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## Bone Density Testing as an Early Detection Devise For Anorexia Nervosa and Osteoporosis in Pre-Adolescent and Adolescent Girls

Kelle L. Brooks

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BONE DENSITY TESTING AS AN EARLY DETECTION DEVISE  
FOR ANOREXIA NERVOSA AND OSTEOPOROSIS IN  
PRE-ADOLESCENT AND ADOLESCENT GIRLS

by

Kelle L. Brooks

A Thesis  
Submitted to the  
Faculty of The Graduate College  
in partial fulfillment of the  
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Western Michigan University  
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Kelle L. Brooks

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Western Michigan University, 2005

Osteoporosis has become one of the leading health problems for post-menopausal women in the United States, however, it has been shown that pre-adolescent and adolescent girls with anorexia nervosa are at an unusually high risk for early on-set osteoporosis and bone fractures.

Bone density testing has already proving itself as an accurate form of detection in post-menopausal women and the elderly and is widely used at medical institutions, clinics, and pharmacies throughout the United States as an inexpensive, non-invasive, and accurate technique for detecting low bone mass.

This research aims to examine anorexia nervosa and its long-term effects on the health of bones for females. Focus will be on anorexia nervosa and the resulting stressors on the body that lead to osteoporosis and a means of early detection through annual physical exams that include bone density testing will be presented as a tool for early diagnosis of both anorexia nervosa and osteoporosis.

In order to fully understand the short and long-term consequences that anorexia nervosa has on bone density this research shows how bone density testing is imperative and that requirements and methods should be put into action beginning at early ages, during annual physical examinations.

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## CHAPTER I

### INTRODUCTION

Anthropological research that examines the high rates of anorexia nervosa and its negative impact on the body is critical as it is reported that five to ten million American women and adolescent girls suffer from eating disorders, in contrast to one million men and boys (The Alliance for Eating Disorders Awareness 2001). The seriousness of eating disorders and their long term health effects on the physical body include: electrolyte imbalances; swollen stomach, face, and ankles; disrupted menstrual cycles; gastrointestinal problems; eruption of the esophagus; kidney failure; tooth decay; over-growth of body hair; irregular heartbeat that can lead to cardiac arrest and often times death (The Alliance for Eating Disorders 2001) as well as increases in early on-set osteoporosis. Each of these health risks are well studied with two exceptions: the short and long-term consequences on bone density in relation to prevention as well as treatment.

Osteoporosis has become one of the leading health problems for women in the United States and is associated with high morbidity and mortality rates (Korpelainen et al. 2003; Mehler 2002). It has been shown that women with anorexia nervosa are at a high risk for early on-set osteoporosis and bone fractures. This research aims to show that screening through annual bone density testing starting at early ages for girls could allow not only for early detection of osteoporosis but also anorexia nervosa.

Bone density testing has been shown to accurately detect osteopenia (low bone mass) and osteoporosis (osteopenia associated with non-traumatic pathological fractures) in both postmenopausal women and the elderly and has been widely used at doctor's offices and open-house clinics at pharmacies throughout the U.S. (Birdwood 1996; Herrin 2003). However, it has been reported that most women already exhibit severe bone loss by the time they are diagnosed and only a very small percentage of women need to be treated preventatively (Birdwood 1996). By instilling requirements and methods for bone density testing, beginning at early ages, during annual physical examinations, young girls and women will be able to live longer, healthier lives. The techniques exist and the need is twofold: saving the lives of young girls and women and making these lives less painful, more fulfilling, and longer.

The occurrence of anorexia nervosa is believed to be multi-dimensional with culture and its ideals affecting certain individuals differently depending on their social, ethnic, religious, and familial backgrounds, to name just a few (Bordo 1993). These cultural ideals are learned at a very early age at home, school, and through mainstream media messages such as television shows and advertisements. This mainstream media and the messages it teaches of western body ideals is one of the main educators for children today (Kilbourne 1989).

## Body Image and the Feminine Ideal

### *Popularization: images and the media*

The average American is exposed to approximately 1500 ads a day selling values, and concepts of what is normal, successful, beautiful, and worthwhile, and many believe that these ads constitute one of the most powerful educational forces in society (Kilbourne 1989). The consequence of this is that adolescent girls are growing up in a world where if you are ugly, overweight, poor, disabled, or anything not considered 'normal' than it appears you are not acceptable. Most women, portrayed through media/ads, conform to a standard of beauty (thin, tall, long-legged, and young) that is not representative of real life society. The cultural messages reward thinness and beauty: beautiful, thin women get the man, the house, the cute kids, and the good job. To have the perfect life one must first have the perfect body. These messages can be easily seen with a click of the television remote or a flip of a magazine page. With the rise in reality television these women are no longer Hollywood actresses but "real" women. For example, the bachelorette is never an overweight woman fighting off twenty attractive and successful men but rather a thin, beautiful, sexy woman.

The result of the media messages, according to some feminist thinkers such as Susie Orbach, is that American women today find themselves vulnerable, to one degree or another, to the requirements of popular society to fit this feminist ideal (as cited by Bordo 1993). Starting in childhood popular television shows and

advertisements affect perceptions of body shape and places pressure on children especially as they are in the midst of forming self-identifying conceptual ideas of themselves and others and are also undergoing numerous physical and psychological changes (Rosenvinge and Borresen 1999). Through the media, stereotypes that pit the culturally “preferred” people against the “unpreferred” bombard female children teaching them that in order to be successful you must also be beautiful. A possible result of this is that many girls are dieting at younger ages, judging themselves against individuals around them, and taking this to the extreme which often results in an eating disorder. Male children are not safe from this bombardment of body ideals and the result is that they often grow up believing that women should fit into this stereotypical ideal.

With the age of the internet it seems as though children will not only be bombarded almost every second of their day with advertisements but now they also have a place where they can receive information, support and build alliances with other girls who have embraced the anorectic “lifestyle”. Project Makeshift has formed a website ([www.plagueangel.net](http://www.plagueangel.net)) where girls can talk to one another about their success and failures of trying to remain thin. As they suggest, anorexia is not a disorder or a disease, it is a lifestyle. This website gives girls tips on how to lose more weight, how to look as though you are eating when around family and friends, what foods to eat when you have no choice but to eat, and constantly speaks of how great it feels to be in control of ones own body. Like most websites that are out there

for teens that offer support, this one too makes you feel connected, powerful, and excited about your anorexic desire and need.

This pressure to be thin has also taken on the form of health and wellness with an increase emphasis on diet pills, diet foods, and the ongoing pursuits to find the fountain of youth. Beyond the media's constant badgering there has been an increasing trend in the health industry to promote and achieve the perfect female body. Hesse-Biber's (1998) work on the different influences on women and weight reveals that the diet and weight loss industry is as much to blame for a women's risk of succumbing to an eating disorder as is the media. Within the health industry, women are bombarded with products that aim to control and define the female body: cellulite control cream; firming cream; diet pills; diet drinks; lite foods; machines that burn fat while you sit at your desk; etc. Hesse-Biber (1998) even makes mention of one diet pill that seems to draw on women's desire to turn towards an eating disorder for thinness control by naming it Anorex-eck. Those that make this product and others like them are hoping to sell these products by inferring a direct correlation with the effects of this pill and the effects of an eating disorder, ultimately thinness.

American ideals of femininity and body play an important role in maintaining women's perceptions of their bodies. While other factors have been shown to lead to eating disorders, such as sexual abuse, depression, anxiety and trauma (Ward et al. 2000), the media continues to play an important role in reflecting and maintaining patriarchal ideologies that in turn lead to potentially dangerous eating behaviors. Bordo (1993) suggests that blaming the media "as the sole enemy" without exploring

gender and how these ideals came about throughout history leaves out the key components to understanding eating disorders. Culture and all its components- ideology, images, organization of the family, the construction of personality, the training of perception are all to blame for producing eating disorders (Bordo 1993). Although the media is not “the sole enemy”, it is indeed an enemy whose constant unattainable portrayal of women has helped to maintain the idea of what women should be and look like. In a time when pop-culture is more influential than what we learn in school or from our parents the pressure to meet the female ideal is becoming increasingly more dangerous.

The question of what contributes to anorexia nervosa is a focus for researchers today and the effects of this disorder are numerous and life-threatening. The research presented here aims to examine anorexia nervosa and its long term effects on the health of bones for females, through an extensive analysis of current literature and scientific studies. Focus will be on the correlation of clinical data from medical studies on anorexia nervosa and the resulting stressors on the body (rapid changes in body weight, osteoporosis, amenorrhea, changes in estrogen levels). Then a model of the impact on community health and means of early detection through regular annual physical exams that include bone density testing beginning at an early age are examined as methods that could result in lessening the problems associated with anorexia nervosa and facilitate strong sense of body image for young girls.

The primary goals of this research address anorexia nervosa and its effects on bone density, and show that long term monitoring through bone density testing will

help in earlier diagnosis for at risk girls. The following questions will be explored in an attempt to bring to the forefront the biocultural dilemma associated with anorexia nervosa:

- Does anorexia nervosa lead to osteoporosis and, if so, how long before it is evident?
- Is bone density testing an accurate and reliable form of testing for osteoporosis?
- If anorexia nervosa and osteoporosis are caught early enough can loss of bone density be renewed?

By examining these questions a larger picture of osteoporosis and anorexia nervosa will bring to the forefront the extreme and immediate need, as well as the realistic possibility of helping girls and women worldwide live longer, healthier lives. When medical science presents a technique for helping people live healthier lives, what possible explanation is there for not taking full advantage?

Different cultures deal with the body in different ways. In western culture many women are obsessed with their bodies but not comfortable with them. Women are constantly trying to find ways to change/fight their natural body in order to better resemble the ideal body image. It is argued here that these ideals come from mainstream perceptions of women and are instilled in females from a very early age through media, advertisement, and culture in general. It is widely understood that a large majority of women with eating disorders have been directly affected by the cultural ideals that are reinforced in every segment of western society, however, the

emphasis of this study is on an increased awareness of the negative effects of the idealized woman on women's health in the United States which ultimately leads to starvation and consequently a loss of bone density that can affect the quality of life and often shorten life expectancy. By working to bring to the forefront the potential to not only treat but to facilitate early detection, this multifaceted research offers new ways to assess eating disorders in young girls and possibly even help save lives.



## CHAPTER II

### ANOREXIA NERVOSA

Eating disorders are extensively researched by an array of professionals at universities and medical institutions throughout the U.S. focusing on the high numbers of American women who suffer from various eating disorders. Eating disorders have become a global problem with approximately 70 million individuals worldwide struggling with an eating disorder of some type (The Alliance for Eating Disorders Awareness 2001). Of those that are diagnosed with anorexia nervosa, half will remain anorexic for more than seven years and about 18% will die within 20 years of the diagnosis (Birmingham and Beumont 2004). Half of these deaths are caused by suicide and the other half are due to medical causes (Birmingham and Beumont 2004). By reviewing the feminist, medical, clinical and anthropological literature, it will be shown that the culture surrounding anorexia nervosa is an intricate and complex web of factors that come together to produce the eating disorder.

The term “eating disorder” carries many meanings [which vary in seriousness and consequence] none of which are healthy or positive. The Alliance for Eating Disorders Awareness (2001: 3) refers to an eating disorder as any “eating habits that are hurtful to an individual; at times resulting in death.” The three main eating disorders that are discussed in the mainstream are obesity, bulimia, and anorexia nervosa and although these three life-threatening disorders vary in consequence on

the physical body they are all extremely serious and growing in emergence (Herring 2003; Schlundt and Johnson 1990). Overeating, purging, and starvation all place stress on the body which are often times irreversible and too often ignored. Obesity, which can be seen with the naked eye, is at epidemic levels in America striking people at younger ages and causing a disease that was once considered “adult” in nature to become a disease with which children are afflicted. Unlike anorexia nervosa and bulimia, which is most often hidden, obesity is taking place at home in front of parents and at school in front of teachers and administrators, and is being allowed. It is no wonder then why we can’t seem to help those whose eating disorder is practiced in private before the ailments that are associated with anorexia are far too many and far too severe.

## The History of Dieting

### *Anorexia Nervosa and its Emergence*

Anorexia nervosa is one of the few psychiatric conditions that can result in death (Martin 1998) and has been described by many as a persistent pursuit of thinness, or fat phobia. Anorexia nervosa, or self-starvation, is an intense fear of gaining weight which leads to a refusal to eat at all and possibly death (The Alliance for Eating Disorders Awareness 2001). The questions surrounding anorexia nervosa are many with most researchers agreeing that food is not the sole basis. Other factors to be taken into consideration are: familial predisposition, psychopathology, race,

sex, sociocultural influences, and abuse, to name just a few (Bordo 1993; Bruch 1982; Brumberg 2000; Martin 1998).

### *Late 19<sup>th</sup> Century and Earlier*

Sir William Withey Gull, a British physician, is credited with identifying anorexia nervosa in the late 19<sup>th</sup> century (Hepworth 1999; MacSween 1993). He first presented his findings while delivering a paper to members of the British Medical Association during the fall of 1868 and again in 1874. In 1868, the phrase, *aepsia hysterica* (digestive problems of hysterical origin) was used and then five years later Gull changed the term to anorexia nervosa (Gull 1873). Gull reports that the change was made because the term hysteria is used usually in relation to women and since the disease affects both males and female he thought the term nervosa to be more fitting (Gull 1873). In his detailed case studies, Gull reported that his female patients suffered from such ailments as: emaciation, apparent weakness, amenorrhea, and abnormal pulse and respirations and he concluded that these ailments were a direct result of self-starvation (Gull 1873). Although these ailments today are still associated with anorexia nervosa the ideas and theories surrounding the disorder have consistently changed along with social and cultural beliefs.

Prior to the classification of anorexia nervosa, self-starvation was considered the result of everything from religious beliefs to madness (Hepworth 1999). For example, during the twelfth and thirteenth centuries, women who practiced self-starvation, or fasting, were thought of as saints because they were capable of existing

without nourishment (Hepworth 1999). This practice of fasting took place mostly among the aristocratic Greeks and the Christians in the Middle Ages as way of showing “domination of the flesh” and “excellence of spirit” (Bordo 1993; Brumberg 2000). For the aristocrats it was a road to self-mastery and practice of moderation and for the Christians as an instrument for the development of a “self” (Bordo 1993). Hepworth (1999) explains that because of shifts in religious interpretations of women from the twelfth and thirteenth centuries to the fifteenth and sixteenth centuries the same practice of self-starvation brought with it the label “witch” rather than saint. At this time any women who acted in a way not considered religious was considered evil and therefore deemed a witch. In the seventeenth century there was a change in ideas from religious to medical authority. Prior to Gull’s coining the term *anorexia nervosa*, a number of medical clinicians report on self-starvation was referred to as ‘*inedia prodigiosa*’ meaning a great starvation, and ‘*anorexia mirabilis*’, miraculously inspired loss of appetite (Hepworth 1999). At this time self-starvation was still tied to the religious ideologies but was beginning to be seen more as a medical condition.

In the nineteenth century, Gull’s work shifts self-starvation into the medical arena and into the realm of medical treatment in the form of psychological treatment. During this time the idea of a cure was seen as simply a need for ‘moral management’ (MacSween 1993). By ‘moral management’ it was believed that complete control of the patient’s behavior and environment with forced feeding was the only way to fight off this ‘madness’ (MacSween 1993). As MacSween (1993) discusses, for women suffering from self-starvation, the doctor and asylum were seen as a stand-in for the

father and home with the responsibility of the former to fix what the father and home had failed at.

Independently of Gull's research, but at approximately the same time, a French physician, Lasèque, introduced the disease 'hysterical anorexia' to the medical community, and his description is not unlike Gull's except for one major difference. Lasèque agrees that there was a positive aversion to food; however, hunger still existed, whereas Gull claimed that the girls had no appetite for food (Gull 1873; Hepworth 1999; MacSween 1993).

The discourse surrounding hysteria and women become strong at this time and lead the way for major dialogue among researchers and women alike. The late nineteenth century, which marks the beginning of the women's emancipation movement, has been labeled 'the golden age of hysteria' and also marks a time when clinically women were often diagnosed as possessing a hysterical disposition (Hepworth 1999). Hepworth (1999) suggests that the shift from a religious or physical origination of anorexia nervosa to a psychological one was managed partly through the discourse of hysteria at this time. The association between anorexia and hysteria developed as a means to understand food refusal in women. Hysteria had been used for centuries by religious organizations to describe particular abnormal behaviors that were intrinsic to women and since anorexia was mainly found in women the medical and psychiatric professions picked up on the idea of hysteria and nervousness also (Hepworth 1999.) At this time the slim look was no longer only about spirituality and control but started to signify social status among women.

Middle-class daughters of the 19<sup>th</sup> century often opted for a small, slim body as a way of setting themselves apart from the milkmaids and other lower-class girls (Brumberg 2000). Thus self-starvation was not seen as an illness but rather the status quo of wealth and success.

### *20<sup>th</sup> Century-present*

By the turn of the twentieth century elite women were no longer the only ones suppressing their appetites in order to have the frail look that was sought after from the elite men, but now lower class women were receiving pressure to also be thin. Mothers were often times the ones who applied the pressure to diet on their daughters in hopes of attracting a more successful husband (Brumberg 2000). Daughters were told that sturdiness implied vulgarity and low social class.

With dieting now a popular trend among young women of all classes the twentieth century brought with it new ideas of anorexia nervosa that centered more on social, cultural and feminist theories such as the ones presented by Bordo (1993) on the multi-dimensional components of eating disorders. Among other ideas at this time were the rapidly changing representations of women, and like today this clearly contributed to the onset of eating disorders (Hepworth 1999). Clinically, anorexia was viewed as a mental illness, but a very rare one, and this notion remained dominant until 1914 when Simmonds, a physician, described the death of a woman patient as being caused by starvation in which the pituitary was found to be damaged (Hepworth 1999). This brought about new medical treatments for women who were

thought to be anorectic in which they underwent the implantation of animal pituitary glands to try to cure them (Bruch 1982). For the next three decades infrequent cases of anorexia became known as 'Simmonds Disease' and the term anorexia, as well as the psychological causes, practically disappeared (as cited by Bruch 1982; as cited by MacSween 1993). A 1949 study conducted by Sheehan and Summers showed strong proof that pituitary gland damage and the symptoms of anorexia were not related and the controversy ended. This brought to light the realization that anorexia was a real problem and that food restriction as a means of self identity for woman was not going to end.

However, anorexia was still viewed as a fairly rare condition and increase in interest and research did not occur until the late 1960's (Bruch 1982; MacSween 1993). Since then the increase in interest and in research reveals that there is no simple explanation for anorexia nervosa and that it is a complex disease in which culture, genetics, biology, family, trauma, ethnicity and temperament can all play an important role in who will be afflicted with this life threatening condition (Bordo 1993).

The image of the female body has played and continues to play a vital role in western culture in defining and redefining what a "real" woman should look like. Though the body images have transformed over the past two centuries, the struggle to conform has had a consistent effect on women's health and how women have been and continue to be viewed by society. However, body image and the pressure to look a specific way is not the sole factor to understanding anorexia nervosa. Many

researchers insist that other factors play an important role (Bordo 1993; Bruch 1982; Macsween 1993). The following section will review the psychologist, anthropologist, and feminist approaches to understanding anorexia nervosa.

### Psychological, Feminist and Anthropological Assessments

#### *Psychological*

There are numerous psychological methods that are used to try to understand why women succumb to self-starvation. Bemis (1978) suggests four main approaches to understanding anorexia: the psychodynamic, the familial, the behavioral, and the medical. The psychodynamic approach is described as a disorder of the individual in which the refusal to eat is caused by a deeper anxiety. The familial approach is one in which is described as a power strategy within family relations. The behavioral sees anorexia as being learned and thus able to be unlearned without ever looking into the deeper meaning of the condition, and lastly the medical approach is one in which a physiological or organic cause is thought to bring on the condition.

When talking about psychodynamic approach both Bordo (1993) and MacSween (1993) make mention of Bruch's work in the late 1970's. Bruch, a psychiatrist and leading authority on anorexia, saw food control, and thus anorexia, as an attempt to impose control in a life that is lacking control. Bruch suggests thinness as the ultimate purpose, goal, and achievement for the anorectic, but that this is not centered on neither food nor weight but rather the hard proof that she has taken control within her life (Bruch 1982). She also suggests that this lack of control is



formed during childhood where the child's needs were not correctly recognized by the parents. The child then grows up with no sense of her own needs and feels as though she is living in accordance with the demands of others (Bruch 1982). In such families Bruch (1982) suggests that the growth and development of the child are not conceived of as the child's accomplishments but rather the parents and that this translated into the anorectic as being "deficient in the sense of autonomy" and lacking in the ability to make decisions. Although many see Bruch's mother/parent/daughter claim as being fundamentally unfortunate most do however agree with the fundamental idea of the female trying to gain control in a life that is in disarray (Bordo 1993; MacSween 1993; Rabinor 1994).

As Bordo (1993) states, anorectics are similar to runners and bodybuilders who are constantly pushing the limits of their bodies allowing each new goal to be the driving force that gets them there. The goal and feeling of mastery when it is reached appears to derive from two sources: the first, the guarantee that one can overcome any physical obstacle placed on the body: the second, the joy and excitement that comes with being in charge of shaping ones own body. Sacks, a professor of psychiatry at Cornell Medical College suggests that an unmanageable culture may be part of the problem and may explain why so many women are using food, or the lack of, as a way to feel in control (as cited by Bordo 1993). People no longer feel as though they can control the world around them: jobs, kids, relationships, etc. but they can control their food. As culture changes, is it possible that the reasons underlying anorexia are also changing? Self-esteem is another area that has been looked at by

many psychologist and it has been seen that there is indeed a strong connection between one's feelings about their body and ones self-esteem overall (Mendelson 2002; Springer 1999; Thompson 1999; Tiggemann 2001). Mendelson et al. (2002) examine the relationship of self esteem and body esteem. This 2002 study examined the multidimensional measures of body esteem in relation to self-esteem by looking at how women who were clinically diagnosed with an eating-disorder would rate themselves compared to a nonclinical sample. 74 eating disordered women and 103 female university students, who did not have eating disorders, completed questionnaires on body esteem, self-esteem, and body mass index. The researchers concluded that there was a strong correlation between these two concepts and that one does not exist without the other suggesting that if women feel bad about their bodies then their self esteem is also low.

A similar study conducted by Thompson et al. (1999) examined eating disturbances in relation to teasing, body comparison with others, and body image by questioning 173 female students from the University of South Florida. Questions concerning maturation, teasing, comparison of body to others, body image, and eating disturbances were asked and the researchers were able to conclude that there is a strong link between body image and social feedback such as teasing and eating disorders. Thompson et al. (1999) states that "exposure and internalization" of perfect ideas of body and appearance may be a factor in understanding body dissatisfaction and eating disorders.

The psychological factors leading to and understanding anorexia nervosa are many with most clinicians believing that there can be numerous factors coming together that lead to disturbed eating behaviors. Familial relations, learned behaviors, psychological and organic causes, as well as individual anxieties about self are all thought to contribute to the overall cause of anorexia nervosa. Psychologists do not see one main contributing factor but rather several components that can come together and lead to anorexia nervosa. The psychological perspective is not the only perspective that perceives anorexia nervosa as being multi-dimensional. The feminist approach, although different in its root cause, also is multi-dimensional.

### *Feminist*

The feminist/cultural perspective on eating disorders focuses its attention on the learned/addictive dimension of eating disorders, gender as the primary determinant rather than contributory and social causes, thus weakening the medical arguments of dysfunction and pathology (Birmingham and Beumont 2004; Bordo 1993). Many researchers have argued that if culture is to blame for eating disorders then why do so many women escape from it. Bordo (1993) argues that the cultural environment is not the same for everyone and that although we are all exposed to the same images of femininity and beauty these images alone do not cause eating disorders. Instead she argues that different configurations of ethnicity, social class, sexual orientation, religion, genetics, education, family, age, etc. of each individual person will determine how each person is affected by culture. The original research

on anorexia nervosa focused most of its attention on the psychological factors and/or on the body and body-size. The feminist perspective however focuses its attention on women's position in a patriarchal society (Bordo 1993; MacSween 1993).

MacSween (1993) and Bordo (1993) suggest that anorexia nervosa is mainly rooted in the battle between individual and feminist ideologies, and that women are not able to fully develop an individual self in a patriarchal culture. Interestingly, nearly every proposed theory in the psychopathology of anorexia has been deconstructed to reveal this disorder as cultural in nature. Whereas those following a psychological or medical theorem for understanding anorexia see distinct lines between those with and those without an eating disorder, in contrast to feminists thinkers in this arena who see "varying degrees of disorder" by which women's full potential is undermined (Bordo 1993). Bordo (1993) suggests all females are in some way fighting their bodies and constantly critiquing themselves against the feminine ideal. Culture has taught women to be insecure and constantly engaged in physical improvement, and culture teaches both males and females how to see bodies. This idea, that culture is responsible, has been attacked by researchers from both the psychological and the medical arenas (Bruch 1982; Mendelson 2002). Feminists such as Brumberg (2000) have also questioned why, if we all live and grow in the same culture, some girls are not developing the disorder. Bordo's (1993) response to this is both clear and concise in that sense that it holds true for all aspects of life, not just eating disorders. She suggests that although we are all subject to the same images and mainstream ideologies of femininity and beauty it is not these ideologies alone

that form our behaviors and identities. She suggests that the “unique configurations” of ethnicity, social class, sexual orientation, religion, genetics, education, family, age, etc. will determine how each person is affected by the surrounding culture.

Psychological research conducted by Ludwig and Brownell (1999) supports this claim by examining how the views of individual femininity and masculinity in relation to appearance and sexual orientation are related to body image. In this study, 188 lesbian and bisexual women participated: 36% of the subjects were between the ages of 18 and 21; 31% between 21 and 29; 21% were in their 30s; with the remaining 12% between the ages of 40 and 55. 53% of the subjects had completed college and 67% of those were in or had completed graduate school. Participants completed a 75-item survey made up of 5 major sections: demographics (age, educational level and height), the Kinsey scale (to determine sexual orientation), weight (lowest, highest, current), community affiliations and attitudes, and body satisfaction. They found that women who consider themselves more feminine, and belong to groups that consider this the ideal, had lower self esteem regardless of sexual orientation. In contrast, women who consider themselves more androgynous and who belong to groups that consider this the norm, or the ideal, had higher self esteem and appeared to be less affected by images of ideal female bodies portrayed through media and advertisement.

Do these female ideals reach across culture and borders or are they based solely on the assumptions and mainstream ideas that are presented through western views of females and femininity? Research conducted by Rieger et al. (2000)

examined two main assumptions surrounding weight concern for anorectics. First, that these weight concerns are specific to western manifestations of the disorder and second, that the occurrence of anorexia in non-western settings is a primary result of the globalization of western values of thinness. The data they used was obtained from the medical records of 14 Asian patients from different regions, all of whom were previously diagnosed with anorexia nervosa or bulimia, between 1984-1996. Of the 14 patients, 8 had anorexia nervosa with a mean body mass index (calculated by dividing weight [kg] by square of height [m]) of 15.1 and 6 had bulimia nervosa with a mean body mass index of 19.6. The mean age of the patients was 21.6 years with a mean level of education at 12.3 years. The researchers concluded that when weight loss was positively valued rather than the result of a “fat phobia”, concerns about weight revealed that this is not limited to contemporary western perceptions but may transcend cultures. It is interesting to note, however, that it could not be proven that the globalization of western ideals was responsible for the occurrence of the disorder elsewhere.

Another study conducted by Thomas et al. (2002) that supports the feminist idea of multi-dimensionalism looked at the influence of ethnicity, gender, mood and social class on eating attitudes. This study’s sample consisted of both male and female students from two different public high schools in England who ranged in ages 11 – 16. A self-completed questionnaire was used in which questions concerning age, sex; parental occupation; language; and parent’s country of birth were asked. Students were asked to describe themselves in terms of ethnicity,

religion and culture and were asked to take an eating attitudes test as well as a self-esteem test. Thomas et al. (2002) found that cultural and socio-economic factors played an important role in eating attitudes across age ranges, and that ethnicity played a major role in eating attitudes for adolescents. Ethnicity was a particularly important factor for adolescents growing up in western societies with families that adhere to traditional values, resulting in contrasting, cultural values at odds with each other and causing internal conflicts, and dramatically affecting individual perceptions of food and body.

The feminist perspective is clearly wrapped up in culture and gender as the primary contributing factors that lead to anorexia nervosa. With the idea that women's position in society in terms of ethnicity, sexual orientation, social class, religion, education, family, age, and genetics and how all these come together for any particular woman will determine how each woman is affected by culture and therefore their susceptibility to an eating disorder.

### *Anthropological*

Alongside the psychological and feminist dialogues, anthropologists are also taking a great interest in the politics of the body, both past and present. Much of the anthropological focus stresses the different ways in which men and women view not only their bodies but also the bodies of the opposite sex, food ideologies and practices, as well as infant and child feeding practices to understand the role of culture and biology in the formation of body image ideals and resulting problems. Anthropologists

have shown that the body is a dynamic and important component in signifying social identity through many venues including: ornamentation; hair; modifications (piercings, tattoos); etc. (Lock, 1993). Lock (1993) goes on to say that the body, imbued with social meaning becomes an active forum for expression, illness can also be used as a tool for expression and control; a way to resist that which is going on around us. Her example of a child's refusal to go to school as his/her way of resisting the social order enforced upon him/her by parents, teachers, and other authority figures could also be used to explain the control that many anorectics are trying to gain over their lives and the world around them.

Social anthropological studies of food consumption and availability in non-industrialized societies have argued that the search and preparation of food, when not readily available, made food a primary focus and thus brought with it a symbolic expression of one's social status (Messer 1984). Social psychological analyses from anthropologists have suggested that food supply and emotions surrounding food are directly related to eating disorders, both over and under-eating. An example given by Messer (1984) is that of Puerto Ricans who live on the mainland where food is plenty overindulge for fear that food supplies will run out and that overweight body size is the ideal and preferred. The same can be said for those who have grown up in western societies where food is in abundance and therefore thin and slim is a way of showing control and thus stands for high social class. Messer (1984) suggests that these types of issues surrounding food should be referred to and studied as cultural diseases rather than nutritional diseases since culture, cultural practices, cultural



ideologies, and resources all play an important role in determining who is culturally predisposed to such cultural diseases.

Biocultural studies among anthropologists have looked into the consequences of particular dietary habits and the interactions between malnutrition and social organization (Messer 1984). It has been seen, although not proven, that malnutrition of a particular nutrient in certain societies has brought on psychologically abnormal behaviors for the malnourished group (Messer 1984). It has been noted that hypoglycemia and aggression are strongly correlated although the causation of aggression is not fully understood and how iodine deficiencies have been connected with mental impairments in highland Ecuador (Messer 1984). Evolutionary theory would suggest that those foods which are healthy and therefore enhance our chances of survival would automatically be selected as essential and desirable however the mechanisms by which nutritional advantage and food practices and preferences are learned are not yet fully understood (Messer 1984).

Anthropological research has led to the belief that body and attractiveness are one in the same with men and women have very differing opinions about what the ideal body is. In a study conducted by Brewis (1999) to measure the accuracy of judgments of attractive bodies, 84 women and 77 men living in both rural and periurban environments in Samoa and 41 females and 24 males living in urban Auckland (a media-rich industrialized society) were given scales of male and female body outlines that increased in size on a continuous scale. Participants were first asked to locate their own current size on the scale depicting their own sex, the size

they would most like to be, and average size for their age-group, the size most attractive to the opposite sex, and the upper and lower limits of acceptable body size. The Samoan sample of both males and females depicting the average size for their age-group to be slightly smaller than what they perceived themselves to be, but in all cases they were able to accurately predict the size that the opposite sex found attractive. In Auckland however, women showed a tendency to tolerate a larger male body than men thought they would whereas men set a lower limit for tolerable body size than women thought they would (Brewis 1999). Body preference however is not where this obsession with attractiveness stops.

With the pressure to be thin and thus beautiful coming from all segments of society it is no wonder that how a person looks, whether it is beauty, thinness, clothes, is a reflection of how that person will be judged within society. In a study by a University of Toronto social psychologists (Dion and Berscheid 1974) on person perception, 243 female students were presented with the scenario of a child continuously throwing a rock at a dog until it bled. These students were then asked to assess the child's behavior. The researchers attached to each report pictures of different children, some exceedingly cute and others not so cute. Dion and Berscheid (1974) found that most of the "cute" kids received lesser criticisms even though they all committed the same cruel act. They suggest that these results reflect the role of "cuteness" in how people are judged and that used in other situations that outcome will be the same. For example "ugly" and overweight people are usually considered mean, unsafe, and more criminalistic than their beautiful, thin counterparts. In a

similar study as cited by Katz (1991), Landy and Sigall, psychologists at the University of Rochester, asked 60 male undergraduates to grade essays written by other undergraduates. The results revealed that those essays with photographs of pretty girls attached to them were consistently graded higher than the ones that had photographs of unattractive girls, regardless of the essays content.

So not only are women constantly comparing themselves against this body ideal portrayed through media and advertisements but they are also living in a society where most women are comparing themselves to all other women around them to see how well they fit the ideal compared to others. These studies and others like them show how females are affected by the concept of the perfect body ideal by not only judging themselves but by constantly being judged by others around them and this judgment potentially affects all aspects of a female's life. These studies help to show that this judgment is not only a superficial one having only to do with looks but it is something that becomes engrained in all of us when we are judging someone's self worth and merit.

## CHAPTER III

### ANOREXIA NERVOSA: COMPLICATIONS, ASSESSMENTS AND TREATMENTS

#### *Complications*

The health concerns and risks are numerous for any patient suffering from anorexia nervosa and all health clinicians need to be aware of the vast array of physical manifestations brought on by self-starvation, which include: wasting; lanugo hair; hypothermia; Russell's sign; hypercarotenemia; xerosis; mitral valve prolapse; parotid hypertrophy; latent tetany; delayed relaxation of the tendon jerks; bradycardia; volume depletion; organic brain syndrome; bruising; hair loss to name just a few. By being aware of these physical manifestations clinicians can not only diagnose anorexia sooner but can quite possibly save a life. These ailments are medical manifestations of anorexia nervosa and are a concern for pediatricians and physicians for adults alike and although many of these symptoms are simply regarded as physiological adaptations that do not need to be treated for they will disappear as the illness is brought under control, many others are life threatening depending on the severity of the illness (Birmingham and Beumont 2004).

These physical manifestations affect every system of the body: neurological (central nervous system, spinal cord, muscles, peripheral nervous system); skin (lanugo hair, xerosis, telogen effluvium, edema, acrocyanosis, scurvy); respiratory (pulmonary disorders such a pneumonia); cardiovascular (cardiac structure and

function, atherosclerosis, bacterial endocarditis, low heart rate, low blood pressure); gastrointestinal (enlargement of the salivary glands, esophageal dysfunction, stomach dysfunction, bowel dysfunction, pancreatic dysfunction); endocrine (hypothalamic/pituitary changes, thyroid, adrenal, ovarian, genital, hypoglycemia); renal (stones, urine dysfunction); hematological (anemia); and bones and joints (osteoporosis) (Birmingham and Beumont 2004; Schlundt and Johnson 1990). Many of these health risks are merely complications of the greater illness that will in fact mend themselves as the patient begins to recover. For instance, lanugo hair (a fine hair similar to that seen on newborns) develops mostly on the back and abdomen of anorectic patients when extremely low weights are reached. This hair disappears with recovery from anorexia (Birmingham and Beumont 2004). A symptom such as this can help to tip off a physician as to the underlying eating disorder but is not a major concern in terms of health for the patient. There are however many ailments that, although are manifestations of anorexia, become major health concerns and could result in permanent damage to the patient and even death.

#### *Neurological: causes and symptoms*

Low body weight affects the neurological system in numerous ways and can have a prolonged effect of the body even after recovery has begun. The overall function of the nervous system, spinal cord, and muscles are all affected by malnutrition and can have serious effects on the patient's life if not dealt with properly. Organic brain syndrome, which is due to protein-calorie malnutrition and

vitamin deficiencies, impairs the patient's ability to understand concepts that would have at one time been simple (Birmingham and Beumont 2004). Birmingham and Beumont (2004) suggest that because of this syndrome psychotherapy to help cure the disorder can be difficult and often times needs to be put on hold until the patient is better able to understand the concepts surrounding the illness. The brain is also affected in terms of memory and concentration impairment and could worsen any depression that the patient is feeling and also inhibits the use of anti-depressants.

Degeneration of the spinal cord is also affected by low body weight causing impaired joint position sense as well as motor neuron weakness (Birmingham and Beumont 2004). These impairments are a direct result of vitamin B12 deficiencies. Other vitamin deficiencies play a direct role in muscle weakness. Wasting, which occurs when the muscles around the scapulae, ribs, spine and buttocks literally wastes away, is another manifestation of anorexia that should tip off the physician to the underlying illness.

#### *Cardiovascular: causes and symptoms*

Most patients that die of anorexia nervosa do so because of cardiac dysrhythmias which are a direct result of malnutrition (Birmingham and Beumont 2004). Cardiac function in general is greatly affected in numerous ways with the end result all leading to congestive heart failure and although these manifestations can be reversed with weight gain they are life threatening and should be taken very seriously.

It is because of these types of physical manifestations that it is so important that anorexia nervosa be caught as early and as close to onset as possible.

*Amenorrhea: causes and symptoms*

Amenorrhea is best defined as the absence of three or more consecutive menstrual cycles and can be related to numerous health risks and concerns for women and health professionals (Beals et al. 1999). Most 'normal' females after reaching menarche will continue to have cyclic bleeding every month until eventually becoming menopausal later in life. This cyclic bleeding requires normally functioning ovaries and uterus and when not functioning normally can point to many metabolic; endocrine; congenital, and numerous other gynecological disorders all ranging in terms of severity (Kiningham et al. 1996).

Amenorrhea is broken up into primary and secondary amenorrhea. Primary amenorrhea refers to delayed menarche or the absence of menstruation by the age of 16 in girls possessing secondary sex characteristics (Beals 1999; Kiningham 1996). Secondary amenorrhea is defined as the absence of menstrual bleeding for several months in females with prior regular menses (Beals 1999; Kiningham 1996).

Amenorrhea is associated with pregnancy; infertility; endometrial hyperplasia; disordered eating; excessive exercise; estrogen deficiencies; and osteoporosis (Bauer 2002; Kiningham 1996; Schlundt and Johnson 1990). Hypothalamic amenorrhea is the type which is most normally associated with anorexia nervosa and is the result of an alteration of the hypothalamic-pituitary-ovarian axis which occurs in response to

psychological stress, depression, severe weight loss or strenuous exercise (Kiningham et al. 1996) all of which are commonly associated with inadequate stimulation of the Gonadotropin-releasing hormone (GnRH). The GnRH is a hormone secreted by the hypothalamus that releases gonadotropins, which are follicle stimulating hormones and luteinizing hormones released by the pituitary in order to stimulate sex hormone secretion by the male and female gonads (Birdwood 1996). These sex hormones regulate sexual development and functions such as estrogens and progesterone in females (Birdwood 1996).

Amenorrhea is known to be associated with premenopausal bone loss and is a direct result of estradiol deficiencies. Persistent amenorrhea, which as stated earlier, is associated with low body weight, anorexia nervosa, athletics as well as endocrine and gynecological disorders prevents the ovarian follicles from ovulating and secreting estradiol. Regardless of the underlying cause, estradiol deficient women need hormone replacement therapy in order to protect them from osteoporosis (Birdwood 1996).

### *Assessments*

Assessment and treatment of anorexia nervosa has changed over the past two centuries with the changing views and attitudes of anorexia and the theory surrounding its origination. Depending on whether in a medical or a psychological setting, the assessments are somewhat different. For example, the job of the primary care physician as the one professional that usually comes into contact with the female



at least once a year has a responsibility to ask the right questions and to notice differences in body and health from one year to the next. However, this goal is not so easy when the girl suffering from anorexia has become so good at hiding it. There are signs that can be observed when at the medical doctor's office in maturing girls that should persuade a doctor to at least look in to the possibility that the young girl could be withholding food from herself. Normal breast development, normal height and weight as well as pubic distribution are good indicators of sexual maturity as well as inspection of the external genitalia which often show signs of estrogen deficiency (Kiningham et al. 1996; Pritts and Susman 2003). However, with anorexia affecting younger girls all the time tests like these may be too late (Walsh 2002). The above complications, such as lanugo hair, are major signs that should not be missed by a physician as well as detecting negative eating behaviors by way of discussion and question asking.

Currently there are two major classification systems in use that list the diagnostic criteria that must be met in order to be diagnosed with anorexia nervosa. The *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)* (Appendix A) and the *World Health Organization's International Classification of Diseases (ICD)-10<sup>th</sup> edition* (Appendix B) are the most current, reliable, and most used (American Psychiatric Association 2000; Herrin 2003; Birmingham and Beumont 2004). Before a diagnosis can be made all of the criteria outlined must be present. Persons who exhibit serious eating problems but fail to meet all the criteria are diagnosed with the

standard *Eating Disorder Not Otherwise Specified* (EDNOS) (Herrin 2003) (See Appendix C).

### *Treatments*

Once a girl is diagnosed with anorexia nervosa she is normally referred to medical, psychological and nutritional treatment where her weight can be managed and a return to health can be established but also the factors surrounding the eating disorder and faulty thinking can be discussed and dealt with.

When a person is diagnosed with anorexia nervosa by the terms listed above the primary focus in terms of treatment are the medical manifestations that impair physical function and increase the likelihood of death (Birmingham and Beumont 2004; Schlundt and Johnson 1990). When body weight falls 15 percent below ideal weight, weight restoration becomes a priority (Schlundt and Johnson 1990). There are three approaches to weight restoration: 1. soft solid foods and oral liquid nutrition supplements, 2. liquid nasogastric tube feeding, and 3. hyperalimentation or total parenteral nutrition (Birmingham and Beumont 2004; Herrin 2003; Schlundt and Johnson 1990). Soft foods and liquids are the preferable treatment but can only be considered when the patient is motivated to recover. A nasogastric tube consists of a plastic surgical tube that is inserted down the nose and swallowed into the stomach at which point supplements are forced down the tube on a regular feeding schedule in hopes of the patient gaining one-quarter pound or more a day (Schlundt and Johnson 1990). Total parenteral nutrition (hyperalimentation) is a procedure in which

solutions of glucose, amino acids, fatty acids, and other nutrients are infused into the superior venae cavae through the subclavian vein (Schlundt and Johnson 1990). This technique is restricted for severe cases where the patient has dropped 35 percent below ideal body weight.

Simultaneously, treatment of the psychiatric disorder is required and a must for a full recovery. Cognitive therapy is advised with the goal of correcting faulty, negative beliefs about food and weight. This therapy includes educational components, meal-planning, weight monitoring, and written self-observation (Birmingham and Beumont 2004; Herrin 2003). Three common cognitive errors that must be dealt with are described by Birmingham and Beumont (2004), they are: *personalization* which is when the patient views everything in terms of themselves; *polarization*, when a patient views everything as being either all good or all bad; and *overgeneralization*, which occurs when the patient draws conclusion about a certain situation well beyond the circumstances. By working closely with health professionals the patient is able to learn new ways of thinking about themselves, food, and weight, as well as learning effective problem-solving skills in order to help prevent a relapse.

Primary prevention should always happen in the home and school. Teaching healthy body image in class and dispelling the myths and misconceptions surrounding dieting and body weight should be addressed for males and females and this should be happening at the grade school level. For athletic girls playing school sports body image for that particular sport and information on amenorrhea should also be

discussed. Coaches need to maintain open lines of communication with the players and need to be aware of changes taking place both in body weight and energy level. Some warning signs and symptoms for athletic departments, school officials and parents to be on the outlook for are: excessive criticism of ones own body; noticeable weight loss; preoccupation with food, calories, and/or weight; excessive exercise; mood swings; depression; withdrawal from others; passiveness; dependency; obsessive/compulsive behavior; avoiding food-related activities; laxative, diuretic, and/or diet pill use; chronic fatigue; impaired concentration; brittle hair and nails; loss of scalp and pubic hair; dry and discolored skin; anemia; cold intolerance; irregular or absent menstrual cycle; gastrointestinal problems; frequent musculoskeletal injuries; and prolonged injury healing (Beals et al. 1999; Herrin 2004).

All of these symptoms and behaviors, with close observation, can be recognized by parents and/or school officials. The one however that is not easily recognizable to either outsiders or even the anorectic herself is the damage which occurs to the skeletal system when extremely low body weights are reached and menses ends. Osteoporosis and its association with anorexia nervosa is becoming widely known to medical clinicians in the field, however it is not yet fully known if full recovery from osteoporosis is possible, even after a return to healthy eating and living.

## CHAPTER IV

### BONE DENSITY AND ANOREXIA NERVOSA

#### Bone Health

Osteoporosis can be defined as low bone density which results in an increased risk of fractures (Beals et al. 1999; Mehler 2003; Stini 1995). Over the years there has been an increase in the number of people affected by this disease and it is thought that osteoporosis is partly responsible for “limiting the human life span” (Korpelainen et al. 2003; Stini 1995). In order to fully understand osteoporosis one must first have an understanding of bone formation (osteoblasts) and bone resorption (osteoclasts). Bone is a living tissue consisting of many elements and purposes and thus reacts to stress as well as nutritional and environmental factors (Bourne 1972; Mehler 2002). There is a distinction to be made between the age of the body and the age of individual cells. Some cells are non-renewing such as neurons and age in parallel with the body, while others, such as bone, undergo renewal (Hall 1990). In this way we can say that neurons are older in an older person than they are in a younger person, whereas bone cells differentiate depending on when renewal occurred last (Hall 1990). Stated simply: the skeleton of a fifty year old man is not fifty years old. Since bone is constantly being remodeled there is some bone that will be weeks old and others fifteen years old, all occurring in the body of the fifty year old man (Frost 1963).

Due to a great amount of research, like that conducted by Stini (1995), we know that skeletal health depends on many factors such as nutrition, disease and trauma (Stini 1995). Disease and trauma affect the bone in various ways depending on the severity and age of onset whereas malnutrition has been shown to result in low bone density. Research on malnutrition has shown that a lack of vital nutrients, such as calcium and vitamin D will result in the loss of bone density which promotes osteoporosis (Stini 1995).

### *Osteoporosis*

Osteoporosis is broken down into two distinct types. Type I osteoporosis or “postmenopausal osteoporosis” is characterized by a loss of trabecular bone (Stini 1995). Trabecular bone is less dense than cortical bone (which forms the outer surface of bone) and maintains a high turnover rate throughout life (Stini 1995). During menopause there is a much higher rate of trabecular bone lost than cortical bone thus making menopausal women more susceptible to bone fractures in areas where trabecular bone is found in high proportion such as the vertebrae and proximal femur. Type II osteoporosis or “senile osteoporosis” which is seen usually in the elderly mainly effects cortical bone (Mehler 2002; Stini 1995). As trabecular bone available for resorption decreases, there is a progressive thinning of the cortex of the long bones leading to type II osteoporosis (Mehler 2002; Stini 1995).

### *Susceptibility to osteoporosis*

Osteoporosis is usually associated with menopausal women and the elderly but research has shown that those who over exercise and under eat are also susceptible. Research conducted by Turner et al. (2000) found that adolescents with eating disorders do have an increased risk of low bone density. Sixty-nine females with dieting disorders were examined through interviews, blood sampling, body composition, and lumbar spine density tests. All were found to have low bone density which was then directly associated to early onset malnutrition as a result of not eating appropriate nutrients throughout puberty. These researchers go on to state that although there is not a direct link between low bone density and estrogen exposure there is an association when looking at menopausal women and amenorrheic women with eating disorders. We see low levels of estrogen in patients with eating disorders but mainly those diagnosed with anorexia nervosa.

Another study conducted by Soyka et al. (1999) found that bone density is significantly reduced in adolescents with anorexia. They studied 38 white adolescent girls, 19 with anorexia nervosa and 19 healthy, ranging in ages from 12-18 years. All the girls with anorexia met the criteria laid out in the DSM-IV with duration since diagnosis ranging from 2-72 months. Total body and lumbar spine bone densities were taken and statistically analyzed using *t* test and linear regression analysis. Lumbar spine bone mineral density (BMD) was significantly lower than the age-matched healthy girls to such a degree that these researchers were able to determine that spinal osteopenia is common in girls with anorexia.

Rigotti et al. (1991) conducted a study on 27 women with anorexia nervosa over a period of 25 months to determine the effects of weight gain, estrogen and calcium supplements, and exercise had on bone density. They determined that bone density in anorectic women is not rapidly reversed by recovery and that these anorectic women are at an increased risk for bone fractures.

In women with estrogen deficiencies cases of osteoporosis are highly reported on (Rigotti et al. 1991). It has been shown that adult women, when they reach menopause, exercise excessively, or experience extreme weight loss, put themselves at high risk for depletion in estrogen levels (Baker et al. 2000). It is also known that females with non-eating disorders often times exercise excessively, endure large amounts of weight loss, and also experience a loss of menarche (amenorrhea). Is this correlation enough to lead to causation or is it just one of many variables that result in loss of bone density?

### *Bone density testing*

Bone density testing is a non-invasive way (sound waves or radiation) of measuring the strength and density of one's bones and only takes several minutes from beginning to end (National Osteoporosis Society 2001) and has been recommended for women younger than 65 years of age who have one or more risk factors for developing osteoporosis (National Osteoporosis Foundation 1998). Dual-energy x-ray absorptiometry (DEXA) is the most commonly used technique for measuring bone density and only takes under 30 minutes from beginning to end



(Mehler 2003). The radiation risks associated with the DEXA scan is very low and estimated to be less than 10% of that of a chest x-ray (Mehler 2003) therefore allowing patients to be re-investigated as often as necessary (Birdwood 1996). Some experts suggest that a DEXA scan be used for all anorectic patients with a history of 2 or more years of anorexia nervosa because the discovery of significantly reduced bone density has important treatment implications (Mehler 2003).

DEXA, although the most widely used, is not the only non-invasive method by which bone density can be determined. Three other main types of densitometry exist and are currently in clinical use: Single-photon absorptiometry (SPA), Dual-photon absorptiometry (DPA), and Quantitative computer tomography are all non-invasive, fast, inconvenient, and hazardless.

Single-photon absorptiometry was the very first technique used to measure bone density in the 1970's (Birdwood 1996). The patient, during this process, has only to sit with his/her forearm in a water bath for few minutes in which a digitalized scan will accurately reflect the high degree of photon absorption by bone, which is directly proportionate to its bone mineral density. The water bath minimizes the interference of soft tissue (fat) by creating a uniform thickness of soft-tissue and liquid (Birdwood 1996). Dual-photon absorptiometry is less subject to soft-tissue interference and is therefore capable of reading the bone density in the spine and hip regions. Quantitative computer tomography uses a CAT scan which slices through the body by way of high degrees of radiation and is currently the more comprehensive test but also most expensive with the highest degree of radiation (Birdwood 1996).

## CHAPTER V

### DISCUSSION

#### *Reversing the effects of anorexia nervosa and osteoporosis*

Intervention in eating disorders during the first twelve months is crucial in preventing low bone density (Wong et al. 2001). Wong et al. (2001) evaluated adolescent females in the first 12 months of presenting with an eating disorder and found that an insignificant amount of bone density is lost during this time. The most common long-term problem that endangers the life of a recovering anorectic is osteoporosis with its recurrent bone fractures which cause chronic pain and can lead to a lifetime of disability (Birmingham and Beumont 2004). In order to better understand bone health in relation to anorexia nervosa we must begin performing bone density tests on young girls prior to the onset of osteoporosis rather than waiting until it is too late. Parents, the health community, and the government must take an active role in initiating extensive longitudinal research to gain a more knowledgeable understanding of when exactly loss of bone density occurs, why amenorrhea occurs, and what can be done to reverse these effects. To understand the long-term effects of unhealthy eating now, could possibly save many young girls from the debilitating effects of early on-set osteoporosis.

By requiring bone density tests from a very early age, during annual physicals, insight can be gained not only into osteoporosis but also what can be done to reverse its effects. This would allow physicians and parents to be able to diagnose eating

disorders such as anorexia nervosa early on and to seek a range of treatments before long-term damage is done. If bone density tests are conducted annually then decreases in the bone density of an individual patient would alert medical officials and parents that something is wrong. The benefits of this are twofold: more knowledge of low bone density and saving the lives of many young girls who are suffering from anorexia nervosa.

If further research were to support this evidence then this acknowledgment alone should push people (parents, health officials, schools) to take a more aggressive approach to educating young girls about body image, dieting, and risk factors involved.

### *Future Goals*

There has been enough research thus far to show that girls who suffer from anorexia are younger and the numbers increase with each new year. There has also been enough research to show that bone density is in fact affected by malnutrition and amenorrhea which are both directly related to self-imposed starvation. However, what is not yet clear are the long term effects on the skeleton when there is a return to normal weight and normal menstruation. Longitudinal studies of young girls, both at pre-menarche and menarche stages, must be conducted throughout the healing process and after in order to fully comprehend how malnutrition, amenorrhea, and estrogen deficiencies affect the skeletal system. Along with this randomized controlled trials are also necessary to determine the effects of estrogen replacement

on bone mass of young girls suffering with anorexia. These types of tests are not within the scope of this research project but it is imperative to a complete understanding of anorexia nervosa and its effect on bone health.

## Conclusion

As stated earlier, the goals of this research were to further examine the following questions with the goal of bringing to the forefront the serious health risks associated with anorexia nervosa and to present a risk free, medically approved way for early diagnosis with the hopes of preventing the long term medical effects associated with anorexia nervosa and osteoporosis.

- Does anorexia nervosa lead to osteoporosis and if so how long before it is evident?

Research and studies conducted by leading experts around the world have shown that anorexia nervosa does in fact lead to a loss of bone density, and that if not properly treated then this loss of bone density will eventually lead to osteoporosis.

- Is bone density testing an accurate and reliable form of testing for osteoporosis?

It has been shown that bone density testing is an accurate, useful, non-invasive, and widely used technique for diagnosing postmenopausal women with osteoporosis and has already been recommended for women younger than 65 years of age who have risk factors associated with osteoporosis.

- If anorexia nervosa and osteoporosis are caught early enough are the ailments reversible?

Research conducted has not been able to accurately predict at what stage the ailments of osteoporosis are reversible, if at all. Loss of bone density happens gradually over time and is dependant upon the severity of anorexia nervosa. The earlier osteoporosis is detected and thus treated the better the chances are for a complete return to healthy living. However, depending on the severity and the time frame a complete return to health may not be possible making early detection one of the main concerns for me. Children still in the midst of developing skeletally will have a life of chronic pain and fractures and as they age and eventually become postmenopausal the effects of bone loss will be worsened and their lives shortened. With early diagnosis of both anorexia nervosa and osteoporosis, by way of techniques that are already widely used, the lives of girls and women can be literally saved. By instilling bone density testing into annual physical exams we could broaden our understanding of two illnesses and the effects they have on the body both short term and long term.

Osteoporosis is a life-altering/life-threatening illness which drastically changes the standard of living for anyone afflicted with it, regardless of age. Pre-adolescent and adolescent girls who suffer from anorexia nervosa are at a high risk for bone loss which can lead to early on-set osteoporosis. In order to gain a greater understanding of this debilitating disease, and to save, as well as improve, the lives of girls and women who suffer from anorexia nervosa, bone density testing needs to

become a standard practice in all medical offices around the country. Women need to be able to utilize what science has already proved works and it needs to be implemented into a yearly exam where large variations in numbers can not be ignored. It is time that women, women's issues, women's health, and women's lives become a top priority; why not start with two very debilitating illnesses.

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## APPENDIX A

### THE DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS (DSM-IV) CRITERIA FOR ANOREXIA NERVOSA

**Appendix A. DSMV-IV Criteria for Anorexia Nervosa**

<b>Criterion</b>	<b>Description</b>
A	Refusal to maintain body weight at or above a minimally normal weight for age and height (e.g., weight loss leading to maintenance of body weight less than 85% of that expected or failure to make expected weight gain during period of growth, leading to body weight less than 85% of that expected).
B	Intense fear of gaining weight or becoming fat, even though underweight.
C	Disturbance in the way in which one's own body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or denial of the seriousness of the current low body weight.
D	In postmenarcheal females, amenorrhea, i.e., the absence of at least three consecutive menstrual cycles. (A woman is considered to have amenorrhea if her periods occur only following hormone, e.g., estrogen, administration.)
<i>Specify type</i>	
Restricting type	During the current episode of anorexia nervosa, the person has not regularly engaged in binge-eating or purging behavior (i.e., self-induced vomiting or the misuse of laxatives, diuretics, or enemas.)
Binge-eating/purging type	During current episode of anorexia nervosa, the person has regularly engaged in binge-eating or purging behavior (i.e., laxatives, diuretics, or enemas.)

(Birmingham and Beumont 2004:14)

## APPENDIX B

### THE INTERNATIONAL CLASSIFICATION OF DISEASES (ICD)-10 DIAGNOSTIC FOR ANOREXIA NERVOSA

**APPENDIX B.** International Classification of Diseases (ICD)-10 diagnostic for anorexia nervosa

<b>Criterion</b>	<b>Description</b>
A	Body weight is maintained at least 15% below that expected (either lost or never achieved), or Quetelet's body mass index is 17.5 or less. Prepubertal patients may show failure to make the expected weight gain during the period of growth.
B	Weight loss is self-induced by avoidance of "fattening foods" and one or more of the following: self-induced vomiting, self-induced purging, excessive exercise, use of appetite suppressants and/or diuretics.
C	There is body-image distortion in the form of a specific psychopathology, whereby a dread of fatness persists as an intrusive, overvalued idea, and the patient imposes a low weight threshold on themselves.
D	A widespread endocrine disorder involving the hypothalamic-pituitary-gonadal axis is manifest in women as amenorrhea and in men as a loss of sexual interest and potency. (An apparent exception is the persistence of vaginal bleeds in anorexic women who are receiving replacement hormonal therapy, most commonly taken as a contraceptive pill.) There may also be elevated levels of growth hormone, raised levels of cortisol, changes in the peripheral metabolism of thyroid hormone, and abnormalities of insulin secretion.
E	If onset is prepubertal, then the sequence of pubertal events is delayed or even arrested (growth ceases; in girls, the breasts do not develop and there is primary amenorrhea; in boys, the genitals remain juvenile). With recovery, puberty is often completed normally, but menarche is late.

(Birmingham and Beumont 2004:14)

APPENDIX C

DIAGNOSTIC CRITERIA FOR EATING DISORDERS  
NOT OTHERWISE SPECIFIED (EDNOS)



## APPENDIX C. Diagnostic Criteria for Eating Disorder Not Otherwise Specified (EDNOS)

The Eating Disorder Not Otherwise Specified category is for disorders of eating that do not meet the criteria for any specific eating disorder. Examples include:

<b>Criterion</b>	<b>Description</b>
A	For females, all of the criteria for anorexia nervosa are met except that the individual has regular menses.
B	All of the criteria for anorexia nervosa are met except that, despite significant weight loss, the individual's current weight is in the normal range.
C	All of the criteria for bulimia nervosa are met except that the binge eating and inappropriate compensatory mechanisms occur at a frequency of less than twice a week or for a duration of less than 3 months.
D	The regular use of inappropriate compensatory behavior by an individual of normal body weight after eating small amounts of food (e.g., self-induced vomiting after the consumption of two cookies).
E	Repeatedly chewing and spitting out, but not swallowing, large amounts of food.
F	Binge-eating disorder: recurrent episodes of binge eating in the absence of the regular use of inappropriate compensatory behaviors characteristic of bulimia nervosa.

(Herrin 2003:207)