SPSS regression revealed that for all regression models, the assumption of no multicollinearity was met. Prior to performing the regression analyses an outlier was identified and removed. As a result, the regression models revealed that for all four competition scales, the Personal Development Competitive Attitude (PDCA) scale, the Motivation to Achieve in Appearance (MAA) scale, the Dieting Peer Competitiveness (DPC) scale, and the Hypercompetitive Attitude (HCA) scale, the experimental conditions of male condition and competition condition were significantly interacting only with each other, $B = 10.90$, $SE = 5.36$, $t = 2.03$, $p = .04$; $F(3,119) = 25.78$, $p < .001$, and the equation removed the variables of PDCA, MAA, DPC, and HCA in each regression, for lack of correlation.

Hypothesis 7 (Rating of Evolutionary Desirability of the Males)

An independent *t*-test was conducted to verify the sexual selection theory in evolutionary theory. In particular, when physical attractiveness is controlled for, females will prefer males with evolutionarily desirable qualities over males who do not possess those traits. This is a manipulation check and replication of previous studies that have both demonstrated and confirmed this finding. Participants exposed to the evolutionarily desirable males rated them as desirable ($M = 4.00, SD = .67$), and indicated that they would be happy with their mate choice while participants exposed to the evolutionarily undesirable males did not rate them as desirable ($M = 1.62, SD = .58$), $t(122) 21.03, p < .001, d = 3.80$, and indicated that they would be unhappy with their mate choice. The hypothesis was verified. The range in ratings of desirability of the evolutionarily desirable males was 3 (2-5), with only 2 participants rating the male below the midpoint of the scale at a score of two, and similarly, the range for ratings of the evolutionarily undesirable males was 2 (1-3), with only 3 participants rating the male at midpoint of the scale. The hypotheses, analyses used and results are listed in Table 4.

Table 4.

Summary of Study Hypotheses and Results

Hypotheses	Variables to be used in testing the hypotheses	Analyses Used & Results
<p>H1. Predicted 3-way interaction.</p> <p>Restrained eaters in the competition condition who are exposed to the evolutionarily desirable males will eat the least amount of M&Ms.</p>	<p>Criterion Variable is the amount of M&Ms consumed.</p> <p>Independent variables are Restraint status, competition condition and male desirability.</p>	<p>Analysis of Variance.</p> <p>$F(7,116) = 10.79$, $p < .001$</p> <p>Post hoc comparisons revealed that the hypothesis was not verified.</p>
<p>H2. Predicted 2 way interaction.</p> <p>Single females exposed to descriptions of evolutionarily desirable males and induced to feel competitive toward other women will eat less regardless of restraint status.</p>	<p>Criterion Variable is the amount of M&Ms consumed.</p> <p>Independent variables are competition condition and male desirability.</p>	<p>Analysis of Variance.</p> <p>$F(1, 116) = 5.44$, $p < .05$</p> <p>Hypothesis verified.</p>

<p>H3. Mate Status: (Desirable vs. Undesirable): Single females exposed to desirable males will eat significantly less than single females who are exposed to undesirable males.</p>	<p>Criterion Variable is amount of M&Ms consumed. Independent variable is the male desirability status.</p>	<p>Analysis of Variance. $F(7,116) = 45.48,$ $p < .001$ Hypothesis verified.</p>
<p>H4. Competition: (Competition vs. No-Competition): Single females in the competition condition will eat significantly less than single females in the no-competition condition.</p>	<p>Criterion Variable is amount of M&Ms consumed. Independent variable is the competition condition.</p>	<p>Analysis of Variance. $F(7,116) = 19.77,$ $p < .001$ Hypothesis verified.</p>

<p>H5. Competitiveness: Hypercompetitiveness will be a better predictor of M&M consumption than personal development competitiveness.</p>	<p>Criterion Variable is amount of M&Ms consumed. Predictor variables are the scores on the hypercompetitive attitude (HCA) scale and the personal development competitive attitude (PDCA) scale.</p>	<p>Regression. (HCA) $B= 0.16, SE= 0.15, t = 1.09, p = .28$ (PDCA) $B= -0.16, SE= 0.14, t = -1.13, p = .26$ $F (2,121) = .90, p = .41$ Hypothesis not verified.</p>
<p>H6. Dieting Peer Competitiveness: M&M consumption will be better predicted by the combined effect of dieting peer competitiveness (DPC) and motivation to achieve (MAA) than by either of these alone.</p>	<p>Criterion Variable is amount of M&Ms consumed. Predictor variables are the scores on the dieting peer competitiveness scale and the motivation to achieve in appearance scale.</p>	<p>Regression. (DPC X MAA) $B = 0.05, SE = 0.05, t = 0.94, p = 0.35$ (DPC) $B= -0.38, SE= 0.78, t = -0.49, p = .63$ (MAA) $B= -1.78, SE= 1.27, t = -1.41, p = .16$ $F (2,121) = 1.16, p=.33$ Hypothesis not verified.</p>

<p>H7. Evolutionary Desirability of the Males: Participants' rating of the evolutionarily desirable males will be significantly higher than their ratings of the evolutionarily undesirable males.</p>	<p>Criterion Variable is the scores on the five point partner questionnaire scale. Independent variable is the male descriptions.</p>	<p>Independent <i>t</i>-Test. $t(122) = 21.03, p < .001$ Hypothesis verified.</p>
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CHAPTER IV

Discussion

Hypothesis One

The main hypothesis was that restrained females induced to compete with evolutionarily desirable females for evolutionarily desirable males would eat the least. For this hypothesis to be verified, three conditions needed to be met: Within the competition condition the restrained eaters needed to eat less than the unrestrained eaters when exposed to the desirable males and they needed to eat less when exposed to the desirable males than when exposed to the undesirable males. Finally, restrained eaters exposed to the desirable males needed to eat less in the competition than in the no-competition condition.

This hypothesis was not verified because there was no significant difference in M&M consumption between restrained and unrestrained eaters exposed to evolutionarily desirable males in the competition condition. Also, restrained eaters appear to have applied their cognitive restraint strategies throughout and were only minimally influenced by exposure to desirable males or competition with attractive females. In fact, restrained eaters' eating pattern was very similar in the competition and the no competition condition. Even though under competition they ate significantly less when exposed to evolutionarily desirable males than when exposed to undesirable males, and this difference was not significant in the no-competition condition, visual inspection of Figure 1 clearly shows a very similar eating pattern in both competition conditions. This suggests that while dieters are influenced by intra-sexual competition, they are much less responsive to this factor than are unrestrained eaters.

One simple explanation for why they were not more responsive to the competition manipulation could be that there was a floor effect in the restrained eaters' M&M consumption; they were already eating minimally making it impossible for a potential effect to manifest. There is another compelling explanation for why there were no significant differences between restrained and unrestrained eaters in the competition condition combined with exposure to evolutionarily desirable males. Perhaps there are other factors that are contributing to the restrained eaters' maintenance of cognitive restraint over and above the factors proposed by the evolutionary theory of eating disorders and as such, their maintenance of cognitive restraint, and associated failure to release restraint, could be the result of a bevy of factors associated with restrained eating.

Stice's (2002) meta-analytical review compiled a plethora of research findings documenting factors that contribute to the risk and maintenance of eating pathology and from this review he identified several factors that contribute to dieting. These included widely established and supported factors for restrained eating such as high body mass index, socio-cultural pressure to be thin, body dissatisfaction, and internalization of the thin-ideal, though the effect of the thin-ideal on maintenance of dieting was noted to be medium, compared to the other factors (Stice, 2002). For example, females with elevated body mass indexes (BMI) who participated in a three-year longitudinal study endorsed feeling increased body dissatisfaction and perceived pressure to be thin that led to restrictive eating (Cattarin & Thompson, 1994). As well, active pressure from peers and perceived pressure from media sources to be thin has been directly linked to body dissatisfaction and restrictive eating (Wilksch & Wade, 2004; Durkin & Paxton, 2002).

Thus, it is possible that the restrained eaters in this study were maintaining their restraint for reasons unrelated to those proposed by evolutionary theory, such as sexual selection strategies. These could include high BMI or peer or societal pressure. As a result, exposure to other evolutionary desirable females may have had little effect in the face of their multi-determined restraint.

In sum, these results, which are the first known findings that tested the evolutionary theory of eating disorders, do not support Abed's proposition that Intra-sexual competition (due to a novel environment) as the main, ultimate mechanism for 'why' eating disorders arise. To recall, Abed's (1998) theory argues that women pursue thinness (dieting) to appear more reproductively attractive and communicate reproductive value to potential mates. For a small subset of women, this strategy spirals out of control (due to increased intra-sexual competition within our societal environment) leading some women to develop eating disorders. Thus, for the evolutionary theory of eating disorders to demonstrate wide range applicability, the restrained eaters (individuals who are pursuing thinness) should have been more responsive to the intra-sexual competition than were the unrestrained eaters. The results were in direct contrast to Abed's prediction that it is the chronic pursuit of thinness that leads some females to experience 'runaway' strategies that lead to the development of eating disorders. In fact, pursuit of thinness as a mate attraction strategy appeared to lead to acute food restriction in unrestrained eaters but may only be one of the many factors that could affect chronic dieters confirming that disordered eating is multi-determined. In fact, the results suggest that dieting to pursue mates is less associated with the development of disordered eating than the current established risk factors. In short, it

was the non-dieting females who were more affected and adopted the 'pursuit of thinness to attract a mate' strategy, and who displayed significant differences in food intake dependent on which males they were exposed to, not the dieters, which is likely due to their absence of pre-formed cognitive restraint.

As noted above, the unrestrained eaters' eating behaviour in the desirable male condition and in the competition condition was more responsive. More specifically, when unrestrained females were exposed to the evolutionarily desirable males, their eating was significantly suppressed compared to when they were looking at the undesirable males. Furthermore, competition suppressed unrestrained eaters' food consumption regardless of the quality of the males to whom they were exposed.

Interestingly, viewing undesirable males in a non-competitive situation resulted in the highest levels of M&M consumption, especially for unrestrained eaters. One possible explanation for why the unrestrained, non competing females ate the most could be that their M&M consumption reflected typical, uninhibited eating. Without the pressure of competition or desirable males, they ate the equivalent of one regular size bag of M&Ms (48gm, a standard bag has between 53-58 individual M&Ms), which may simply reflect their normal eating behaviour.

Finally, another plausible explanation for why unrestrained eaters consumed fewer M&Ms when presented with undesirable males in a competition condition concerns self-esteem. Across the literature, restrained eaters report lower self-esteem than unrestrained eaters and self-esteem is largely unrelated to body size, but is highly related to restraint status (Heatherton, Polivy, & Herman, 1990; Polivy, Heatherton, & Herman, 1988). Non-

dieters are known to have higher self-esteem than do dieters (Polivy, Heatherton, & Herman, 1988). Although in this study, the restrained eaters' self-esteem scores ($M = 31.16$, $SD = 4.74$) were not significantly different from the unrestrained eaters' scores ($M = 32.71$, $SD = 4.30$), $F(1,122) = 1.92$, $p = .17$, there was a significant negative correlation between self-esteem scores and restraint scores. Specifically, higher self-esteem was significantly correlated with lower restraint, $r(124) = -.24$, $p < .01$. Furthermore, individuals with high self-esteem engage in significantly more impression management behaviour than do those with low self-esteem (Baumeister, 1982; Baumeister, Tice, & Hutton, 1989). When an individual with high self-esteem experiences an attack on their self-esteem, they engage in impression management to protect their favourable self-image (Sommer & Baumeister, 2002). Thus, perhaps exposure to desirable females resulted in self-reflection on one's own worth and involved a potential self-esteem threat that high self-esteem females sought to redress by engaging in compensatory behaviours such as reduced eating. Thus, unrestrained eaters may have been engaging in behaviours to match the attractiveness level of the females who may have represented a self-esteem threat (Baumeister, 1982). In this case, they could have been consuming fewer M&Ms as a way of increasing or maintaining their competitive edge related to their appearance.

Hypothesis Two

The second hypothesis of the study stated that single females exposed to descriptions of evolutionarily desirable males and induced to feel competitive toward other women would eat less than other groups, regardless of restraint status. This hypothesis was verified. Past research had shown that females restrict their eating while in the presence of

physically attractive males, with no manipulation of evolutionary qualities (Copeland, Woods, & Hursey, 1995; Pliner and Chaiken, 1990). Recent research has confirmed one facet of Abed's hypothesis, that single females eat less when exposed to evolutionarily desirable males (Robillard, 2004). A second facet of Abed's (1998) theory posits that some females set their body template at an abnormally low weight in order to compete with other females for mating rights with males. This competitiveness would characteristically be seen in females who are looking for males with evolutionarily desirable traits. The present research confirmed that women engage in acute restrained eating when they are exposed to these males and to other competitive females. This study has demonstrated that females who are in competition with evolutionarily desirable females eat less than females who are not competing. This reduction in eating is further seen when these females are also looking at evolutionarily desirable males.

This finding is compatible with some of the leading proximal theories of eating disorders. Social influence research has shown that adolescent girls who view themselves in the eyes of their same-sex peers believe that if they were thinner and more attractive, they would be popular with males (Lieberman et al., 2001). Also, past research revealed that participants assumed that an attractive individual was more likely to find an acceptable partner than individuals who were perceived as less attractive (Dion et al, 1972). Our research with university women, who clearly have been shown to restrict their eating when induced to think of an evolutionarily desirable male, draws attention to the pervasiveness of this societal influence, and the powerful influence of same sex peers' views.

Past research has shown that women perceive men as desiring thinness, and that

women themselves want to be thinner than what men want them to be (Fallon & Rozin, 1985; Rozin & Fallon, 1988). This self-perpetuated “perceived requirement” to appear attractive, and thus thin to potential partners, could be observed directly in the present results where all females ate less when exposed to a desirable male description, and even less when exposed to competing desirable females. In sum, the desire to alter one’s appearance to conform to what is now considered ‘socially attractive’ parallels the evolutionary theory of mate selection.

In terms of psychological theories, a major theory suggests that stressful life events serve as predisposing factors for both AN and BN sufferers. These events could have positive, neutral, or negative connotations such as the onset of puberty, leaving home, the beginning of new relationships, the loss of relationships, the death or illness of a loved one, or the loss of a job (Cooper, 1995). Furthermore, the loss of a romantic relationship has been shown to be a predisposing factor for disordered eating, which aligns with evolutionary theory which argues that women who are available for dating will restrict their eating to appear desirable to potential new males (Evans & Wertheim, 2005).

Thus, in terms of the development and maintenance of eating disorders, the current results are consistent with previously identified social and psychological causes of eating disorders. This study has further demonstrated that females who are looking at evolutionarily desirable males engage in acute restrictive eating, and when in competition with evolutionarily desirable females for those males, reduce their eating further.

Hypothesis Three

The third hypothesis purported that females who were exposed to evolutionarily

desirable males would eat less overall than females who were exposed to the evolutionarily undesirable males. This hypothesis was confirmed and provided further support to previous research that revealed that the evolutionary qualities of a male do have an impact on women's eating behaviour (Robillard, 2004). These findings are important in that most research in this area has only manipulated physical attractiveness of males and has not examined evolutionary qualities. In review, past research found that females ate less while in the presence of a physically attractive male (Pliner & Chaiken, 1990), and that average restrained females significantly reduced their eating following interactions with physically attractive males (Copeland, Woods, & Hursey, 1995).

Hypothesis Four

The fourth hypothesis of the study stated that single females who were made to feel competitive with evolutionarily desirable females also looking for a long term mate would eat significantly less than females who were not made to feel competitive. This hypothesis was supported. These findings are consistent with previous research on attraction and competition, which found that humans' competitive mentality is focused on winning the approval of the opposite sex (Gilbert, 2001). These results also support the proposed link found in many studies (Chaiken & Pliner, 1987; Connor-Greene, Striegel-Moore, & Cronan, 1994; Huon et al., 2002; Lieberman et al., 2001) between increased pressure to be thin/attractive via comparison with others and disordered eating habits.

Interestingly, along with eating less when in a competition condition, women in the competition condition also compared themselves more to other women than women in the no competition condition. The effects of appearance comparisons have been extensively

documented. For example, comparing oneself with other women has been shown to result in lower self-esteem (Pliner & Chaiken, 1990), and body image comparison results in body image dissatisfaction and lowered mood (Stormer & Thompson; 1996).

A meta-analytic review of body image research revealed that women feel worse about their bodies after exposure to thin media models than to other types of images (Groesz, Levine, & Murnen, 2002). This research has been conducted with adolescents, young women and adults. Research by Durkin and Paxton (2002) revealed that adolescent girls exposed to idealized female images experienced increased body dissatisfaction and decreased well being. Durkin and Paxton (2002) hypothesized that the girls use the media images as templates for comparison; as the girls age and they perceive themselves as failing to measure up, their body dissatisfaction rises. As well, young women reported greater body dissatisfaction and more negative affect after being asked to compare themselves with television images of females than when given distraction images or neutral instructions (Cattarin, Thompson, Thomas, & Williams, 2000). Bessenoff (2006) demonstrated that young women who felt that their bodies were significantly discrepant from their 'ideal' bodies reported lowered self-esteem, increased depressive thoughts, and negative mood when viewing thin-ideal women then when they viewed advertisements that depicted non clothing product advertisements.

Similar results have been found with adult women. Adult females who were asked to engage in social comparison with thin models reported increased body dissatisfaction and decreased physical attractiveness (Field, Carmago, Taylor, Berkey, & Colditz, 1999). Crouch and Degelman (1998) and Shaw (1995) found that participants experienced a

decrease in self-reported attractiveness and an increase in body dissatisfaction after viewing thin-ideal images compared to control images.

Thus, appearance social comparison with women who reflect the 'thin-ideal' does seem to result in body image dissatisfaction and lowered feelings of attractiveness. The current research demonstrated that all women across all conditions self-reported comparing themselves with other women when asked after the experimental manipulation. This self-endorsed comparison was engaged in even by the women who were not exposed to other females. The women in the competition condition reported engaging in significantly more comparison, likely due to the provision of examples of evolutionarily desirable women for the participants in the competition condition to examine and compare themselves to. They also self-reported feeling competitive with those women, which may have resulted in body image comparisons that could lead to poor self image. Perhaps intra-sexual competition is the main mechanism or forum for how body image comparisons are conducted. Women's eating is reduced via body image comparison that may leave them feeling discouraged and lacking. They may try to eat less to improve their competitive edge.

Hypotheses Five and Six

It was also hypothesized that hypercompetitiveness would be a better predictor of eating behaviour than would personal development competitiveness. This hypothesis was not verified. There was no significant relationship between females' style of competitiveness and their eating habits. It also was predicted that females' M&M consumption would be better predicted by the interaction of high dieting peer competitiveness and high motivation to achieve in appearance than by either alone. This

hypothesis also was not verified.

Prior research has demonstrated a relationship between competitiveness and eating behaviour (both attitudes and behaviours) as measured by scales such as the Eating Disorder Inventory (EDI) and the Disordered Eating Symptoms Scale (DESS). Specifically, one study conducted with a university sample that used a similar competitiveness measure found a link between a high need to achieve/competitive behaviour and self-reported disordered eating (Striegel-Moore, Silberstein, Grunberg, & Rodin, 1990). Another study conducted by Burckle et. al. (1999) found that hypercompetitive attitudes, measured as high scores on the hypercompetitive attitude scale, were highly correlated with disordered eating. The results of these prior studies are somewhat inconsistent with the results of this study which found that the experimentally induced competitiveness was very effective at influencing eating behaviour and what are considered measures of trait competitiveness were not related to eating behaviour.

There could be two potential reasons for this difference. First, no known studies have examined the relationship between actual measured eating in a laboratory and competitiveness. Perhaps there is a difference between women's self-reported eating behaviour and attitudes, and their actual eating behaviour in relation to competitive styles. The second reason could be the sample characteristics. Both the Striegel-Moore et al. (1990) study and the Burckle et al. (1999) study used a general university population but did not pre-screen and exclude any potential participants who were experiencing any type of eating pathology and thus, their results likely reflect a wide range of women with varying levels of eating behaviour. In fact, one study conducted by Staples and Bravender (2003)

with 1804 undergraduates assessed the prevalence of disordered eating among females at 23% based on participants' scores on a disordered eating measure. The current research utilized a two-part screening process, first an initial screen at the participant pool level and then a structured self-report form (EDEQ) to ensure that all potential participants were not engaging in disordered eating (past or present). Perhaps, because the population sample for the current study was rigorously screened and subsequently selected for its non-clinical attributes, it resulted in lower endorsed levels of competitiveness, and impacted the overall expected relationship between trait competitiveness and eating behaviour.

Hypothesis Seven

The last hypothesis of this study stated that participants' rating of the evolutionarily desirable males would be significantly higher, and thus more favourable, than participants' rating of the evolutionarily undesirable males. This hypothesis was supported and replicated previous studies showing that females prefer males who possess evolutionarily desirable characteristics (Barash & Lipton, 2002; Buss, 1999; Buss et al., 1990; Davis, 1990). These results replicate the findings of a prior study (Robillard, 2004) and directly support the sexual selection theory of evolution suggesting that females favour males who display the characteristics necessary to provide for their well-being and that of their offspring.

Restraint Results: Robillard 2004 Study Vs. Dissertation Study Findings

Based on previous research (Abed, 1998), Robillard (2004) predicted that restrained eaters would restrict most in the presence of an evolutionary desirable male. This prediction was not verified and restrained eaters actually ate significantly more M&Ms than

did unrestrained eaters regardless of male exposure. In contrast, results from the current study were consistent with previous research showing that female dieters actually restrict their eating while in the presence of others, especially, while in the presence of attractive males (Copeland et al., 1995; Pliner & Chaiken, 1990). There could be a number of reasons explaining why the behaviour of restrained eaters was different in the Robillard (2004) study and the current study.

First, the slight differences between studies with regard to participant demographics and procedure cannot be ruled out as a potential contributing factor to differences in restrained eaters' consumption. Specifically, the 2004 study included both single and committed participants whereas the current study only examined single participants. As well, the procedure varied in that this study included a competition component. Finally, participants in the 2004 study were asked to justify their choice of male across conditions, whereas participants in the current study were asked to write about themselves. Of all these potential reasons, the final one offers the most fruitful avenue of explanation.

Past research has characterized the relationship between restraint and self-awareness as inconclusive at best. Some results revealed that self-awareness served to limit the amount of food that restrained eaters consumed, while other studies showed that they ate even more at times of high self-awareness (Sakhai, 1998). Both self attention and attention from others have been shown to counteract the disinhibitory effects caused by calorie preloads, resulting in dieters' compliance with their previous cognitive restraint strategies (Polivy, Herman, Hackett, & Kuleshnyk, 1986). Increased self-awareness, or self-focus, has been found to facilitate the self-regulation of behaviour in a variety of domains,

including ad lib eating situations (Heatherton, Polivy, Herman & Baumeister, 1993; Herman, Polivy, & Silver 1979).

Research by Heatherton et al. (1993) revealed that escape from a self-awareness state (low self-awareness) leads to disinhibition whereas high, aversive, self-awareness maintains inhibitions. Robillard (2004) suggested that restrained eaters may have disinhibited as they ate more than did the unrestrained eaters across all conditions. In contrast, the present study revealed that restrained eaters may have maintained their cognitive restraint across all conditions. Perhaps the nature of the 2004 study consisting of participants justifying their choice of male provided a low self-focused state because the task did not require the participant to write about themselves. On the contrary, the present task may have induced high self-awareness because participants had to write about themselves with the knowledge that someone from the dating agency would read their statement, or the evolutionarily desirable males would read it. In other words, when restrained eaters were asked to write about themselves, it may have heightened their self-awareness, including their valued goals of attaining and maintaining thinness, which could have facilitated cognitive restraint.

Other research has yielded similar results to those found by Heatherton et al., and demonstrated that in a high public self-awareness condition, restrained eaters consumed less when confronted with failure feedback on a test of social perception than when presented with failure feedback in a low public self awareness condition (Stephens, Prentice-Dunn, & Spruill, 1994). This research adds supportive evidence to the theory. The task of having participants write about themselves for others to read (public self-awareness) may have

contributed to the restrained eaters maintenance of their cognitive restraint. In addition, the pressure of writing about oneself for others to judge their merit as a potential relationship partner may have induced fears of failure and further reinforced their cognitive restraint strategies.

The same research by Stephens et al. (1994) revealed that in situations of low public self-awareness, failure on a task resulted in increased eating by restrained eaters. In the Robillard (2004) study, restrained eaters ate more than unrestrained eaters regardless of whether they were exposed to the desirable or undesirable males. It could be extrapolated that the task of justifying one's choice of potential partner induced low public self-awareness as participants were not writing about themselves. Or perhaps the combination of low public self-awareness and the nature of the task requiring that they make a long term mate choice may have induced some transient feelings of failure about overall mating. When the task involved justifying a choice of an evolutionarily undesirable male this could have intensified the feelings of failure by the participant as they are providing reasoning for why they would want to be with an undesirable person with whom they really have no desire to be. In a similar fashion, when the restrained participants were justifying the choice of an evolutionarily desirable male, they potentially could have felt some level of failure if they then began to engage in self-comparison with their chosen male. They may have felt inadequate in comparison to these evolutionarily desirable males who were designed to present as perfect.

Thus, according to past research on the self awareness theory, two key features may have affected consumption of food; level of public awareness and the experience of failure

(Heatherton et al., 1993; Stephens et al., 1994). The nature of the task for the current dissertation research was one of high public self-awareness in that individuals were writing about themselves for others to read their qualities. In the Robillard (2004) study participants were asked to justify a choice for the examiner to read later, likely inducing a state of low self-awareness. Also, the act of choosing a mate could be construed to create feelings of failure, whether it be because all the participants were single in the current study (at this stage of life still unsuccessful at establishing a stable romantic relationship), because the participants were asked to really imagine being with the evolutionarily undesirable males (which could be construed as failure), or conversely, because the participants were asked to imagine being with an evolutionarily desirable male which they may have felt they would never find or deserve.

As well, Stephens et al. (1994) found that restrained eaters exhibited more regulated eating behaviour when exposed to a combination of disinhibitors, whereas each disinhibitor taken separately was associated with increased consumption. Robillard (2004) exposed participants to one potential disinhibitor, male status. The current study manipulated participants' exposure to two variables, competition and male status. Perhaps similar to the research of Stephens et al. (1994), the combination of the exposure to two potential disinhibitors (males and competition) resulted in restrained eaters exhibiting more regulated eating behaviour.

Implications for the Evolutionary Theory of Eating Disorders

In sum, the current research has a serious impact on Riadh Abed's Sexual Competition Hypothesis for Eating Disorders as it did not support the theory. Specifically,

one of the key proponents of the theory posits that women pursue thinness to attract a mate, and the current research showed that pursuit of thinness as a mate attraction strategy appeared to lead to acute food restriction in unrestrained eaters but did not affect restrained eaters' eating. Thus, it may only be one of the many factors that could affect restrained eaters confirming that disordered eating is multi-determined and unable to be explained fully by evolution. In fact, other published research outlined below examined females' eating behaviours/pursuit of thinness and produced findings that are contradictory to Abed's argument that females' distorted eating is a result of their attempt to increase their competitive edge for potential male partners.

One study demonstrated that women endorsing high levels of eating pathology preferred a significantly thinner shape for themselves than the body shape that they perceive men to find attractive (Zellner et al., 1989). If women with symptoms of disordered eating were solely concerned with finding a mate and modifying their eating behaviour to do so, then their own preference for their body shape, and thus their eating behaviour, would be more in line with what men desire. Also, a qualifier for the diagnosis of AN is amenorrhea, a consequence of significant emaciation, which results in an inability to successfully reproduce (APA, 2000). The development of amenorrhea is counterproductive to the final goal of reproduction, and thus further evidence against the applicability of Abed's theory that women pursue thinness to attract a mate with which they can reproduce. Further, another factor that makes extreme thinness counterproductive from an evolutionary perspective, is that women who are extremely emaciated and not producing menses report a loss of sexual interest that researchers have attributed to their emaciated state (Ghizzani &

Montomoli, 2000; Tuiten, Panhuysen, Everaerd, Koppeschaar, Krabbe, Zelissen, 1993).

Specifically, the relationship between extreme thinness and loss of sexual interest has been attributed to the altered balance of ovarian steroids and central nervous system transmitters measured within AN patients (Ghizzani & Montomoli, 2000).

All of these findings serve as contradictory evidence demonstrating that women pursue extreme thinness over and above what is deemed necessary to demonstrate reproductive potential and attract a male. This is in direct contrast to the evolutionary theory of eating disorders, which argues that due to sexual selection strategies, women engage in the relative pursuit of thinness to maximize their chances of reproduction. Thus, perhaps evolutionary theory is best suited to explain acute or short term food restriction to maintain thinness until a mate has been found whereas the chronic pursuit of thinness typical of women with disordered eating seems driven by other forces, such as the ones outlined by Stice (2002).

Limitations of the Present Research

There are several limitations to the present research. The most apparent is in the sample characteristics. Participants were selected to be free of eating disorders, which precludes generalization of these findings to women with clinical eating disorders. On the other hand, it is not impossible that some participants did have an eating disorder, which would somewhat contaminate the sample. Participants were considered to have no eating pathology based on their initial responses to the participant pool questions and their subsequent scores on the Eating Disorder Examination Questionnaire (EDEQ). Although the EDEQ is a detailed self-report questionnaire developed from a clinical interview for

diagnosing eating disorders (Fairburn & Cooper, 1993), a clinical interview with each participant would have ruled out the presence of any eating disorders with more certainty.

Another limitation concerns the age of the participants who were all under 27 years old. By using a university population, participants were assessed at a time that most naturally reflects when they would be searching for a life partner, which was vital to the integrity of the study. However, that meant that whether older women engage in these same behaviours could not be tested.

Also, these participants were primarily Caucasian, a limitation that is relevant given that evolutionary theory should be applicable across cultures. Another limitation of the study could be the cross-sectional nature of the study. It provided a one-time measure of participants' eating with exposure to one set of males in one style of relationship. Following women's eating behaviour within a longitudinal design would provide a measure of individuals' eating behaviour in a variety of different social/mating situations involving various levels of potential male desirability and various levels of intra-female competitiveness and ultimately provide more ecologically valid data.

Another limitation that may be relevant was the possible contamination of the cover story. Both the current study and the Robillard (2004) study were conducted with a relatively small pool of potential participants over a period of three years (data collected in 2004 and in 2006). It is possible that the true purpose of the study was known to participants before starting the current study. Although participants were asked during their debriefing not to talk to anyone about the true purpose of the studies, it is possible that they did not abide by this promise. Thus, the possibility of participants discussing the cover

story and the true nature of the study with other potential participants remains a limitation of this research which could be reduced by conducting the two studies at different institutions simultaneously. However, a procedure consisting of tracking all participants involved in eating behaviour and body image research was implemented by our research group to ensure that no participant was tested twice in our lab. This would greatly minimize the possibilities for communication between participants of either study.

The use of mate packages instead of real life males for exposure could be considered to reduce believability and thus limit the possibility of finding significant results. However, there were significant effects in spite of this, suggesting that the manipulation was robust enough. Nevertheless, it is possible that employing live male confederates to pose as potential mates would induce greater overall effects or even different effects on the participants' eating behaviour.

Finally, this study was limited in that it examined dieting and dating behaviours in females only. The demographics of the psychology participant pool are such that it would have been very difficult to obtain an adequate number of male participants to include in the present research. However, research suggests that the incidence of disordered eating, in particular anorexia nervosa for males, is substantially less prevalent than in females (Woodside & Kennedy, 1995). As well, in terms of evolutionary theory, a thin body shape is recognized to be most relevant to males seeking females, whereas females are more interested in males' financial and emotional resources. Due to the differences in preferences and the higher prevalence of eating disorders in females, the goal was to research and confirm a theory of female eating behaviour.

Suggestions for Future Research

In order to increase external validity, and thus generalizability, it would be important to replicate this study within the general population, which would provide a wider cross-sampling of ethnicities. As well, although it would be quite involved and taxing to implement, a naturalistic longitudinal study that examined the eating behaviour of females in different mating arrangements/aspirations would provide invaluable data regarding female eating behaviour in conjunction with their mating status.

A suggestion for future research is to replicate the study with both high school age females and unattached and/or divorced females in the age range of 45-60 years. This would provide key information about whether the current results are occurring with both younger and older women. There is an expectation that high school females would also be engaging in restrictive eating behaviour, but perhaps to a lesser extent given that they are just starting to explore potential mates. As women become older, dating becomes more of a selection process and mate sorting, whether the motive is conscious or not. This may be more intense at the university level when females are typically looking for lifetime partners (Rice, 1995). As well, females between the ages of 45 and 60 are typically past their child bearing years, which could influence their behaviours in relation to evolutionarily desirable males. Thus, it would be interesting to replicate the study in other age groups to evaluate whether evolutionary theory is significant for these populations. To date, no studies have examined non-university age populations and their eating habits relative to their desire to find a mate.

Although this research has established that exposing females to descriptions of

'evolutionarily desirable females' is successful in inducing competition, this strategy may still be somewhat limited in terms of ecological validity. Future research may use a more vivid manner of exposing participants to other females. Certainly, exposing participants to other females with the knowledge that this results in comparisons that could ultimately lead to feelings of inferiority or poor body-image in a laboratory setting raises ethical concerns. This could be addressed in the debriefing and participants could be given contact information for the local eating disorder clinic or counselling centre as part of the standard debriefing. However, using a richer manner of inducing competition, such as having participants watch a video dating ad of someone interested in dating the same men, may produce a stronger impact in the minds of participants, as it would provide both visual and auditory cues. These may make the situation to which participants are exposed more vivid, and in turn may trigger a stronger competitive reaction.

Conclusions

The present research used an experimental design to demonstrate that exposure to evolutionarily desirable males results in significant reduction of food consumption by single females. Furthermore, when females are competing with evolutionarily desirable females for males, they eat even less. This finding did not support Abed's theory regarding vulnerable females who engage in restrictive eating, but actually showed non-dieters to be more susceptible to the effect of competition for desirable males. Therefore, the theory does not seem to adequately predict disordered eating but rather acute restrained eating in response to desirable males and competition with attractive females. Whether restrained eaters would, under other conditions, restrict their eating more than do non-dieters when

competing for desirable males remains an unanswered question.

Although the exact mechanisms explaining the relationship between eating behaviours and competition for desirable males are not yet fully understood, the results of the present study confirm intra-sexual competition as a risk factor for restrained eating. In fact, these findings are the first to demonstrate that competition for evolutionarily desirable males induces females to acutely restrict their eating, presumably to become thinner. Therefore, further research examining the relationship between eating disorders and evolution needs to be conducted. At minimum, these findings need to be replicated, and further developed, preferably across cultures. If these findings are consistent across replications the next step would be to assess clinical relevance, however, the introduction of evolutionary theory into clinical application would need to be done very carefully. Research on prevention, particularly in the eating disorder field, has shown that at a 6-month follow up of a school based prevention program, females actually reported higher levels of dietary restraint than pre-intervention (Carter, Stewart, Dunn, & Fairburn, 1997). As well, research conducted by Stice, Shaw, Burton, & Wade (2006) found that intervention programs that required active participation from participants resulted in greater reductions of body dissatisfaction, dieting, and negative affect compared to programs that disseminated information in a psycho-educational format. Both of these research studies highlight the seriousness of prevention work, particularly, that prevention interventions are not straightforward and require preliminary studies.

In sum, these results have revealed that restrained eaters do not seem to be at higher risk for eating disordered symptoms as a result of exposure to competition for

evolutionarily desirable males. Moreover, the unrestrained eaters appeared to be more affected by the exposure to desirable males and competition with other females for those males as evidenced by their eating behaviour. Thus, competition with other females could be a mechanism that leads unrestrained females who are not already affected by a bevy of factors that create/cause restraint, to eventually engage in chronic dieting. If they do begin restraining as a strategy to attract a mate, they could then be susceptible to the more established risk factors for restriction of food intake such as socio-cultural influences, and ultimately, become vulnerable to developing an eating disorder. Therefore, a natural starting point would be to assess females' pursuit of thinness to attract desirable men in relation to the treatment and prevention of disordered/restricted eating for a large segment of the population, not just restrained eaters who are already at risk.

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Appendix A



CONSENT FORM TO PARTICIPATE IN RESEARCH - Mate Selection and Evolution

You are asked to participate in a research study conducted by Sara Robillard (PhD candidate) and Dr. Josee Jarry, from the Psychology Department at the University of Windsor. The results will contribute to a dissertation. If you have any questions or concerns about the research, please feel to contact Dr. Josee Jarry (253-3000, ext 2237) in the Department of Psychology.

PURPOSE OF THE STUDY - The purpose of this study is to assess partner qualities and the reasoning behind why people choose certain partners over others.

PROCEDURES - If you volunteer to participate in this study, we would ask you to do the following things. The researcher will require you to spend twenty minutes reading the two candidates descriptions, and filling out some questionnaires concerning your choice of partner. Afterwards, you will be asked to fill out some additional questionnaires which should take approximately 20 to 25 minutes. All responses will go into a sealed envelope and will be stored together to ensure participant anonymity. At no time during the study will we be taking any pictures, video recordings or audio recordings. The researcher will ask that you set aside 45 minutes to 1 hour for the total length of participation time. The research will take place in room 287 of Chrysler Hall South.

POTENTIAL RISKS AND DISCOMFORTS - You will be asked a variety of questions which may be personal in nature. A risk associated with this study is the possibility that thinking about these personal issues may raise some psychological and emotional concerns for you. If during or after the study, you have concerns you wish to discuss please contact the Student Counselling Centre at 253-3000 ext. 7012.

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY- You will not benefit from the current study other than the opportunity to learn about and contribute to psychological research. The benefit to society is increasing scientific knowledge in the area of evolution.

PAYMENT FOR PARTICIPATION - Finally, to thank you for your participation in this

study, you may be eligible to receive two bonus points toward an undergraduate psychology course of your choice.

CONFIDENTIALITY - Any information you provide will be used for research purposes only, which may eventually include publication in a research article, or use of your anonymous data in subsequent studies. Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission. Your name will not appear on any of the questionnaires you fill out or in any future publications. My signature on this sheet indicates that I agree to participate in this study assessing mate qualities. Signing this form indicates that I understand the following:

1. I am a volunteer and can withdraw from the study at any time.
2. The data I provide is confidential, and will be securely stored in the Department of Psychology at the University of Windsor for seven years.

PARTICIPATION AND WITHDRAWAL - You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may exercise the option of removing your data from the study. You may also refuse to answer any questions that you don't want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so. If at any time during the study, you have questions, please feel free to ask the examiner. Also, please do not discuss this study with anyone, as they may also be participating in the study. If other participants have inside knowledge of this study, the integrity of the study may be compromised.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE SUBJECTS - If so desired, participants will be able to access the research findings in the Psychology Department and will be made available in June 2008 or online at the Research Ethics Board website: <http://www.uwindsor.ca/reb>

SUBSEQUENT USE OF DATA - This data may be used in subsequent studies. Do you give consent for the subsequent use of the data from this study provided that confidentiality extends to the new study? () Yes () No

RIGHTS OF RESEARCH SUBJECTS - You may withdraw your consent at any time and discontinue participation without penalty. This study has been reviewed and received ethics clearance through the University of Windsor Research Ethics Board. If you have questions regarding your rights as a research subject, contact:

Research Ethics Co-ordinator
University of Windsor
Windsor, Ontario N9B 3P4

Telephone: 253-3000 ext. # 3916
E-Mail: ethics@uwindsor.ca

SIGNATURE OF RESEARCH PARTICIPANT/LEGAL REPRESENTATIVE

I understand the information provided for the study “Mate Selection and Evolution” 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. I have received explanations about the nature of the study, its purpose, procedures, and how the results will be used.

Name of Participant

Signature of Participant

Date

SIGNATURE OF INVESTIGATOR

In my judgment, the subject 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



LETTER OF INFORMATION - Mate Selection and Evolution

You are asked to participate in a research study conducted by Sara Robillard (PhD candidate) and Dr. Josee Jarry, from the Psychology Department at the University of Windsor. The results will contribute to a dissertation. If you have any questions or concerns about the research, please feel to contact Dr. Josee Jarry (253-3000, ext 2237) in the Department of Psychology.

PURPOSE OF THE STUDY - The purpose of this study is to assess partner qualities and the reasoning behind why people choose certain partners over others.

PROCEDURES - If you volunteer to participate in this study, we would ask you to do the following things. The researcher will require you to spend twenty minutes reading the two candidates descriptions, and filling out some questionnaires concerning your choice of partner. Afterwards, you will be asked to fill out some additional questionnaires which should take approximately 20 to 25 minutes. All responses will go into a sealed envelope and will be stored together to ensure participant anonymity. At no time during the study will we be taking any pictures, video recordings or audio recordings. The researcher will ask that you set aside 45 minutes to 1 hour for the total length of participation time. The research will take place in room 287 of Chrysler Hall South.

POTENTIAL RISKS AND DISCOMFORTS - You will be asked a variety of questions which may be personal in nature. A risk associated with this study is the possibility that thinking about these personal issues may raise some psychological/emotional concerns. If during or after the study, you have concerns please contact the Student Counselling Centre at 253-3000 ext. 7012.

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY - You will not benefit from the current study other than the opportunity to learn about and contribute to psychological research. The benefit to society is increasing scientific knowledge in the area of evolution.

PAYMENT FOR PARTICIPATION - Finally, to thank you for your participation in this study, you may be eligible to receive two bonus points toward an undergraduate psychology course of your choice.

CONFIDENTIALITY- Any information you provide will be used for research purposes only, which may eventually include publication in a research article, or use of your anonymous data in subsequent studies. Any information that is obtained in connection with

this study and that can be identified with you will remain confidential and will be disclosed only with your permission. Your name will not appear on any of the questionnaires you fill out or in any future publications. My signature on this sheet indicates that I agree to participate in this study assessing mate qualities. Signing this form indicates that I understand the following: I am a volunteer and can withdraw from the study at any time and the data I provide is confidential, and will be securely stored in the Department of Psychology at the University of Windsor for seven years.

PARTICIPATION AND WITHDRAWAL - You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences. You may exercise the option of removing your data from the study. You may also refuse to answer any questions that you don't want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so. If at any time during the study, you have questions, please feel free to ask the examiner. Also, please do not discuss this study with anyone, because if future participants have inside knowledge of this study it will compromise the integrity.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE SUBJECTS - If so desired, participants will be able to access the research findings in the Psychology Department and will be made available in June 2008 or online at the Research Ethics Board website: <http://www.uwindsor.ca/reb>

SUBSEQUENT USE OF DATA - This data may be used in subsequent studies. Do you give consent for the subsequent use of the data from this study provided that confidentiality extends to the new study? () Yes () No

RIGHTS OF RESEARCH SUBJECTS - You may withdraw your consent at any time and discontinue participation without penalty. This study has been reviewed and received ethics clearance through the University of Windsor Research Ethics Board. If you have questions regarding your rights as a research subject, contact the Research Ethics Coordinator at 253-3000, ext. # 3916 or by email, ethics@uwindsor.ca.

SIGNATURE OF INVESTIGATOR - In my judgment, the subject 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**

Appendix B



**DEBRIEFING CONSENT FORM – POST STUDY CONSENT TO PARTICIPATE
IN RESEARCH**

Title of Study: Experimental Evaluation of Intra-Sexual Competition Effects in Single Females for Males according to Restraint Status.

You have just been asked to participate and participated in a research study conducted by Sara Robillard (PhD candidate) and Dr. Josee Jarry, from the Psychology Department at the University of Windsor. The results will contribute to a dissertation. If you have any questions or concerns about the research, please feel to contact Dr. Josee Jarry (253-3000, ext 2237) in the Department of Psychology.

Purpose of the Study: The purpose of this study was to look toward evolution as the ultimate cause of eating disorders. Behaviour has both proximate and ultimate causes, where proximate causation is concerned with the environmental stimuli that trigger behaviour, and ultimate causation is concerned with the evolutionary significance of the behaviour. Current theories have offered proximal explanations to the existence of eating disorders. Although they definitely function as contributing factors in the environment, they still fail to explain why males are much less likely to fall prey to the same eating pathology as females, why it declines with age, or why eating disorders are actually occurring. Prior research shows that eating disorders arise out of increased intra-sexual competition between females for evolutionarily desirable males. Specifically, current conditions in the world have increased females' ability to both control their body shape and their mating behaviour, creating a more competitive environment where ultimately, some females succumb to the competitive pressures through the development of Anorexia Nervosa (Abed, 1998). Thus, from an evolutionary perspective, female competition for mate selection may be an underlying force driving the development of eating disorders, through their intra-sexual competition for males and their desire to appear attractive. The purpose of this study is to investigate the relationship between restraint, competition, evolution and mate selection.

Procedures: Having volunteered in this study, you did the following things:

Initially, the researcher asked that you set aside 45 minutes to 1 hour to participate. The researcher required you to spend twenty minutes reading the two candidates descriptions, and filling out some questionnaires concerning your choice of partner. Afterwards, you were asked to fill out some additional questionnaires which took approximately 20 to 25 minutes. At that point, you were debriefed to the true nature of the study. During the

debriefing we outlined three instances during the course of this study where we were required to be deceptive in nature. The first instance was the presentation of fabricated individuals from a dating agency. The second instance was the presentation of M&Ms as being left over from a prior study. In point of fact, the M&Ms were bought and brought into the experimental procedure so that we could measure your food consumption while exposed to the experimental manipulation. Finally, we were deceptive in not informing you at the beginning of the study to the fact that we would be requesting a measure of your weight and height at the end of the study. If we were to inform you of this request at the beginning, it would have compromised the integrity of the study as you would have wondered why we were doing so. Now, as a final part of the larger study you have just completed, we are now asking you to allow the investigator to obtain a measure of your height and weight, so your body mass index (BMI) can be calculated. Of course, taking part in this final portion of this study is completely voluntary. If you do not wish to be weighed or have your height measured, you are free to refuse without any penalty or loss of bonus points.

Potential Risks and Discomforts: You have been asked a variety of questions which may be personal in nature. A risk associated with this study is the possibility that thinking about these personal issues may raise some psychological/emotional concerns. If during or after the study, you have concerns please contact the Student Counselling Centre at 253-3000 ext. 7012. There could be some risks associated with the deception in that you may be feeling 'tricked' in that you were not told the true purpose of the study. However, it is believed that any negative reactions to the deception will be counteracted by the fact that the reason for the deception is clearly explained to you and by the fact that you will be given adequate time and opportunity to discuss your reaction to the deception. As well, there is a small chance that you will feel embarrassment about being weighed by the researcher, however, this discomfort is considered transient in nature and no different from the discomfort you may feel in a physician's office.

Potential Benefits to Subjects and/or to Society: You will not benefit from the current study other than the opportunity to learn about and contribute to psychological research. The benefit to society is increasing scientific knowledge in the area of evolution and the role it plays in the formation of eating disorders.

Payment for Participation: Finally, to thank you for your participation in this study, you may be eligible to receive two bonus points toward an undergraduate psychology course of your choice. Remember, if you do not wish to be weighed or have your height measured, you are free to refuse without any penalty or loss of bonus points.

Confidentiality: Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission. Any information you provide will be used for research purposes only, which may eventually include publication in a research article, or use of your anonymous data in subsequent studies. The data you provide will be securely stored in the Department of Psychology at the University of Windsor for seven years.

Participation and Withdrawal: You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so. As a reminder, please do not discuss this study with anyone, as they may also be participating in the study. If other participants have inside knowledge of this study, the integrity of the study may be compromised.

Feedback of the Results of this Study to the Subjects: If so desired, participants will be able to access the research findings in the Psychology Department and will be made available in June 2008 or online at the Research Ethics Board website:

<http://www.uwindsor.ca/reb>

Subsequent Use of Data: This data will be used in subsequent studies. Do you give consent for the subsequent use of the data from this study? () Yes () No

Rights of Research Subjects: You may withdraw your consent at any time and discontinue participation without penalty. If you have questions regarding your rights as a research subject, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario N9B 3P4; telephone: 519-253-3000, ext. 3916; e-mail: lbunn@uwindsor.ca.

SIGNATURE OF RESEARCH SUBJECT/LEGAL REPRESENTATIVE - I understand the information provided for the study "Experimental Evaluation of Intra-Sexual Competition Effects in Single Females for Males according to Restraint Status" as described herein. My questions have been answered to my satisfaction, I understand the reasons for the deception, and I agree to have my weight and height taken. I have been given a copy of this form.

Name of Subject

Signature of Subject

Date

SIGNATURE OF INVESTIGATOR -These are the terms under which I will conduct research.

Signature of Investigator

Date

Appendix C

Dating Advertisement

(November, 2005, Toronto Star) - This NEW Toronto Dating Agency has 2 different communities: casual dating, and long-term romance - 2 options to meet your needs. The LONG TERM ROMANCE brings people together who share the desire to meet that special person with whom they can share the rest of their lives.

Because this dating agency is looking to make life long connections, individuals are required to write up their profiles entirely on their own. This agency does not have categories that you HAVE to fit into, or information that you have to provide.

Remember, this agency is looking to connect serious individuals, interested in long-term relationships, so the more well-rounded description you provide, the easier it will be for us to find that special person. The only requirement is that you provide a picture with your profile that we will take right at the agency. Remember, first impressions are everything.

Security is a priority, and all applicants who want to be a member of this exciting new agency must agree to participate with the procedures, and will be thoroughly screened for honesty on the application. Unlike other agencies, you will have no worries that the person advertising their attributes is telling anything but the truth!

This is a new front line style of dating connections that is guaranteed to offer lots of new and interesting personals not found on the other dating sites. This is the most popular "newest" dating site on the Web. To become a member of either site, the one time cost is \$150 Canadian.

The following are two descriptions of two different males who hope to be potential partners. They were provided by the company for research purposes. This task involves looking at two pictures and accompanying descriptions of the candidates and indicating which male you would prefer if you were choosing based on a long-term relationship (either common law, or marriage). You have to choose one of them. Please answer all the questions as honestly as you can. Remember, all of your responses will be kept completely confidential. There is no way in which we can identify you with your responses and we have truly no interest in doing so.

You will be filling out two questionnaires based on your choice and then be asked to write more information down, approximately a page in length. (Space will be provided for this). The first questionnaire will address how important these partner characteristics are to you and the second questionnaire will address the degree to which you feel that your 'partner choice' possesses those qualities. You will have exactly 20 minutes to read the descriptions, choose your mate, answer the questionnaires and complete the writing section.

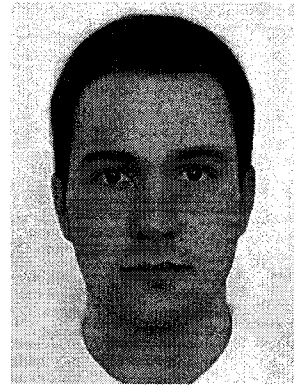
Mate Descriptions

Mate One



Alex

Mate Two



Glenn

General Information

Age	26 years old	Age	27 years old
Height	6'1''	Height	6'
Weight	205 pounds	Weight	195 pounds
Hair Colour	Light Brown	Hair Colour	Black
Eye Colour	Green	Eye Colour	Brown

Evolutionarily Manipulated Mate Descriptions to accompany Package A.

Desirable Mate Descriptions

1. Hi, my name is Alex. I grew up in Barrie, Ontario and I have two brothers and one sister. I just graduated from the University of Toronto, Pharmacy program and have recently moved back to Barrie where I have since opened up two pharmacies in the area. I work on average four days a week, spending two days at each pharmacy during the week. I enjoy spending time with my family and my sister's children. I have recently purchased my own home from an estate sale, and spend my free days exploring the acreage that came with it. I often get together with my friends on Sundays at home and we have BBQ's and play baseball. I enjoy all sorts of activities, and hold season tickets to both the Toronto Symphony Orchestra and the Toronto Maple Leafs. I like to cook and I enjoy rollerblading. My friends would say that I am an honest, hardworking, loyal, funny guy and that I enjoy life to the fullest. I am hoping to find someone special who shares my goals interests and will want to share their life with me.

2. Hi my name is Glenn. I was born and raised in St. Catherine's with my two sisters. I have been living in St. Catherine's for two years since graduating from the McMaster Medicine program. I am a general practitioner and I have co-ownership in a clinic that recently opened up in St. Catherine's. I am nearing completion of my specialization course in surgery and will have one additional year of internship before registering as a full surgeon. My hobbies include playing squash in the summers and skiing in Aspen in the winters where I own a condominium. Due to my part-ownership of the clinic I set my own hours and often work three or four days a week. I recently bought a small yacht and often hold evening parties while sailing around Lake Erie. Also, one morning a week, I spend time at a free clinic seeing children who cannot afford any procedures that are not covered by the Ontario Health Plan. When asked, my friends would unanimously agree that I am a dependable, warm, and caring, honest individual who is not shy of commitment and looking for that 'special' one.

Evolutionarily Manipulated Mate Descriptions to accompany Package B.

Undesirable Mate Descriptions

1. **Hi, my name is Alex. I grew up in Barrie, Ontario and I have two brothers and one sister. I am currently working at Pizza Pizza as a delivery guy and I will be up for promotion to pizza cook in six month's time. I generally work evenings and weekends but I do have the weekdays free to hang out. I enjoy shooting pool and have recently joined a league. I still live at home with my family, because the rent is cheap, it allows me to support my comic book collection, and I can borrow the car. Even though my sister's kids are hanging around my living arrangement is suitable because it will also allow me to pay for most of our dates. I often get together with my friends on my off time and we jam with our guitars. I hate to cook, but I get free pizza which we will be able to enjoy together. When asked, my friends would say that I enjoy a good time and live for the moment.**

2. **Hi my name is Glenn. I was born and raised in St. Catherine's with my two sisters. Currently, I divide my time between working at a retail discount store and writing lyrics for songs, which I hope to sell to a singer someday. I still live at home, (in the basement), which guarantees some privacy. I love computer games, and I am currently the champion of 'War of the World's,' an online computer game. I am also good at fixing cars, and I am currently fixing up an old '88 Chevy that I hope to get on the road someday soon. My friends say that although I am a little unpredictable at times, I usually follow through with things, and that I am lots of fun to hang out with. I am looking for that one person who also finds my unpredictable nature appealing and thinks that I could be the one.**

Appendix D

Partner Questionnaire – Importance of Characteristics

This task involves identifying characteristics that you would view as important when choosing a long-term partner (common law or marriage). Please indicate to what degree you think each attribute would be important to you with ‘1’ being ‘not at all important’ to ‘5’ being ‘extremely important’.

	1 Not at all Important	2	3 Somewhat Important	4	5 Extremely Important
	Partner Characteristics				Scale
1	How important is attractiveness?				1 2 3 4 5
2	How important is age?				1 2 3 4 5
3	How important is generosity?				1 2 3 4 5
4	How important is intelligence?				1 2 3 4 5
5	How important is physique (athletic prowess)?				1 2 3 4 5
6	How important is status of employment (job or no job)?				1 2 3 4 5
7	How important is profession or job choice?				1 2 3 4 5
8	How important is perceived financial stability?				1 2 3 4 5
9	How important is education?				1 2 3 4 5
10	How important is honesty?				1 2 3 4 5
11	How important is his ability to be emotionally supportive?				1 2 3 4 5
12	How important is a desire for a long-term commitment that will likely lead to marriage?				1 2 3 4 5
13	How important is his ability to interact with children in a positive manner?				1 2 3 4 5
14	How important is maturity?				1 2 3 4 5
15	How important is loyalty?				1 2 3 4 5
16	How important is resources?				1 2 3 4 5
17	How important is his ability to be a good provider?				1 2 3 4 5
18	How important is health or healthy behaviour?				1 2 3 4 5
19	How important is social status?				1 2 3 4 5
20	How important is ambitiousness and industriousness?				1 2 3 4 5

I would be happy to have a serious relationship that could lead to marriage with a partner possessing these qualities, or if I am in a relationship I would like these qualities in my mate.

1 Not at all accurate	2	3 Somewhat accurate	4	5 Extremely accurate
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Partner Questionnaire

This task involves answering questions on a scale about your long-term partner (common law or marriage) choice from this study. Please indicate the degree to which each attribute influenced your partner choice with '1' being 'not at all' to '5' being 'extremely'.

1 2 3 4 5
 Not at all Somewhat Extremely

	Partner Characteristics	Scale
1	His attractiveness?	1 2 3 4 5
2	His age?	1 2 3 4 5
3	His generosity?	1 2 3 4 5
4	His intelligence?	1 2 3 4 5
5	His physique (athletic prowess)?	1 2 3 4 5
6	His status of employment (job or no job)?	1 2 3 4 5
7	His profession or job choice?	1 2 3 4 5
8	His perceived financial stability?	1 2 3 4 5
9	His education?	1 2 3 4 5
10	His perceived honesty?	1 2 3 4 5
11	His perceived ability to be emotionally supportive?	1 2 3 4 5
12	His perceived desire for a long-term commitment that he hoped would lead to marriage?	1 2 3 4 5
13	His perceived ability to interact with children in a positive manner?	1 2 3 4 5
14	His perceived maturity?	1 2 3 4 5
15	His perceived loyalty?	1 2 3 4 5
16	His perceived resources?	1 2 3 4 5
17	His perceived ability to be a good provider?	1 2 3 4 5
18	His health or healthy behaviour?	1 2 3 4 5
19	His social status?	1 2 3 4 5
20	His perceived ambitiousness and industriousness?	1 2 3 4 5

I would be happy to have a serious relationship that could lead to marriage with my mate choice from this study.

1 2 3 4 5
 Not at all Somewhat Extremely
 accurate accurate accurate

Appendix E**Female Evolutionarily Manipulated Descriptions for Competition Condition**

Age	21
Height	5'6"
Weight	125
Hair Colour	Black
Eye Colour	Brown

Hi, my name is Sharon. I grew up in Hamilton, Ontario and I have one older sister. I am still in university at McMaster studying English. I am a member of the varsity volleyball team and the track team. I also work part time modeling to help pay the rent. When I am not working or at school, I enjoy spending time with my friends or my sister's family and often take my nieces out to the zoo or the movies. I also spend time gardening and enjoy going out dancing at the clubs with my friends. In the summers I enjoy camping and will often go on extended hiking vacations. I am an attractive, physically fit woman who loves exercising and the outdoors and I am looking for someone who enjoys the same types of activities.



Age	19
Height	5'4"
Weight	115
Hair Colour	Light Brown
Eye Colour	Brown

Hi my name is Linda. I'm originally from Manitoba but moved to Toronto one year ago to attend the University of Toronto. I am currently enrolled in the Human Kinetics program and I also work part time at the YMCA downtown as a fitness instructor and a personal trainer. I am an only child but I am close to my family. In my spare time I enjoy spending time with my friends. My hobbies include painting and reading. Two afternoons a week I volunteer time at the Humane Society and at a Community Center for the Elderly. My friends and family would describe me as an attractive, fun, girl who is looking for a long-term relationship.

Appendix F

Demographic Questionnaire

Personal Information:

Please answer the following questions:

1. What is your age? _____
2. What is your ethnicity?
Caucasian _____ Native Canadian _____ Asian _____
African Descent _____ Hispanic/Latino _____ Other _____
3. What year of school are you in? _____
4. What is your program?
Arts _____ Science _____ Health _____ Business _____ Other _____
5. What is your major? _____
6. What is your marital status?
Single _____ Dating _____ If dating how long? _____ yrs _____ mths
Living Together _____ Married _____ Divorced/Separated _____
7. What is your sexual orientation?
Heterosexual (prefer members of opposite sex) _____
Homosexual (prefer members of same sex) _____
Bi-Sexual (prefer both sexes) _____
8. Do you have any allergies or dietary restrictions? _____ If yes, what? _____

9. Do you restrict your caffeine intake? _____
10. Do you have type 1 or type 2 diabetes? _____
11. Do you have any food aversions (dislikes)? _____ If yes, what?

Appendix G

Eating Questionnaire Instructions: These questions are concerned with the PAST 4 WEEKS (28 days). Read carefully/circle the appropriate number on the right. Please answer all questions.

	ON HOW MANY OUT OF THE PAST 28 DAYS ...	No Days	1-5 Days	6-12 Days	13-15 Days	16-22 Days	23-27 Days	Every Day
1	Have you been deliberately <u>trying</u> to limit the amount of food you eat to influence your shape or weight?	0	1	2	3	4	5	6
2	Have you gone for long periods of time (8 hrs +) without eating in order to influence your shape or weight?	0	1	2	3	4	5	6
3	Have you <u>tried</u> to avoid any foods which you like in order to influence your shape or weight?	0	1	2	3	4	5	6
4	Have you <u>tried</u> to follow definite rules regarding your eating in order to influence your shape or weight; for example, a calorie limit, a set amount of food, or rules about what or when you should eat?	0	1	2	3	4	5	6
5	Have you ever wanted your stomach to be empty?	0	1	2	3	4	5	6
6	Has thinking about food or its calorie content made it much more difficult to concentrate on things you are interested in; for example, read, watch TV, or follow a conversation?	0	1	2	3	4	5	6
7	Have you been afraid of losing control over eating?	0	1	2	3	4	5	6
8	Have you an episode of binge eating?	0	1	2	3	4	5	6
9	Have you eaten in secret? (Do not count binges).	0	1	2	3	4	5	6
10	Have you definitely wanted your stomach to be flat?	0	1	2	3	4	5	6
11	Has thinking about shape or weight made it much more difficult to concentrate on things you are interested in; for example, read, watch TV, or follow a conversation?	0	1	2	3	4	5	6

ON HOW MANY OUT OF THE PAST 28 DAYS ...		No Days	1-5 Days	6-12 Days	13-15 Days	16-22 Days	23-27 Days	Every Day
1	Have you had a definite fear that you might gain weight or become fat?	0	1	2	3	4	5	6
1	3 Have you felt fat?	0	1	2	3	4	5	6
1	4 Have you had a strong desire to lose weight?	0	1	2	3	4	5	6

15. On what proportion of times that you have eaten have you felt guilty because of the effect on your shape or weight? (Do not count binges). Circle the number which applies:

None of the times	A few of the times	Less than half of the times	Half the times	More than half the times	Most of the time	Every time
0	1	2	3	4	5	6

16. Over the past four weeks (28 days), have there been any times when you have felt that you have eaten what other people would regard as an unusually large amount of food given the circumstances?

No	Yes
0	1

17. How many such episodes have you had over the past four weeks? _____

18. During how many of these episodes of overeating did you have a sense of having lost control over your eating? _____

19. Have you had other episodes of eating in which you have had a sense of having lost control and eaten too much, but have not eaten an unusually large amount of food given the circumstances?

No	Yes
0	1

20. How many such episodes have you had over the past four weeks? _____

21. Over the past four weeks have you made yourself sick (vomit) as a means of controlling your shape or weight?

No	Yes
0	1

22. How many times have you done this over the past four weeks? _____

23. Have you taken laxatives as a means of controlling your shape or weight?

No	Yes
0	1

24. How many times have you done this over the past four weeks? _____

25. Have you taken diuretics/water pills as a means of controlling your shape or weight?

No	Yes
0	1

26. How many times have you done this over the past four weeks? _____

27. Have you exercised hard as a means of controlling your shape or weight?

No	Yes
0	1

28. How many times have you done this over the past four weeks?

OVER THE PAST FOUR WEEKS (28 DAYS) Please circle the number which best describes your behaviour?		Not at all		Slightly		Moderately		Markedly
29	Has your weight influenced how you think about (judge) yourself as a person?	0	1	2	3	4	5	6
30	Has your shape influenced how you think about (judge) yourself as a person?	0	1	2	3	4	5	6
31	How much would it upset you if you had to weigh yourself once a week for the next four weeks?	0	1	2	3	4	5	6
32	How dissatisfied have you felt about your weight?	0	1	2	3	4	5	6
33	How dissatisfied have you felt about your shape?	0	1	2	3	4	5	6
34	How concerned have you been about other people seeing you eat?	0	1	2	3	4	5	6
35	How uncomfortable have you felt seeing your body; for example, in the mirror, in shop window reflections, while undressing or taking a bath or a shower?	0	1	2	3	4	5	6
36	How uncomfortable have you felt about others seeing your body; for example, in communal changing rooms, when swimming or wearing tight clothes?	0	1	2	3	4	5	6

Appendix H

RRS

The following questions refer to your normal eating patterns and weight fluctuations:

1. How often are you dieting?

Never	Rarely	Sometimes	Usually	Always
-------	--------	-----------	---------	--------

2. What is the maximum amount of weight (in pounds) that you have ever lost within one month (circle)?

0-4	5-9	10-14	15-19	20+
-----	-----	-------	-------	-----

3. What is your maximum weight gain within a week (in pounds)?

0-1	1.1-2	2.1-3	3.1-5	5.1+
-----	-------	-------	-------	------

4. In a typical week, how much does your weight fluctuate (in pounds)?

0-1.0	1.1-2	2.1-3	3.1-5	5.1+
-------	-------	-------	-------	------

5. Would a weight fluctuation of 5 pounds affect the way that you live your life?

Not at all	Slightly	Moderately	Very Much
------------	----------	------------	-----------

6. Do you eat sensibly in front of others and splurge alone?

Never	Rarely	Often	Always
-------	--------	-------	--------

7. Do you give too much time and thought to food?

Never	Rarely	Often	Always
-------	--------	-------	--------

8. Do you have feelings of guilt after overeating?

Never	Rarely	Often	Always
-------	--------	-------	--------

9. How conscious are you of what you are eating?

Not at all	Slightly	Moderately	Extremely
------------	----------	------------	-----------

10. What is your maximum weight ever? _____

11. How many pounds over your desired weight were you at your maximum weight?

0-1	2-5	6-10	11-20	21+
-----	-----	------	-------	-----

12. When you break your diet, do you react by (circle one):

Going right back on the diet	Compensating by eating less for a while	Continue to eat non-diet foods and start the diet another day	Get rid of the food by vomiting or taking laxatives	Not Applicable
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Appendix I

MAA

The following statements assess a type of motivation. Please indicate your level of agreement on your answer sheet.

#	Item	Strongly disagree	Slightly disagree	Neither disagree or agree	Slightly Agree	Strongly Agree
1	I am strongly motivated to work on being attractive.	1	2	3	4	5
2	One of the things I am most motivated about working on in my life is my appearance.	1	2	3	4	5
3	Others have noticed my strong motivation to be attractive.	1	2	3	4	5
4	I find appearance to be a real motivator to keep my weight under control.	1	2	3	4	5
5	I spend a lot of time working to improve my appearance.	1	2	3	4	5

Appendix J

HCA - Please read each of the following statements carefully, and indicate how characteristic it is of you by placing a tick (✓) in the appropriate brackets.

#	Item	Never true of me	Seldom true of me	Sometimes true of me	Often true of me	Always true of me
1	Winning in competition makes me feel more powerful as a person.					
2	I find myself being competitive even in situations which do not call for competition.					
3	I do not see my opponents in competition as my enemies.					
4	I compete with others even if they are not competing with me.					
5	Success in athletic competition does not make me feel superior to others.					
6	Winning in competition does not give me a greater sense of worth.					
7	When my competition receive rewards for their accomplishments, I feel envy.					
8	I find myself turning a friendly game or activity into a serious contest or conflict.					
9	It's a dog-eat-dog world. If you don't get the better of others, they will surely get the better of you.					

#	Item	Never true of me	Seldom true of me	Sometimes true of me	Often true of me	Always true of me
10	I do not mind giving credit to someone for doing something that I could have done just as well or better.					
11	If I can disturb my opponent in some way in order to get the edge in competition, I will do so.					
12	I really feel down when I lose in athletic competition.					
13	Gaining praise from others is not an important reason why I enter competitive situations.					
14	I like the challenge of getting someone to like me who is already going with someone else.					
15	I do not view my relationships in competitive terms.					
16	It does not bother me to be passed by someone while I am driving on the roads.					
17	I can't stand to lose an argument.					
18	In school, I do not feel superior whenever I do better on tests than other students.					
19	I feel no need to get even with a person who criticizes or makes me look bad in front of others.					

#	Item	Never true of me	Seldom true of me	Sometimes true of me	Often true of me	Always true of me
20	Losing in competition has little effect on me.					
21	Failure or loss in competition makes me feel less worthy as a person.					
22	People who quit during competition are weak.					
23	Competition inspires me to excel.					
24	I do not try to win arguments with members of my family.					
25	I believe that you can be a nice guy and still win or be successful in competition.					
26	I do not find it difficult to be fully satisfied with my performance in a competitive situation.					

Appendix K

PDCA - Please read each of the 15 statements very carefully so that you understand what is being asked. Then ask yourself how strongly you agree or disagree with the statement. Please rate your answer to that statement on the five-point scale by circling the number that best corresponds with your feelings about each item.

#	Item	Strongly disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Strongly agree
1	I enjoy competition because it gives me a chance to discover my abilities.	1	2	3	4	5
2	Competition does not increase my awareness and understanding of myself and others.	1	2	3	4	5
3	Competition can lead to the formation of friendship with others.	1	2	3	4	5
4	Competition is <i>not</i> a means of motivating me to bring out the best in myself.	1	2	3	4	5
5	I enjoy competition because it tends to bring out the best in me rather than a means of feeling better than others.	1	2	3	4	5
6	I do not find competition to be a valuable means of learning about myself and others.	1	2	3	4	5
7	I like competition because it teaches me a lot about myself.	1	2	3	4	5
8	I value competition because it helps me to be the best that I can be.	1	2	3	4	5

#	Item	Strongly disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Strongly agree
9	I find competition enjoyable because it lets me express my own potentials and abilities during competition.	1	2	3	4	5
10	Competition does not help me develop my abilities more.	1	2	3	4	5
11	Without the challenge of competition I might never discover that I had certain potentials or abilities.	1	2	3	4	5
12	I enjoy competition because it brings me and my competitors closer together as human beings.	1	2	3	4	5
13	I like competition because it helps me to develop my own potentials more fully than if I engaged in these activities alone.	1	2	3	4	5
14	I enjoy competition because it brings me to a higher level of motivation to bring the best out of myself rather than a means of doing better than others.	1	2	3	4	5
15	Through competition I feel that I am contributing to the well-being of others.	1	2	3	4	5

Appendix L

DPC

Please read each of the following statements carefully, and indicate how characteristic it is of you by placing a tick (✓) in the appropriate brackets.

#	Item	Not at all like me	Slightly like me	Moderately like me	Reasonably like me	Extremely like me
1	I do not like wearing a swimming costume because I don't think I look as good as the other girls.					
2	I don't mind having junk food even if my friends are having healthy food.					
3	When I look at my slim friends I wish I could look like them.					
4	Before going to a party I spend a long time worrying about whether I will look as attractive as some of my friends.					
5	I feel happier about my figure when I am with someone who is larger than myself.					
6	I don't mind going out in a short skirt even if my friend is wearing a short skirt and looks better than I do.					
7	I look at other girls' figures to see how well I measure up.					
8	At a party I don't mind eating dessert, even if my friends decide not to have any.					
9	I am likely to buy low calorie things even when everyone else isn't doing so.					

Appendix M

RSES

Instructions: Below is a list of statements dealing with your general feelings about yourself. If you strongly agree, circle SA, If you agree with the statement, circle A. If you disagree, circle D. If you strongly disagree, circle SD.

		Strongly Agree	Agree	Disagree	Strongly Disagree
1	On a whole, I am satisfied with myself.	SA	A	D	SD
2	At times, I think I am no good at all.	SA	A	D	SD
3	I feel I have a number of good qualities.	SA	A	D	SD
4	I am able to do things as well as most other people.	SA	A	D	SD
5	I feel I do not have much to be proud of.	SA	A	D	SD
6	I certainly feel useless at times.	SA	A	D	SD
7	I feel that I'm a person of worth, at least on an equal plane with others.	SA	A	D	SD
8	I wish I could have more respect for myself.	SA	A	D	SD
9	All in all, I am inclined to feel that I am a failure.	SA	A	D	SD
10	I take a positive attitude toward myself.	SA	A	D	SD

Appendix N

STAI-Y-1 - A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel *right now*, that is, at this *moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	Not at all	Somewhat	Moderately so	Very much so
1. I feel calm	1	2	3	4
2. I feel secure	1	2	3	4
3. I am tense	1	2	3	4
4. I feel strained	1	2	3	4
5. I feel at ease	1	2	3	4
6. I feel upset	1	2	3	4
7. I am presently worrying over possible misfortunes	1	2	3	4
8. I feel satisfied	1	2	3	4
9. I feel frightened	1	2	3	4
10. I feel comfortable	1	2	3	4
11. I feel self-confident	1	2	3	4
12. I feel nervous	1	2	3	4
13. I am jittery	1	2	3	4
14. I feel indecisive	1	2	3	4
15. I am relaxed	1	2	3	4
16. I feel content	1	2	3	4
17. I am worried	1	2	3	4
18. I feel confused	1	2	3	4
19. I feel steady	1	2	3	4
20. I feel pleasant	1	2	3	4

Appendix N

STAI - Y - 2 - A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel *generally feel*. There are no right or wrong answers. Don't spend too much time on any statement but give the answer which seems to describe how you *generally feel*.

	Almost Never	Sometimes	Often	Almost Always
21. I feel pleasant	1	2	3	4
22. I feel nervous and restless	1	2	3	4
23. I am satisfied with myself	1	2	3	4
24. I wish I could be as happy as others seem to be	1	2	3	4
25. I feel like a failure	1	2	3	4
26. I feel rested	1	2	3	4
27. I am 'calm, cool, and collected.'	1	2	3	4
28. I feel that difficulties are piling up so that I cannot overcome them	1	2	3	4
29. I worry too much over something that really doesn't matter	1	2	3	4
30. I am happy	1	2	3	4
31. I have disturbing thoughts	1	2	3	4
32. I lack self-confidence	1	2	3	4
33. I feel secure	1	2	3	4
34. I make decisions easily	1	2	3	4
35. I feel inadequate	1	2	3	4
36. I am content	1	2	3	4
37. Some unimportant thought runs through my mind and bothers me	1	2	3	4
38. I take disappointments so keenly that I can't put them out of my mind	1	2	3	4
39. I am a steady person	1	2	3	4
40. I get in a state of tension or turmoil as I think over my recent concerns and interests	1	2	3	4

Appendix O

Manipulation Check

Sometimes when we interact with others (friends, colleagues, television actresses, models, strangers) we compare ourselves to them by thinking about that person's characteristics and abilities in relation to ourselves. Competitiveness also arises in that we may feel competitive or compete against each other either informally or formally. How strongly did you socially compare and or feel competitive with other females when reading, choosing, and then writing about yourself?

How much did you socially compare yourself with other females?

1	2	3	4	5
Not at all	A little	Moderately	A lot	Extremely

How much did you feel competitive with these other females?

1	2	3	4	5
Not at all	A little	Moderately	A lot	Extremely

Appendix P

WRITTEN DEBRIEFING

Thank you for participating in my dissertation research entitled, "Experimental Evaluation of Intra-Sexual Competition Effects in Single Females for Males according to Restraint Status." The purpose of this study was to look toward evolution as the ultimate cause of eating disorders. Behaviour has both proximate and ultimate causes, where proximate causation is concerned with the environmental stimuli that trigger behaviour, and ultimate causation is concerned with the evolutionary significance of the behaviour.

Current theories have offered proximal explanations to the existence of eating disorders. Although they definitely function as contributing factors in the environment, they still fail to explain why males are much less likely to fall prey to the same eating pathology as females, why it declines with age, or why eating disorders are actually occurring. Prior research shows that eating disorders arise out of increased intra-sexual competition between females for evolutionarily desirable males. Specifically, current conditions in the world have increased females' ability to both control their body shape and their mating behaviour, creating a more competitive environment where ultimately, some females succumb to the competitive pressures through the development of Anorexia Nervosa (Abed, 1998). Thus, from an evolutionary perspective, female competition for mate selection may be an underlying force driving the development of eating disorders, through their intra-sexual competition for males and their desire to appear attractive. The purpose of this study is to investigate the relationship between restraint, competition, evolution and mate selection.

The reason that we needed to be deceptive about the underlying nature of the study, was to enable the researchers to obtain an accurate picture of whether individuals modify their eating behaviour when exposed to the concept of a desirable mate and evolutionarily desirable females. There were three instances during the course of this study where we were required to be deceptive in nature. The first instance was the presentation of fabricated individuals from a dating agency. The second instance was the presentation of M&Ms as being left over from a prior study. In point of fact, the M&Ms were bought and brought into the experimental procedure so that we could measure your food consumption while exposed to the experimental manipulation. Finally, we were deceptive in not informing you at the beginning of the study to the fact that we would be requesting a measure of your weight and height at the end of the study. If we were to inform you of this request at the beginning, it would have compromised the integrity of the study as you would have wondered why we were doing so. We need to obtain the most current and up to date weight and height information as it adds to important information that we need for assessing restraint status. As mentioned prior, this information will be kept confidential and anonymous.

VITA AUCTORIS

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