

THESIS

KNOWLEDGE OF AND ATTITUDES TOWARDS EATING DISORDERS OF
UNDERGRADUATE NUTRITION MAJORS AT THREE COLORADO UNIVERSITIES

Submitted by

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ABSTRACT

KNOWLEDGE OF AND ATTITUDES TOWARDS EATING DISORDERS OF UNDERGRADUATE NUTRITION MAJORS AT THREE COLORADO UNIVERSITIES

Eating disorders are potentially deadly conditions. RDs who are knowledgeable about eating disorders can have a positive impact in eating disorder treatment. They can also contribute by recognizing symptoms of eating disordered behavior in clients and bringing awareness of the issue to the public through education on the differences between healthy and disordered eating. The question addressed in this research is: Are the Didactic Programs in Dietetics at three Colorado universities adequately preparing students, intent on becoming RDs, for encounters with patients with eating disorders?

In this study, participants were asked to complete a survey on their knowledge, beliefs, and attitudes towards eating disorders. Participation was completely optional and anonymous. Topics included etiology of eating disorders, knowledge of the physical effects of eating disorders, attitudes towards treating patients with eating disorders, and knowledge of treatment options and procedures for eating disorders.

There was no difference between schools in students' knowledge and attitudes except for the belief in the likelihood of anorexia nervosa to be fatal and the number of practitioners to which students would refer a client with an eating disorder. Significant differences were found between students who suspected and/or had been diagnosed with an eating disorder compared to those who had not. Those who had been diagnosed with or suspected they had an eating disorder

were more knowledgeable about anorexia and bulimia nervosa, felt eating disorders were harder to treat, and felt that individuals who develop eating disorders were less in control of the disease.

While undergraduate Didactic Programs in Dietetics (DPD) students in Colorado appear somewhat knowledgeable about anorexia and bulimia nervosa, they know less about binge eating disorder. It is recommended that DPD programs make time for at least a brief overview of EDs in appropriate classes, such as medical nutrition therapy or lifecycle nutrition, to better prepare students for encountering patients with EDs during their careers. This instruction should not only cover the physical signs, symptoms, and treatment options for EDs but also the psychological aspects of the disorders.

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CHAPTER 1: INTRODUCTION

Eating disorders (ED) are biologically-based psychological disorders, the physical behaviors of which can lead to severe medical problems. The Diagnostic and Statistical Manual of Mental Disorders- Fifth Edition (DSM-V) currently lists four separate categories of eating disorders: anorexia nervosa (AN), bulimia nervosa (BN), other specified feeding and eating disorders (OSFED), and binge eating disorder (BED) ^{1,2}. Anorexia nervosa, in which patients heavily restrict food intake to achieve extremely low body weight, has two subtypes: restricting (AN-R) subtype, in which the patient restricts food, and binge-purge subtype (AN-BP), in which the patient typically restricts food, but also has binge-purge episodes. Bulimia nervosa is characterized by episodes of binge eating followed by inappropriate compensatory mechanisms to eliminate the food and calories consumed. This can include purging through methods such as self-induced vomiting or abuse of laxatives or diuretics. There is also a subgroup of individuals with bulimia who do not purge, and instead use tactics such as excessive exercise and fasting. Binge eating disorder, which recently received its own category in the DSM-V, involves episodes of binge eating but no compensatory behaviors. Other specified feeding and eating disorders is a new category that involves sub threshold and atypical conditions; in this category, an individual clearly has an eating disorder, but the physical and/or psychological symptoms do not meet the criteria for one of the eating disorders listed above ². This category is similar to the formerly used category of eating disorders not otherwise specified (EDNOS). Despite receiving less media and researcher attention than AN, BN, and BED, OSFED conditions are perhaps the most common EDs seen in treatment ³⁻⁵. A common component in all EDs is that individuals rely on weight and shape to establish their sense of self-esteem and self-worth ⁶.

Complications of Eating Disorders

The physical complications that can arise from eating disorders are numerous, and can vary in severity depending on the behaviors of the individuals with the eating disorder and the duration of the eating disorder. AN can, among many other things, be accompanied by reduced bone density, constantly feeling cold, lanugo, amenorrhea and fertility issues, low blood pressure, cardiovascular issues, muscle weakness, and a decrease in gut motility and kidney function ⁷. Psychological and behavioral factors include lethargy, irritability, social withdrawal, inability to concentrate, excessive physical activity, and following a rigid daily schedule ⁸. Common complications from BN are electrolyte imbalance, gastrointestinal complications, dehydration, menstrual irregularities and fertility problems, bloating, cavities, and kidney damage ⁷. It should be noted that individuals with BN tend to be of normal weight, and in some cases are even slightly overweight ^{6,9}. The medical complications of BED are typically overweight/obesity and the associated sequelae of issues associated with excess body weight, such as diabetes, hypertension, and cardiovascular disease ⁶.

Eating disorders have a high rate of comorbidity with other mental disorders. The 2003 National Comorbidity Survey Replication of 9,285 US adults reported that over half of individuals with AN, 94.5% of individuals with BN, and 78.9% of individuals with BED met the criteria for at least one other mental health disorder, with 50-63% receiving treatment for an emotional problem at some point ¹⁰. Adolescents with partial and full-syndrome eating disorders have been found to have significantly higher rates of depression, anxiety, and substance abuse than their non-eating disordered peers ¹¹. Individuals with AN show higher rates of obsessive-compulsive disorder, in particular ^{12,13}. Self-injurious behaviors have also been reported in individuals with eating disorders, with the possibility that those who do self-injure have more severe eating-disordered behaviors ¹⁴.

Unsurprisingly, individuals with eating disorders have an increased rate of death. Mortality rates for AN have been consistently higher than that of the general population¹⁵⁻¹⁸. Common causes of death are suicide and cardiac events^{15,18}. The risk of death from AN rises with the length of the disease¹⁵. BN and OSFED are also associated with increased all-cause mortality¹⁷, and both show a significantly higher rate of deaths from suicide than non-ED populations¹⁶.

Prevalence Rates

The prevalence of EDs in the general population appears to be on the rise^{19,20}. The exact prevalence of EDs is impossible to determine for a variety of reasons, including the low numbers of those with eating disorders actually being identified and treated, varying definitions of ED used in prevalence studies, and the possibility that increased public awareness of eating disorders has simply increased the numbers of those with ED seeking treatment and being diagnosed. Additionally, the current percentage of individuals with ED is relatively small compared to the general population¹⁹.

Therefore, the current numbers available are educated guesses. Hudson and Hiripi estimate that the lifetime prevalence of AN, BN, and BED are 0.9%, 1.5%, and 3.5%, respectively, for women and 0.3%, 0.5%, and 2.0%, respectively, for men¹⁰. Prevalence rates for OSFED are not yet available due to the newness of the diagnosis. It is important to note that individuals can have more than one lifetime diagnosis of an ED, and it is not unheard of to move from one diagnosis to another; thus prevalence rates increase when considering lifetime presence of an eating disorder²¹. Even so, these numbers indicate that approximately 1% of the population has suffered from AN, 2% from BN, and over 5% from BED at some point in life—over 25 million individuals in the US alone. These numbers do not include other ED sub-categories such

as atypical AN, atypical BN, purging disorder, and other manifestations of EDs that do not neatly fit into a diagnosis of AN, BN, or BED, or disordered eating, suggesting that the prevalence rate of EDs in the United States is likely higher than the 8% estimated. This is supported by the finding that 76% of college students report knowing someone with an ED²². In a recent general population survey in the UK, 10% of respondents disclosed disordered eating behaviors²³.

EDs, particularly AN and BN, occur more frequently in females than males^{10,24}. BED has a smaller gender gap than other EDs. Although it is still more commonly reported in women than men²⁴, one study reported higher rates of subthreshold BED in men than women¹⁰. Males do suffer from eating disorders, often with the same psychological issues and physical consequences, although these symptoms are not as readily recognized as being caused by an ED as they would be in female patients²⁵. In fact, in a treatment setting, male patients tend to have more severe, life-threatening issues than their female counterparts due to longer periods of pre-treatment malnutrition, typically because there is a longer delay in males receiving treatment^{25,26}. Additionally, some of the signs and symptoms of ED in males can differ from females. For example, males with ED are more likely to be athletes and are more focused on body shape and muscularity than females^{26,27}.

Minority women, particularly African-American women, can also be afflicted by eating disorders, yet studies have shown that the general public and physicians are more likely to diagnose a white or Hispanic patient with an ED than an African-American one^{28,29}. But, minority women do suffer from body image, weight concerns, and eating disordered behaviors^{30,31}. In a 2000 study, black girls aged 11-16 years actually scored higher than white girls on several personality traits of the Eating Disorders Inventory (EDI) subscale commonly associated with ED³².

While the incidence and prevalence rates for AN seem to be relatively stable³³, the incidence of BN cases seen in a primary care setting increased, hitting a peak in the 1990's before leveling off^{10,20}. The incidence of EDNOS diagnoses, which include BED and "atypical" AN and BN, in the general population increased in the past decade³³.

Etiology

To date, the cause of eating disorders remains an elusive mix of a variety of factors. Genetics play a role, certainly in anorexia and bulimia⁶, and quite possibly for BED and OSFED as well, although genetic studies of those particular EDs is limited. Other factors include low self-esteem, previous obesity (particularly with BN), perfectionism, anxiety disorders, a family history of dieting, family history of eating disorders, past substance abuse or a family history of substance abuse, and external pressure to conform to a particular body shape from family, friends, or athletic subculture^{6,21,34}.

A 2003 study of 934 Italian women with a history of ED showed dieting to be a significant predictor of ED, with the risk of developing an ED increasing with the number of diets attempted²¹. The same study also showed that a history of childhood abuse (physical and/or sexual) was significantly associated with both AN and BN²¹. More urbanized environments have also shown higher prevalence rates of ED, although it is not completely clear as to why²¹.

Eating Disorders Treatment and Recovery

Eating disorders are treatable, although treatment is often difficult and complicated. Studies show that recovery rates from BN are higher than those from AN. For patients with BN, 75% reached full recovery a median of 9 years after beginning treatment³⁵. Among patients with AN, studies have shown that slightly less than one half fully recover, around one third improve but do not reach full recovery, and around 20% of those who receive treatment remain chronically ill¹². Recovery for AN patients was more likely in those who received longer follow-

up treatment and were younger at the age of diagnosis, and less likely for those who engaged in binge and/or purging behaviors, had the illness for longer periods of time, and showed obsessive-compulsive personality symptoms¹². Relapse rates for AN and BN appear to be similar, with around one third of individuals who recover relapsing back to ED behaviors³⁵. Individuals with a previous diagnosis of AN who relapse tend to show significant bulimic behavior, whereas individuals with remitted BN relapse back into bulimic behaviors³⁵. This lends support to the idea that binge/purge behavior is a possible barrier to remission. This also relates to the issue of diagnostic crossover seen in EDs, where an individual begins with the diagnosis of one eating disorder and transitions into another eating disorder, most commonly AN to BN^{6,36}, and AN, BN, and BED to less well-defined eating disorders³⁷. Low levels of self-directedness and high levels of parental criticism may contribute to crossover from AN to BN³⁶.

The rates of relapse and remission for OSFED and BED have not been as widely studied as AN and BN. The research that has been done is not conclusive. While certain studies indicated that relapse and remission rates for EDNOS (to date, no studies have been done on relapse rates for OSFED) did not differ significantly from those of BN³⁸, others found that EDNOS had higher and faster remission rates than either AN and BN³⁷. A recent study on the remission rate of BED shows that BED also has a higher remission rate than AN and BN³⁷, but this was just one study and more needs to be done to clarify remission rates.

Current Treatment Practices

Due to the broad range of symptoms, eating disorders are best treated by a team of professionals. A physician, a psychiatrist, a licensed therapist or psychologist, a dentist (if vomiting is present) and a registered dietitian should all be members of an eating disorder treatment team³⁹⁻⁴¹. Depending on the individual circumstances and symptomatology of each

client, other individuals, including parents and/or guardians for adolescents and partners/spouses for adults also play a role in treatment ^{42,43}.

According to the Academy of Nutrition and Dietetics, “a RD is an essential component of team treatment of patients with anorexia nervosa, bulimia nervosa, and other eating disorders... during assessment and treatment across the continuum of care” ⁴¹. The registered dietitian plays a vital role in the treatment team, as s/he addresses the patient’s diet and eating habits, behaviors focal to the disorder and the treatment. Registered dietitians help physicians establish an appropriate minimum body mass index (BMI), as well as monitor food intake and weight gain, provide meal planning and food preparation education, and counsel on food behaviors ⁴. The RD must also work closely with primary care physicians in monitoring severely malnourished patients for refeeding syndrome, in which potentially fatal fluid and electrolyte imbalances can occur during the first few days of refeeding a severely malnourished patient if proper protocol is not followed ^{39,44}. The RD also collaborates with both the therapist and physician on establishing and monitoring adequate nutrient intake, appropriate weight ranges, and the return to normalized eating ³⁹. This particular responsibility is especially crucial to AN for three reasons. For one, weight regain is needed to improve the efficacy of therapy ⁴⁵. For another, patients with AN are hypothesized to have better outcome if they leave a hospital treatment setting with the ability to consume a varied diet, including foods of higher caloric density ⁴⁵. Third, most of the physical complications associated with AN can be reversed with weight gain ^{6,46}.

The specialized knowledge registered dietitians can bring to eating disorder treatment is invaluable. A 2002 survey of Canadian family practitioners found that, although family physicians are comfortable with the diagnosis of eating disorders, they are less comfortable with managing eating disorders. Most would share care with other professionals, typically

psychiatrists and nutritionists⁴⁷. Another survey found that 55% of healthcare providers reported that they would refer a patient with an eating disorder to a nutritionist⁴⁸. Furthermore, many physicians may not feel qualified to give adequate nutritional counseling⁴⁹. Psychiatrists, therapists and nurses also do not have the same level of nutritional expertise as dietitians⁵⁰, which can be problematic when either the therapist or psychiatrist addresses specific eating behaviors and nutrition beliefs in therapy sessions. The challenge is that many individuals with eating disorders believe they possess a great deal of nutrition-related knowledge⁵⁰. A healthcare provider must have enough nutrition knowledge to identify and address any misconceptions, inaccuracies, and gaps in the nutrition beliefs of those with EDs⁵⁰, and the dietitian is certainly the most well-qualified to address this area of treatment.

The RD also plays a vital role in nutrition education, not only for patients but their family members as well. For patients being treated using the Maudsley method, in which individuals under the age of 18 are provided effective treatment at home with the parents regulating and enforcing meal times and dietary habits, the RD plays an integral role in instructing the parents and/or guardians in proper nutrition⁷, which requires forming a trusting relationship with them⁴². When clients/patients have reached a point in their treatment where they are maintaining a relatively healthy weight, but still may be struggling with eating disordered thoughts and minor behaviors, the RD is responsible for continuing to counsel and educate on healthy eating behaviors. This includes meal planning, shopping, and dining out⁴⁰.

Educational Preparation for Dietetic Professionals Working with ED

A 2011 practice paper published by the American Dietetic Association (ADA), now known as the Academy of Nutrition and Dietetics, states that it is the responsibility of RDs involved in ED treatment to “obtain advanced training, continuing education and case consultations” and to remain well-read on current research pertaining to EDs⁴⁰. Since eating

disorders affect an individual's life in many ways, and require multiple medical practitioners to treat, individuals who work specifically with eating disorders must have specialized knowledge. In the case of the registered dietitian, he or she must have mental health literacy, lack of which is a barrier to treatment ⁵¹. Any dietitian working with eating disorders must have an understanding not only of the psychological effects and symptoms of eating disorders, but fully appreciate how ingrained these thoughts and behaviors are, and how they are expressed through eating behaviors ⁵². They also must be aware of how symptoms of common comorbid psychological disorders, such as depression, anxiety disorders, substance abuse, and obsessive-compulsive disorder, interact with EDs ⁵³. A thorough understanding of EDs can help prevent a treatment professional from accidentally triggering ED thoughts and feelings; for example, a well-meaning compliment of a patient's physical appearance can be interpreted by the patient as "You look fat" ⁵².

Less knowledge and understanding of eating disorders among healthcare providers has been shown to correlate with more negative views on patients with eating disorders ⁵⁴. This correlation may reflect frustration, hopelessness, lack of competence, or worry about the patient, and has been associated with a lack of improvement on behalf of the patient ⁵⁴. Many healthcare professionals see eating disorders as difficult and time consuming to treat, and feel that they lack the proper training, support, and confidence to treat this group of patients ⁵¹. While certainly not all healthcare practitioners specialize in treating eating disorders, it is important that they know enough about EDs and their own personal limits to properly refer patients to those who specialize in EDs ⁵⁵.

Patients with ED can be difficult to work with for several reasons. Some have no desire to change their behavior because they see it as positive, or serving a needed purpose, particularly in AN ^{6,51,55}. They also may lie about behaviors or not recognize behavior as problematic ⁵⁶. The

presence of an eating disorder is usually comorbid with other issues such as Axis I and II mental disorders, alcohol and drug use^{57,58}, and self-injury¹⁴ which can complicate treatment^{12,13,34,58}. Relapse is not uncommon in AN and BN, particularly in individuals with high levels of body image distortion³⁵.

Even if an RD does not start out intending to work with eating disorders, it is possible that s/he could encounter or, either intentionally or unintentionally, be responsible for a patient with an ED. It is important RDs are educated enough to understand these complexities and fully realize what EDs and their treatments entail, so they can judge if they are competent to work with the client or should refer him/her to a more experienced RD. RDs must also be careful to maintain professional boundaries between themselves and the patient, which can be difficult with EDs due to the nature of the disease⁵⁵. They must also be careful not to take on the role of psychotherapist. RDs, although they can play a critical role in identification of an ED as well as a crucial role in treatment, should not diagnose an ED. That is the role of either a physician or mental health practitioner⁴⁰.

An RD knowledgeable about eating disorders, however, is invaluable to treatment. Previous studies show common themes pertaining to successful eating disorder treatments are the presence of supportive, understanding relationships both during and outside of treatment and being able to talk openly about alternative coping mechanism to ED behaviors⁵². Awareness and self-perceived skill in ED knowledge was associated with a higher rate of identifying BN in a study among nurses⁵¹. There is no reason to assume this trend would not be seen in dietitians.

An additional reason why all RDs should be educated on eating disorders is for identification and referral purposes. RDs may see individuals with ED who were referred to them for reasons other than ED treatment. RDs may be the first practitioner to be consulted by a

patient with an ED⁴¹, although possibly for symptoms secondary to the ED. For example, an individual may seek dietary advice for a cosmetic issue such as dry skin, thinning hair, or swollen cheeks, when the causes of these issues may be eating disorder behaviors. RDs who work with high risk groups, such as college students, athletes, and patients diagnosed with conditions that require a heavy focus on dietary intake such as diabetes, can be vitally important in the early recognition of eating disorders⁵⁹, but only if they know the sometimes subtle indications. Dietitians or nutritionists were ranked third in an Australian community survey for mental health literacy for persons most likely to be helpful in treating AN, after physicians and psychologists⁶⁰, and were ranked first for persons most likely to be helpful in treating BED⁶¹.

RDs may also be in a better position to recognize EDs in male and minority populations whose risk for ED is typically overlooked by physicians^{26,28,62}. An appointment with an RD focuses on diet and eating behaviors, so disordered eating habits may be more noticeable.

Given the current obesity levels among children and adults, there has also been a push for individuals to slim down via diet and exercise. Here, too, is an area where RDs and nutrition educators must be aware and knowledgeable of EDs. With all the current media attention on the health risks of obesity, RDs must be able to give information on dieting and weight management in a healthful way. They also must be able to detect the signs of BED and BN in obese/overweight patients. RDs, in addition, must be aware that EDs such as AN, BN, or OSFED can and do appear in patients who start out as overweight/obese and then lose weight⁶³.

Current RD Knowledge and Attitudes Towards Eating Disorders

To date, very few published studies have been conducted on the knowledge, attitudes, beliefs, and training level of RDs and dietetics students towards EDs. The results of the few studies that do exist indicate that educational opportunities for RDs related to EDs are lacking. One survey of Canadian RDs reported that 71% of respondents were dissatisfied or very

dissatisfied with educational opportunities for RDs in nutrition counseling, with many reporting reading and intuition as their main routes for education on this topic ⁶⁴. Given the importance of the role of the RD in ED detection and treatment, one wonders why there is a lack of research addressing the question: Are graduating nutrition students prepared to work with patients with EDs? There are many areas in which an RD could encounter patients with an ED, such as sports and athletics, nutrition education, clinical settings, adolescents, bariatric surgery, obstetrics, diabetes care, and private practice. ED education, particularly education that emphasizes the subtle indications of an ED as well as general symptoms and emphasizes that EDs can affect anyone in the population regardless of gender, race, or socioeconomic status, is a required tool for ED recognition in any of these at-risk populations ²².

Some students seek a nutrition degree because they plan to work with eating disorders. A study that interviewed applicants to a Master's Nutrition program at a North American university reported that 30% of applicants were motivated to apply by personal experiences with obesity and eating disorders ⁶⁵. Literature suggests that dietetics and nutrition majors have a higher incidence of ED behaviors ⁶⁶, with one study showing that 20% vomited after overeating ⁶⁷, and another reporting that 90% of dietetics majors were unsatisfied with their bodies with an additional 30% scoring for disordered eating on the Bulimic Inventory Test ⁶⁸. Inappropriate/potentially dangerous weight-loss methods such as vomiting after meals, skipping meals, and fasting have been reported in dietetics majors ⁶⁹. Thus, while dietetics and nutrition majors may have a relatively higher rate of EDs than other populations, it does not mean they are knowledgeable enough about ED to effectively recognize or treat them.

Many nutrition majors apply for dietetic internships with the goal of becoming RDs and working in various areas of nutrition. As described above, it is likely that they will encounter

patients/clients with EDs, regardless of whether they specialize in ED treatment or not. Thus, graduating students need a basic level of ED competency. According to the ADA 2011 practice paper regarding nutritional intervention in EDs, competence includes knowledge of signs and symptoms, the ability to analyze appropriate lab and anthropomorphic data, an understanding of the need for immediate treatment, and knowing the proper treatment facilities and/or treatment professionals to which to refer clients⁴⁰. Since practitioner attitudes and beliefs towards eating disorders can have a strong positive or negative impact on treatment success, it is important to inform students that a positive attitude towards EDs is essential for treating these disorders.

Surveys and questionnaires have been used by a variety of medical professionals, medical students, therapists, counselors, dietitians, undergraduate students, and physical activity and nutrition educators regarding their knowledge, attitudes, and beliefs on eating disorders^{22,47,49,64,70,71}. These types of measurement tools are acceptable instruments for pursuing further insight.

Purpose of thesis project

The purpose of this project was to measure knowledge, attitudes, and beliefs towards EDs in senior undergraduate nutrition majors in several DPD programs.

CHAPTER 2: JOURNAL OF THE ACADEMY OF NUTRITION AND DIETETICS MANUSCRIPT

Summary

Background

Eating disorders are potentially deadly conditions. RDs who are knowledgeable about eating disorders can have a positive impact in eating disorder treatment. They can also contribute by recognizing symptoms of eating disordered behavior in clients and bringing awareness of the issue to the public through education on the differences between healthy and disordered eating. The question addressed in this research is: Are the Didactic Programs in Dietetics at three Colorado universities adequately preparing students, intent on becoming RDs, for encounters with patients with eating disorders during their careers?

Methods

In this study, participants were asked to complete a survey on their knowledge, beliefs, and attitudes towards eating disorders. Participation was optional and anonymous. Topics included etiology of eating disorders, knowledge of the physical effects of eating disorders, and attitudes towards treating patients with eating disorders.

Results

There was no difference between schools in students' knowledge and attitudes except for the belief in the likelihood of AN to be fatal and the number of practitioners to which students would refer a client with ED. Significant differences were found between students who suspected and/or had been diagnosed with an eating disorder compared to those who had not. Those who had been diagnosed with or suspected they had an eating disorder were more knowledgeable

about anorexia and bulimia nervosa, felt eating disorders were harder to treat, and felt that individuals who develop eating disorders were less in control of the disease.

Conclusions

While undergraduate DPD students in Colorado appear somewhat knowledgeable about anorexia and bulimia nervosa, they know less about binge eating disorder. It is recommended that DPD programs include EDs in relevant classes such as medical nutrition therapy or lifecycle nutrition.

Introduction

Eating disorders (ED) are biologically-based psychological disorders, the physical behaviors of which can lead to severe medical problems. The Diagnostic and Statistical Manual of Mental Disorders- Fifth Edition currently lists four separate categories of eating disorders: anorexia nervosa (AN), bulimia nervosa (BN), other specified feeding and eating disorders (OSFED), and binge eating disorder (BED) ^{1,2}. In AN, individuals heavily restrict food intake to achieve extremely low body weight. BN is characterized by episodes of binge eating followed by inappropriate compensatory mechanisms to eliminate the food and calories consumed. BED, which recently received its own category in the DSM-5, involves bingeing but no compensatory behaviors. OSFED (formerly eating disorders not otherwise specified, or EDNOS) is a new category that involves sub threshold and atypical conditions; in this category, an individual clearly has an eating disorder, but the physical and/or psychological symptoms do not meet the criteria for one of the eating disorders listed above ².

The physical complications that can arise from eating disorders are numerous, and can vary in severity depending on individual behaviors and the duration of the eating disorder. Complications of AN include reduced bone density, constantly feeling cold, lanugo, amenorrhea

and fertility issues, low blood pressure, cardiovascular issues, a decrease in gut motility and kidney function ⁷. Common BN complications are electrolyte imbalance, gastrointestinal complications, dehydration, menstrual irregularities and fertility problems, and kidney damage ⁷. The medical complications of BED are typically overweight/obesity and the associated sequelae of issues associated with excess body weight, such as diabetes, hypertension, and cardiovascular disease ⁶.

EDs have a high rate of comorbidity with other mental disorders. Over half of individuals with AN, 94% of individuals with BN, and 79% of individuals with BED met the criteria for at least one other mental health disorder ¹⁰, including significantly higher rates of depression, anxiety, obsessive-compulsive disorder, substance abuse, and self-injury than their non-eating disordered peers ¹¹⁻¹⁴.

Individuals with EDs also have an increased rate of death. Standardized mortality rates for AN have been consistently higher than that of the general population ¹⁵⁻¹⁸. Common causes of death are suicide and cardiac events ^{15,18}. BN and OSFED are also associated with increased all-cause mortality ¹⁷, and both show a significantly higher suicide rate than non-ED populations ¹⁶.

Hudson and Hiripi estimate that the lifetime prevalence of AN, BN, and BED are 0.9%, 1.5%, and 3.5%, respectively, for women and 0.3%, 0.5%, and 2.0%, respectively, for men ¹⁰. Individuals can have more than one lifetime diagnosis of an ED, and it is not uncommon to move from one diagnosis to another ²¹. These numbers do not include other ED sub-categories such as atypical AN, atypical BN, purging disorder, other manifestations of EDs that do not neatly fit into a diagnosis of AN, BN, or BED, or disordered eating, suggesting that the prevalence rate of EDs in the United States is likely higher than the 8% estimated. This is supported by the finding

that 76% of college students report knowing someone with an ED²². In a recent general population survey in the UK, 10% of respondents disclosed disordered eating behaviors²³.

Currently the prevalence rates of AN and BN appear to be relatively stable^{10,20} whereas the incidence rates of BED among the population are growing¹⁰. The incidence of EDs in males has been increasing⁹.

To date, the cause of eating disorders remains an elusive mix of a variety of factors. Genetics play a role, certainly in AN and BN⁶, and quite possibly for BED and OSFED as well, although genetic studies of those particular EDs is limited. Other factors include low self-esteem, previous obesity, perfectionism, anxiety disorders, a family history of dieting and/or EDs, past substance abuse or a family history of substance abuse, and external pressure to conform to a particular body shape from family, friends, or athletic subculture^{6,7,21,34,72}.

Eating disorders are treatable, although treatment is often difficult and complicated. Studies show that recovery rates from BN are higher than those from AN. For patients with BN, 75% reached full recovery a median of 9 years after beginning treatment³⁵. Among patients with AN, studies have shown that slightly less than one half fully recover, around one third improve but do not reach full recovery, and around 20% of those who receive treatment remain chronically ill¹². Relapse rates for AN and BN appear to be similar, with around one third of individuals who recover relapsing back to ED behaviors³⁵. Certain studies indicate that relapse and remission rates for EDNOS do not differ significantly from those of BN³⁸, others find that EDNOS has higher and faster remission rates than either AN and BN³⁷.

Due to the broad range of symptoms, eating disorders are best treated by a team of professionals. A physician, a psychiatrist, a licensed therapist or psychologist, a dentist (if

vomiting is present) and a registered dietitian (RD) should all be members of an eating disorder treatment team^{39-41,72}.

The RD plays a vital role in the treatment team, as s/he addresses the patient's diet and eating habits, behaviors focal to the disorder and the treatment. The RD works closely with primary care physicians in monitoring severely malnourished patients for refeeding syndrome^{39,44}. The RD collaborates with both the therapist and physician on establishing and monitoring adequate nutrient intake, appropriate weight ranges, and the return to normalized eating³⁹. The RD also plays a role in nutrition education, not only for patients but their family members as well. For patients being treated using family-based therapy, in which individuals under the age of 18 are provided effective treatment at home with the parents regulating and enforcing meal times and dietary habits, the RD plays an integral role in instructing the parents and/or guardians in proper nutrition⁷. When clients/patients have reached a point where they are maintaining a relatively healthy weight, but still may be struggling with eating disordered thoughts and minor behaviors, the RD is responsible for continuing to counsel and educate on healthy eating behaviors. This includes meal planning, shopping, and dining out⁴⁰.

The 2011 practice paper published by the American Dietetic Association (ADA) states that it is the responsibility of RDs involved in ED treatment to “obtain advanced training, continuing education and case consultations” and to remain well-read on current research pertaining to EDs⁴⁰. Individuals who work specifically with eating disorders must have specialized knowledge, e.g., an understanding not only of the psychological effects and symptoms of eating disorders, but how ingrained these thoughts and behaviors are, and how they are expressed through eating behaviors⁵². They must be aware of how symptoms of common

comorbid psychological disorders interact with EDs⁵³. RDs should not diagnose an ED. That is the role of either a physician or mental health practitioner⁴⁰.

Previous studies show common themes pertaining to successful eating disorder treatments are the presence of supportive, understanding relationships both during and outside of treatment and being able to talk openly about alternative coping mechanism to ED behaviors⁵². Therefore it is not surprising that less knowledge and understanding of eating disorders among healthcare providers has been shown to correlate with more negative views on patients with eating disorders, which may reflect frustration, hopelessness, lack of competence, or worry about the patient, and has been associated with a lack of improvement on behalf of the patient⁵⁴. Many healthcare professionals see eating disorders as difficult and time consuming to treat, and feel that they lack the proper training, support, and confidence to treat these patients⁵¹. Thus, it is important that healthcare practitioners who do not specialize in EDs know enough about EDs and their own personal limits to properly refer them to ED specialists⁵⁵.

Patients with ED can be difficult to work with; some have no desire to change their behavior because it is seen as positive, or serving a needed purpose, particularly in AN^{6,51,55}. They also may lie about ED behaviors or not recognize behavior as problematic⁵⁶. The presence of comorbid mental health issues can complicate treatment^{12,13,34,58}. Relapse is not uncommon in AN and BN, particularly in individuals with high levels of body image distortion³⁵.

RDs who work with high risk groups, such as college students, athletes, and patients diagnosed with conditions that require a heavy focus on dietary intake such as diabetes, can be vitally important in the early recognition of eating disorders⁵⁹. An appointment with an RD focuses on diet and eating behaviors, which could make disordered eating habits more noticeable. RDs may also be in a better position to recognize EDs in male and minority

populations whose risk for ED is typically ignored by physicians^{26,28,62}. As overweight and obese individuals try to slim down via diet and exercise, a growing number of overweight and obese individuals resort to unhealthy eating behaviors and developing EDs⁶³. Often, the disorder goes unnoticed due to the individual's starting weight; large amounts of weight can be lost yet the individual remains at a "healthy" BMI⁶³. ED education, particularly that emphasizes the subtle indications of an ED, is a required tool for ED recognition in any of these at-risk populations²².

Many nutrition majors apply for dietetic internships with the goal of becoming RDs. As described above, it is likely that they will encounter patients/clients with EDs, regardless of whether they specialize in ED treatment or not. Thus, graduating students need a basic level of ED competency. According to the ADA 2011 practice paper regarding nutritional intervention in EDs, competence includes knowledge of signs and symptoms, the ability to analyze appropriate lab and anthropomorphic data, an understanding of the need for immediate treatment, and knowing the proper treatment facilities and/or treatment professionals to refer clients⁴⁰. Since practitioner attitudes and beliefs towards eating disorders can have a strong positive or negative impact on treatment success, it is important to inform students that a positive attitude towards EDs is essential for treating these disorders.

To date, few published studies have reported on the knowledge, attitudes, beliefs, and training level of RDs and dietetics students towards EDs. The few studies that do exist indicate that RDs wish for more educational opportunities on EDs⁶⁴. Given the importance of the role of the RD in ED detection and treatment, one wonders are graduating nutrition students prepared to work with patients with EDs?

The purpose of this study was to measure knowledge of and attitudes and beliefs towards EDs in senior undergraduate nutrition majors. Surveys and questionnaires have been used among

a variety of medical professionals, medical students, therapists, counselors, dietitians, undergraduate students, and physical activity and nutrition educators in regards to their knowledge, attitudes, and beliefs on eating disorders^{22,47,49,64,70,71}.

Methods

Participants

Participants for this cross-sectional study were undergraduate students enrolled in senior capstone classes (or the equivalent) during the fall semester of 2013 in the nutrition programs at Colorado State University (CSU), the University of Northern Colorado (UNC), and the Metropolitan State University of Denver (MSU). All students in these classes were given the option to participate in the anonymous survey. Students were provided with a cover letter (Appendix 1) in lieu of a signed form of consent. The survey tool was modeled after a survey used in a similar study²², with permission of the original study authors. The study was approved by the Institutional Review Boards of the participating universities.

Study Tool

Demographics were included because age and gender have been shown to correlate with knowledge of EDs⁶⁰. Nutrition students may demonstrate a higher than average rate of disordered eating⁶⁶⁻⁶⁹, thus respondents were asked if they had been diagnosed with or suspected having an ED due to the potential of affecting an individual's beliefs, knowledge, and attitudes towards ED etiology, physical complications, and treatment.

The first part of the survey assessed how students perceived the development of EDs. It consisted of one "yes/no" question on whether students believed they could identify ED in someone they had just met, followed by two questions asking students to rank their beliefs (on a 9-point Likert scale) on whether or not they thought EDs were treatable and whether or not

individuals with EDs have control over the development of the disorder, with 1 being “very little” and 9 being “a lot.”

The second section focused on knowledge and beliefs of the physical consequences and consisted of four 9-point Likert scale items addressing the likelihood of EDs to cause physical damage and the fatality of AN, BN, and BED, with 1 being “not at all likely” and 9 being “very likely.” This was followed by items asking students to identify the physical complications of EDs. Students were given a list of the same 22 possible physical complications of EDs for AN, BN, and BED; they were asked to select “yes,” “no,” or “don’t know.” Every item was a possible physical complication of at least one of the three EDs.

The third section focused on EDs in clinical practice. Students were asked four questions related to their self-perceived preparedness to recognize symptoms of an ED, explain ED treatment, refer patients with EDs to a treatment team and/or treat EDs as part of a treatment team using a 9-point Likert scale. Students were asked to agree or disagree with six items to assess their attitudes towards individuals with EDs: individuals with EDs are difficult to treat; individuals with EDs do not want treatment; EDs are time-consuming to treat; whether or not the student would feel uncomfortable treating a client with an ED; whether or not the student would feel a sense of personal satisfaction treating a client with an ED; and whether or not an RD should be able to diagnose an ED. Lastly, students were asked to list any treatment professionals to whom they would refer a client with an ED.

The last section of the survey asked for age, gender, and ethnicity, the amount of college-level instruction they had received on EDs. Students were also asked to indicate if they had been diagnosed with, treated for, or suspected they had an ED. A survey (Appendix 1) was used in this project because of the relative ease of distribution, collection, and coding.

The study tool was reviewed for content validity by a registered dietitian with experience treating clients with ED and teaching college-level courses about ED. Reliability was established using a test-retest procedure, which used Pearson's correlations and dependent t-tests to determine the reliability of each item. Pearson's correlations for knowledge of the physical complications of AN, BN, and BED were 0.64, 0.84, and 0.79, respectively.

Data Collection

A hard copy of the survey was given to participants in their senior capstone class by their professors and participants completed the survey either in class or on their own time, at the discretion of the professor. Students returned their completed surveys to their professors who then returned them in a sealed envelope to the PI or Co-PI.

Data Analyses

Data was entered into a Microsoft Excel spreadsheet by the co-PI. The co-PI double-checked entered data for errors. Data was then analyzed using Statistical Analysis Software (SAS) version 9.2 (SAS Institute, Inc., Cary, NC 2008), with the level of significance defined at $p < 0.05$. Frequency analyses were performed for all variables. Chi-square analysis was performed to compare schools for demographic information, if students had college-level courses on ED, and whether participants suspected or had been diagnosed and/or treated for an ED. Analysis of variance (ANOVA) compared the participants' ages across schools. Additional ANOVA or analysis of covariance (ANCOVA) analyses were used to compare variables across schools and according to the number of ED related courses taken. For between-school analyses, age was controlled.

All four preparedness items were strongly linked (Cronbach's alpha of 0.8) and were thus combined into one variable, "Self-reported preparedness to treat EDs." The attitude variables

“individuals with EDs are difficult to treat” and “Individuals with EDs are time-consuming to treat” were also strongly linked and were combined into the variable “hard to treat.” None of the analyses justified combining other attitude variables. T-tests were used to compare individuals with no history of ED and those who suspected/had been diagnosed with an ED.

Results

One-hundred and eighty-two surveys were distributed and 104 completed surveys were received for a 57% response rate: 33 surveys from CSU (55% response rate), 63 from MSU (69% response rate), and 8 from UNC (26% response rate) (Table 1). Of the respondents, 88% were female and 89% were white. Students at MSU were significantly older than students at CSU or UNC. Only 9% of students had taken a class dedicated to EDs while 59% had taken a class that at least mentioned EDs. Approximately 25% of students reported suspecting that they had an ED. All students who indicated they had been formally diagnosed with and/or treated for an ED also marked that they suspected they had an ED.

Student attitudes towards patients with EDs were largely positive (Table 2). Students rated difficulty of treating eating disorders as 6.9 (1.5). Students were neutral on the statement that individuals with EDs did not want treatment (4.4 [2.0]) and agreed (7.2, [1.8]) that they would feel a sense of personal satisfaction from treating EDs. Students were neutral on whether or not an RD should be able to diagnose an ED by him or herself (5.2 [2.7]). Students knew more about the physical complications of AN (15.2 [2.7]) than BN (12.8 [3.7]), and knew the least about the physical complications of BED (10.6 [5.2]).

Significant differences were found between students who suspected they had or had been diagnosed with an ED compared to those who had not (Table 3). Compared to the other respondents, those who had been diagnosed with or suspected they had an ED felt that

Table 1. Demographic characteristics according to school.

Demographic Variable	Colorado State University (n =33)	School University of Northern Colorado (n =8)	Metropolitan State University of Denver (n =63)
Gender, % female	97	100	79
Ethnicity, % white	94	87	83
Age, LSM (SE)	22 (1.0) ^a	21 (2.0) ^a	29 (0.8) ^b
Took at least 1 course that focused on EDs	18	0	5
Took at least 1 course that mentioned but did not focus on EDs	61	75	54
Have not taken any courses that mention EDs	21	25	41
% who suspect/been diagnosed with an ED	24	29	25

Different letter superscript in row indicates significant difference.

individuals had less control over the development of an ED, were more knowledgeable about the physical complications of AN and BN, believed that BN was less likely to be fatal, felt EDs were more difficult and time consuming to treat, and would refer a client with an ED to more treatment professionals. They also indicated they would feel a greater sense of personal satisfaction in treating individuals with EDs versus students who did not suspect they had an ED.

When comparing students by classes taken, those who took a class that mentioned eating disorders but did not focus on them showed significantly greater knowledge of AN physical complications than those who did not take a class that mentioned EDs (average of 15.6±0.3

Table 2. Student responses according to school

Variable	Colorado State University (n =33)	School University of Northern Colorado (n =8)	Metropolitan State University of Denver (n =63)	All (n=102)
		Ismean (SEM)		Mean (SD)
Control over development of ED	4.8 (0.5)	4.8 (0.8)	4.8 (0.3)	5.1 (2.0)
Knowledge of...				
...physical complications of AN	15.6 (0.6)	16.1 (1.1)	14.6 (0.4)	15.2 (2.7)
...physical complications of BN	13.6 (0.9)	11.0 (1.4)	13.1 (0.6)	12.8 (3.7)
... physical complications of BED	10.8 (1.2)	12.5 (2.0)	11.6 (0.8)	10.6 (5.2)
Likelihood of AN to be fatal	6.9 (0.3) ^a	6.7 (0.5) ^a	7.7 (0.2) ^b	7.7 (1.2)
Likelihood of BN to be fatal	6.3 (0.4)	6.9 (0.7)	6.7 (0.3)	6.7 (1.7)
Likelihood of BED to be fatal	6.3 (0.4)	6.9 (0.7)	6.7 (0.3)	6.0 (1.9)
EDs are difficult and time consuming to treat	6.5 (0.4)	6.5 (0.6)	7.0 (0.2)	6.9 (1.5)
People with EDs do not want treatment	3.5 (0.5)	3.3 (0.8)	4.4 (0.3)	4.4 (2.0)
Would feel a sense of personal satisfaction treating client with ED	6.5 (0.4)	6.8 (0.7)	7.0 (0.3)	7.2 (1.8)
RDs should be able to diagnose EDs	5.8 (0.7)	5.9 (1.2)	5.1 (0.5)	5.2 (2.7)
Number of practitioners would refer a client with ED	4.9 (0.2) ^a	3.8 (0.4) ^b	5.3 (0.2) ^a	5.2 (1.0)
Perceived preparedness to treat EDs	6.1 (0.6)	5.1 (0.9)	5.3 (0.4)	5.2 (2.0)

Different letter superscript in row indicates significant difference. Maximum knowledge score= 22. Maximum referral score=6. All other values on Likert scale, 1= Strongly Disagree, 9=Strongly Agree. AN=Anorexia Nervosa. BN=Bulimia Nervosa. BED=Binge Eating Disorder.

Table 3. Student responses according to self-identified eating disorder

Variable	Status of Eating Disorder	
	Diagnosed with and/or suspect has an ED (n=25)	No ED (n=77)
	Ismean (SEM)	
Control over development of ED (larger #= less control)	6.1 (2.1)	4.8 (1.9)**
Knowledge of...		
...physical complications of AN	16.2 (0.4)	14.9 (0.3)*
... physical complications of BN	13.9 (0.6)	12.4 (0.4)*
... physical complications of BED	11.3 (0.8)	10.3 (0.6)
Likelihood of AN to be fatal	7.7 (1.4)	7.7 (1.2)
Likelihood of BN to be fatal	6.0 (0.4)	6.9 (1.5)*
EDs are difficult and time consuming to treat	7.5 (1.2)	6.9 (1.5)*
People with EDs do not want treatment	4.2 (2.0)	4.5 (1.9)
Would feel uncomfortable treating a client with ED	3.3 (2.1)	3.5 (2.3)
Would feel a sense of personal satisfaction treating a client with ED	8.0 (1.2)	6.9 (1.8)**
RDs should be able to diagnose EDs	5.0 (2.9)	5.3 (2.7)
Number of practitioners would refer a client with ED	5.7 (0.1)	5.1 (0.1)*
Perceived preparedness to treat EDs	5.6 (2.1)	5.1 (2.0)

*p<0.05. **p<0.01. Maximum knowledge score= 22. Maximum referral score=6. All other values have maximum score=9.

Table 4. Student’s Knowledge of Eating Disorders according to Courses Taken

Knowledge of Physical Complications of	Took at least 1 course that focused on EDs (n=9)	Took at least 1 course that mentioned but did not focus on EDs (n=59)	Have not taken any courses that mention EDs (n=34)
	Ismean (SEM)		
Anorexia Nervosa	15.4 (0.9) ^{a,b}	15.6 (0.3) ^b	14.3 (0.5) ^a
Bulimia Nervosa	13.0 (1.2) ^{a,b}	13.3 (0.5) ^b	11.6 (0.6) ^a
Binge Eating Disorder	13.6 (1.7) ^a	10.4 (0.7) ^b	9.7 (0.9) ^b

Different letter superscript in row indicates significant difference. Maximum score =22.

versus 14.3±0.5 respectively, $p < 0.05$), (Table 4). Knowledge of BN yielded similar results: knowledge was significantly higher for those who had taken a class that mentioned, but did not focus on, eating disorders compared to those who had not taken a class that mentioned ED and was not statistically different from having taken a class focused on ED . For BED, knowledge was higher for those who had taken a class focused on EDs, with an average score of 13.6±1.7, compared to those who had not taken a class on ED or had taken a class that only mentioned EDs.

Discussion

In general, it appears students from the three schools have similar knowledge and attitudes. On average, individuals scored higher for knowledge of physical complications of AN and BN than BED. There were no differences between schools for all variables with the exception of the likelihood of AN to be fatal and number of possible referrals the respondent might make to other practitioners. Since higher scores for both occurred at the same university it is possible these students were more exposed to this information.

The results on knowledge for AN and BN are interesting. While taking a class that mentioned, but did not focus on, EDs significantly raised participant’s knowledge level on AN

and BN above those who had not taken a class that mentioned ED, taking a class that focused on EDs resulted in scores that were not significantly different than never having taken a class that mentioned EDs. One would expect that taking a class on EDs would raise knowledge levels significantly, but that was not the case. The likely explanation for this is that the small sample size of students who took a class focusing on EDs could be masking any more significant effects. Another is that participants who have taken a class that focused on EDs might be aware of the fact that eating disorder symptoms and behaviors can vary between individuals (there are different subtypes of AN and BN, all with different specific behaviors). For example, not all individuals with BN use vomiting as a form of purging, and thus are less likely to develop physical complications associated with frequent vomiting such as tooth decay. Thus, individuals who were well-versed on the complexities of EDs may have responded “I don’t know” to certain knowledge questions, as the exact subtype of eating disorder was not specified.

Taking a class that focused on EDs did significantly raise knowledge on BED above that of never taking a class on EDs or taking a class that mentioned but did not focus on EDs. Even among students who had taken a class on EDs, knowledge of BED was still lower than knowledge of AN or BN. Also of note is that 54% of students believed that a physical effect of BED was cavities, and 49% believed BED could also cause an electrolyte imbalance, which indicates that a large number of respondents may have mistakenly believed that purging is a behavior seen in BED.

Most students felt that EDs are difficult and time-consuming to treat, yet were open to working with these clients, which correlates with views of healthcare professionals⁵¹. However, students largely felt that individuals with EDs do want help. This differs from studies of patients in ED facilities that indicate many individuals with ED feel ambivalent towards treatment^{52,73}.

The fact that most students responded that patients with EDs do want treatment and that they would feel comfortable treating EDs could be a result of improved attitudes towards individuals with eating disorders. Which also contradicts previous research indicating that college students see EDs in an unfavorable light ⁷¹. Negative attitudes of treatment professionals have been associated with lack of patient improvement ⁵⁴, so the largely positive attitudes among students towards those with EDs is encouraging, particularly in light of the fact that many professionals who work with ED clients cite the ability to build a relationship with the client as more helpful than the type of treatment they provide ⁵¹.

Although most respondents who wish to work as an RD in a clinical setting responded that they would be open to working with an ED client, students indicated they did not feel well prepared to treat the population. This concurs with previous research indicating that lack of confidence and professional training and support in treating EDs is a common complaint among treatment professionals ⁵¹.

Recent studies examining EDs and disordered eating among non-athlete female students at American colleges and universities estimate a prevalence of 13% ^{74,75}, but 25% of respondents to this survey reported having an ED. This finding correlates with previous studies indicating that college nutrition majors are more prone to ED than students in other majors ⁶⁶⁻⁶⁸.

The statistically significant differences between individuals who did not report a history of an ED and those who had been diagnosed with an ED or suspected they had one were higher levels of knowledge for AN and BN, as well as more positive attitudes towards patients with EDs. This might be expected, as previous research has shown that individuals may be more sympathetic and more positive towards subjects (in this case, individuals with EDs) they perceive to be similar to themselves ⁷¹. Those with an ED or suspected ED have an insider's

perspective on the thoughts, emotions, and cognitions that accompany them. This could not only give them a more sympathetic view of individuals who suffer from EDs, but also increase their satisfaction from treating EDs because of a greater sense of understanding of the work that goes into recovery on behalf of the patient. This correlates well with research into the advantages reported by therapists with a previous diagnosis of an ED, particularly having more empathy and expertise ⁷⁶.

While students with a history of an ED had a more positive and understanding view of patients with ED, it is important to note that they did not feel more or less prepared to treat patients with ED than their non-ED peers. This is surprising, as individuals who had a history of an ED might be expected to have an incentive to research the condition and its treatment on their own. However, their low self-perceived preparedness could reflect their apprehension about triggering their own symptoms ⁷⁶. Students who either had or suspected they had an ED also did not know significantly more about BED. Again, this could be due to the fact that BED has only recently been identified and there is less information on it than either AN or BN.

This study does have limitations. Most respondents were non-Hispanic white females in their early 20's. This demographic group has been shown to know more about AN and BN than others ^{22,60}. However, the majority of RDs in the United States are white females ⁷⁷, so the relatively uniform racial and gender makeup of respondents may serve as a more accurate marker for the majority of RDs and aspiring RDs. The low number of males in this study also means that any previously reported differences in the knowledge, attitudes, and beliefs about EDs between males and females were not able to be investigated ²². Another limitation is this survey only looked at students from one state. In addition, because many students took the survey home to complete, it is possible that they could have researched the topic of EDs before filling out the

surveys. However, the similar results seen in the three different institutions suggest respondents did not look up answers. There is a possible response bias; students who already knew about EDs and/or had an interest in treating EDs could have been more likely to complete and turn in the survey. Also, the survey did not measure knowledge of psychological symptoms of EDs, which are an important component of EDs for providers to know.

Conclusion

To date, few studies have examined the knowledge of and/or attitudes and behaviors towards EDs of dietetics professionals and dietetic students, despite the vital role RDs play in the treatment of EDs. This study was relatively small, but it raise concerns relevant to the education of future RDs regarding EDs.

While undergraduate Didactic Programs in Dietetics (DPD) students in Colorado seem to be somewhat knowledgeable about AN and BN, they do not know much about binge eating disorder (BED). This is of concern, because BED is more prevalent than both AN and BN ⁷⁸. Another concern is that 34% of students had not taken a class that even mentioned EDs. Given that dietitians may have more frequent contact with individuals with EDs than psychologists or counselors ⁵¹, this indicates a gap in the education of future dietetic professionals that should not be ignored. It would be beneficial for schools to make time for at least a brief overview of EDs in appropriate classes, such as medical nutrition therapy or lifecycle nutrition, to better prepare students for encountering patients with EDs during their careers. This instruction should not only cover the physical signs, symptoms, and treatment options for EDs but also the psychological aspects of the disorders. Healthcare professionals who work with EDs must understand how the ED fits into the life of the client as a coping mechanism and a way to feel in control of some aspect of his or her life ⁵². Even with partial-syndrome EDs, in which individuals exhibit some

signs of an ED but not to an extent significant enough to warrant a diagnosis, individuals show elevated levels of anxiety, depression, and substance abuse¹¹. Furthermore, the AND should offer a certification program for RDs who wish to specialize in ED treatment, similar to current certifications for specializations in sports dietetics and pediatric, gerontological, renal, and oncology nutrition, to ensure that proper educational criteria are met for treating these disorders.

Future research in this area is needed to investigate whether or not students know of the psychological issues associated with EDs. There may also be between-institution differences in knowledge of and attitudes and beliefs towards ED. Additionally, while the attitudes, beliefs, and knowledge of EDs have been studied among nurses and physicians, comparatively little research has been done in this area on practicing RDs, and what studies there are indicate a desire for more education and training materials for EDs⁶⁴.

Over 5% of the population could develop an ED in their lifetime. Given the difficulty in recognizing EDs in their earlier stages, the challenge of treating these disorders, and the importance of nutrition education and therapy in ED treatment, DPD programs cannot ignore this topic.

CHAPTER 3: FURTHER CONCLUSIONS AND IMPLICATIONS

The fact that slightly over a third of the students surveyed reported that they had not had a class that even mentioned EDs also highlights that EDs are not prioritized in DPD curricula in Colorado. Even in programs that do include ED education for nutrition students, the students themselves may not feel like EDs are important. In the two schools where ED-focused nutrition courses were offered as optional choices, only 18% of students at CSU and 5% of students at MSU actually took them. Other factors could also account for the low enrollment, such as scheduling conflicts with required courses. It is recommended that DPD programs re-evaluate educational requirements and identify opportunities to include EDs in their curriculum.

Another implication of this study is that students knew significantly less about BED compared to AN and BN. BED is an ED they are more likely to encounter in clinical practice (and daily life) than AN and/or BN. Thus, it is recommended that DPD programs include BED in required courses such as medical nutrition therapy and/or lifecycle nutrition. Medical nutrition therapy classes could cover EDs in a separate lecture, while classes such as lifecycle nutrition can tie EDs into other topics already covered in the curriculum. For example, EDs could be tied into nutrition during puberty and pregnancy. Classes covering sports nutrition could also go more in depth on EDs, particularly when covering the female athlete triad (energy deficit, amenorrhea, and osteoporosis). Nutrition counseling classes should mention EDs, particularly BED, when discussing weight loss counseling and obesity.

While this project was enlightening, there are adjustments that could improve the quality of the results of future studies. The first would be to replicate this study in other states. The results from this study can only be applied to students from Colorado, and while they can be used

as an indicator for the rest of the country, there are potential significant differences between schools from one state to the next. Another adjustment could be to have a parallel qualitative study rather than “yes/no” items or Likert-scales. While qualitative questions could lower the response rate due to respondent burden and are harder to code, they have the potential to give more detailed information on students’ knowledge and attitudes about EDs. Further research on this topic should also focus on practicing RDs to identify how current practitioners view EDs and identify areas to improve in their education.

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APPENDIX 1: SURVEY TOOL AND COVER LETTER



July 9, 2013

Dear Participant,

My name is Marcia Winer and I am a researcher from Colorado State University in the Food Science and Human Nutrition department. We are conducting a research study on senior undergraduate students in nutrition departments about their knowledge of and attitudes towards eating disorders. Given many of you plan to become registered dietitians, there is a chance that you will encounter individuals with eating disorders in your careers. The title of our project is "Surveying the Knowledge of and Attitudes Towards Eating Disorders of Undergraduate Nutrition Majors." The Principal Investigators are Dr. Garry Auld, PhD, RD and Dr. Melissa Wdowik, PhD, RD of the Food Science and Human Nutrition Department and the Co-Principal Investigator is Marcia Winer, MS student in the Food Science and Human Nutrition Department.

We would like you to please complete the following survey that has been given to you by your senior capstone professor to complete in class or outside of class on your own time. Participation will take approximately 15 minutes. Your participation in this research is voluntary. If you decide to participate in the study, you may withdraw your consent and stop participation at any time without penalty.

While we do ask basic demographic information at the end of the survey, we will not be collecting any direct identifying information. The individuals who will have access to the completed surveys will be myself, Dr. Garry Auld, and Dr. Melissa Wdowik. While there are no direct benefits to you, we hope to gain more knowledge on the knowledge, attitudes, and beliefs of undergraduates on eating disorders and how well prepared the students of these programs feel to work with individuals with eating disorders. This information may be useful when designing future courses or programs.

There are no known risks to filling out this survey. It is not possible to identify all potential risks in research procedures, but the researcher(s) have taken reasonable safeguards to minimize any known and potential, but unknown, risks.

If you have any questions, please contact Marcia Winer at 720-480-6884 or via e-mail at marcia.winer@gmail.com or Dr. Garry Auld at 970-491-7429 or via e-mail at garry.auld@colostate.edu. If you have any questions about your rights as a volunteer in this research, contact Janell Barker, Human Research Administrator, at 970-491-1655.

Sincerely,

Dr. Garry Auld, PhD, RD
Professor
Dept. Food Science and Human Nutrition
Colorado State University

Marcia Winer
MS Candidate
Dept. Food Science and Human Nutrition
Colorado State University

The following websites are good resources to learn more about eating disorders:

The National Eating Disorder Association
www.nationaleatingdisorders.org

National Institute of Mental Health
www.nimh.nih.gov/health/topics/eating-disorders

Something Fishy Website on Eating Disorders
www.something-fishy.org

To receive more personal information about eating disorders and eating disorder treatment centers in your area, please contact your school counseling services or:

National Eating Disorder Association toll-free helpline (9am-9pm M-Th and 9am-5pm Fridays, EST)
1-800-931-2237
<http://www.nationaleatingdisorders.org/treatment>

Eating Recovery Center
<http://www.eatingrecoverycenter.com/>
Denver, CO
1-877-825-8584

La Luna Center
<http://www.lalunacenter.com/>
Fort Collins, CO: 970-282-8282
Boulder, CO: 720-470-0010

Beyond the Mirror
<http://www.beyondthemirror.org/>
Fort Collins, CO: 970-402-8543

EATING DISORDERS SURVEY

Thank you for participating in our survey. Please keep in mind that this is not a test, so you should not worry about giving right or wrong answers. We are interested in anything that you know, think, believe, or feel about eating disorders. Remember that the questionnaire is anonymous and confidential.

Please do not discuss this survey with others. Please do not look up the answers.

Section I. Development of Eating Disorders

We want to learn about your opinions on the development of eating disorders.

1. Do you think that you could tell whether someone you just met has an eating disorder?
(please circle one)

_____ Yes

_____ No

2. Do you think eating disorders are treatable? (please circle one)

Yes 1 2 3 4 5 6 7 8 9 No

3. How much control do you think a person has over the development of an eating disorder?

None 1 2 3 4 5 6 7 8 9 A lot

4. How much influence do you think the following factors have on the development of an eating disorder?

Genetics	Very Little	1	2	3	4	5	6	7	8	9	A lot
Puberty	Very Little	1	2	3	4	5	6	7	8	9	A lot
Family enmeshment	Very Little	1	2	3	4	5	6	7	8	9	A lot
Family history of depression	Very Little	1	2	3	4	5	6	7	8	9	A lot
Family history of dieting	Very Little	1	2	3	4	5	6	7	8	9	A lot
Perfectionism	Very Little	1	2	3	4	5	6	7	8	9	A lot
The media	Very Little	1	2	3	4	5	6	7	8	9	A lot
Peer pressure	Very Little	1	2	3	4	5	6	7	8	9	A lot
Controlling family environment	Very Little	1	2	3	4	5	6	7	8	9	A lot
Family history of alcohol and/or drug abuse	Very Little	1	2	3	4	5	6	7	8	9	A lot
Low self-esteem	Very Little	1	2	3	4	5	6	7	8	9	A lot
Personal history of trauma/abuse	Very Little	1	2	3	4	5	6	7	8	9	A lot
Presence of other mental health problems (such as depression or anxiety.)	Very Little	1	2	3	4	5	6	7	8	9	A lot

Section II. Physical Consequences of Eating Disorders

We now want to learn about your knowledge and opinions on the physical consequences of eating disorders.

1. How likely are eating disorders to cause **physical damage** to the body?

Not at all 1 2 3 4 5 6 7 8 9 Very
Likely Likely

2. How likely are the following eating disorders to be **fatal**?

Anorexia:

Not at all 1 2 3 4 5 6 7 8 9 Very
Likely Likely

Bulimia:

Not at all 1 2 3 4 5 6 7 8 9 Very
Likely Likely

Binge Eating Disorder:

Not at all 1 2 3 4 5 6 7 8 9 Very
Likely Likely

4. Which of the following are possible physical complications of **Anorexia Nervosa**? Please check the best response for each.

- | | | | | | | |
|---|-------|-----|-------|----|-------|------------|
| Always cold | _____ | Yes | _____ | No | _____ | Don't Know |
| Anemia | _____ | Yes | _____ | No | _____ | Don't Know |
| Bloating | _____ | Yes | _____ | No | _____ | Don't Know |
| Broken blood vessels in eyes/face | _____ | Yes | _____ | No | _____ | Don't Know |
| Cardiovascular disease | _____ | Yes | _____ | No | _____ | Don't Know |
| Cavities | _____ | Yes | _____ | No | _____ | Don't Know |
| Constipation | _____ | Yes | _____ | No | _____ | Don't Know |
| Type II diabetes | _____ | Yes | _____ | No | _____ | Don't Know |
| Electrolyte imbalance | _____ | Yes | _____ | No | _____ | Don't Know |
| Fatigue | _____ | Yes | _____ | No | _____ | Don't Know |
| Gastroesophageal reflux disorder | _____ | Yes | _____ | No | _____ | Don't Know |
| Hair loss | _____ | Yes | _____ | No | _____ | Don't Know |
| Heart arrhythmia | _____ | Yes | _____ | No | _____ | Don't Know |
| High blood pressure | _____ | Yes | _____ | No | _____ | Don't Know |
| Low blood pressure | _____ | Yes | _____ | No | _____ | Don't Know |
| High cholesterol | _____ | Yes | _____ | No | _____ | Don't Know |
| Insomnia | _____ | Yes | _____ | No | _____ | Don't Know |
| Lanugo (fine, downy hair that covers the face and body) | _____ | Yes | _____ | No | _____ | Don't Know |
| Menstrual irregularities/ infertility | _____ | Yes | _____ | No | _____ | Don't Know |
| Muscle wasting/ weakness | _____ | Yes | _____ | No | _____ | Don't Know |
| Obesity | _____ | Yes | _____ | No | _____ | Don't Know |
| Osteoporosis | _____ | Yes | _____ | No | _____ | Don't Know |

5. Which of the following are possible physical complications of **Bulimia Nervosa**? Please check the best response for each.

- | | | | | | | |
|---|-------|-----|-------|----|-------|------------|
| Always cold | _____ | Yes | _____ | No | _____ | Don't Know |
| Anemia | _____ | Yes | _____ | No | _____ | Don't Know |
| Bloating | _____ | Yes | _____ | No | _____ | Don't Know |
| Broken blood vessels in eyes/face | _____ | Yes | _____ | No | _____ | Don't Know |
| Cardiovascular disease | _____ | Yes | _____ | No | _____ | Don't Know |
| Cavities | _____ | Yes | _____ | No | _____ | Don't Know |
| Constipation | _____ | Yes | _____ | No | _____ | Don't Know |
| Type II diabetes | _____ | Yes | _____ | No | _____ | Don't Know |
| Electrolyte imbalance | _____ | Yes | _____ | No | _____ | Don't Know |
| Fatigue | _____ | Yes | _____ | No | _____ | Don't Know |
| Gastroesophageal reflux disorder | _____ | Yes | _____ | No | _____ | Don't Know |
| Hair loss | _____ | Yes | _____ | No | _____ | Don't Know |
| Heart arrhythmia | _____ | Yes | _____ | No | _____ | Don't Know |
| High blood pressure | _____ | Yes | _____ | No | _____ | Don't Know |
| Low blood pressure | _____ | Yes | _____ | No | _____ | Don't Know |
| High cholesterol | _____ | Yes | _____ | No | _____ | Don't Know |
| Insomnia | _____ | Yes | _____ | No | _____ | Don't Know |
| Lanugo (fine, downy hair that covers the face and body) | _____ | Yes | _____ | No | _____ | Don't Know |
| Menstrual irregularities/ infertility | _____ | Yes | _____ | No | _____ | Don't Know |
| Muscle wasting/ weakness | _____ | Yes | _____ | No | _____ | Don't Know |
| Obesity | _____ | Yes | _____ | No | _____ | Don't Know |
| Osteoporosis | _____ | Yes | _____ | No | _____ | Don't Know |

6. Which of the following are possible physical complications of **Binge Eating Disorder**? Please check the best response for each.

- | | | | | | | |
|---|-------|-----|-------|----|-------|------------|
| Always cold | _____ | Yes | _____ | No | _____ | Don't Know |
| Anemia | _____ | Yes | _____ | No | _____ | Don't Know |
| Bloating | _____ | Yes | _____ | No | _____ | Don't Know |
| Broken blood vessels in eyes/face | _____ | Yes | _____ | No | _____ | Don't Know |
| Cardiovascular disease | _____ | Yes | _____ | No | _____ | Don't Know |
| Cavities | _____ | Yes | _____ | No | _____ | Don't Know |
| Constipation | _____ | Yes | _____ | No | _____ | Don't Know |
| Type II diabetes | _____ | Yes | _____ | No | _____ | Don't Know |
| Electrolyte imbalance | _____ | Yes | _____ | No | _____ | Don't Know |
| Fatigue | _____ | Yes | _____ | No | _____ | Don't Know |
| Gastroesophageal reflux disorder | _____ | Yes | _____ | No | _____ | Don't Know |
| Hair loss | _____ | Yes | _____ | No | _____ | Don't Know |
| Heart arrhythmia | _____ | Yes | _____ | No | _____ | Don't Know |
| High blood pressure | _____ | Yes | _____ | No | _____ | Don't Know |
| Low blood pressure | _____ | Yes | _____ | No | _____ | Don't Know |
| High cholesterol | _____ | Yes | _____ | No | _____ | Don't Know |
| Insomnia | _____ | Yes | _____ | No | _____ | Don't Know |
| Lanugo (fine, downy hair that covers the face and body) | _____ | Yes | _____ | No | _____ | Don't Know |
| Menstrual irregularities/ infertility | _____ | Yes | _____ | No | _____ | Don't Know |
| Muscle wasting/ weakness | _____ | Yes | _____ | No | _____ | Don't Know |
| Obesity | _____ | Yes | _____ | No | _____ | Don't Know |
| Osteoporosis | _____ | Yes | _____ | No | _____ | Don't Know |

4. Please indicate how much you agree or disagree with the following:

Individuals with eating disorders are difficult to treat.

Strongly Disagree 1 2 3 4 5 6 7 8 9 Strongly Agree

Individuals with eating disorders do not want treatment.

Strongly Disagree 1 2 3 4 5 6 7 8 9 Strongly Agree

Individuals with eating disorders are time consuming to treat.

Strongly Disagree 1 2 3 4 5 6 7 8 9 Strongly Agree

I would feel uncomfortable treating individuals with eating disorders.

Strongly Disagree 1 2 3 4 5 6 7 8 9 Strongly Agree

I would feel a sense of personal satisfaction if I treated individuals with eating disorders.

Strongly Disagree 1 2 3 4 5 6 7 8 9 Strongly Agree

A registered dietitian should be able to diagnose an eating disorder by him/herself.

Strongly Disagree 1 2 3 4 5 6 7 8 9 Strongly Agree

5. Please list healthcare professionals who should be included in an eating disorder treatment team. Please check all that apply.

- | | |
|--|---|
| <input type="checkbox"/> General Practitioner (M.D.) | <input type="checkbox"/> Therapist/Psychologist |
| <input type="checkbox"/> Psychiatrist | <input type="checkbox"/> Dentist |
| <input type="checkbox"/> Registered Dietitian | <input type="checkbox"/> Family Therapist |

6. If you strongly suspect a client has an eating disorder, what would you do? Please check all that apply.

- Refer to a psychiatrist
- Advise them to contact an MD
- Treat them myself for an eating disorder
- Refer to another RD
- Refer to a therapist/psychologist
- Treat them myself for only the issue they came to see me for
- Educate them on eating disorders
- Diagnose them with an eating disorder

Section IV. Demographics

We are interested in knowing something about the students answering our survey. You may skip any questions that you do not feel comfortable answering. Please keep in mind that this questionnaire is completely anonymous and confidential.

1. Age: _____

2. Gender: Female Male

3. What is your racial/ethnic background? (circle all that apply)

White African-American Hispanic

Asian-American Native American

Other: _____
(please write in)

4. Have you taken a college-level course on eating disorders?

_____ Yes, I have taken a class specifically focused on eating disorders. Credit Hours _____

_____ I have taken a class that was not focused on eating disorders, but I learned a little about them in one of my classes

_____ No, I have not taken a class on eating disorders but plan to

_____ No, I have not taken a class on eating disorders and do not plan to

We are interested in the number of respondents who themselves have experienced eating disorders. We realize that this is highly personal information. Again, we remind you that this questionnaire is completely anonymous and confidential.

5. Have you ever been diagnosed with an eating disorder? (circle one)

Yes No

6. Have you ever been treated for an eating disorder?

Yes No

7. Do you suspect you have/have had an eating disorder?

Yes No