

THE PREVALENCE OF EATING DISORDERS AMONG FEMALE
COLLEGIATE EQUESTRIAN ATHLETES

A THESIS

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By
Alexandra Marie Houck

Research Advisor, Dr. Carol Biddington
California, Pennsylvania
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CALIFORNIA UNIVERSITY of PENNSYLVANIA
CALIFORNIA, PA

THESIS APPROVAL

Graduate Athletic Training Education

We hereby approve the Thesis of

Alexandra Marie Houck
Candidate for the degree of Master of Science

Date

Faculty

4-9-09

Carol Biddington
Carol Biddington, Ed.D (Chairperson)

04/07/09

Margaret Marcinek
Margaret Marcinek, Ed.D, RN.

04/07/09

Ellen West, MS, ATC
Ellen West, MS, ATC

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TABLE OF CONTENTS

	Page
SIGNATURE PAGE	ii
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vii
INTRODUCTION	1
METHODS	6
Research Design.	6
Subjects.	6
Instruments	7
Procedures	9
Hypotheses	10
Data Analysis	10
RESULTS	12
Demographic Data	12
Hypotheses Testing	15
Additional Findings	18

DISCUSSION	23
Discussion of Results	23
Conclusions	31
Recommendations	32
REFERENCES	34
APPENDICES	36
A. Review of the Literature	37
Equestrian Sports	39
Intercollegiate Horse Show Association	39
Riding for Form and Function	40
Disordered Eating	42
Types of Disordered Eating	42
Causes of Disordered Eating	48
Menstrual Irregularities	52
Types of Menstrual Irregularities	52
Causes of Menstrual Irregularities	55
Summary	58
B. The Problem	60

Statement of the Problem	61
Definition of Terms	62
Basic Assumptions	65
Limitations of the Study	65
Significance of the Study	66
C. Additional Methods	67
Eating Behaviors and	
Demographics Questionnaire (C1)	68
Institutional Review Board(C2)	74
Email Sent to IHSA Board(C3)	81
Cover Letter Sent to Participants(C4)	83
REFERENCES	86
ABSTRACT	89

LIST OF TABLES

Table		Page
1	Characteristics of Participants	12
2	Participants' Class Rank	12
3	Participants' Oral Contraceptives Usage	13
4	Participants' Responses for Menstrual Regulation	13
5	Participants' Main Event	13
6	Participants' Responses for Eating Binges	14
7	Participants' Responses for Vomiting	14
8	Participants' Responses for Weight Control	14
9	Participants' Eating Disorder Treatment	15
10	Eating Disorder Issues	15
11	Pearson-Product Moment Correlation Between The Equestrians Age and Total Score	16
12	A One-Way ANOVA for Eating Disorders among Riding Events	17

13	Pearson-Product Moment Correlation between The Equestrians BMI Scores and Total Score	18
14	T Test Comparison between Binge Eating Responses for the EAT-26 Score	19
15	T Test Comparison between Weight Control Substance Use (WCSU) for the EAT-26.	20
16	T Test Comparison of Responses for the Eating Disorder Issues for EAT-26.	22
17	Coaches' Ratings of the Seriousness of Eating/Dieting Behaviors for the Athlete's Health and Performance	51

LIST OF FIGURES

Figure		Page
1	Binge Eating Responses for EAT-26	19
2	Substance Use Responses for EAT-26	20
3	Eating Disorder Issues for EAT-26	21
4	Proper Riding Position	41

INTRODUCTION

For years females have been participating in athletics for both leisure and competition. There is no limit to the type of sports in which women may participate. From field hockey to softball, from motor bike racing to track, women can do it all. But one sport that is often overlooked when discussing female participants in sports is horseback riding (or equestrian sports).

While equestrian sports have been in existence for years, and have continued to grow rapidly, the amount of research on equestrians is sparse. The few studies found by the researcher on equestrian sports mainly examined the different types of injuries that could be sustained by horseback riding. There is little research that pertains to potential psychological disorders of equestrians and the physiological effect.

Female equestrians are at the same, if not greater, risk of sustaining injuries as athletes in other sports. It could even be hypothesized that equestrians are at a higher risk of injury since they are dealing with an animal that can at times be unpredictable, uncontrollable, and dangerous. However, it has yet to be determined if female equestrians have the same risk level or if they are even at

risk for developing psychological disorders that affect other female athletes.

Eating disorders and the possibility of developing menstrual irregularities are among the major psychological concerns for female athletes. It has been demonstrated that 32% of female collegiate athletes practice pathogenic weight-control behaviors that could be associated with eating disorders.¹ Furthermore, menstrual irregularities, like amenorrhea and oligomenorrhea, may be related to eating disorders.

The potential for female riders to develop eating disorders as well as associated menstrual irregularities is present in equestrian sports. In the past, when horses were used as beasts of burden instead of a form of entertainment, it was important for riders to be lean, flexible, and strong so that they could move and work with the horse more efficiently. It is still important for modern day equestrians to be flexible and strong to be an efficient rider. While a lean physique may not be necessary for success in equitation, it is an important aspect in competition judging. In equestrian sports where riders are judged on their equitation(or riding position), pressure can be put on equestrian athletes to have a lean figure.

It is often unspoken knowledge that overweight riders are less likely to experience success in competitions than riders who have a lean build.

Equestrians can feel the pressure to stay lean through many different outlets. Parents, coaches, teammates, and competition can all put unnecessary pressure upon equestrians to do whatever it takes to win in their division. It is also important to recognize that some equestrians could feel pressure to be lean from their coaches. Equestrians, like other female athletes, may avoid reporting symptoms of eating disorders for fear that their coaches would remove them from competition.² Previous research has demonstrated that collegiate coaches consider behaviors that can be associated with eating disorders to be a serious matter as both the athlete's health and performance are placed at risk.³ Thus if equestrian athletes are aware that their coaches feel strongly against behaviors associated with eating disorders, they will be less likely to report them.

Although no evidence could be found in the literature that listed equestrian sports as being a lean or non-lean sport, research has been done to evaluate whether or not the type of sport (lean or non-lean) has an effect on the

prevalence of eating disorders. It has been found that 25% of lean sport athletes had more disordered eating symptoms and were at greater risk of developing an eating disorder compared to 2.9% in non-lean sports.⁴ Thus, if equestrians consider themselves to be in a lean sport, they may also be at a higher risk for developing an eating disorder and developing menstrual irregularities.

Menstrual irregularities are a result of eating disorders and are often used as a criterion for detecting them.⁵ The commonly observed interval between menstrual cycles is 26-32 days, which represent a "normal" menstrual status.⁵ Therefore, cycles that are either shorter or longer than the "normal" range indicate eating disorders among female athletes.⁵ It has also been reported that athletes had more significantly long cycles (79%) than non-athletes (45%).⁶ This "normal" range is used in determining the presence or absence of both amenorrhea and oligomenorrhea.^{6,7}

It has been stated that amenorrhea occurs almost 20 times more frequently in female athletes when compared to the general population, and it can exist in up to 50% of female athletes.⁶ Amenorrhea can also occur in normal weight females that have a low percentage of body fat.⁸ Thus,

female equestrians are also at risk for developing menstrual irregularities.

When female equestrians go to the extremes to be lean in order to be competitive in their sport, they put themselves at risk. Whether they knowingly or unknowingly engage in disordered eating behavior, they must be made aware of it in order to encourage healthy training habits. Thus, it is most important for athletic trainers and those working with female equestrians to realize that these athletes may be risk for developing eating disorders and associated menstrual irregularities and help to guide them in a more appropriate path.

This study will attempt to answer the following questions: 1)What is the relationship between age and eating disorders in collegiate female equestrians? 2)What are the differences between eating disorders and riding events among female equestrians? 3)What is the relationship between body mass index and eating disorders among female equestrians?

METHODS

The purpose of this study is to discover whether or not there is a prevalence of eating disorders amongst female collegiate equestrians. This section will include the following subsections: research design, subjects, instruments, procedures, hypotheses, and data analysis.

Research Design

A descriptive design was used for this study. The independent variables were age, body mass index, and the type of riding event. The dependent variable was the scores on the eating disorders survey, the Eating Attitudes Test (EAT-26), and the results of the demographics survey.

The strengths of this study are that a national survey was distributed and the instrument used by the researcher has demonstrated reliability⁹. One limitation of the study is that the population is limited to only female collegiate equestrians.

Subjects

The number of subjects that were included in this study was determined by how many surveys were returned from

a population of 6500, as long as they met the set criteria. Subjects (N=127) were female collegiate equestrian athletes, who competed in six different divisions: 1) hunter/jumper, 2) equitation, 3) dressage, 4) reining, 5) western pleasure, and 6) barrel racing/speed events. The sampling of this study was done by using all surveys that were returned from the collegiate female athletes of the Intercollegiate Horse Show Association (IHSA). Informed consent was not necessary as it was an electronic survey and consent was implied by the completion and return of the survey.

Instrumentation

The instrument that was used for this study was the Eating Attitudes Test (EAT-26), as well as a demographics section that has additional specific questions. The specific questions in the demographics portion pertained to the participant's length of menarche, their usage of hormonal contraceptives to regulate menstruation, and the type of equestrian sport. The combination of the EAT-26, demographics section, and specific questions was titled the Eating Behaviors and Demographics Questionnaire (Appendix C1). Internal consistency reliability for the score of the Eating Attitudes Test have ranged between .70 and .88.⁹

Demographics include age, height, weight, and class rank. The athlete's length of menarche, their usage of hormonal contraceptives to regulate menstruation, and the type of equestrian sport they participated in was analyzed through specific questions. Length of menarche was assessed by asking the participants, "On average, how long is your normal menstrual cycle (from the start of one period to the beginning of the next period)?" Use of hormonal contraceptives and their use to regulate menstruation as well as what riding event they participate in were also asked.

The Eating Attitudes Test included 26 questions with an optional answer of either "always", "usually", "often", "sometimes", rarely", or "never". There are also four additional questions that asked about 1) binge eating, 2) self induced vomiting, 3) the use of weight controlling substances, and 4) past eating disorder treatment. For all questions (excluding #25) each of the responses were given the following value: 3 points for "always", 2 points for "usually", 1 point for "often", and 0 points for "sometimes", "rarely", and "never". For item #25 the responses were given the following values: 0 points for "always", "usually", and "often", 1 point for "sometimes",

2 points for "rarely", and "3 points for "never". After scoring the items the scores were added together. If the sum was greater than 20 then the participant was considered to have an eating disorder issue. Also if the participant answers "yes" to any of the four additional questions, they should also be considered to have an eating disorder issue.

Procedures

The California University Institutional Review Board for Protection of Human Subject Form (Appendix C2) was completed and approved. Upon receiving approval for the study from the Institutional Review Board, an email (Appendix C3) including a cover letter (Appendix C4) was sent out to the chairperson of the Intercollegiate Horse Show Association. The IHSA chairperson was then notified by the primary researcher of his/her willingness to participate in the study. Once clearance was allowed by the IHSA, a link to an electronic survey was sent out to all participants in the IHSA. The participants were also emailed a copy of the cover letter which described the study, indicated that they are not required to participate, confirm that their identities would remain unknown, and remind them that they have to be at least 18 years old to

participate. All surveys that were completed and returned to the researcher were then analyzed in the study.

Hypotheses

The level of significance used for testing the hypothesis was set at an alpha level of .05.

Hypothesis 1: There will be a relationship between age and eating disorders.

Hypothesis 2: There will be a difference between the different types of riding events for eating disorders.

Hypothesis 3: There will be a negative relationship between BMI and eating disorders.

Data Analysis

The level of significance used for testing the hypothesis was set at an alpha level of .05.

1: A Pearson Product Moment Correlation was used to determine if there would be a significant relationship between age and eating disorders.

2: An ANOVA was used to determine if there would be a significant difference between riding events for eating disorders.

3: A Pearson Product Moment Correlation was used to determine if there would be a significant negative relationship between BMI and eating disorders.

RESULTS

Demographic Data

The sample consisted of female equestrians from the Intercollegiate Horse Show Association (n=127). Table 1 depicts the characteristics of the participants from this study.

Table 1. Characteristics of Participants

Characteristic	Range	Mean \pm SD
Age	18-29	20.08 \pm 2.01
Height (inches)	60-72	65.30 \pm 2.59
Weight (pounds)	100-230	136.15 \pm 22.85
BMI	16.95-33.67	22.33 \pm 3.26
Menstrual Cycle Length (days)	18-70	29.34 \pm 5.85

Table 2 displays the class rank responses of the subjects.

Table 2. Participants' Class Rank

Class Rank	Frequency	Percent
Freshman	37	28.9%
Sophomore	37	28.9%
Junior	26	20.3%
Senior	22	17.2%
Graduate Student	5	3.9%

Table 3 displays the oral contraceptive use responses of the subjects.

Table 3. Participants' Oral Contraceptives Usage

Oral Contraceptive Use	Frequency	Percentage
Yes	65	50.8%
No	62	48.4%

Table 4 displays the oral contraception use for regulating menstruation.

Table 4. Participants' Responses for Menstrual Regulation

Menstrual Regulation	Frequency	Percentage
Yes	34	26.6%
No	32	25.0%

Table 5 displays the main equestrian event responses of the subjects.

Table 5. Participants' Main Event

Event	Frequency	Percent
Hunter/ Jumper	60	46.9%
Equitation	42	32.8%
Dressage	8	6.2%
Reining	3	2.4%
Western Pleasure	13	10.2%
Barrel Racing/ Speed Events	1	0.8%

Table 6 displays the eating binge responses of the subjects. The range was between 1 and 20 with a mean score of 6.52 ± 6.72 .

Table 6. Participants' Responses for Eating Binges

Eating Binges	Frequency	Percentage
Yes	30	23.4%
No	96	75%

Table 7 displays the vomiting (purging) responses of the subjects. The range was between 1 and 30 with a mean score of 5.56 ± 9.46 .

Table 7. Participants' Responses for Vomiting

Vomiting	Frequency	Percentage
Yes	9	7%
No	116	90.6%

Table 8 displays the use of weight control substances (laxatives, diet pills, or diuretics) responses of the subjects. The range was between 1 and 180 with a mean score of 10.45 ± 39.96 .

Table 8. Participants' Responses for Weight Control

Weight Control Substances	Frequency	Percentage
Yes	21	16.4%
No	105	82%

Table 9 displays the past treatment for eating disorders history responses of the subjects. The range was between 2000 and 2006 with a mean score of 2003 ± 2.45 .

Table 9. Participants' Eating Disorder Treatment

Eating Disorder Treatment	Frequency	Percentage
Yes	7	5.5%
No	118	92.2%

Table 10 displays the frequency of participants with an eating disorder issue based upon their responses.

Table 10. Eating Disorder Issues

Eating Disorder Issue	Frequency	Percentage
Yes	48	37.79%
No	79	62.2%

Hypotheses Testing

The level of significance used for testing the hypotheses was set at an alpha level of .05.

Hypothesis 1: There will be a relationship between age and eating disorders.

A Pearson correlation coefficient was calculated for the relationship between the participants' age and the

total scores on the EAT-26 survey. A weak correlation that was not significant was found ($r_{125} = .026$, $p > .05$), indicating that age is not related to the total scores on the EAT-26. The results of this analysis are presented below in Table 11.

Table 11. Pearson-Product Moment Correlation Between The Equestrians Age and Total Score

Variable	N	r	P
Age & Total Scores	125	.026	.779

Hypothesis 2: There will be a difference between the different types of riding events for eating disorders.

The mean scores on the EAT-26 for each equestrian who participated in one of four events were compared using a one-way ANOVA. No significant difference was found ($F_{3,118} = .211$, $p > .05$). The equestrians' scores on the survey did not differ significantly based on event. Equestrians who participated in hunter/jumper events had a mean score of 7.43 ± 8.46 . Equestrians who participated in equitation events had a mean score of 7.43 ± 7.12 . Equestrians who participated in dressage events had a score of 9.25 ± 8.45 . Equestrians who participated in western pleasure

events had a mean score of 8.83 ± 9.60 . The results of this analysis are presented below in Table 12.

Table 12. A One-Way ANOVA for Eating Disorders among Riding Events

Eating Disorders	Sum of Squares	Df	MS	F	P
Between Groups	41.98	3	13.99	.211	.888
Within Groups	7818.19	118	66.26		
Total	7860.16	121			

Hypothesis 3: There will be a negative relationship between BMI and eating disorders.

A Pearson correlation coefficient was calculated to evaluate the existence of a negative relationship between the participants' BMI and the total scores on the EAT-26 survey. A weak positive correlation that was significant was found ($r_{115} = .114$, $p > .05$), indicating that BMI is not negatively related to the total scores on the EAT-26. The results of this analysis are presented below in Table 13.

Table 13. Pearson-Product Moment Correlation between The Equestrians BMI Scores and Total Score

Variable	n	r	P
BMI Scores & Total Score	115	.114	.225

Additional Findings

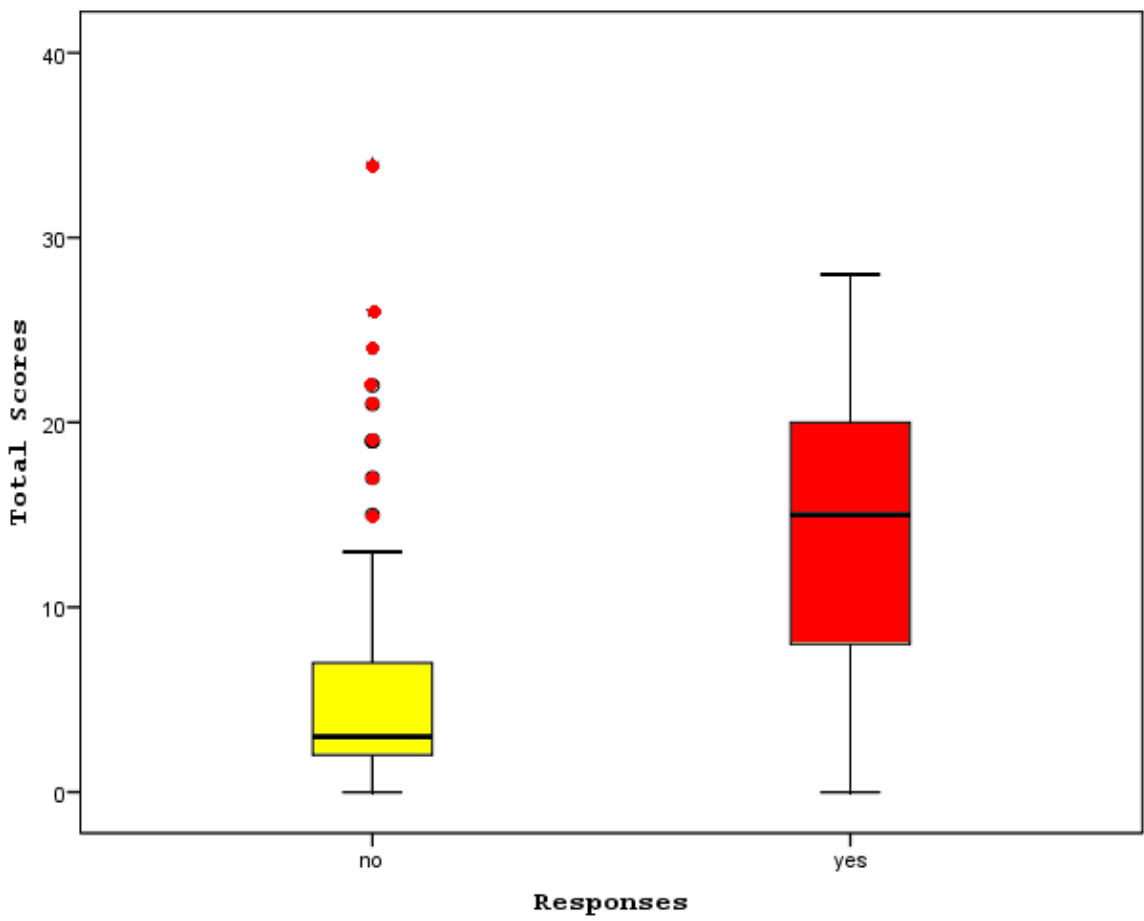
Several tests were conducted using the total eating disorder scores and the responses to the last four questions on the EAT-26 survey in an attempt to discover additional findings.

An independent samples t-test was conducted to compare the mean scores of the groups that answered "yes" and "no" to the question, "Have you gone on eating binges where you feel that you may not be able to stop?" for their disordered eating total scores. A significant difference was found between the two groups ($t_{114} = -5.29, p < .05$). The mean of the group that answered "no" was significantly lower (5.68 ± 6.68) than the mean of the group that answered "yes" (14.08 ± 8.22). The results of the analysis are presented below in Table 14 and Figure 1.

Table 14. T Test Comparison between Binge Eating Responses for the EAT-26 Score

Binge Eating	n	M	SD	t	P
No	91	5.68	6.68		
Yes	25	14.08	8.22	-5.29	.023

Figure 1. Binge Eating Responses for EAT-26

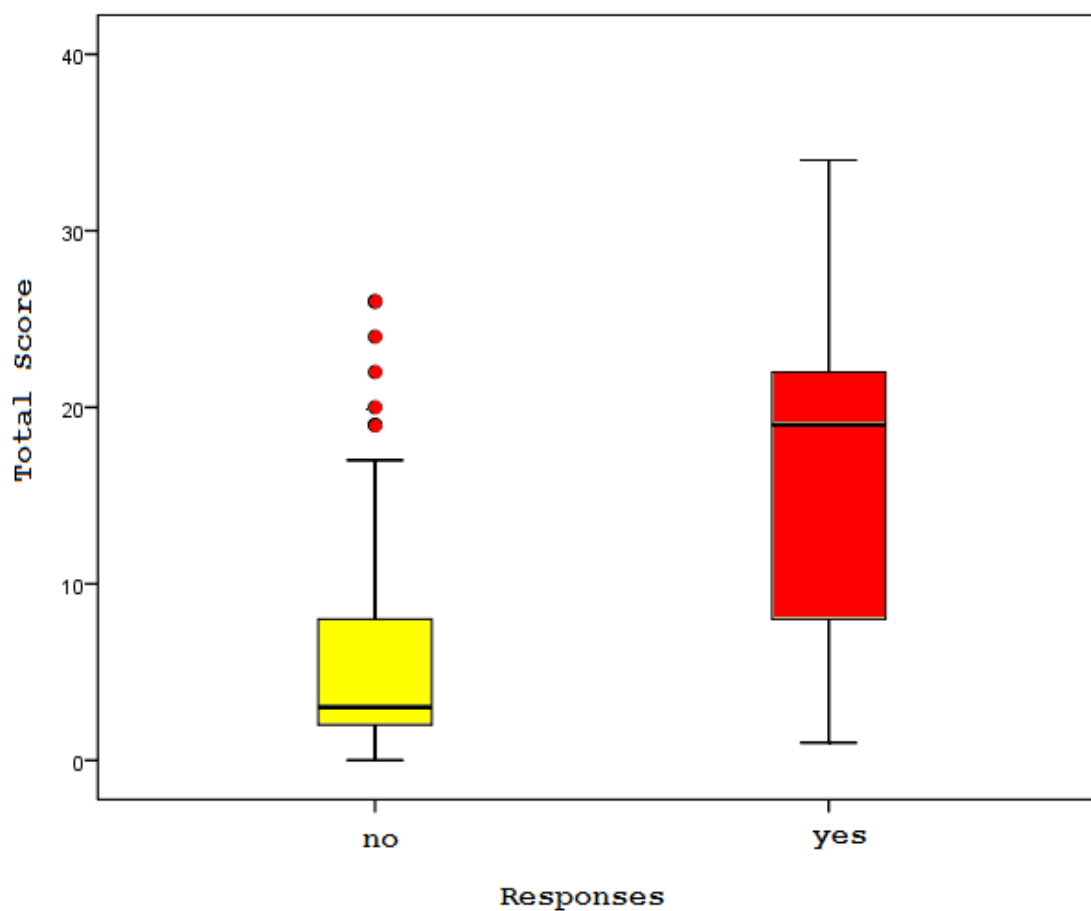


Another independent samples t-test was conducted to compare the mean scores of the groups that answered "yes" and "no" to the question, "Have you ever used laxatives,

diet pills, or diuretics (water pills) to control your weight or shape?" for their disordered eating total scores. A significant difference was found between the two groups ($t_{113} = -5.82, p < .01$). The mean of the group that answered "no" was significantly lower (5.74 ± 6.22) than the mean of the group that answered "yes" (15.74 ± 9.49). The results of this analysis are presented below in Table 15 and Figure 2.

Table 15. T Test Comparison between Weight Control Substance Use (WCSU) Responses for the EAT-26

WCSU	n	M	SD	t	P
No	96	5.74	6.22		
Yes	19	15.74	9.49	-5.82	.001

Figure 2. Substance Use Responses for EAT-26

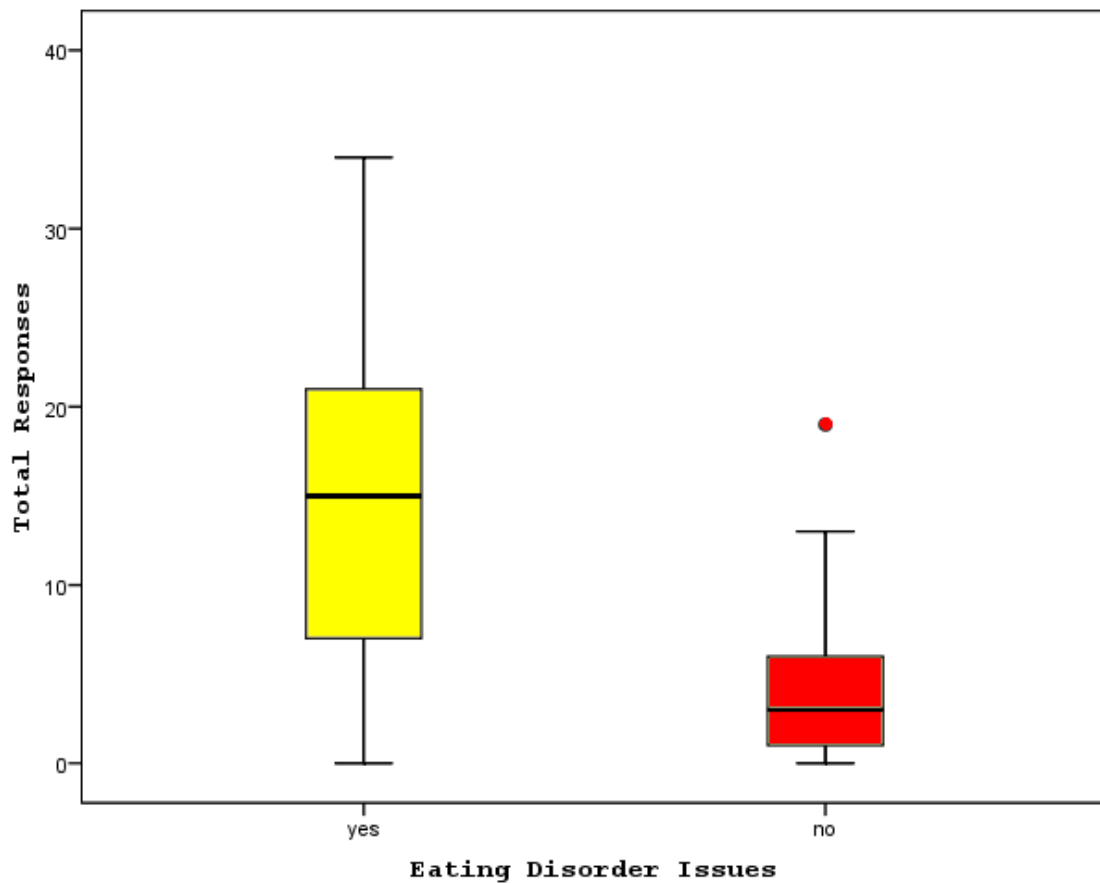
A final independent samples t-test was conducted to compare the mean scores of the equestrians who had an eating disorder issue to those who did not, based on their scores on the EAT-26 survey. A significant difference was found between the two groups ($t_{115} = 8.81, p < .001$). The mean of the group that had an eating disorder issue was significantly higher (14.05 ± 8.85) than the group that did

not have an issue (3.80 ± 3.64). The results of this analysis are presented below in Table 16 and Figure 3.

Table 16. T Test Comparison of Responses for the Eating Disorder Issues for EAT-26

EDI	n	M	SD	t	P
Yes	42	14.05	8.85	8.81	.000
No	75	3.80	3.64		

Figure 3. Eating Disorder Issues for EAT-26



DISCUSSION

Discussion of Results

The focus of this study was to discover the prevalence of eating disorders among female collegiate equestrian athletes. The researcher evaluated whether or not age, type of riding event, and BMI had an effect on the prevalence of eating disorders.

Hypothesis 1 stated that age would be significantly related to the prevalence of eating disorders. The researcher proposed that age would have an effect on the number of equestrians with eating disorders. There was no significant data showing that age was a predictor of eating disorders.

Even though there is no significance in the data, age can still be a predictor of important signs of eating disorders. In previous research it was determined that subjects felt that their weight became a problem around the mean age of 22.2 years.¹⁰ Since having weight issues can be a predictor of eating disorders and 22.2 years old is well within the range found for the ages of collegiate equestrians in this study; age should still be considered when evaluating female equestrians for eating disorders.

Hypothesis 2 stated that there would be a difference between the riding events and eating disorders. The researcher proposed that events that put additional pressure on the equestrian to be lean (equitation, dressage, and western pleasure) would have a higher prevalence of eating disorders opposed to other events (hunter/jumper, reining, and barrel racing/speed events). Due to the lack of data, reining and barrel racing/speed events were not included in the analysis.

There was no significant data showing that any one event would lead to a higher prevalence of eating disorders than another. Findings showed that there was only a 1.82 difference in mean scores for the EAT-26 between events. Although there is no significance in the data, this researcher still believes that this is an area that should continue to be evaluated due to the small number of responses for the survey.

Although there was no significance found; athletic trainers, coaches, parents, and team mates should be aware that there may still be pressure to be thin put on equestrians based on the events that they participate in. Those working with equestrians should be educated on eating disorders and their prevalence in other female sports.

Attempts should be made to recognize and seek treatment for those equestrians who may have eating disorders or related issues.

Hypothesis 3 stated that there would be a negative relationship between BMI and eating disorders. The researcher proposed that as BMI scores got lower the scores on the EAT-26 would increase and that BMI was a predictor of eating disorders in among female equestrians. The results showed that BMI and eating disorders were not significantly related.

Although this data does not support the hypothesis that BMI and eating disorders are related, there has been previous research that does support this hypothesis. A study done by Reinking and Alexander⁴ showed that 25% of lean sport athletes had more disordered eating symptoms and were at greater risk of developing an eating disorder compared to 2.9% in non-lean sports. Also, lean sport athletes are more likely to have lower BMI values. Thus, if an athlete were to have a low BMI value, they would be at a higher risk of developing an eating disorder.

Despite the fact that equestrian sports have yet to be defined as lean or non-lean, equestrians could still be at

risk for developing an eating disorder based on Reinking and Alexander's research. If equestrians consider themselves to be in a lean sport and have lower BMI values because of this, they are placing themselves at risk.

More research needs to be conducted to discover whether or not equestrian sports are considered to be lean or non-lean. Until then, athletic trainers, coaches, parents, and teammates need to be aware that participants with low BMI values are at risk for developing an eating disorder. These participants should be further evaluated and referred to a physician for treatment.

In addition to hypothesis testing, analysis was also done on the total eating disorder scores and the responses to the last four questions on the EAT-26 survey. First, a comparison of the mean scores was conducted for the two groups who answered "no" and "yes", to the question "Have you gone on eating binges where you feel that you may not be able to stop?", for their total disordered eating scores. A significant difference was found between the two groups and mean of the group that answered "yes" was significantly higher than that of the group that answered "no".

These results mean that female collegiate equestrians who use binge eating for weight control are at risk for eating disorders. Professionals who work with collegiate equestrians should be aware that binge eating is prevalent among them. They should thus be vigilant in recognizing the signs and symptoms of binge eating before it leads to more serious health issues related to binge eating and eating disorders.

A second comparison that was conducted was between the mean scores of the groups that answered "yes" and "no" to the question, "Have you ever used laxatives, diet pills, or diuretics (water pills) to control your weight or shape?" for their disordered eating total scores. A significant difference was found between the two groups and the mean of the group that answered "yes" was significantly higher than the mean of the group that answered "no".

These results mean that female collegiate equestrians are, in some cases, not only using binge eating for weight control but also substances in attempt to ease their eating disorder issues. Both binge eating and the use of substances for weight control are used as diagnostic criteria for bulimia nervosa.¹¹ In a study by Johnson et al¹², 1.1% of the female athletes met the diagnostic

criteria for bulimia nervosa, 9.2% were diagnosed with sub clinical bulimia, and 38% could be considered at risk for developing bulimia. This study is comparable to Johnson's research as 23.4% of participants said that they had used binge eating and 16.4% had said that they used substances as a form of weight control.

Professionals who work with collegiate equestrians, then must also, be aware that the use of substances is prevalent among them. Like binge eating, the use of substances could lead to more serious health issues and eating disorders. The results from this study for binge eating and substance use compare to a study done by Rosen et al¹, who found that 32% of a female collegiate athlete sample practiced pathogenic weight-control behaviors.

In some cases, respondents who answered "yes" to these questions also had a score of more than 20 on the EAT-26 survey. Thus, these participants are not only dealing with an eating disorder issue, but are also currently performing eating disorder practices (like binge eating and substance abuse). The results from this analysis tell those who work with female collegiate equestrians that those who are practicing weight control behaviors are also most likely dealing with an eating disorder. Professionals must be

educated and work hard to recognize sign and symptoms of binge eating, substance abuse, and other eating disorder symptoms in order to prevent additional harm and get treatment from those who are already suffering.

The final additional analysis that was conducted compared the mean scores of the equestrians who had an eating disorder issue to those who did not, based on their scores on the EAT-26 survey. A significant difference was found between the two groups; the mean of the group that had an eating disorder issue was significantly higher than the group that did not have an issue.

This analysis showed that 37.79% of the female collegiate equestrians who participated in this survey are currently dealing with eating disorder issues. Of these equestrians who are dealing with eating disorder issues, nine answered "yes" to one or more of the four questions at the end of the EAT-26. Consequently, putting them at an even greater risk of developing or even currently having an eating disorder.

This information correlates to multiple studies that found that 39.2% of female athletes met diagnostic criteria for bulimia nervosa (BN), 4.2% of female athletes met

diagnostic criteria for anorexia nervosa (AN), and 22.1% of ballet dancers and 18% of gymnasts had been diagnosed with eating disorders not otherwise specified (EDNOS).^{13,14}

Although this study did not determine the presence of eating disorders or distinguish between them, it is still necessary to note and compare the percentage of eating disorder issues to the percentage of other female athletes who have been diagnosed with eating disorders.

A descriptive analysis was also done which found the average menstrual cycle length among female collegiate equestrians. The mean and standard deviation was found to be 29.34 ± 5.85 , which is a "normal" menstrual cycle length (26-32 days).⁵ This information does not correspond with the Williams et al⁵ study which reported that athletes had more significantly long cycles (79%) than non-athletes (45%). Although, it should be noted that of the 65 equestrians (50.8%) who are using oral contraceptives, 34 (26.0%) of them are using it for menstrual cycle regulation. So it is possible that the mean menstrual cycle length could be affected by the use of hormonal oral contraceptives for menstrual regulation. Further research needs to be conducted in order to distinguish how much the menstrual

cycle length in collegiate female equestrians is affected by oral contraceptive use.

Conclusions

Based on the results from Table 10 and Figure 3, of the 127 female collegiate equestrians that were surveyed 48 (37.79%) are dealing with an eating disorder issue. Despite the small sample size, this information shows that eating disorder issues and behaviors are present among female collegiate equestrians. These results reiterate previous research that shows the predominance of eating disorder issues among female collegiate athletes. The results also show that despite the lack-of-popularity of equestrian sports as a varsity collegiate sport, equestrians still suffer from the same eating disorder issues as other varsity level collegiate athletes.

It should also be noted that since there was no difference found between events for the scores on the EAT-26, the event that the rider participates in is not a valid predictor of whether or not the participant is at risk of having an eating disorder. Thus, athletic trainers, coaches, parents, and teammates must not be biased towards certain events and must treat all equestrians, no matter

what event they are in, as if they could develop an eating disorder.

The demands being put on female equestrians to be lean combined with a negative body image mentality is driving female collegiate equestrians towards poor eating habits and behaviors associated with eating disorders. These equestrians continue to get away with practicing unhealthy weight control behaviors without being treated or even recognizing that they have a problem.

Recommendations

The results of this study are most definitely significant to equestrian sports and those who participate in the sport. This should lead those who work with equestrians to be more aware of the prevalence of eating disorders among female collegiate equestrians. Coaches and parents should be educated on the signs, symptoms, and health issues associated with eating disorders. Teammates should also be educated as they often spend more time together and may notice any eating disorder behaviors sooner than coaches or parents.

This information is invaluable to athletic trainers and team physicians who work with female collegiate

equestrians as they are the ones who are most likely to recognize eating disorder symptoms in their athletes. Professionals must then be made aware of the prevalence of eating disorder issues among this population and include eating disorder screenings in their pre-participation exams. If equestrians are attending a college that does not provide athletic trainers for their sport, coaches should encourage their athletes to get physically cleared to participate in events by a physician prior to the beginning of the season. Perhaps then equestrians who are suffering from an eating disorder could be recognized and treated leading to a safer competitive setting.

REFERENCES

1. Rosen LW, McKeag DB, Hough DO, Curley V. Pathogenic weight control behaviors in female athletes. *Physician Sportsmed*. 1986;14:79-86.
2. Torstveit M, Rosenvinge J, Sundgot-Borgen J. Prevalence of eating disorders and the predictive power of risk models in female elite athletes: a controlled study. *Scandinavian J Med Sci Sports*. 2008;18:108-118.
3. Trattner R, Thompson R. NCAA Coaches Survey: The role of the coach in identifying and managing athletes with disordered eating. *Eating Disorders*. 2005;13:447-466.
4. Reinking M, Alexander L. Prevalence of disordered-eating behaviors in undergraduate female collegiate athletes and nonathletes. *J Athletic Training*. 2005; 40(1):47-51.
5. Williams N, Leidy H, Flecker K, Galucci A. Food attitudes in female athletes: Association with menstrual cycle length. *J Sports Science*. 2006;24(9):979-986.
6. Volk E. Female athletes and menstrual irregularities. *Anabolic Pharmacology*. 2002. Available at: <http://www.anabolicpharamcology.com>. Accessed September 15, 2008.
7. Lippincott Williams & Wilkins. 2006. Oligomenorrhea. Available at: http://www.wrongdiagnosis.com/symptoms/menstrual_irregularities/book-causes-8e.htm. Accessed October 6, 2008.
8. Pinheiro A, Thornton L, Plotnicov K, et al. Patterns of menstrual disturbance in eating disorders. *Int J Eat Disord*. 2007;40:424-434.
9. Burnett K, Doninger G, Enders C. Validity evidence for eating attitudes test scores in a sample of female college athletes. *Measurement Physical Education Exercise Science*. 2005;9:35-49.
10. McAllister R, Caltabiano M. Self-esteem, body image and weight in noneating-disordered women. *Psychological Reports*. 1994;75:1339-1343.

11. Nordqvist C. What is an eating disorder? Types of eating disorders. 2008. Available at:
<http://www.medicalnewstoday.com/articles/105102.php>.
Accessed October 6, 2008.
12. Johnson C, Powers PS, Dick RW. Athletes and eating disorders: the natural collegiate athletic association study. *Int J Eat Disord*. 1999;26:179-188.
13. Burckes-Miller M, Black D. Male and female college athletes: Prevalence of anorexia nervosa and bulimia nervosa. *Athletic Training*. 1988;23:137-140.
14. Ravalidi C. Body image and eating disorders among non-elite athletes. *Eating Disorders Review*. 2003;14:8.

APPENDICES

APPENDIX A

REVIEW OF THE LITERATURE

Review of the Literature

The prevalence of eating disorders and menstrual irregularities is a topic that has been studied extensively over the past years, but there is a lack of literature to be found about the prevalence of these conditions among equestrian sports participants. Despite the lack of literature to be found on eating disorders and menstrual irregularities in equestrian sports, pressure is put on these athletes to have a lean and athletic build (in terms of both form and function) in order to place and win competitions. This pressure may put equestrians at risk for eating disorders. As important as it is to be lean in equestrian sports it is more necessary that these athletes be strong enough to work around and control horses at all levels and disciplines of competition...a task that is not easily done if the athlete is underweight or underdeveloped due to eating disorders.

Recognition of potential eating disorders may help shed light on this in equestrian sports that often goes unnoticed or ignored. The topics that will be discussed in this literature review include: equestrian sports, eating disorders, and menstrual irregularities. A brief summary will also be included at the end of the literature review.

Equestrian Sports

Equestrian sports range from many levels from amateur to Olympian and include many different events from fox hunting to barrel racing. Although equestrian sports may not be a varsity level sport in many colleges, it is still a fairly common club sport and has its own collegiate governing body.

Intercollegiate Horse Show Association

Established in April of 1967, the Intercollegiate Horse Show Association (IHSA) is the governing body that collegiate riding teams compete under in the United States. The goal of the IHSA is to promote competition between equestrians at all levels regardless of financial status.¹ There are 300 member colleges in the IHSA with more than 6500 riders who compete at the regional and national levels as either an individual or team. The three major competitive events are hunter seat equitation, western horsemanship, and reining. One of the goals of the IHSA is to eliminate the costs of owning a horse so teams travel to surrounding schools and are randomly assigned a horse to ride. The riders are not allowed to use their own tack (saddle and bridle) and are not allowed warm-up time on their horse, so they are truly judged on their horsemanship

skills and riding ability since they generally have never ridden the horse that they are competing on before.¹

Riding for Form and Function

In competitive equestrian sports where the rider is judged on their equitation (riding form) there is often pressure put upon them by coaches, peers, and themselves to be lean. It is an unspoken but common idea that riders who are thin are often more likely to place than riders who are overweight or heavy set since a thin or lean build looks more ascetically pleasing while riding. Being lean also enables the rider to be more flexible and capable of moving with the horse in order to do certain tasks. But it is also important for riders to be strong enough to control a horse, weighting anywhere from 500-2000 lbs, while looking controlled and organized, and keeping their own body in proper riding position. The proper riding position enables the rider to be perfectly balanced on top of the horse and to move in sync with the animal without putting the horse off balance. In order to do this the rider must sit in the middle of the saddle, with the balls of their feet resting on the stirrups, their toes pointing forward, and their heels down. If the rider were to be seen from the side it would look like a line could be drawn from the rider's

heels, to their hips, to their shoulders, and through the center of their head. It is also important that the rider keep their head up and looking forward towards where they are traveling, and that they keep their back straight.²

Figure 4 provides an example of the proper riding position.³

Figure 4: Proper Riding Position



Disordered Eating

Types of Disordered Eating

There are many different types of disordered eating that can affect both the general public and athletes. For the purpose of this study anorexia nervosa, bulimia nervosa, and eating disorders not otherwise specified (EDNOS) will be described.

Anorexia nervosa (AN) can be defined as a psychological disorder where the patient has a distorted body image with an irrational fear of being overweight.⁴ Seventy six percent of reported cases of AN list onset to be between the ages of 11 and 20; the later ages being that of many college aged undergraduate athletes.⁴ In a study done by Johnson et al⁵ on collegiate athletes, 9.2% of surveyed athletes had behaviors that were consistent with anorexia and 35% were at risk for developing anorexia. Furthermore, Burckes-Miller and Black⁶ reported that 4.2% of female athletes in their sample met diagnostic criteria for AN. Thus it is important to recognize that athletes are at risk for developing AN, and coaches, teammates, and the medical staff should be able to recognize signs and symptoms of it.

A person with AN generally weighs much less than they should (at least 15% or more below their ideal body weight based on age and height), has a BMI of 17.5% or less, has missed three consecutive menstrual periods, has a preoccupation with body shape and weight, and has a severe fear of putting on weight, according to DSM-IV-TR® Diagnostic and Statistical Manual of Mental Disorders.⁴ The physiological signs and symptoms of AN include but are not limited to: thin appearance, fatigue, abnormal blood counts, dizziness, brittle nails, thin hair, menstrual irregularities, constipation, dry skin, irregular heart rhythms, low blood pressure, dehydration, and low bone mineral density.⁷ Several emotional symptoms can also be present in patients with AN, like refusing to eat, denial of hunger, excessive exercise, difficulty concentrating, and a preoccupation with food.⁷ Recognition of these symptoms is most important, in order to diagnose and treat AN before it can lead to further health problems.

Bulimia Nervosa (BN) is another type of eating disorder that can affect collegiate athletes. It is defined as a psychological disorder where the patient goes through regular bouts of over-eating which leads to guilt that causes them to purge (self-induced vomiting),

excessively exercise, or crash diet.⁴ In a study performed by Johnson et al⁵ that was mentioned before, 1.1% of the female athletes met the diagnostic criteria for bulimia nervosa, 9.2% were diagnosed with sub clinical bulimia, and 38% could be considered at risk for developing bulimia. Also, Burckes-Miller and Black⁶ reported that 39.2% of female athletes in their sample met diagnostic criteria for BN. Based off of these two studies, BN has a higher rate of occurrence in female athletes than AN. Female athletes that compete in lean sports also have a higher percentage of meeting diagnostic criterion for developing BN than non-lean sports.⁸ Thus making it all the more important that those surrounding female athletes at risk for developing BN be able to recognize the signs and symptoms.

According to DSM-IV-TR® Diagnostic and Statistical Manual of Mental Disorders a patient must meet the following four criteria to be diagnosed with BN. The patient must: repeatedly binge-eat while feeling that they can't stop or control their eating, repeatedly and inappropriately try to compensate for their over-eating (for example through use of laxative, excessive exercising, fasting, and purging), been binge-eating and

compensating at least twice a week for a consecutive 3 months, and over judge their weight and body shape.⁴ Physiological signs and symptoms of BN include: abnormal bowel functioning, damaged teeth and gums (due to excessive purging), swollen salivary glands in the cheeks (due to excessive purging), sores in the throat and mouth, bloating, dehydration, fatigue, dry skin, irregular heartbeat, sores, scars or calluses on the knuckles or hands, and either menstrual irregularities or loss of menstruation (amenorrhea).⁷ Behavioral and emotional symptoms of BN include: constant dieting, a feeling that they can't control their eating behavior, eating until the point of discomfort or pain, self-induced vomiting, laxative use, excessive exercise, unhealthy focus on body shape and weight, having a distorted, excessively negative body image, going to the bathroom after eating or during meals, hoarding food, and depression or anxiety.⁷

In a study done by Katzman and Wolchik⁹ a sample of female undergraduates were evaluated for bulimia, binge eating, or normal eating habits. It was found that bulimics had higher levels of the pathology based upon behavioral and personality variables (depression, self-esteem, and body attitudes) as well as a higher

preoccupation with dieting.⁹ Therefore, as well as bulimia being more prevalent among female athletes, bulimics also tend to have more emotional and behavioral symptoms.

The final type of eating disorder (or disorders) that will be discussed is Eating Disorders Not Otherwise Specified (EDNOS). In a study done by Ravalidi¹⁰ that evaluated eating disorders among ballet dancers, gymnasts, and female controls, it was found that 22.1% of ballet dancers had EDNOS; which was significantly higher than AN at 1.8% and BN at 2.7%. Also, 18% of gymnasts in this study were diagnosed with EDNOS, while only 2.6% had AN.¹⁰ Based off of this information, it can be suggested that EDNOS is more prevalent among collegiate female lean-sport athletes. Thus making it all the more important that coaches, peers, and sports medicine staff are able to recognize it.

Patients who suffer from EDNOS are classified into this type of disorder because although they may have symptoms of AN or BN, they do not meet the criteria for them.¹¹ Female patients with an EDNOS must meet the following criteria: all the criteria for AN must be met except they have a regular menses, and despite a significant weight loss, the patient still maintains a

normal range BMI.¹² Also, all criteria is met for BN except that the inappropriate compensating behavior (laxative use, excessive exercising, fasting, and purging) occurs less than twice a week for less than three months, the regular use of inappropriate compensating behaviors even with small amounts of food, and the repeated chewing and spitting out (not swallowing) of food.¹² Additionally, patients with EDNOS often switch between different types of eating disorders, making it difficult to diagnose them.¹²

Female athletes with EDNOS can use techniques like excessive dieting, crash diets, fasting, excessive exercising, purging, or taking diuretics and laxatives. It was found in a study done by McAllister and Caltabiano, that 65.15% of women in their study used dieting as a form of weight loss.¹³ Also, Petrie¹⁴ concluded in his study that 18% of gymnasts reported using excessive exercise as their sole mean of weight-loss, and of 33 gymnasts who were classified as dieter/restrictors 18.2% reported only using dieting (without exercise) as their form of weight loss. Petrie's finding were consistent with Burckes-Miller and Black⁶ who found that over half of the female college athletes in their sample used exercising

excessively as a form of weight control. Furthermore 15% of female athletes engaged in day-long fasts or fad diets.⁶ Based off of this information it can be concluded that exercise may be more frequently use by female collegiate athletes, as opposed to dieting and fasting, as a weight-loss method.

Although there are many types of eating disorders with differing signs and symptoms for each, the causes of eating disorders can overlap between different types.

Causes of Disordered Eating

Disordered eating (DE) is a term to describe a spectrum of attitudes and behaviors like a preoccupation with body weight and shape, food restriction, and dieting as well as bingeing, vomiting, and the abuse of diuretics, laxatives and diet pills.⁸ Disordered eating in women can be caused by a combination of psychological, social, and physiological factors.¹⁵ Dissatisfaction with body shape in the stomach, hips, and thighs has been reported by 80% of women from ages 19-29 in a study done by McAllister et al.¹³ In athletes the pressures to be thin can also be influenced by pressures to lose weight to satisfy personal or coaches goals, peer pressure from teammates, the focus to have a

thin physique, personality characteristics like poor self-esteem, family dysfunction, sexual abuse, dieting, the types of sport they participate in, and the belief in the inverse relationship between body size and performance.^{8,15}

In collegiate athletes, the mean age when subjects felt that their weight became a problem was 22.2 years old, as seen in a study performed by McAllister et al.¹³ In fact, according to Rosen et al,¹⁶ 32% of a female collegiate athlete sample practiced pathogenic weight-control behaviors. Even more surprisingly, 70% of these athletes felt that these practices were harmless.

The type of sport can also have an influence on whether or not the athlete is at risk for developing an eating disorder. In previous studies differences have been found between lean and non-lean sports in regards to DE. Lean sports consist of gymnastics, swimming/diving, track, cross-country, dance, and cheerleading, while non-lean sports consist of softball, volleyball, basketball, rugby, soccer, and field hockey. No evidence was found in the literature that lists equestrian sports as lean or non-lean sports.

When comparing the risk of developing an eating disorder in lean to non-lean sports, Reinking and

Alexander¹⁵ found that 25% of lean sport athletes had more disordered eating symptoms and were at greater risk of developing an eating disorder compared to 2.9% in non-lean sports. This could be due to the fact that female athletes in non-lean sports feel that the positive effects of participating in sports outweigh the pressure of competitive collegiate athletics in regards to eating behaviors.¹⁵

Some athletes avoid reporting DE because they feel that if they do, it could lead to problems that might cause them to be ejected from the team or kept from playing.⁸ This is a thought that can be validated by Trattner and Thompson¹⁷ that identified the coaches rating of seriousness of eating disorders/ eating behaviors (see Table 17). If athletes are aware of how their coaches feel about eating disorders, they may be less likely to report such incidences. On the other hand, athletes in non-lean sports are more prone to self-report their experiences with eating disorders because they do not feel that it is a "natural" part of their sport.⁸

TABLE 17: Coaches' Ratings of the Seriousness of Eating/Dieting Behaviors for the Athlete's Health and Performance

Behaviors	Health	SD	Performance	SD	Greater Impact
Self-induced vomiting	3.90*	.41	3.85*	.46	H*
Laxative abuse	3.83*	.50	3.79*	.53	H*
Diuretic abuse	3.77	.55	3.75	.57	H
Fasting	3.39*	.85	3.68*	.66	P*
Binge eating	3.24	.78	3.21	.80	H
Skipping 2 meals/day	2.15*	.74	3.42*	.70	P*
Under eating	3.15*	.79	3.35*	.73	P*
Weighing multiple times	3.08*	.86	2.61	1.06	H*
Excessive exercise	3.05*	.82	3.10*	.85	P*
Eating fast food frequently	2.58*	.79	2.82*	.86	P*
Skipping 1 meal/day	2.05*	.78	2.42*	.87	P*
Eating fast food occasionally	1.55*	.71	1.87*	.87	P*

Note: Mean scores reflect ratings on a 4-point scale (1 = "not at all serious" to 4 = "very serious"). The symbol H indicates that the behavior was rated as more serious for the athlete's health. The symbol P indicates the behavior was rated as more serious for the athlete's performance. All behaviors noted with an * had paired samples *t* scores significant at <.0001.

In conclusion, there are many different causes of eating disorders among collegiate female athletes. It is important that sports medicine personnel, coaches, and peers are aware of these causes so that persons at risk can be easily identified and treated before their disorders lead to further health problems.

Menstrual Irregularities

Often menstrual irregularities are a result of eating disorders and are used as a criterion for detecting them.¹⁸ The median age at menarche is 12.9 years of age.¹⁹ The commonly observed interval between menstrual cycles is 26-32 days, which was chosen by Williams et al¹⁸ to represent a "normal" menstrual status. As a result of their study of collegiate female athletes, Williams et al¹⁸ reported that cycles that are either shorter or longer than the "normal" range indicated eating disorders among female athletes. Williams et al¹⁸ also reported that athletes had more significantly long cycles (79%) than non-athletes (45%).

Types of Menstrual Irregularities

There are many types of menstrual irregularities that can affect both the general public and athletes alike. Menstrual disorders can include: amenorrhea, oligomenorrhea, luteal phase defects, dysmenorrhea, anovulation, abnormal or excessive uterine bleeding, and premenstrual syndrome.^{20, 21} For the purpose of this study amenorrhea (the primary menstrual irregularity) and oligomenorrhea will be described.

Amenorrhea can be defined as a lack of menstruation, although there is an inconsistency among the literature in defining the term.²² Volk explained the criteria for amenorrhea to be as follows: one menstrual period during the last ten months, less than three menstrual cycles per year, and the absence of periods from 3-12 months.²² In her review of literature, Volk also stated that amenorrhea occurs almost 20 times more frequently in female athletes when compared to the general population, and it can exist in up to 50% of female athletes.²² Besides the absence of menstruation, amenorrhea can also have symptoms like milky nipple discharge, headaches, vision changes, and excessive hair growth on the face and torso (hirsutism).²³ Pinheiro et al²⁴ explained in a review of the literature that women with amenorrhea also had a significantly lower BMI than those without amenorrhea.

Amenorrhea can also present itself in different forms, primary and secondary amenorrhea. Primary amenorrhea is the absence of a menstrual period by age 16 with the presence of secondary sexual characteristics or by the age of 14 when there are also a lack or secondary sexual characteristics.²¹ Secondary amenorrhea is the absence of menstruation for three to six months after previously going

through menstruation.²³ Since menarche occurs when body fat makes up 17% of body weight, secondary amenorrhea then occurs when body fat falls below 22% of body weight.²⁵

Pinheiro et al²⁴ stated that within patients with BN, 7-40% of patients presented with amenorrhea, 35.6% presented with secondary amenorrhea, and BN patients with a history of AN reported the highest frequency of secondary amenorrhea (77.1%). A study by Griffith et al²⁶ also found that 60.6% of gymnasts and 59.8% of cross-country runners presented with amenorrhea. Among the participants of this study, 70% of amenorrheic athletes also had eating disorders. Lastly, amenorrhea can also occur in normal weight females that have a low percentage of body fat both prior to significant weight loss and can continue in AN patients after weight restoration.²⁴

The second type of menstrual disorder to be discussed is oligomenorrhea. Oligomenorrhea can be defined as abnormal infrequent menstruation characterized by only 3 to 6 menstrual cycles per year.²⁷ When menstruation does occur it is generally profuse, prolonged (up to 10 days), and loaded with clots and tissue; occasional spotting is also associated with oligomenorrhea.²⁷ Oligomenorrhea is also

more frequent in BN patients, occurring in 37-64% of patients.²⁴

Causes of Menstrual Irregularities

The causes of menstrual irregularities can vary from patient to patient depending on the type of menstrual irregularity, the patient's age, weight, sport, emotional stress, psychological factors, or a combination of factors. For example, Harlow and Matanoski²⁸ reported that there was an association between life stressors and changes in weight and long menstrual cycles in college-aged women.

Although several causes for menstrual irregularities exist most authors agree that hypothalamic dysfunction is the major cause. Since the hypothalamus releases gonadotrophin releasing hormone (GnRH) which regulates the release of gonadotrophins, like luteinizing hormone (LH) and follicle stimulating hormone (FSH), if it is not functioning properly these hormones would not be released. If LH and FSH aren't released into the body, important sex hormones like estrogen and progesterone fail to be released. Without these hormones normal menstruation will not occur.^{22,25}

Dietary choices can also lead to amenorrhea. When dietary sources (calories from fats and carbohydrates) are limited or restricted metabolic fuels are shunted and metabolic pathways are blocked. Without the proper metabolic balance the hypothalamus will malfunction and GnRH will not be properly released.²² Correlations have been found in athletes with diets low in fat and carbohydrates and menstrual irregularities.²²

Poor diet choices as well as sport type can also lead to a low percentage of body fat, which in turn can also lead to amenorrhea for the same reason.^{22,23} As mentioned before menarche occurs when body fat makes up 17% of body weight, so when body fat falls below 22% of body weight amenorrhea may occur.²⁵ Female athletes who practice restrictive eating habits because it is believed that lower body weight will result in greater performance levels are put themselves at high risk for menstrual irregularities.²⁹ For example in a study done by Stokic et al¹⁹ that evaluated ballet dancers, it was reported that the ballet dancers had lower body weights and BMIs than the control group. Because of this, the ballet dancers also had a higher prevalence of amenorrhea (20%) and oligomenorrhea (10%) than the control group.¹⁹

It should also be noted that training volume and intensity can have an effect on the prevalence of menstrual irregularities. The term exercise-related menstrual irregularities (ERMI) has been given to menstrual irregularities that are caused by prolonged and extreme endurance exercises.²² These extended exercise sessions can lead to significant changes in gonadotrophin plasma levels, lower ovarian blood circulation, and an increase in metabolism causing changes in metabolic clearances of endogenous hormones.²² Athletes may also create a negative energy balance by burning more calories than they consume, causing dysfunctioning of the hypothalamus.²⁵

Lastly, causes of menstrual irregularities can also differ depending on the type of eating disorder the patient has. For example Pinheiro et al²⁴ explain that amenorrhea occurs in AN patients as a result of malnutrition-induced impairments in gonadotropin (principally luteinizing hormone (LH) secretory pattern). In BN patients as a result of low LH concentrations and reduced LH pulse frequency and low levels of estradiol and noradrenalin.²⁴

Summary

By participating in equestrian sports female athletes put themselves at risk for sustaining athletic injuries and illnesses. It is possible that they are also then at risk for developing eating disorders and menstrual irregularities. Thus the types and causes of eating disorders and menstrual irregularities were the main focus of this literature review.

Eating disorders can include anorexia nervosa, bulimia nervosa, and eating disorders not otherwise specified. Researchers have attempted to find links between possible causes of eating disorders and situation factors that might predispose female athletes to them.

Menstrual irregularities can sometimes be a symptom of eating disorders that are experienced by female athletes. Although research has shown that menstrual irregularities have a link to lean vs. non-lean sports, it still lacks in what factors can predispose female athletes to them.

It is obvious that eating disorders and menstrual irregularities are related. The causes of these conditions in female athletes can range from sport type, body dissatisfaction, and physiological and psychological

disturbances. Thus it is important for the sports medicine staff surrounding female athletes to be aware of them, and be able to properly diagnose them.

APPENIDX B

THE PROBLEM

The Problem

Statement of the Problem

Extensive research has been done that has evaluated the prevalence of eating disorders and menstrual irregularities among female athletes. Studies have attempted to find common variables among female sports that may cause an athlete to be more predisposed to developing an eating disorder. Researchers have even gone far enough to study the effects that these issues have on the female body in terms of the resulting health issues. Although research has been done to discover what sports or types of sports (lean vs. non-lean) could predispose an athlete, no research could be found as to whether or not female equestrian athletes are at risk for developing eating disorders and menstrual irregularities.

Thus, the purpose of this study is to discover whether or not there is a prevalence of eating disorders amongst female collegiate equestrians. A secondary purpose of this study is to determine the average length of female collegiate equestrian's menstrual cycle. The goal is to see if there are any significant variables that may increase the prevalence of eating disorders.

Definition of Terms:

The following terms have been defined for the purposes of this study:

- 1) Amenorrhea- a lack of or abnormal cessation of menstruation, either: one menstrual period during the last ten months, less than three menstrual cycles per year, and the absence of periods from 3-12 months, can be either primary or secondary²²
 - i. Primary Amenorrhea- the absence of a menstrual period by age 16 with the presence of secondary sexual characteristics or by the age of 14 when there are also a lack or secondary sexual characteristics
 - ii. Secondary Amenorrhea- the absence of menstruation for three to six months after previously going through menstruation
- 2) Anorexia Nervosa (AN) - a psychological disorder where the patient has a distorted body image with an irrational fear of being overweight, according to DSM-IV-TR® Diagnostic and Statistical Manual of Mental Disorders,⁴ an AN patient:

- a. weights much less than they should (at least 15% or more below their ideal body weight based on age and height)
 - b. has a BMI of 17.5% or less
 - c. has missed three consecutive menstrual periods
 - d. has a preoccupation with body shape and weight
 - e. has a severe fear of putting on weight
- 3) Body Mass Index- an index of a person's weight in relation to height, calculated by multiplying the person's weight in pounds by 705 and dividing by the square root of the height in inches
- 4) Bulimia Nervosa (BN)- according to DSM-IV-TR® Diagnostic and Statistical Manual of Mental Disorders,⁴ a patient with BN:
- a. repeatedly binge-eats while feeling that they can't stop or control their eating
 - b. repeatedly and inappropriately tries to compensate for their over-eating through use

of laxative, excessive exercising, fasting, or purging

c. has been binge-eating and compensating at least twice a week for a consecutive 3 months

d. over judges their weight and body shape

- 5) Disordered Eating- a spectrum of attitudes and behaviors like a preoccupation with body weight and shape, food restriction, and dieting as well as bingeing, vomiting, and the abuse of diuretics, laxatives and diet pills⁸
- 6) Eating Disorder- a psychological disorder where the patient has a distorted body image which leads them to consume an insufficient amount of nutrients to maintain normal, healthy life
- 7) Equestrian Sports- sporting events where an athlete participates as a team with a horse
- 8) Normal Menstrual Cycle- the functioning of reproductive organs and glands that prepare a women's body for pregnancy and child birth, made up of three phases within 26-32 days¹⁷

- 9) Oligomenorrhea- abnormal infrequent menstruation characterized by only 3 to 6 menstrual cycles per year

Basic Assumptions

There were several basic assumptions that were made for the purpose of this study.

- 1) The subjects will answer all questions honestly and to the best of their knowledge.
- 2) The subjects will not receive assistance from any outside individual or source on any of the questions.
- 3) The sample is a representative of the population of female collegiate equestrians.

Limitations of the Study:

The following are possible limitations of the study:

1. The study only consisted of female collegiate athletes from the Intercollegiate Horse Show Association.
2. The study only consisted of subjects who are 18 years or older.

Significance of the Study:

Professionals working around female equestrians should possess adequate knowledge of eating disorders. Since many equestrian sports teams do not have a sports medicine person on staff, it is even more important that coaches are able to recognize signs and symptoms in athletes that may be at risk. The timely identification of these topics is essential to decrease the risk of an athlete developing the adverse effects that result from eating disorders. Those surrounding female equestrians should also be able to recognize and refer at risk patients to the proper health care professionals.

This study examined eating disorders among collegiate female equestrian athletes. Thus, this study provided results on this topic for female equestrian athletes and those who work with them. Furthering their education on eating disorders could potentially lead to increased health in the female equestrian population.

APPENDIX C
ADDITIONAL METHODS

APPENDIX C1

Eating Behaviors and Demographics Questionnaire

EATING BEHAVIORS AND DEMOGRAPHICS QUESTIONNAIRE

Please answer all questions honestly and to the best of your knowledge, without any assistance. Please understand that this questionnaire is voluntary. If you feel uncomfortable answering any question, please feel free to leave it blank.

Age: _____

Height: _____

Weight: _____

Class Rank: Freshman ___ Sophomore ___ Junior ___

Senior ___ Graduate Student ___

- On average, how long is your normal menstrual cycle in days (from the start of one period to the beginning of the next period)? _____
- Do you use a form of female hormonal contraceptive (ex. birth control pills, the patch, the shot)?
Yes: _____ No: _____
- If you answered "yes" to the previous question, please answer the next question.
Do you use this contraceptive to regulate your menstrual cycle?
Yes: _____ No: _____
- Please place a check mark next to the **ONE** riding event that you consider to be your **MAIN** event from the following list.

hunter/jumper _____	reining _____
Equitation _____	western pleasure _____
dressage _____	barrel racing/speed events _____

Please circle a response for each of the following statements:

1. Am terrified about being overweight
Always Usually Often Sometimes Rarely Never
2. Avoid eating when I am hungry
Always Usually Often Sometimes Rarely Never
3. Find myself preoccupied with food
Always Usually Often Sometimes Rarely Never
4. Have gone on eating binges where I feel that I may not be able to stop
Always Usually Often Sometimes Rarely Never
5. Cut my food into small pieces
Always Usually Often Sometimes Rarely Never
6. Aware of the calorie content of foods that I eat
Always Usually Often Sometimes Rarely Never
7. Particularly avoid foods with high carbohydrate content (i.e. bread, rice, potatoes ,etc.)
Always Usually Often Sometimes Rarely Never
8. Feel that others would prefer if I ate more
Always Usually Often Sometimes Rarely Never
9. Vomit after I have eaten
Always Usually Often Sometimes Rarely Never
10. Feel extremely guilty after eating
Always Usually Often Sometimes Rarely Never
11. Am preoccupied with a desire to be thinner
Always Usually Often Sometimes Rarely Never
12. Think about burning up calories when I exercise
Always Usually Often Sometimes Rarely Never
13. Other people think that I am too thin
Always Usually Often Sometimes Rarely Never
14. Am preoccupied with the thought of having fat on my body
Always Usually Often Sometimes Rarely Never

15. Take longer than others to eat my meals	Always	Usually	Often	Sometimes	Rarely	Never
16. Avoid foods with sugar in them	Always	Usually	Often	Sometimes	Rarely	Never
17. Eat diet foods	Always	Usually	Often	Sometimes	Rarely	Never
18. Feel that food controls my life	Always	Usually	Often	Sometimes	Rarely	Never
19. Display self-control around food	Always	Usually	Often	Sometimes	Rarely	Never
20. Feel that others pressure me to eat	Always	Usually	Often	Sometimes	Rarely	Never
21. Give too much time and thought to food	Always	Usually	Often	Sometimes	Rarely	Never
22. Feel uncomfortable after eating sweets	Always	Usually	Often	Sometimes	Rarely	Never
23. Engage in dieting behavior	Always	Usually	Often	Sometimes	Rarely	Never
24. I like my stomach to be empty	Always	Usually	Often	Sometimes	Rarely	Never
25. Enjoy trying new rich foods	Always	Usually	Often	Sometimes	Rarely	Never
26. Have the impulse to vomit after meals	Always	Usually	Often	Sometimes	Rarely	Never
Total Score_____						

Please respond to the following questions:

1) Have you gone on eating binges where you feel that you may not be able to stop? (Eating much more than most people would eat under the same circumstances)

No_____ Yes_____

If yes, how many times in the last 6 months?_____

2) Have you ever made yourself sick (vomited) to control your weight or shape?

No_____ Yes_____

If yes, how many times in the last 6 months?_____

3) Have you ever used laxatives, diet pills, or diuretics (water pills) to control your weight or shape?

No_____ Yes_____

If yes, how many times in the last 6 months?_____

4) Have you ever been treated for an eating disorder?

No_____ Yes_____

If yes, when?_____

Scoring the Eating Attitudes Test:

For all items (except #25), each of the responses receives the following value:

Always	= 3
Usually	= 2
Often	= 1
Sometimes	= 0
Rarely	= 0
Never	= 0

For item #25, the responses receive these values:

Always	= 0
Usually	= 0
Often	= 0
Sometimes	= 1
Rarely	= 2
Never	= 3

After scoring each item, add the scores for a total. If your total score is greater than 20, the participant has a disordered eating issue, and realistically should be seen by a counselor. If the participant answered "yes" to any of the last four yes/no questions, they are also considered to have a disordered eating issue.

APPENDIX C2

INSTITUTIONAL REVIEW BOARD



California University
of Pennsylvania

Proposal Number

08-031
12-01-08 (7)

PROTOCOL for Research Involving
Human Subjects

exempt

Institutional Review Board (IRB) approval is required before beginning any research and/or data collection involving human subjects

(Reference IRB Policies and Procedures for clarification)

Project: The Prevalence of Eating Disorders among Collegiate Equestrian Sports

Researcher/Project Director Alexandra M. Houck

Phone # (410) 428-6807 **E-mail Address** hou1486@cup.edu

Faculty Sponsor (if required) Dr. Carol Biddington

Department Health Sciences and Sports Studies

Project Dates January 2009 to March 2009

Sponsoring Agent (if applicable) _____

Project to be Conducted at California University of Pennsylvania

Project Purpose: **Thesis** **Research** **Class Project** **Other**

Keep a copy of this form for your records.

Required IRB Training

The training requirement can be satisfied by completing the online training session at <http://cme.nci.nih.gov/>. A copy of your certification of training must be attached to this IRB Protocol. If you have completed the training at an earlier date and have already provided documentation to the California University of Pennsylvania Grants Office, please provide the following:

Previous Project Title *see attached*

Date of Previous IRB Protocol _____

Please attach a typed, detailed summary of your project AND complete items 2 through 6.

1. *Provide an overview of your project-proposal describing what you plan to do and how you will go about doing it. Include any hypothesis(es) or research questions that might be involved and explain how the information you gather will be analyzed. For a complete list of what should be included in your summary, please refer to Appendix B of the IRB Policies and Procedures Manual*

The purpose of the study is to determine the prevalence of eating disorders among collegiate equestrian sports. After IRB approval, contact will be made with the board of the Intercollegiate Horse Show Association to administer the survey. An email will then be sent through the IHSA list serve containing a cover letter and a link to where the survey is posted. All surveys that are completed and returned to the researcher will be analyzed in the study. This study will attempt to answer the following questions: 1) What is the prevalence of eating disorders among collegiate equestrian athletes? 2) What is the relationship between age and eating disorders? 3) What are the differences between the riding events for eating disorders? 4) What is the relationship between body mass index and eating disorders? The level of significance will be set at $\alpha \leq .05$ to test the acceptability of the stated hypotheses. 1. A dependent t-test will be used to determine the prevalence of eating disorders among collegiate equestrian athletes. 2. A Pearson Product Moment Correlation will be used to determine if there will be a relationship between age and eating disorders. 3. An ANOVA will be used to determine if there will be a difference between riding events for eating disorders. 4. A Pearson Product Moment Correlation will be used to determine if there will be a negative relationship between BMI and eating disorders.

2. *Section 46.11 of the Federal Regulations state that research proposals involving human subjects must satisfy certain requirements before the IRB can grant approval. You should describe in detail how the following requirements will be satisfied. Be sure to address each area separately.*
 - a. *How will you insure that any risks to subjects are minimized? If there are potential risks, describe what will be done to minimize these risks. If there are risks, describe why the risks to participants are reasonable in relation to the anticipated benefits*

No research will be conducted until approval is granted by the IRB. There are also no risks involved with completion of survey questions.

- b. *How will you insure that the selection of subjects is equitable? Take into account your purpose(s). Be sure you address research problems involving vulnerable populations such as children, prisoners, pregnant women, mentally disabled persons, and economically or educationally disadvantaged persons. If this is an in-class project describe how you will minimize the possibility that students will feel coerced.*

The link to the survey will be emailed directly to the participant as well as a cover letter describing the survey. The cover letter will state that by completing and submitting the survey the participants are giving informed consent. The subjects will voluntarily take part in the survey and will be free to discontinue taking the survey or leave any questions that they feel uncomfortable answering blank.

- c. *How will you obtain informed consent from each participant or the subject's legally authorized representative and ensure that all consent forms are appropriately documented? Be sure to attach a copy of your consent form to the project summary.*

Informed consent is implied through completion and returning of the survey. Subjects have the right to chose not to participate. This is stated in the email that the participants will receive to take the survey.

- d. *Show that the research plan makes provisions to monitor the data collected to insure the safety of all subjects. This includes the privacy of subjects' responses and provisions for maintaining the security and confidentiality of the data.*

No names will be filled out on the survey. The researcher will have no way of knowing the names or identity of those taking the survey. The results of the survey will be kept in a safe and secure place.

3. *Check the appropriate box(es) that describe the subjects you plan to use.*

<input checked="" type="checkbox"/> <i>Adult volunteers</i>	<input type="checkbox"/> <i>Mentally Disabled People</i>
<input type="checkbox"/> <i>CAL University Students</i>	<input type="checkbox"/> <i>Economically Disadvantaged People</i>
<input type="checkbox"/> <i>Other Students</i>	<input type="checkbox"/> <i>Educationally Disadvantaged People</i>
<input type="checkbox"/> <i>Prisoners</i>	<input type="checkbox"/> <i>Fetuses or fetal material</i>
<input type="checkbox"/> <i>Pregnant Women</i>	<input type="checkbox"/> <i>Children Under 18</i>
<input type="checkbox"/> <i>Physically Handicapped People</i>	<input type="checkbox"/> <i>Neonates</i>

4. *Is remuneration involved in your project?* *Yes* or *No*. *If yes, Explain here.*
5. *Is this project part of a grant?* *Yes* or *No* *If yes, provide the following information:*
Title of the Grant Proposal _____
Name of the Funding Agency _____
Dates of the Project Period _____
6. *Does your project involve the debriefing of those who participated?* *Yes* or *No*
If Yes, explain the debriefing process here.

If your project involves a questionnaire interview, ensure that it meets the requirements of Appendix ___ in the Policies and Procedures Manual.

Project Director's Certification
Program Involving HUMAN SUBJECTS

The proposed investigation involves the use of human subjects and I am submitting the complete application form and project description to the Institutional Review Board for Research Involving Human Subjects.

I understand that Institutional Review Board (IRB) approval is required before beginning any research and/or data collection involving human subjects. If the Board grants approval of this application, I agree to:

1. Abide by any conditions or changes in the project required by the Board.
2. Report to the Board any change in the research plan that affects the method of using human subjects before such change is instituted.
3. Report to the Board any problems that arise in connection with the use of human subjects.
4. Seek advice of the Board whenever I believe such advice is necessary or would be helpful.
5. Secure the informed, written consent of all human subjects participating in the project.
6. Cooperate with the Board in its effort to provide a continuing review after investigations have been initiated.

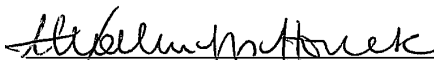
I have reviewed the Federal and State regulations concerning the use of human subjects in research and training programs and the guidelines. I agree to abide by the regulations and guidelines aforementioned and will adhere to policies and procedures described in my application. I understand that changes to the research must be approved by the IRB before they are implemented.

Professional Research


Project Director's Signature

Department Chairperson's Signature

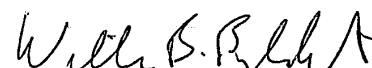
Student or Class Research



Student Researcher's Signature



Supervising Faculty Member's Signature if
required



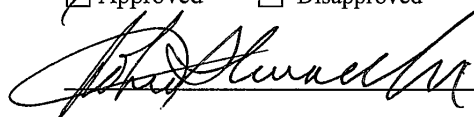
Department Chairperson's Signature

ACTION OF REVIEW BOARD (IRB use only)

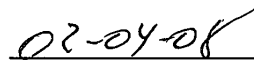
The Institutional Review Board for Research Involving Human Subjects has reviewed this application to ascertain whether or not the proposed project:

- 1. provides adequate safeguards of the rights and welfare of human subjects involved in the investigations;
- 2. uses appropriate methods to obtain informed, written consent;
- 3. indicates that the potential benefits of the investigation substantially outweigh the risk involved.
- 4. provides adequate debriefing of human participants.
- 5. provides adequate follow-up services to participants who may have incurred physical, mental, or emotional harm.

Approved Disapproved



Chairperson, Institutional Review Board



Date

APPENDIX C3

EMAIL SENT TO IHSA BOARD

Naomi Blumenthal

Hello, my name is Alexandra Houck and I am a graduate athletic training student at California University of Pennsylvania. As part of my graduate studies I am required to complete a thesis. The topic that I have chosen for my thesis is “The prevalence of eating disorders and menstrual irregularities in collegiate equestrian sports.” Being an equestrian myself I have felt the pressures to be thin and have been able to recognize a need for a study such as this. By completing this study I hope to shed a light on the prevalence of eating disorders and menstrual irregularities in equestrian sports (if there is a notable number to be found) so that healthy eating habits can be developed and encouraged among any suffering equestrians to promote a safer, healthier competitive environment.

I had previously consulted with Robert Cacchione to inquire about getting the survey distributed to the equestrian participants in the IHSA. I spoke with him on the phone about my thesis and he was very excited and informed me that you were the lady to email about getting my survey sent out. We spoke about how the survey will remain anonymous and that I will not have any contact or way of knowing who participated in the survey, all I will receive back from the participants are the results of the survey. He also mentioned that the distribution of the survey may have to be approved by the IHSA board which meets in January, but time constraints on my thesis mean that I have to have the survey distributed in January. Thus this is something we may have to talk about and brainstorm over the phone.

In order to complete this study though I am in need of subjects to complete a survey that is composed of questions concerning eating disorders and menstrual irregularities. The identity of the subjects will remain anonymous as it is important to legally protect their rights. The survey has not yet been set up or completed (and probably won't be up and running until January of 2009) as I wanted to be sure that I had a subject basis first. I am hoping that the IHSA will see the importance of this study and will be willing to help out. Please contact me with any questions you may have about the survey and whether or not the IHSA will be able to help me complete my thesis study. My email address is [hou1486@cup.edu](mailto:houl486@cup.edu) and my personal cell phone # is (410) 428-6807. Please provide information I will need to conduct the study (i.e. contact person's name, email, and phone). Thank you very much for the time you are taking to read and respond to my email, it is greatly appreciated.

APPENDIX C4

COVER LETTER TO PARTICIPANTS

Dear Participants:

I am a master's degree candidate at California University of Pennsylvania, requesting your help to complete part of my degree requirements. As a fellow equestrian, the researcher feels an honest concern that there may be a connection between equestrian sports and eating disorders (and the possible menstrual irregularities that can result from them). Thus I am conducting this study to see if any connection does exist. The results of this study (not including individual information) will be published in medical journals to inform the medical community if there is a possible connection between equestrian sports and eating disorders. The female equestrians of the IHSA have been chosen as the subjects for this study because the researcher feels that this group is the best representation of female collegiate equestrians across the nation. Please follow the link at the end of this letter to an online survey titled: Eating Behaviors and Demographics Questionnaire.

The questionnaire consists of 38 questions, which will take about 5 to 10 minutes to complete. Due to this being a survey there is minimal risk involved as confidentiality will be maintained.

All equestrians in the Intercollegiate Horse Show Association are being asked to complete this questionnaire, although you do have the right to choose not to participate or to discontinue participation at any time. If the participant chooses to discontinue the survey (by clicking the EXIT THIS SURVEY button on the top of the webpage) then all information will be discarded. Participants of this survey must be 18 years of age or older. The California University of Pennsylvania Institutional Review Board has approved this study for the Protection of Human Subjects. This approval is effective 02/04/2009 and expires 02/03/2010.

This is an anonymous questionnaire and upon submission, neither your name nor email address will be attached to your answers. Your information will be kept strictly confidential and it will only be accessible to the primary researcher. All individual survey information will be stored on a password protected online database that only the primary researcher will have access to. Upon completion of the study all individual survey results will be deleted. By completion of the survey, you are giving

consent for me to use the results of your survey in the study.

As an equestrian in the IHSA, your information and opinions regarding this topic makes your input invaluable. Please take a few minutes to fill out the anonymous questionnaire you will find by clicking on this link..

http://www.surveymonkey.com/s.aspx?sm=AtE_2fHkisSgVpImZMZ_2frleg_3d_3d

If you have any concerns or questions please feel free to contact me through email at houl486@cup.edu or by phone at (410)428-6807. Thank you for your time and consideration.

Sincerely,

Alexandra Houck, ATC
California University of Pennsylvania
250 University Avenue
California, PA 15419
Houl486@cup.edu
(410)428-6807

Carol Biddington, EdD
Faculty Advisor
Health Science and Sport Studies
Biddington@cup.edu
724-938-4562

REFERENCES

1. IHSA History. IHSAINC.com. Available at: <http://www.ihsainc.com/default.aspx?mid=12>. Accessed September 15, 2008.
2. Rider Position. HorseRidingLessons.com. Available at: <http://www.horseridinglesson.co.uk/RiderPosition.html>. Accessed September 17, 2008.
3. NewRider.com. Available at: http://www.newrider.com/Kindr_Way/The_Rider/the_saddle.html. Accessed September 17, 2008.
4. Nordqvist C. What is an eating disorder? Types of eating disorders. 2008. Available at: <http://www.medicalnewstoday.com/articles/105102.php>. Accessed October 6, 2008.
5. Johnson C, Powers PS, Dick RW. Athletes and eating disorders: the natural collegiate athletic association study. *Int J Eat Disord*. 1999;26:179-188.
6. Burckes-Miller M, Black D. Male and female college athletes: Prevalence of anorexia nervosa and bulimia nervosa. *Athletic Training*. 1988;23:137-140.
7. Mayo Clinic Staff. Eating Disorders. Available at: <http://www.mayoclinic.com/health/eating-disorders/DS00294/DSECTION=symptoms>. Accessed October 6, 2008.
8. Torstveit M, Rosenvinge J, Sundgot-Borgen J. Prevalence of eating disorders and the predictive power of risk models in female elite athletes: a controlled study. *Scandinavian J Med Sci Sports*. 2008;18:108-118.
9. Katzman M, Wolchik S. Bulimia and binge eating in college women: A comparison of personality and behavioral characteristics. *J Counseling Clinical Psych*. 1984;52:423-428.
10. Ravaldi C. Body image and eating disorders among non-elite athletes. *Eating Disorders Review*. 2003;14:8.
11. Walden Behavioral Care Staff. Eating disorders not otherwise specified (EDNOS). Available at:

http://www.waldenbehavioralcare.com/ednos_facts.asp.
Accessed October 6, 2008.

12. Deep Drive Media. Eating disorders not otherwise specified (EDNOS). Available at:
<http://eatingdisordersonline.com/explain/ednos.php>.
Accessed October 6, 2008.
13. McAllister R, Caltabiano M. Self-esteem, body image and weight in noneating-disordered women. *Psychological Reports*. 1994;75:1339-1343.
14. Petrie T. Disordered eating in female collegiate gymnasts: Prevalence and personality/attitudinal correlates. *J Sport Exercise Psych*. 1993;15:424-436.
15. Reinking M, Alexander L. Prevalence of disordered-eating behaviors in undergraduate female collegiate athletes and nonathletes. *J Athletic Training*. 2005; 40(1):47-51.
16. Rosen LW, McKeag DB, Hough DO, Curley V. Pathogenic weight control behaviors in female athletes. *Physician Sportsmed*. 1986;14:79-86.
17. Trattner R, Thompson R. NCAA Coaches Survey: The role of the coach in identifying and managing athletes with disordered eating. *Eating Disorders*. 2005;13:447-466.
18. Williams N, Leidy H, Flecker K, Galucci A. Food attitudes in female athletes: Association with menstrual cycle length. *J Sports Science*. 2006;24(9):979-986.
19. Stokic E, Srdic B, Barak O. Body mass index, body fat mass, and the occurrence of amenorrhea in ballet dancers. *Gynecological Endocrinology*. 2005;20:195-199.
20. Redman L, Loucks A. Menstrual disorders in athletes. *Sports Med*. 2005;35(9):747-755.
21. Dangal G. Menstrual disorders in adolescents. *Int J Gynecology Obstetrics*. 2005;21:121-127.
22. Volk E. Female athletes and menstrual irregularities. *Anabolic Pharmacology*. Available at:
<http://www.anabolicpharmacology.com>. Accessed September 15, 2008.

23. Mayo Clinic Staff. Available at:
<http://www.mayoclinic.com/health/amenorrhea/DS00581>.
Accessed October 6, 2008.
24. Pinheiro A, Thornton L, Plotnikov K, Tozzi F. Patterns of menstrual disturbance in eating disorders. *Int J Eat Disord*. 2007;40:424-434.
25. Redman L, Loucks A. Menstrual disorders in athletes. *Sports Med*. 2005;35(9):747-755.
26. Griffith. Menstruation and eating disorders among NCAA athletes. *Eating Disorders Review*. 2004:7.
27. Lippincott Williams & Wilkins. Oligomenorrhea. Available at:
http://www.wrongdiagnosis.com/symptoms/menstrual_irregularities/book-causes-8e.htm. Accessed October 6, 2008.
28. Harlow S, Matanoski G. The association between weight, physical activity, and stress and variation in the length of the menstrual cycle. *American J Epidemiology*. 1991;133:38-49.
29. Wolf AS, Marx K, Ulrich U. Athletic amenorrhea. *Ann N Y Acad Sci*. 1997;816:295-304.

ABSTRACT

Title: THE PREVALENCE OF EATING DISORDERS AMONG FEMALE COLLEGIATE EQUESTRIAN ATHLETES

Researcher: Alexandra M. Houck

Advisor: Dr. Carol Biddington

Date: May 2009

Research Type: Master's Thesis

Purpose: The purpose of this study was to determine a prevalence of eating disorders among female collegiate equestrian athletes.

Problem: No research could be found as to whether or not female equestrian athletes are at risk for developing eating disorders and menstrual irregularities. It must be determined if this population is at risk so that they can be treated accordingly.

Methods: A descriptive type of research was conducted. One hundred and twenty seven female collegiate equestrians from the Intercollegiate Horse Show Association volunteered for the study. The instrument used was the Eating Behaviors and Demographics Questionnaire.

Findings: Equestrians who practice binge eating or purging have significantly higher eating disorder than those who do not. Equestrians who use substances for weight control have significantly higher eating disorders than those who do not. A significant number of female collegiate equestrian athletes have eating disorder issues.

Conclusions: Eating disorders are prevalent in the female collegiate equestrian sport population.