Minnesota Wrestling Nutrition Study

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Table of Contents: **Page #**

List of Tables: **Page #**

List of Figures **Page #**

Literature Review

From Greek antiquity to modern day, competitive wrestlers have been hailed as physical specimens for their endurance, strength, combative nature, and all-around training regimens. Competitive weight classes emerged with the progression of this sport and weight reduction/restriction methods also emerged for athletes to compete at desired weight classes. The stigma of "cutting-weight" has long been associated with this sport despite many attempts to curb the deleterious effects among participants.

Related Research in Wrestling

Over sixty-years ago, W.W. Tuttle published some of the first novel research on the effects of voluntary weight loss for competition among Iowa wrestlers [1]. Tuttle questioned the effects of weight-loss on performance and identified the possible ramifications of poor nutrition, dehydration and excessive exercise on performance. This research begat further research and eventually led to attempts on regulating weight-restriction among high school and college wrestlers. Tipton et al.'s early research focused on studying anthropometric measures and gave recommendations to the efficacy of using minimal weight prediction equations for competitive high school wrestlers. Since this time, efforts were made to have weight certification implemented in high school wrestlers [2, 3]. Pre-season weight-certification programs have been adopted by the National Federation of State High School Associations. Current guidelines require high school athletes to be certified at a minimum body weight for competition based on body fat (via skin-folds or acceptable body composition measures above 7%) and adequately hydrated (via urine specific gravity 1.025 or less) by a trained technician [27].

Not until the death of three college wrestlers in 1997 did the National Collegiate Athletic Association (NCAA) Committee on Competitive Safe Guards step in to impose more strict regulation on weight certification and weight-loss methods to help protect the overall health of these athletes. Prior to these deaths NCAA guidelines recommended that rapid weight-loss methods be prohibited. The deaths of these athletes were attributed to rapid weight loss practices, including dehydration and excessive exercise while wearing restrictive clothing [4]. Mid-season, 1997-1998, the NCAA implemented changes to weight classes, weigh-in times, weight certification and penalties for non-compliance. Seven-pounds were added to each weight class, except heavyweight, in an effort to curb drastic weight-loss. Weigh-in times for competition were changed to 1 hour before dual meets and 2-hours before the beginning of tournament competition. The new weigh-in times were to serve as a deterrent. The rationale was that athletes would forgo rapid weight loss via dehydration since they would not have adequate time to hydrate post weigh-in, thus affecting their performance. The current guidelines set by the NCAA prohibit use of laxatives, enemas, diuretics, excessive food and fluid restriction, self-induced vomiting, hot wrestling rooms (>79 F), hot boxes, saunas, steam rooms, vapor impermeable suits and artificial rehydration techniques (intravenous hydration) [4].

In the beginning of the 1998-1999 collegiate wrestling season the NCAA implemented new weight certification measures to establish minimum competitive weight. The preseason certification included assessing current body fat via skin fold measurements (or comparable measure), body weight and urine specific gravity to detect level of hydration

at certification. The use of urine specific gravity tries to ensure that athletes do not make drastic "weight-cuts" for the sole purpose of the weight certification [4, 5]. A minimum wrestling weight for the season is determined before the season's first official practice. The minimum weight is determined by the wrestlers current weight, hydration status (urine specific gravity <1.020, indicating adequate hydration) and lowest allowable body fat percentage (5%) [28]. The individual performing the weight-certification must be a member of the sports medicine staff. Since the implementation of these rule changes several studies have focused on the efficacy of the new system.

A few studies have investigated the results of the NCAA weight loss safe-guards by looking changes in weight-loss practices and weight cutting. Davis et al. recruited 32 Division I wrestlers from the 1998-1999 season and 29 athletes during the 1999-2000 season for evaluation of weight fluctuations under the guidelines [5]. The results indicated that weight-loss during the beginning of the 98'-99' was more drastic than during the following season (99-00). The results were mildly supportive of a decrease in weight-loss methods. Additionally, Davis's research revealed that 56% of the wrestlers came into the 1998-1999 season more than 10 pounds over the previous years competition weight, and 28% weighed in at more than 20 pounds above the previous years competition weight. The following preseason 50% of the returning wrestlers weighed-in greater than 10 pounds above the previous seasons competitive weight class [5]. It would be feasible to assume that some of the athletes might still be growing and maturing. Alternatively, the preseason results could indicate their relative inactivity and caloric consumption during the off season. Investigations into weight management

among NCAA wrestlers competing in tournaments, post rule changes, concluded rapid weight loss and rapid weight gain were significantly reduced as compared to previous research with mat-side weigh-ins [6].

Eating Behavior and Weight-loss

The prevalence of eating disorders in male athletes has not fully been defined, but it's known that rates are significantly lower in males than females [7] and estimated at 0.2% of boys and young men [8]. The male-female ratio for eating disorders is estimated to be 1/10 to 1/20 [9, 10]. Reports indicate athletes in aesthetic and weight-dependant sports represent a greater proportion of athletic eating disorders than non-aesthetic and weight dependant sports [11]. There has been a lack of substantial research on male athletes and eating disorders, and only a limited amount of data male wrestlers and eating disorders.

The dietary habits and eating behaviors of wrestlers is an under researched area of interest, both prior to and post NCAA rule changes. Enns et al.'s 1987 research on wrestlers body composition, size estimation and eating attitudes touched on the ideology of "sports-induced" disordered eating. Enns differentiated between a possible different etiology between clinically defined disordered eating and sports influenced dietary changes. Twenty-six college wrestlers were compared to 21 cross-country skiers on eating attitudes, drive for thinness, and concern for physical appearance. The study consisted of weight/body composition changes throughout a season, food intake and eating attitudes via an Eating Attitudes Test (original EAT-40). Only wrestlers lost weight throughout the season and both groups had lower than normal body weight with

respect to their non-athlete counterparts [12]. Food records were recorded in the fall (beginning) of the wrestling season and the winter (near the end of the season). The average intake during the fall was 3074 kcal, while there was a drastic drop near the end of the season under 2500 kcal, indicating caloric restriction. Wrestlers scored an average of 20.0 on the Eating Attitude Test and skiers scored an average of 7.4. Four wrestlers scored above 30 on the EAT assessment. Garner has indicated that a score of above 30 indicates criteria to advise certain female athletes to obtain a diagnostic interview for anorexia nervosa [12, 13]. Seven specific questions on the eating attitudes significantly separated wrestlers from skiers [$\chi^2 = p < 0.05$]:

1. Aware of the calorie content of the food that I eat
2. Particularly avoid foods with a high carbohydrate content
3. Exercise strenuously to burn off calories
4. Weigh myself several times a day
5. Think about burning up calories when I exercise
6. Display self-control around food
7. Engage in dieting behavior

There were no significant differences observed in perceived body size between the two groups [12].

Steen and Brownell compared college (n= 63) and high school wrestlers (n=368) (circa 1989 pre-NCAA Minimum Weight Certification) based on weight-loss/dieting patterns, weight loss methods, and psychological factors. College wrestlers reported a mean age of 14 when they began participating in "weight-cutting" practices. Thirty percent of

college wrestlers used a sauna once per week, 26% used rubber or plastic ("sauna") suits 3 to 4 times per week as part of weight-loss methods [14]. Nearly half of the college wrestlers (42%) restricted fluids 3-4 times per week, over half (52%) restricted food 3-4 times per week and 8% restricted food daily. The psychological survey results revealed 63% of college wrestlers were often or always preoccupied with food during the wresting season (vs. 19% during "off" season) and 10% reported often felt or always felt out of control while eating [14]. Note this was before NCAA rule changes on weight loss practices and weigh-in times.

Among high school wrestlers in early 1990's (n=716), 55% lost 1.4 kg or more during the season [15]. The average weight-loss for weight-class certification was 4.0 kg, they averaged a 2.3 kg loss/gain cycle weekly and among 425 subjects the average post-season weight gain was 5.6 kg. The main methods for weight-loss, among weight-cutters, used 3 to 4 times per week or day were: increased exercise, restrictive food eating or fluid consumption, and gradual dieting. A minority of the sample used more extreme weight loss measures: 6% diet pills, 4% vomiting, 3% laxatives, and 3% diuretics (based on sample of wrestlers participating in weight-loss during the season). The prevalence of bulimia was assessed using the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-III and DSM-III-R) criteria, 2.8% and 1.4% of these athletes met the criteria respectively. More than half of the sample reported binge eating episodes [15].

Oppliger et al.'s in-depth examination of weight loss practices in college wrestlers (47 Division I, II, & III teams), post NCAA wrestling changes, indicated that weight-loss

practices were less extreme compared to wrestlers surveyed in the 1980s [16]. This group's survey tool assessed competitive performance, extent of weight loss, weight loss methods, sources of weight loss information and prevalence of bulimia nervosa via DSM-4. Division II, freshman, and lower weight wrestlers exhibited more extreme weight management behavior. Seventy-nine percent (79.5%) used gradual dieting, and 75.2% used increased exercise 3+ days per week for weight loss methods. Caloric restriction was used by 45% of wrestlers and 20.5% used fluid restriction for weight management. These results indicate similar behaviors in caloric restriction compared to college wrestlers of the 1980s [45% Oppliger vs. 52% Steen], but a halving of fluid control methods [20% Oppliger vs. 42% Steen] [14, 16]. The average age at which wrestlers began cutting weight was nearly identical to Steen and Brownell's estimates (13.7 yrs and 14 yrs) and most weight lost for competition reduced to 5.3 kg (avg) versus 7.2 kg (avg) reported by Steen et al., prior to NCAA weight-certification [14].

Oppliger et al. reported the frequent use of saunas/plastic suits among 5 to 8% of wrestlers and infrequent use by 21 to 47%. The use of these weight loss tools are not in compliance with the NCAA Safe Guards. The use of diet pills, laxatives, diuretics, emesis, and enemas were prevalent at low levels (3.9%, 2.8%, 1.9% and 1.2%). The prevalence of these practices is slightly lower than previously reported Steen et al. The NCAA rule changes influenced 40% of the wrestlers' weight management behavior (based on self-report) [16].

Only one wrestler met Oppliger et al.'s criteria (based on 5 components of DSM-IV bulimia) for bulimia and a total of 4 met three or four of the criteria. Oppliger stated, "Little evidence existed for disordered eating behaviors among this sample." [pg 42, 2003] The authors' did not elaborate or clarify this conclusion. Based on the DSM-IV, the prevalence bulimia nervosa among the population was low, but does this mean that disordered eating among this population is not prevalent? Their questionnaire only assessed DSM-IV bulimia-nervosa, not anorexia-nervosa or eating disorder not otherwise specified [EDNOS]. The term "disordered eating" is broad umbrella verbiage that defines eating patterns or behaviors not-considered normal or efficacious to a healthy diet. Anecdotally, the use of restrictive eating and fluid consumption (40.5% and 20.5%) among this population could indicate disordered eating [16].

Oppliger's assessment that the prevalence of bulimia nervosa is low among this population is valid. Bulimic behaviors among the male US population are also relatively low [7-10]. But, are wrestlers at greater risk of developing these etiologies compared to the general population? Dale et al. concluded that there were no significant differences in "risk" for bulimia nervosa among high school/junior high wrestlers (n=85) and non-wrestlers (n=75) [17]. Significant differences were observed for "risk" between "in-season" wrestlers vs. non-wrestlers, and between "in-season" vs. "off-season" wrestlers using the Eating Disorder Inventory (EDI). Dale et al. observed that these bulimic tendencies were transient and resolved with the completion of the competitive wrestling season, indicating that these tendencies do not necessarily mean that wrestlers should be classified as having an eating disorder. Dale concludes that, "The focus of future

research should therefore be on the physical health of wrestlers rather than on eating disorders such as bulimia [17]." Since physical health is a function of disordered eating or eating disorders, it is still pertinent to focus on these aspects along with identifying more tangible dietary patterns.

Additionally, the absence of a classified eating disorder does not rule out the possibility of acute or long term physiological or psychological detriments induced by the nature of this sport. Nor has any research been conducted looking at binge eating disorders (BED) or eating disorders not otherwise specified.

In an analysis of 11 NCAA Division I sports, women and whites, in general, restricted food more than men and other ethnicities (via a food Restriction Index). Wrestlers and gymnasts reported significantly higher Restriction Index scores as compared to the other sports [29]. But, wrestlers reported significantly lower drive for thinness and body dissatisfaction as compared to the other athletes studied. These authors concluded that the motivators for weight loss are not self-induced, but rather from external sources. This research supports the hypothesis that wrestlers' exhibit "sport induced" disordered eating and not typical sypmtomology normally associated with traditional eating disorders.

Assessing Dietary Patterns

Defining dietary patterns have become a key interest to researchers looking at establishing diet-disease relationships and to quantify habits of various populations. Tools such as food frequency questionnaires, diet records, and diet recalls have been

frequently used in epidemiological research. The use of such tools has rarely been used in the use of defining dietary patterns of wrestler and is limited to a few studies [12]. Food restriction has been identified in the wrestling population, but little research has been conducted into the actual diet habits of wrestlers during the competitive season and during the non-competitive season. Defining the consumption patterns of wrestlers could be crucial in identifying areas of nutritional concern (both time periods) and in optimizing the performance of these athletes. The use of dieticians, by athletic programs, for individual athlete assessment would be ideal, but likely impractical for all collegiate wrestling teams. The use of a dietary assessment among a cohort could reveal general trends that could be used to for assessing general dietary health. Specifically individual teams and/or the NCAA could use this information to improve previously set safe-guards for athletes.

Currently there are no 'gold standards' for assessing individual or group food or nutrient intakes. The most commonly used methods of assessing diet are via 24-hour recalls, food records and food frequency questionnaires. Twenty-four hour recalls are typically done with the use of a trained interviewer using a validated database for such assessments. When trying to define an individual's normal intake multiple days of records need to be recorded due to intra-person variability. When assessing populations, often multiple days are recorded to account for both intra- and inter-person variability of nutrient intakes. Considerations such as seasonal variation, age, sex and ethnicity need to be taken into account to ensure accurate assessments are made. When trying to assess or compare large populations, often single day recalls are adequate since this "snap-shot" into a

population will encompass the general variability of the population (falling into a normal distribution). The benefits of using this type of assessment are that subjects do not need to be literate to report their intakes, they generally do not require much time and overall have low participant burden. The negatives include the use of subject's memory to report intakes and individuals often have issues with completely recalling all foods consumed. Women and obese individuals habitually underreport food intake and populations as a whole underreport intake. This might be attributed to social desirability when reporting intake. The use of 24-hour recalls is also expensive when large cohorts are involved: the major costs come from the use of a trained professional and the use of a nationally recognized database [30].

Food records are frequently used when trying to assess individual or population intakes. This method usually requires subjects to record their specific intakes and portion sizes at the time of consumption. As with 24-hour recalls, multiple days of records need to be recorded to fully summarize an individual or populations normal intake due to intra- and inter-person variability. As with 24-hour recalls, age, sex, seasonal variations and ethnicities of the subjects need to be taken into account when planning a study with this method to accurately define the intakes of the population of interest. The major benefits of using food records are that they do not rely on memory since subjects' record intakes and portion sizes at the time of intake. The disadvantages of using food records include high participant burden, social desirability issues, literacy, time and cost associated with training subjects, training technicians/researchers to code response for a database analysis and cost of processing such food records. Since multiple days are often recorded,

subjects tend to underreport as the length in days of records increases [30]. Subjects may still be socially influenced to mis-report their intakes and subjects tend to have difficult times estimating portion sizes. The use of food records is generally not feasible when studying large populations due the high costs associated with using this method [30].

Finally, the most commonly used method of intake assessment for large studies or epidemiological research is the use of a food frequency questionnaire [FFQ]. Typically, FFQs require subjects to report their perceived intakes and portion sizes over a set period of time for a specific set of foods, or food groups. Thus, this assessment defines current and past intake. A FFQ is commonly used in large studies when trying to explore associations with disease states. The relative ranking of consumption of nutrients or foods of interest are compared to the prevalence of the disease state of interest among the population. Unlike the 24-hour recall or food record, typically only a single FFQ is administered to summarize a populations' intake. This method of assessment is not usually used to assess individuals' intakes since it relies on a subjects' perception of their own intake and due to low correlations with actual intake or energy expenditure (compared with other methods of assessing intake and the use of doubly labeled water to determine energy expenditure) [30]. The main benefits of using a FFQ include lower cost, low participant burden, no literacy requirement (if interviewer used) and a preserved relative ranking of food/nutrient intakes among a population. For large studies FFQs can be the only feasible option based on the logistics of implementing study design and the associate costs. The disadvantages of using FFQs include possible low correlations with actual intake, they may not reflect true intake due to memory/perceived intakes, energy

intakes are often underreported and social desirability in reporting (leading to underreporting) [30].

Purpose

The present exploratory study examined the dietary patterns and eating attitudes [including weight-loss methods] of Minnesota NCAA collegiate wrestlers during the competitive wrestling season and the non-competitive collegiate season. The purpose of this study was to (i) evaluate and define the dietary patterns of this population (ii) explore the broad eating attitudes of this population.

Methods

Subjects

During the winter of 2009, Minnesota NCAA collegiate wrestlers were recruited from five schools [University of Minnesota, Augsburg College, Minnesota State University St. Cloud, St. Johns University, and Concordia College] to participate in this study (n=119, Division I = 27, Division II = 35, and Division III = 57). Consent to solicit athletes was given by the head wrestling coaches at the forenamed institutions before individual consent to participate was obtained in person. The study was approved by the University of Minnesota Institutional Review Board (IRB code number 0901P56862). Subjects were included if they were current members of their respective wrestling teams and competitive during the season (varsity and non-varsity). Subjects were excluded from the study if they less than 18 years of age and if they were not competing during the season (medical red-shirts or any circumstance not allowing them to compete).

Subjects were invited to complete an online FFQ (Diet History Questionnaire and an online Eating Attitudes Test 26 (EAT-26) survey once during the competitive wrestling season and once one plus month during the "off-season," as defined by end of their respective NCAA tournaments. Division III athletes had until Saturday, March 7th to complete the "in-season" assessments, while Division II and Division I deadlines were March 14th and March 21st respectively. One month following these dates athletes received e-mail links and passwords to complete the "off-season" assessments and had until the end of June to complete them. Refer to appendix 1 for the DHQ and the EAT-26.

Instruments:

Diet History Questionnaire

The online DHQ is a food frequency questionnaire developed by the National Cancer Institute to assess current and past food intake over a 1 year period. It consists of 124 food items and the results provide specific estimates of macronutrients, micronutrients and servings of USDA food groups. The DHQ reports estimated daily intakes of the 124 food items, macronutrients, micronutrients and vitamin/mineral supplements [18, 19]. Food frequency questionnaires are used to assess 'usual' diet patterns as compared to day or period specific 24-hour recalls or diet records. Since dietary intake can vary extremely during a competitive wrestling season the DHQ was used to capture usual intake expressed as either during the competitive season or off-season. Multiple 24 hr recalls or diet records could have captured a more accurate estimate of intakes but would have been specifically limited to that single time point during the season, thus making the results

less generalizable to the entire season. The use of other instruments was not feasible based on the participant burden required to complete multiple recalls or records and due the cost associated with using these methods.

The DHQ has been validated against other FFQ's [Block and Willet] and against 24-hour recalls [18, 19]. Subar et al. report the DHQ is as good as or better than the two FFQs with which it was compared against. It should be noted that the online version of the DHQ has not been validated against the paper same paper format.

The DHQ was modified for this study. Subjects were asked to reference their usual intakes either during the competitive wrestling season or during the "off-season" (non-NCAA collegiate season) versus referencing intake over the previous 12-months. FFQs are usually used to assess population based intakes at or over specific time periods, they have been used to assess acute changes in intake over relatively short periods of time. Brown et al. used a modified FFQ to assess changes in food intake before pregnancy to mid-pregnancy as compared to 4 day food records [20]. Brown et al. concluded that a FFQ is appropriate to changes in intake over short time periods. There were not any validation tests for this specific version used in the Minnesota Wrestling Nutrition Study, nor were intakes compared to other instruments [24 hr recalls or food records] or control populations.

DHQ intakes were analyzed using Diet*Calc version 1.4.3 [nutrient database file dhq1.database.d031009.csv and the current data dictionary]. Criteria for further analysis

required a kcal intake of 500 < X <10,000 kcals, although there were no subjects outside of this pre-specified range. Twenty-three specific items were chosen for reporting and like-wise comparison [between NCAA Divisions, weight classes, and seasons]. Formal and geometric transformations were made to normalize skewed data. It should be noted that actual estimates from the DHQ should be interpreted skeptically as correlations with specific components vary to different degrees and since subjects tend to underreport kcal intake [18, 19 & 21].

Demographics, Eating Attitudes Test-26, and Weight-Loss Methods

Subjects completing the study were given access to a web-page developed specifically for this study (https://courses.cfans.umn.edu/WrestlingNutritionStudy). Subjects were required to answer basic demographic information: age, years in school, years on team, ethnicity, weight status, weight class, varsity status and NCAA division. Following demographic information, subjects were instructed to complete a survey assessing food restraint, concerns with weight and general eating habits (EAT-26). The EAT-26 was developed to assess behavior associated with anorexia-nervosa and disordered eating [13, 22, 23] refer to appendix 1 for test). Reliability coefficients for this tool range from 0.78 to 0.87 [22]. The EAT-26 is one of the most commonly used tools to assess eating disordered attitudes and behaviors. Subjects are asked 26 Likert scale (ordinal) questions on eating attitudes. They respond either always, usually, often, sometimes, rarely or never to the specific questions, which are scored and turned into a composite score [3 points for always, 2 points for usually, 1 point for often and 0 for sometimes, rarely and never-questions 1-25. For question 26-three points for never, 2 points for rarely, 1 point

for sometimes, and 0 points for always, usually and often]. Scores of ≥ 20 are indicative of possible eating disorders/disordered eating and are the cut off criteria for referral to a specialist for a diagnostic interview [13, 22]. Subjects scoring ≥20 during the competitive season or "off-season" were e-mailed contact information for professional screenings and contact information for emergency aid. Since this study was completely voluntary, subjects were free to refuse answering any questions they deemed inappropriate. When subjects refused or failed to respond to an EAT-26 question they were awarded 0 points toward their composite score for that question.

Finally, subjects were asked to provide the frequency of 14 weight-loss methods as previously defined by Oppliger et al [16]. This information was used for a historical comparison to previously reported weight-loss methods at a time closer to NCAA rules changes on weight-loss methods/practices and for logistic modeling related to in-season EAT-26 scores.

Statistical Analysis:

Means and/or geometric means (with 95% confidence intervals or limits) were compared using general linear modeling (GLM) when looking at differences among in-season intakes and off-season intakes and between season intakes. When comparing difference between weight classifications "in-season" or "off-season" variables were normalized to represent intake per 1,000 kcal. Weights were normalized to negate possible differences in overall caloric consumption. A standardized comparison provides for a more meaningful likewise comparison. EAT-26 scores, in and off-season, were transformed to

normalize for tests of the null hypothesis (no difference in scores between seasons or other prognostic factors) [log(EAT26 + 1)]. GLM was used to assess the effects of weight loss-methods on EAT-26 scores. Logistic regression was performed to explain the relationships between EAT-26 scores and the frequency of various weight-loss methods. For this modeling EAT-26 scores were changed to binomial responses [scores $\geq$10 or scores <10, arbitrarily based on data] and weight-loss method results were classified as units increasing with the frequency of method reported [0 for never/no response, 1 for every 2-4 weeks, 2 for once per week, 3 for 3-4 times per week, and 4 for daily]. Significance levels for this exploratory data were set at α=0.05 unless noted else-wise for Bonferroni alpha corrections due to multiple comparisons of means [LSmeans]. Results may be displayed at both α=0.05 and with alpha corrections. Common sense and applicability need to be taken into account when interpreting the significance of these findings solely based adjusted alpha values. Note the Bonferroni adjustment is concerned with the universal null-hypothesis that the groups of interest (in-season v. off-season or weights et cetera) are identical for all variables of interest. Statistical Analysis was performed using R© version 2.8.1 and SAS© version 9.1.

Results

In-Season DHQ

Seventy-three subjects completed the "in-season" questionnaire. The mean (s.d.) age of the respondents was 20.16 (0.83). These data are representative of 20 NCAA Division I, 27 Division II, and 26 Division III wrestlers and 27 low weight [125, 133, 141], 23 mid weight [149,157, 165] and 23 high weight wrestlers [174, 184, 197, heavyweight]. Refer to table 1 for the summary of the 19 DHQ variables of interest and DHQ "in-season" demographics.

Table 1: In-Season Demographics (n=73) and Food Variables of Interest

	Mean (s.d)	**NCAA Division**	**Weight**
Age	20.16 (0.83)	I (n=20)	Low [125,133,141]; n=27
		II (n=27)	Mid [149,157,165]; n=23
		III (n=26)	High [174,184,197, hwt]; n=23

Food Component	Table 1.b **In Season Avg. Daily Intake** **Mean (s.d.) or *Back-Transformed Geometric Mean (95% Confidence Interval)***
Grams Food	*2379.50 (2111.58, 2681.41)*
Kcal	*2417.38 (2141.82, 2728.41)*
Protein-g	*95.48 (83.75, 108.86)*
Total Fat-g	99.47 (54.26)
CHO-g	*300.30 (265.84, 339.23)*
% Energy Protein	16.10 (3.05)
% Energy Fat	31.94 (7.39)
% Energy CHO	50.49 (8.96)
Fiber-g	*17.56 (15.34, 20.11)*
Alcohol-g*	*2.27 (1.11, 4.65)*
% Energy Alcohol	3.46 (5.26)
Drinks Alcohol*	*0.72 (0.51, 1.02)*
Servings of Grain	6.66 (3.68)
Servings of Vegetables	*2.39 (1.98, 2.88)*
Servings of Dairy	*2.49 (2.09, 2.96)*
Oz. Meat/Fish/Poultry	*4.09 (3.40, 4.93)*
Servings Fruit	*2.55 (2.06, 3.16)*
Discretionary Fat-g	*63.81 (54.28, 75.00)*
TSP Added Sugar	*19.16 (16.28, 22.56)*

Geometric transformations represent natural log of food component; back trans-formations exp(geometric transformation)

*Based on DHQ results: 8 subjects had 0 grams of Alcohol reported, 23 subjects reported consuming no alcohol (>0.09 counts as consuming). Means represent those subjects who consumed

Reference table 2 for comparisons of variables among weight-classes. Using ANOVA/GLM there were no significant effects for weight [low, mid, high] and variables of interest except servings of dairy per 1,000 kcal [$F(2,72)=9.56$, $P=0.0002$]. High weight wrestlers consumed significantly more servings of dairy per 1,000 kcal versus low and mid-weight wrestlers [$P=0.003$, $P=0.003$ respectively; mean (s.d)-high 1.60 (0.71), mean-mid 0.97 (0.52), and mean-low 1.00 (0.45)]. Low-weight wrestlers consumed significantly less grams carbohydrate per 1,000 kcal than mid-weight [119.73 (22.20) v. 132.88 (20.37), $P=0.0388$; $\alpha=0.017$ correction for multiple tests], but no difference between low and high or mid and high were present. When expressed as a percent of total kcal, low-weight wrestlers consumed significantly less carbohydrate than mid-weight wrestlers [Low 47.89% (8.89) kcal CHO v. 53.15% (8.15) kcal CHO; $P=0.0388$, $\alpha=0.017$ correction for multiple tests]. Mid-weight wrestlers consumed significantly more grams of fiber per 1,000 kcal than high-weight wrestlers [9.34 (6.53) v. 6.64 (1.75)); $P=0.0249$, $\alpha=0.017$ correction for multiple tests]. During this competitive season low-weight wrestlers consumed significantly more grams of discretionary fat per 1,000 kcal versus mid-weight wrestlers [28.94 (6.47) v. 24.56 (7.99); $P=0.0371$, $\alpha=0.017$ correction for multiple tests]. Low-weight wrestlers also consumed significantly more grams alcohol per 1,000 kcal than high-weight wrestlers [6.77 (9.42) v. 2.24 (3.89); $P=0.0336$; $\alpha=0.017$ correction for multiple tests] and had a significantly greater percent of energy from alcohol than high-weight wrestlers [4.74% (6.59) v. 1.56 (2.72), $P=0.0336$; $\alpha=0.017$ correction for multiple tests.

Table 2. In-season DHQ comparisons among weights

Avg. Daily Intake by Weight	Low	Med	High	
	Mean (S.D)			
Protein-g/1000 Kcal	39.51 (7.65)	39.85 (7.71)	41.48 (7.72)	
Fat-g/1000 Kcal	37.06 (7.49)	32.69 (8.49)	36.43 (8.36)	
CHO-g/1000 Kcal	119.73 (22.20) **a**	132.88 (20.37) **b**	127.22 (23.33) **ab**	*P(a v. b)=0.0388*
Fiber-g/1000 Kcal	7.45 (2.11) **ab**	9.34 (6.53) **a**	6.64 (1.75) **b**	*P(a v. b)=0.0249*
Alcohol-g/1000 Kcal	6.77 (9.42) **a**	5.23 (7.28) **ab**	2.24 (3.89) **b**	*P(a v. b)=0.0336*
Grain Servings/1000 Kcal	2.51 (0.68)	2.55 (0.81)	2.21 (0.72)	
Vegetable Servings/1000 Kcal	1.12 (0.56)	1.6 (2.03)	0.93 (0.40)	
Fruit Servings/1000 Kcal	1.24 (0.94)	1.61 (1.25)	1.37 (1.16)	
Dairy Servings/1000 Kcal	1.00 (0.45) **a**	0.97 (0.52) **a**	1.6 (0.71) **b**	*P(a v. b)=0.003*
Oz. Meat/Fish/Poultry/1000 Kcal	2.04 (0.96)	1.91 (0.88)	1.75 (0.79)	
Discretionary Fat-g/1000 Kcal	28.94 (6.47) **a**	24.56 (7.99) **b**	28.7 (7.38) **ab**	*P(a v. b)=0.0371*
TSP. Added Sugar/1000 Kcal	8.40 (3.97)	8.67 (4.43)	8.98 (2.70)	
%Energy Protein	15.81 (3.06)	15.94 (3.08)	16.59 (3.09)	
%Energy Fat	33.36 (6.74)	29.42 (7.64)	32.79 (7.52)	
%Energy CHO	47.89 (8.89) **a**	53.15 (8.15) **b**	50.89 (9.33) **ab**	*P(a v. b)=0.0388*
% Energy Alcohol	4.74 (6.59) **a**	3.87 (5.10) **ab**	1.56 (2.72) **b**	*P(a v. b)=0.0336*

-Among rows, different letters represent significant differences at $\alpha=0.05$ (without Bonferroni Correction)

Off-Season DHQ

Reference table 3 for "off-season" results and demographics. Refer to table 4 for off-season comparisons among weights. Among the 24 wrestlers completing the "off-season" DHQ there were no significant differences among the food variables of interest. Using ANOVA/GLM there were no significant effects for these variables.

Table 3: Off-Season Demographics (n=24) and Food Variable of Interest

	Mean (s.d)	**NCAA Division**	**Weight**
Age	20.75 (1.73)	I (n=13)	Low [125,133,141]; n=10
		II (n=6)	Mid [149,157,165]; n=8
		III (n=5)	High [174,184,197, hwt]; n=6

Table 3 (continued):

Food Component	**Avg. Daily Intake** **Mean (s.d.) or *Back-Transformed Geometric Mean (95% Confidence Interval)***
Grams Food	*2285.35 (1787.68, 2921.56)*
Kcal	*2300.99 (1870.09, 2831.18)*
Protein-g	*88.23 (70.26, 110.78)*
Total Fat-g	*79.26 (61.67, 101.87)*
CHO-g	286.74 (115.25)
% Energy Protein	15.59 (2.83)
% Energy Fat	31.96 (7.43)
% Energy CHO	45.94 (6.49)
Fiber-g	*17.26 (13.56, 21.98)*
Alcohol-g	*5.57 (1.57, 19.73)*
% Energy Alcohol	8.26 (10.21)
Drinks Alcohol*	*1.34 (0.64, 2.78)*
Servings of Grain	6.56 (3.43)
Servings of Vegetables	*2.44 (1.76, 3.38)*
Servings of Dairy	*2.14 (1.66, 2.75)*
Oz. Meat/Fish/Poultry	*4.14 (3.03, 5.75)*
Servings Fruit	*1.78 (1.22, 2.59)*
Discretionary Fat-g	*60.08 (46.59, 77.93)*
TSP Added Sugar	17.01 (8.99)

Geometric transformations represent natural log of food component; back trans-formations exp(geometric transformation)

*Based on DHQ results: 4 subjects reported consuming no alcohol (>0.09 drinks counts as consuming). Means represent those subjects who consumed.

Table 4: Off-Season DHQ Comparisons by Weights

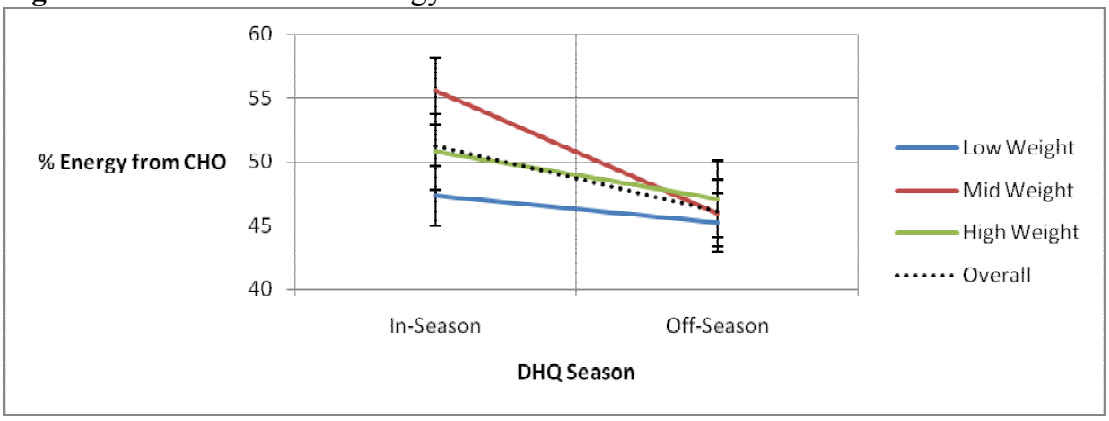
Avg. Daily Intake by Weight	Low	Med	High
	Mean (S.D)		
Protein-g/1000 Kcal	37.42 (5.72)	37.51 (6.97)	43.83 (8.33)
Fat-g/1000 Kcal	37.74 (6.75)	33.43 (9.61)	34.73 (9.22)
CHO-g/1000 Kcal	113.07 (14.46)	114.92 (19.32)	117.72 (17.22)
Fiber-g/1000 Kcal	7.00 (1.51)	10.07 (5.28)	6.70 (0.93)
Alcohol-g/1000 Kcal	10.62 (9.28)	16.04 (22.51)	8.13 (8.19)
Grain Servings/1000 Kcal	2.69 (0.85)	2.73 (0.82)	2.09 (0.76)
Vegetable Servings/1000 Kcal	1.00 (0.33)	1.66 (1.38)	0.99 (0.44)
Fruit Servings/1000 Kcal	0.81 (0.51)	1.44 (1.68)	1.41 (0.82)
Dairy Servings/1000 Kcal	1.09 (0.47)	0.70 (0.37)	1.64 (0.96)
Oz. Meat/Fish/Poultry/1000 Kcal	1.79 (0.71)	2.12 (0.76)	2.01 (0.93)
Discretionary Fat-g/1000 Kcal	29.79 (5.83)	24.92 (7.98)	26.64 (9.15)
TSP. Added Sugar/1000 Kcal	7.98 (2.30)	5.82 (2.85)	6.94 (2.53)
%Energy Protein	14.97 (2.29)	15.00 (2.79)	17.41 (3.33)
%Energy Fat	33.96 (6.07)	30.09 (8.65)	31.26 (8.30)
%Energy CHO	45.23 (5.79)	45.97 (7.23)	47.09 (6.89)
% Energy Alcohol	7.43 (6.49)	11.23 (15.76)	5.63 (5.73)

No significant differences among weights for any nutrient or group

In-Season versus Off-Season DHQ

Subjects completing both in-season and off-season DHQs were analyzed for differences (n=24, refer to table 3 for demographics). Using general linear modeling [GLM], only the variable percent of energy from carbohydrate, had significant findings. When modeling percent energy of carbohydrate as dependant on season (in or off), weight (low, mid, and high) and season x weight, season had a significant effect on the response variable (F=5.55, P=0.0232). In-season mean (95% CI) percent of energy from CHO [51.23 (48.12, 54.32)] was significantly greater than off-season [46.09 (42.99, 49.20); P=0.0232 *note this is a different estimate from table 4 since variables transformed in GLM] (Fig. 1). Although there was not a significant effect for season x weight, there were differences among mid-weight wrestlers when comparing seasons. In-season mid-weight wrestlers had higher proportions of energy from CHO versus their off-season [mean (95% CI): 55.56 (50.30, 60.82) v. 45.97 (40.71, 51.23), P=0.0128; mean difference (95% C.I.) 9.59 (2.15, 17.03); α adjust P=0.003 for multiple comparison] (refer to figure 1). There were no significant differences for kcal intake for weights x season.

Figure 1: Interaction of % Energy CHO



In-Season Eating Attitudes and Weight-Loss Methods

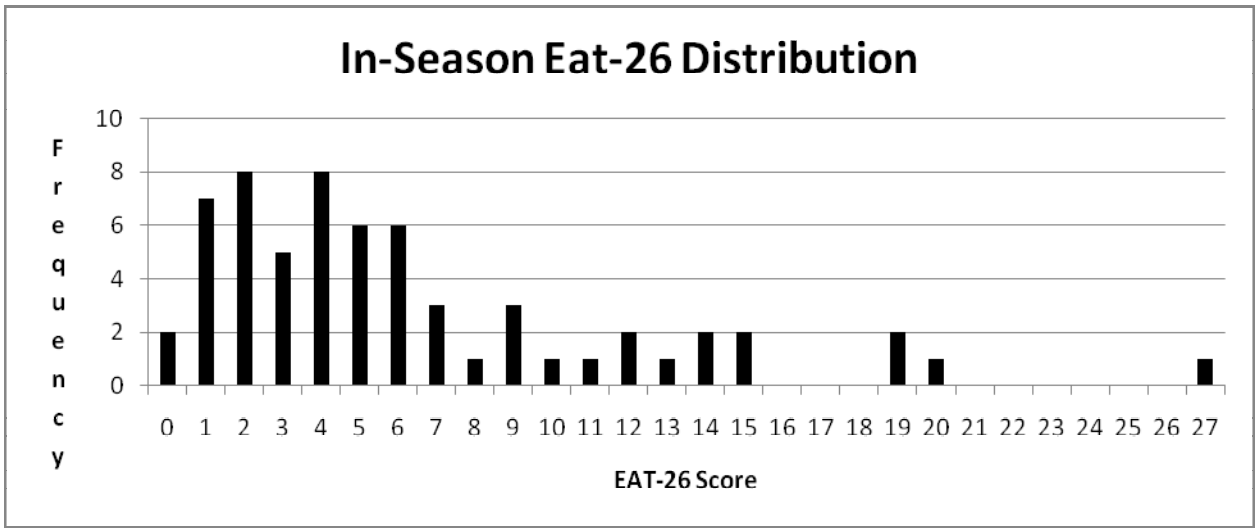
EAT-26

Sixty-two subjects, with a mean (s.d.) age of 20.1 (1.57) completed the EAT-26 and weight-loss methods survey. There were 20 NCCA Division I, 20 Division II, and 22 Division III athletes represented. The majority of the subjects were underclassmen [freshman (n=19), sophomore (n=17), junior (n=14), senior (n=8), senior+ (n=3) and no response (n=1)], non-returning varsity letter-winners (n=41) and white (n=59). There were 21 low-weight, 23 mid-weight, and 18 high-weight wrestlers represented. Refer to table 5 for a summary of in-season eating attitudes and the demographics of the subjects completing it. Refer to figure 2 for distribution of scores.

Table 5: In-Season EAT-26 Demographics (n=62)

	Mean (s.d)	Returning Varsity Wrestler	NCAA Division	Weight	Yr. on team	Yrs. School	Race
Age	20.1 (1.57)	Yes (n=21)	I (n=20)	Low (n=21)	1 (n=21)	Freshman (n=19)	White (n=59)
		No (n=41)	II (n=20)	Mid (n=23)	2 (n=20)	Sophomore (n=17)	Hispanic (n=1)
			III (n=22)	High (n=18)	3 (n=10)	Junior (n=14)	Native Am. (n=1)
					4 (n=7)	Senior (n=8)	Black (n=1)
					5 (n=3)	Senior + (n=3)	NR=1
					6+ (n=1)	NR=1	*mixed ethnicities

Figure 2:



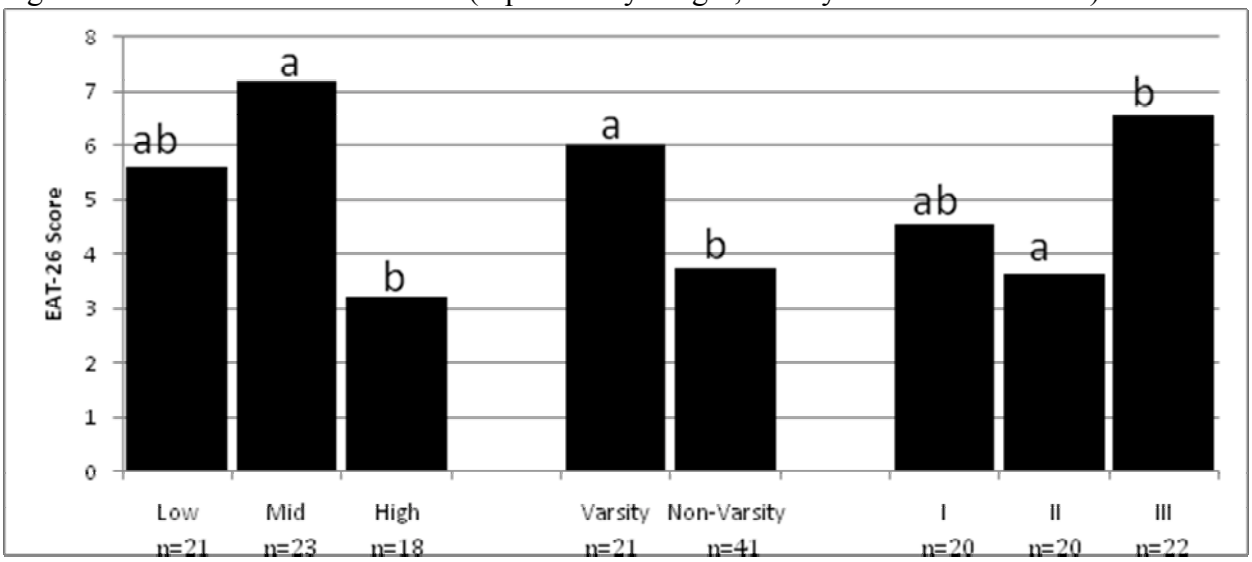
The in-season EAT-26 scores ranged from 0 to 27 with a median of 5. The geometric mean (95% CI) score of this data was 4.64 (3.66, 5.81) [Log(eat_score +1); back-transformation exp(eat_score)-1]. Two subjects scored above 20, a cut-point for a referral to a medical professional for further screening. The top 5 point scoring questions [either 3, 2 or 1] ranked in order were (*indicates tie):

1. Display self-control around food
2. Engage in dieting behavior
3. Aware of the calorie content of food I eat
4. Think about burning up calories when I exercise
5. Avoid eating when I'm hungry*
5. Eat diet foods*

When age, years on wrestling team, weight class (low, mid or high), previous season varsity wrestler (yes or no), NCAA Division (I, II or III), and weight class x NCAA Division were modeled, using GLM, to predict the log transformed in-season EAT-26 score there were significant effects in this model [$F(11,61)=2.92$, $P=0.0042$]. Weight and previous varsity status had significant effects on this model [$P=0.0080$ and $P=0.0406$ respectively]. Mean mid-weight EAT-26 scores were higher than mean high-weight scores [back-transformed geometric means (95% C.I.): 8.18 (5.24, 9.72) v. 3.21 (3.06, 4.80) $P=0.0023$; $\alpha=0.017$ correction for multiple tests]. Previous season varsity wrestlers reported significantly higher EAT-26 scores than their non-varsity status counterparts [back-transformed geometric mean (95% C.I.): 6.04 (4.22, 8.50) v. 3.75 (2.86, 4.86), $P=0.0406$]. Although NCAA Division did not have a significant effect on the model

(P=0.059), NCAA Division III wrestler reported significantly higher EAT-26 scores compared to Division II, but no different than Division I [back-transformed geometric mean (95% C.I.): 6.54 (4.71, 8.95) v. 3.64 (2.41, 5.31); P=0.0205; α=0.017 correction for multiple] (figure 3).

Figure 3: In-Season EAT-26 Scores (separated by weight, varsity status and Division)



-Back-transformed geometric means
*Significant Difference between mid-weight and high-weight (P=0.0023)
*Significant difference between previous varsity v. non-varsity (P=0.0406)
*Significant difference between division II and division III (P=0.0205)

In this exploratory analysis there were significant differences when looking at mean EAT-26 scores for weight class x NCAA Division, but the overall effect was insignificant (alpha correction 0.0014). Among Division II, low-weight wrestlers scored significantly higher than high-weight wrestlers [back-transformed mean difference (95% C.I.): 2.30 (1.07, 4.94); P=0.0331] and mid-weight scored significantly higher than high-weight wrestlers [back-transformed mean difference (95% C.I.): 3.59 (1.70,7.78); P=0.0012]. Among Division III, mid-weight wrestlers scored significantly higher than high-weight wrestlers [back-transformed mean difference (95% C.I.): 2.37 (1.19, 4.72); P=0.0155].

Weight-Loss Methods

Table 6 displays the frequency of in-season self-reported weight loss methods of the Minnesota wrestlers completing the in-season assessment (n=62). The most frequently reported methods were increased exercise (82%), gradual dieting (77%), restricting food or skipping meals (73%), and restricting fluids (71%) [% from subjects reporting once per week and greater and excluding every 2-4 weeks]. The weight-loss methods survey also details some NCAA prohibited extreme weight-loss methods, heated wrestling rooms, the use of saunas, sauna suits (a.k.a. 'plastics'), diuretics, enemas and vomiting.

Table 6. Self-Reported Weight Loss Methods (n=62)

Method (%)	Daily	3-4 times per week	Once per week	Every 2-4 weeks	Never	NR
Gradual Dieting	30.65	30.65	16.13	12.90	9.68	0.00
Restricting food or skipping meals	11.29	22.58	38.71	11.29	16.13	0.00
Fasting (not eating all day	0.00	3.23	32.26	8.06	56.45	0.00
Restricting fluids	3.23	20.97	46.77	8.06	19.35	1.61
Increased exercise	27.42	45.16	9.68	11.29	6.45	0.00
Heated wrestling room	29.03	24.19	8.06	8.06	30.65	0.00
Saunas	0.00	3.23	9.68	19.35	67.74	0.00
Rubber/Plastics/Sauna Suit	1.61	1.61	12.90	12.90	70.97	0.00
Spitting	4.84	1.61	1.61	12.90	79.03	0.00
Laxatives	1.61	0.00	0.00	3.23	95.16	0.00
Diet Pills	0.00	0.00	3.23	1.61	95.16	0.00
Diuretics	0.00	3.23	0.00	1.61	95.16	0.00
Enemas	1.61	0.00	0.00	0.00	98.39	0.00
Vomiting	0.00	1.61	1.61	1.61	95.16	0.00

For statistical analysis the results from the self-reported weight-loss method scores were transformed into a composite score for each subject. The scoring was based on the frequency of self-reported behaviors: 0 points for never or no response, 1 point for every 2-4 weeks, 2 points for once per week, 3 points for 3-4 times per week and 4 points for daily. This composite score was modeled as a response variable with demographic information [age, years on team, weight class, previous varsity status, and NCAA division] as explanatory variables using GLM. There were no significant effects for any of the demographic variables but there were note-worthy significant differences among athletes. Division III athletes scored significantly higher than Division I [mean (s.e.) 16.69 (1.35) v. 12.02 (1.44); mean difference (95% C.I.) 4.66 (0.64, 8.68); P=0.0239; α=0.017 correction for significance due to multiple comparisons]. There were no differences in mean scores between Division I and Division II or Division II and Division III.

To assess the relationship between weight-loss methods and eating attitudes logistic regression was performed with EAT-26 scores as the response variable (dichotomized to $\geq$10 or <10). This logit regression used the defined weight-loss methods [gradual dieting, restricting food or skipping meals, fasting, restricted fluids, increased exercise, heated wrestling rooms, saunas, sauna suits, spitting, laxatives, diet pills, diuretics, enemas, and vomiting], age, years on current team, weight, varsity status, and NCAA division to predict EAT-26 scores. Years on current team, gradual dieting, restricting fluids and increased exercise were significantly predictive of EAT-26 scores. For each one year increase on a current team the odds of scoring $\geq$10 on the EAT-26 increased by 11.59

[95% C.I. (1.35, 99.402); P=0.0254]. For every level increase in frequency of weight-loss method (i.e. never to every 2-4 weeks to once per week to 3-4 times per week to daily) the odds of scoring ≥10 increased by 5.31 for gradual dieting [95% C.I. (1.15, 24.51); P=0.0323], by 31.87 for restricting fluids [95% C.I. (1.57, 647.92); P=0.0243] and by 8.81 for increased exercise [95% C.I. (1.30, 59.59); P=0.0257]. It should be noted that a score of ≥10 is not defined criteria for a separate referral to a medical professional, it was simply used as a binomial response to model the influence previously mentioned.

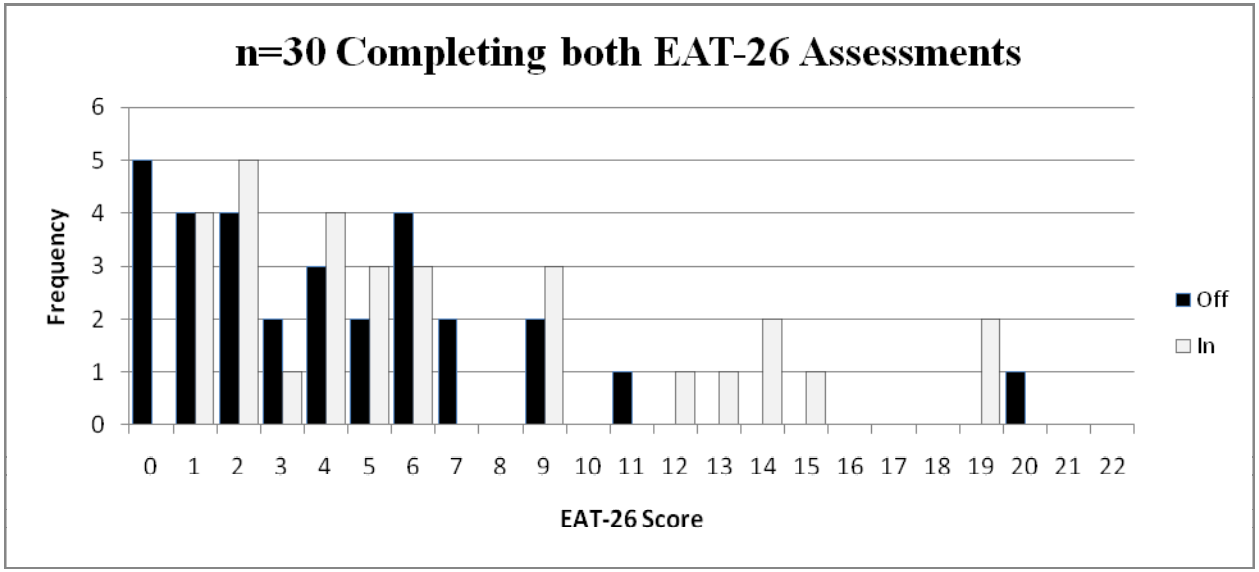
In Season and Off-Season Eating Attitudes Comparison

The back-transformed mean (95% C.I.) EAT-26 scores for wrestlers completing the off-season EAT-26 (n=30) was 2.85 (1.82, 4.25). The ranges of scores were from 0 to 20 with a median score of 3.5. The back-transformed in-season mean (95% C.I.) EAT-26 score for wrestlers who completed the off-season test (n=30) was 4.96 (3.55, 6.82). There was significant difference in the reported in-season v. off-season scores of subjects completing both assessments [mean difference (95% C.I.) 1.55 (1.14, 2.11); P=0.0071, t=2.8967, df=29]. The significant difference in seasonal EAT-26 scores was also confirmed by a Wilcoxin Signed Rank Test [S=-99.5, P=0.0083] . Refer to table 7 for demographics and figure 4 for the distribution of scores.

Table 7: Off-Season EAT-26 Demographics (n=30) [subjects completing both in and off-season]

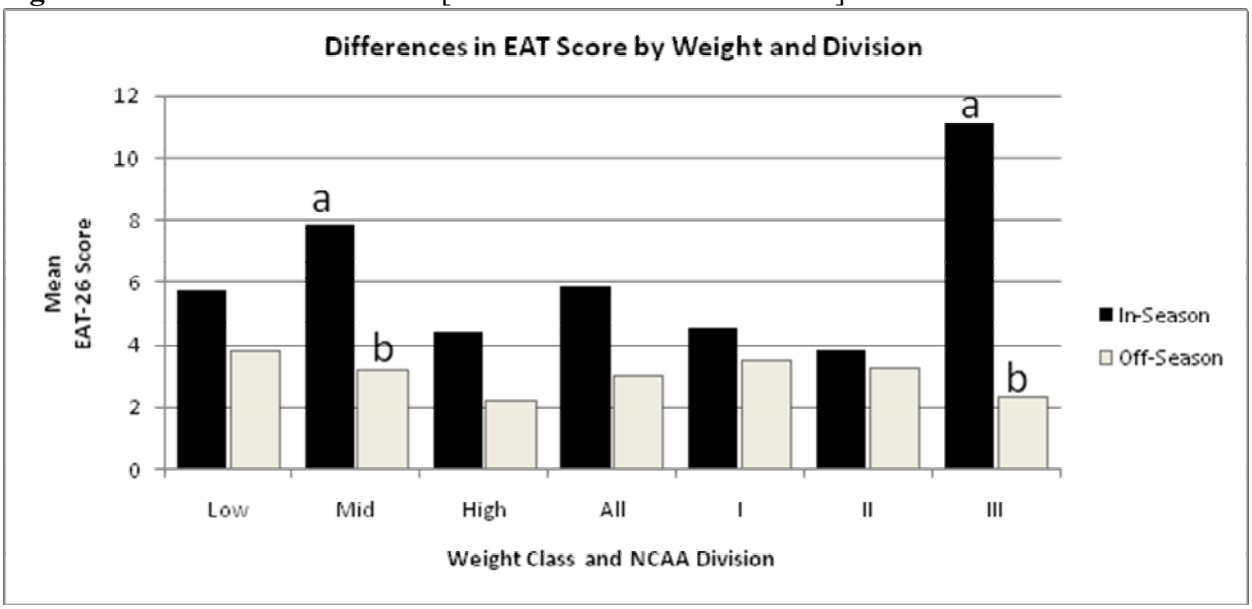
	Mean (s.d)	Returning Varsity Wrestler	NCAA Division	Weight	Yr. on team	Yrs. School	Race
Age	20.37(1.35)	Yes (n=11)	I (n=17)	Low (n=21)	1 (n=6)	Freshman (n=6)	White (n=27)
		No (n=19)	II (n=9)	Mid (n=23)	2 (n=9)	Sophomore (n=9)	Hispanic (n=1)
			III (n=22)	High (n=4)	3 (n=8)	Junior (n=8)	Native Am. (n=0)
					4 (n=5)	Senior (n=6)	Other (n=1)
					5 (n=2)	Senior + (n=1)	NR=1
					6+ (n=0)	NR=0	*mixed ethnicities

Figure 4: Distribution of subject completing both in and off-season EAT-26 (n=30)



To model the effect of demographic information [age, years on team, varsity status, weight class, season, and NCAA division] on EAT-26 scores GLM was performed. The only significant effects on EAT-26 score were season (in v. off) and previous year varsity status (varsity v. non-varsity). There were no significant interactions for season x varsity status, season x weight class, season x NCAA division or season x varsity status x weight-class x NCAA division. The back-transformed mean difference in seasonal EAT-26 scores (95% C.I.; in-season – off-season) was 1.71 (1.03, 2.86) [P=0.0396]. Without the effect of season, the overall back-transformed mean score for non-varsity wrestlers was 2.78, while the mean score for previous season varsity wrestlers was 6.27 [mean back-transformed difference (95% C.I.) 1.92 (0.19, 3.09); P=0.0083]. Refer to figures 5-7 for interaction plots and charts.

Figure 5: In vs. off-season scores [without Bonferroni correction]



-Back-transformed geometric means
*Significant difference among mid weight wrestlers between seasons P=0.0263
*Significant difference in scores by season for Division III wrestlers P=0.0281

Figure 6: Interaction plot by weight class (back-transformed geometric means)

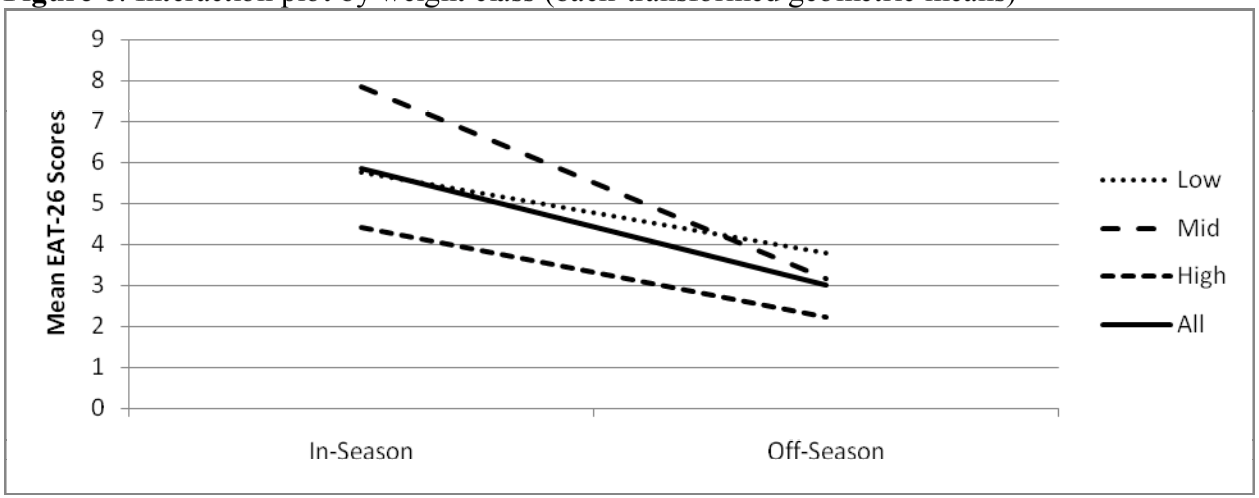
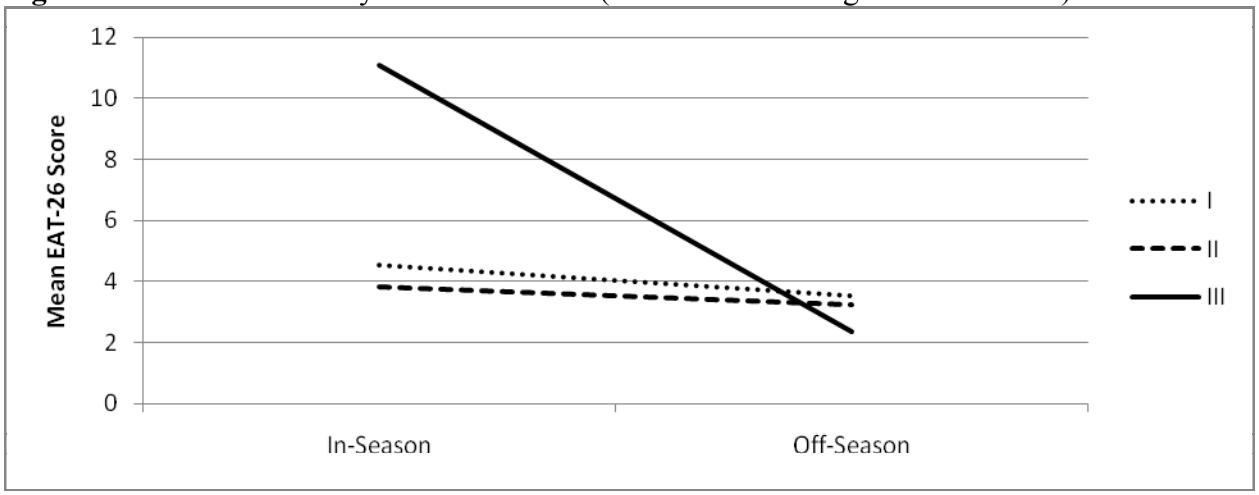


Figure 7: Interaction Plot by NCAA Division (back-transformed geometric means)



Although there was no significant effect for season x weight, there were note worthy differences in scores. There were significant differences in mean EAT-26 scores for mid-weight wrestlers between seasons, but not for low or high-weight wrestlers when looked at separately in this model [back-transformed mean (95% C.I.; In 7.84 (4.53, 13.12) Off 3.17 (1.61, 6.66); P=0.0263; α=0.003 correction for multiple comparisons]. Additionally, NCAA division III wrestlers had a significant decrease in EAT-26 scores between season, but this was not apparent for the other divisions [back-transformed mean (95% C.I.) In- 11.09 (4.34, 26.37) Off- 2.37 (0.49, 6.62); P=0.0281; α=0.003 correction for multiple comparisons]. Refer to figures 5-7 for changes between seasons.

Discussion

This current study provides the only known assessment of dietary intakes of NCAA wrestlers during the competitive wrestling season and during the off-season since the 1997 NCAA rule changes to blunt dangerous weight-loss methods. These results provide general insight into eating patterns of Minnesota NCAA wrestlers but may only be applicable to the study population. Key findings during the competitive season included: high weight wrestlers consuming more servings of dairy per 1,000 kcal as compared to low and mid-weight wrestlers, low-weight wrestlers consumed fewer grams of carbohydrate per 1,000 kcal as compared to mid-weight wrestlers and obtain a smaller percent of kcal from carbohydrate versus mid-weight wrestlers. Low-weight wrestlers also consumed more grams of discretionary fat per 1,000 kcal as compared to mid-weight wrestlers. A surprising finding was that low-weight wrestlers consumed significantly

more alcohol than high-weight wrestlers [either as grams per 1,000 kcal or as a percentage of energy], but there was no difference between low v. mid or mid v. high.

There exists no concrete supporting evidence to either verify these intakes or to directly compare against. Anecdotally, one may speculate that high weight wrestlers consume more dairy servings since they may be on less restrictive diets as compared to their counterparts. Overall, low-weight athletes consumed less carbohydrate and a greater percentage of energy from fat and alcohol. This could indicate that this was simply the preference of the low-weight sample or that the external influences during a wrestling season shape eating preferences. Off-season analysis revealed there were no significant differences among foods/groups of interest and weight classes, thus demonstrating there could be a normalization of diet for low-weight wrestlers post-season.

When directly comparing the subjects who completed both the in and off-season Diet History Questionnaires (n=24) there was a significant decrease in percent of energy from carbohydrate [all weight classes combined]. This is likely explained by a shift in macronutrient consumption toward alcohol, yet this is not conclusive. This study did not reveal a significant change in either caloric consumption or grams of food consumed between seasons. Enns et al. reported that there was a significant decrease in caloric intake during the wrestling season (n=19) [12]. This finding could be due to sample size and a time in wrestling history where more extreme weight-loss methods were acceptable. In the current study, there was no attempt made to differentiate between food intakes and NCAA divisions since the results would not be applicable to a larger

population and due to low sample size. This study focused on distinguishing between food patterns based on weight-classes as it has been reported that lower weight wrestlers engage in more extreme dieting behavior [16].

As earlier stated, one should skeptically view the results from FFQ's and not interpret the reported results as absolute intakes. While the DHQ has modest correlations with true intake [18,19] and has been validated against other instruments, there was no such validation in this study, nor were there control comparison groups (ex. free living population). Some professionals have even recently questioned the use of FFQ's in research for their poor correlations with true intake and correlations with doubly-labeled water [21, 24]. In this exploratory analysis the use of a FFQ was appropriate and the only feasible way to assess these athletes based on sample size and budget. The sensitivity and accuracy of the FFQ used, coupled with a low sample size, likely attenuated any other 'true' differences among season or weight classes. This study possibly demonstrates that these NCAA teams should aliquot more time in monitoring the nutrient intake of their athletes to ensure NCAA compliance with rules [alcohol consumption] and to ensure nutritional adequacy in athletes' diets.

The current study does not provide much supporting evidence for the existence of eating disorders as defined by the EAT-26, but may indicate disordered eating. The geometric mean in-season score was 4.64 and the cut-off for further screening by a medical professional is 20 or above. Two subjects did meet the criteria for additional screening during the wrestling season (2/62). The most frequent (point scoring) questions from this

study were similar to that of Enn. et al. [12]. Common to both were displaying self-control around food, engaging in dieting behavior, aware of the calorie content of food I eat, and think about burning up calories when I exercise [note: the original Eating Attitudes Test had more questions and a different criteria for additional screening-site]. From this study it is not possible to tease out the relationship between the source of these disordered eating thoughts or if they are simply inherent to the sport. You can assume any wrestler who is "cutting weight" will undoubtedly engage and report in the behaviors previously stated since it is in the nature of weight-loss. A wrestler successfully "cutting-weight" would want to display self-control around food, be aware of calories consumed, eat perceived diet foods, avoid eating before a weigh-in and think about weight loss as they practiced. This study was blinded to investigators and it is unknown if the athletes scoring ≥20 on the EAT-26 either sought a professional screening or were diagnosed with an eating disorder.

In this study mid-weight wrestlers scored significantly higher than high-weight wrestlers for the in-season EAT-26, while there was no difference between low and high or low and mid-weights. Wrestlers who were varsity status in the previous season had significantly higher scores than their non-varsity counterparts. During the season Division III wrestlers had the highest scores as compared to the other divisions. In the current study years on team or academic year in school was not a significant predictor of EAT-26 scores.

Related research, not using EAT-26, [16] reported freshmen in all three NCAA divisions had the most weight loss compared to other academic years. Oppliger (2003) reported that Division II athletes were more extreme in weekly weight loss and lost a greater percent of weight compared to the other divisions. In this study Division III wrestlers displayed a greater frequency of weight-loss behavior than Division I, with no difference between DI v. DII or DII v. DIII. Previous research has also concluded that weight-management behaviors among lighter weight classes are more extreme than heavier weight-classes, but this was not evident in this study [16, 25].

Compared to Oppligers 1999 cohort [16], 61.3% of Minnesota wrestlers used gradual dieting throughout the season as compared to 79.5% in a broad study. Increased exercise as a weight loss method had similar proportions with this previous study: current 72.6% v. 75.2% (defined as three or more times per week). There was a decreased proportion of athletes restricting food (33.9% v. 45.5%), and increased restricting fluids (24.2% v. 20.5%) at least 3 times per week, current study compared to Oppliger et al. The Minnesota cohort also reported a more frequent use of diet pills (once per month or greater) and laxatives than in Oppliger et al. [4.8% v. 3.9% and 4.8% v. 3.2%]. Although there appears to be an increased frequency of reporting these weight-loss behaviors as compared to a 1999 cohort, there is a decrease in frequency as compared to NCAA wrestlers pre-1997. Self-reported food restriction decreased daily by 6.7%, 3-4/week decrease by 29.4% and an increase or shift by 12% reporting once per week [14]. Fluid restriction frequency has also decreased by ~5% daily, and by 21% for wrestlers reporting 3-4/week. There is also an increase in the % of athletes never reporting using

saunas or sauna suits (plastics) [67.7% v. 22% and 70.9% v. 10%] [14]. Oppliger noted that the likely decrease in extreme weight-loss behavior could be attributed to athletes knowledge of the new rule changes and it appears that this trend has continued, despite the fact athletes are still breaking NCAA weight-loss rules.

In this study there was an established relationship between increased EAT-26 scores and weight-loss methods or years on current wrestling team. Increases for years on team, frequency of gradual dieting, restricting fluids and increased exercise all increased subjects' odds of scoring above 10 on the EAT-26. Overall, there were significant decreases in EAT-26 scores from the competitive wrestling season to the off-season and a significant effect for season on EAT-26 scores. One wrestler reported an off-season EAT-26 score ≥20, but no information exists on a diagnostic referral to a health professional. The prevalence of disordered eating/eating disorders [based on EAT-26] were low in this study (~3% of the population in season and ~3% in the off-season), as has been also reported in wrestlers. In Oppligers study, only 1 wrestler met criteria for bulimia (using EDI/DSM IVcriteria) [16] and Dale et al.'s investigation of male high-school wrestlers revealed 36% scored above pre-set cut-offs for eating disorders (based on DSM IV, Drive for thinness, Bulimia, or Body Dissatisfaction) during the wrestling season with no subjects meeting all criteria for diagnosis after a professional interview [17]. Dale et al. had a decrease in the number of wrestlers meeting pre-set criteria in off-season (19%). Lakin et al. estimated the prevalence of bulimia among high school wrestlers, using DSM-III and DSM-III-R criteria, at 2.8% and 1.4% respectively. More than half of the sample reported binge eating episodes [15]. The present and former

studies may indicate a resolution of disordered behavior as an athlete transitions into the off-season, but does this mean they are not at risk for future disordered eating behaviors? Antonia Baum contends that at risk athletes, such as wrestlers, tend to revert to disordered behavior outside the context of their sport and these behaviors get incorporated into an athletes' psyche and coping strategies [26]. There have not been any long term studies to confirm this hypothesis among male wrestlers.

What remains unclear in this study, and previous, is why EAT-26 scores and/or weight-loss methods differ among NCAA Divisions. One explanation could be that these differences are localized only to the specific teams at specific time points (or simply limited to the subject population). Another is that there may be intrinsic differences in the way Division I, II, and III are organized and by the subjects that compete at these different levels. There may be a difference in wrestling program budgets among divisions, allowing for more or less staff members (athletic, academic and medical), thus programs may differ in the strength of support staff to monitor athletes. NCAA Division I and II athletes may receive athletic scholarships to attend their respective institutions, while Division III does not. Amongst these divisions there may exists a hierarchy of athletic ability and success, with the most successful attending Division I programs. If success is a function of mental capability and success in weight loss, then possibly pre-existing factors influence wrestlers with less disordered eating/weight loss practices to attend different divisions.

On the other hand, it is just as likely the support staffs at respective institutions develop and foster different norms in eating behavior and weight loss practices. It may be that the most successful coaching staffs congregate at the most elite level (Division I) or most successful school within a division. The most successful coaching staffs are compromised of former athletes achieving high levels of success in the sport as well. Anecdotally, success breeds success, therefore the attitudes and practices promoting success get passed down to current athletes. There has not been any conclusive research exploring success in NCAA wrestling and eating behavior or weight loss practices. Overall, it may not be justifiable in claiming that successful wrestlers exhibit less disordered eating patterns or weight loss practices because it remains unknown. Research in high school wrestlers revealed wrestlers competing below minimum wrestling weight was associated with greater wrestling success [25]. And Oppliger et al. postulated that Division II wrestlers may feel overlooked and therefore, more willing to make greater sacrifices to achieve success [explaining why Division II exhibited more extreme weight loss behavior] or that these differences are just a factor of sample and do not reflect true differences [16].

The current study has several limitations that may limit the applicability of the research findings. The data presented in this study only characterizes the five participating institutions and the athletes completing these assessments. Only 74/119 subjects completed the 1st DHQ, with only 24/119 completing both in-season and off-season DHQ. Sixty-two of the 119 recruited subjects completed the in-season EAT-26 and weight-loss methods survey, while only 30 subjects completed the off-season EAT-26.

This sample also represented varsity and non-varsity, including heavy-weights, which could have skewed both DHQ and EAT-26 results by not specifically targeting athletes most at risk for disordered eating. The limitations of using FFQs to define this population have previously been discussed. The use of the EAT-26 to assess eating behaviors/attitudes is common and widely used but alone it fails to give estimates of actual eating disorders and disordered eating. This tool has been widely used in athletics and was originally validated using females as a reference. There is a possibility that this instrument is not valid for male athletes or for collegiate male wrestlers since there have not been specific validation studies with this population.

The strengths of this study include the integration of technology into research, the novel assessment of dietary intakes for this population since current NCAA guidelines on weight-loss, and the examination of the weight-loss factors and effect on EAT-26 scores. The use of online assessment tools for subjects allowed subjects to remotely complete the study surveys at their own convenience. This effectively reduced participant time burden and possibly social desirability issues with completing surveys in person, amongst teammates. To our knowledge this is the first study that attempted to define NCAA wrestlers dietary intakes on a more compressive level, thus providing more in-depth information to be used by coaches, regulators, and dieticians associated with these athletic teams. Previous research has attempted to use statistical modeling to correlate components of weight-loss and binge scale scores [15] with success, this study provided estimates of the odds of increased scores on eating behavior assessment. There is a distinct temporality or causal issue with concluding these weight-loss behaviors directly

influence EAT-26 scores, but these estimates do help in understanding the factors that may be associated with these behaviors.

It appears that the rule changes implemented by the NCAA's Committee on Competitive Safeguards continues to attenuate the use of more extreme weight-loss behaviors, as compared to historical data, but the question remains, "have these safe-guards actually improved mental health of these athletes?" Two previous studies have indicated the new guidelines have reduced unhealthy weight-cutting and weight-loss [5, 6]. Based on the results of this study and previous studies, there are still athletes reporting extreme weight-loss behaviors and exhibiting patterns of disordered eating, albeit at a low frequency. The NCAA and other interested health organizations now need to assess the long-term ramifications of still existent practices on the overall health and long-term health. It is also apparent that regulation of prohibited weight-loss practices needs to be increased to further deter the NCAA wrestlers partaking in these practices.

In regard to the statistical analysis within this exploratory research significance levels may be reported at both at α=0.05 or with an alpha correction. It is important to report both levels for this exploratory analysis since there were multiple tests of significance (ANOVA/GLM LSmeans) within the study. But caution should be taken when interpreting these results without an adequate understanding of the nature of the correction used. For example, in this present study we compared dietary patterns between the competitive wrestling season and off-season for the 19 variables of interest resulting in an alpha correction of ~0.0026 for significance for the universal null

hypothesis (no differences among season). If one or more of the tests has a significance level at or below this value we reject the universal null hypothesis and say there are differences among the groups. We can conclude there are differences but cannot state which or how many variables differ without further analysis. Thus, the correction may not address the null hypothesis of interest [31]. In the present study significant findings were reported among specific variables when the overall effect may have been insignificant (accepting the universal null) because the nature of this research was to explore and report these specific differences among variables of interest. It is worth noting that you cannot decrease the type I error rate (rejecting the null hypothesis when it is true) without increasing the type II error rate (failing to reject the null when it is not true) [31]. Thus, it is likely that using an alpha correction for multiple sections of this study resulted in finding differences when they did not truly existed, just as the correction resulted in accepting no differences when they truly did exist among this cohort. The results of this study should be used to generate more specific hypotheses to be tested among the wrestling community. The majority of wrestling research on weight loss, diet patterns and food intakes has been exploratory. It is time for more longitudinal, case-control and/or intervention research to blunt the negative aspects of this sport and ensure the safety of the athletes participating in it.

Summary

The dietary intakes of Minnesota NCAA wrestlers varies within the competitive season among weight classes for specific nutrient components [dairy servings per 1,000 kcal higher in high weight wrestlers, lower intakes of CHO and % energy from CHO in low

weight wrestlers, and higher intakes of alcohol in low-weight wrestlers]. There were no differences in selected nutritional components during the off-season by weight-class and overall, % energy from CHO decreased from the competitive season to the off-season.

Disordered eating behaviors/attitudes still exist during the competitive season and mid-weight wrestlers exhibited higher EAT-26 scores as compared to high-weight wrestlers. Previous year varsity wrestlers also exhibited higher EAT-26 scores during the wrestling season as compared to previous year non-varsity wrestlers. There is still a high prevalence of athletes reporting prohibited weight-loss behavior as compared to previous research. Logistic regression demonstrated a possible relationship between increased EAT-26 scores and age, years on current team, varsity status, gradual dieting, restricting fluids and increased exercise. There was a significant decrease in EAT-26 scores from the competitive wrestling season to the off-season. Further NCAA rules regulation and research needs to be instituted to continually ensure the safety of these athletes.

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Appendix A

Consent to Solicit Athletes

Athlete Consent Form

Minnesota Wrestling Nutrition Study:

Minnesota NCAA Wrestling Coaches,

You are invited to participate in an upcoming University of Minnesota study, through the department of Food Science and Nutrition. The purpose of this study is to assess: i. changes in dietary patterns and (ii.) eating attitudes during the wrestling season and off season

Reason for research: There are a limited number of scientific nutrition studies on wrestlers. The information that is available provides some insight into the dietary habits of this population but does little to provide enough information that could be beneficial to the health of these athletes.

Why you should care or participate: The results of this study, and the results of possible subsequent studies, could be directly applicable to your programs. By identifying areas of nutritional concern, we may be able to make sound nutritional recommendations on diet, nutrition education, supplement use and possibly disordered eating patterns.

What is your burden if you choose to participate: There will be a limited time burden for your staff and athletes. As participants in this study: athletes will be completing three nutrition assessments (a) the Diet History Questionnaire (DHQ), (b) Eating attitudes, and (c) weight-loss practices . One DHQ will be administered online during the middle/end of the wrestling season and another online DHQ will be completed 1+ month(s) out of the wrestling season. At the same time as the DHQ is administered, athletes would also complete a dietary attitudes assessment called the EAT-26, and a weight-loss practices (only once during the season). If athletes meet a threshold score on the EAT-26 they will be asked to complete one additional survey, Eating Disorder Diagnostic Survey (EDDS), to estimate the prevalence of eating disorders in this population (estimated time 10 minutes).

Estimated Time Burden: DHQ x 2 (45 – 60 min) = 90 – 120 minutes

Demographics, EAT-26 and weight-loss methods (15 – 20 min) = 30 – 40 minutes

Total = 120 – 160 minutes (2 hr – 2 hrs 40 min)

Since these assessments can be taken online, it should not interfere with any of your scheduled practice or competition time. If you choose to participate there will need to be a meeting between myself and all of your wrestlers willing to participate; this time will be used to obtain consent forms, gather contact information and to explain the study. This should take no longer than a half an hour.

Timeline: January to March- on campus visit to recruit participants, completion of 1st DHQ, and EAT-26 (*EDDS if applicable)

April to early June – completion of final DHQ, and EAT-26 (*EDDS if applicable)

June to July – data analysis and research dissemination

Participation in this study is completely voluntary and participants have the freedom

to leave the study at any time.

As an active member in the wrestling community, I implore you to seriously consider participation in this research. As a former high school coach and former collegiate wrestler I personally know the time constraints involved in a typical season and assure you that participating in this study is a feasible option. All information will be kept confidential and participation would be completely voluntary.

If you would be willing to participate in this novel research please complete the consent form on the next page, print, date, and sign this document for access to athlete. Then mail, fax, or scan a copy back to us as soon as possible. We need these forms completed before our research project goes before the Institutional Review Board for clearance.

Sincerely,

Andy Strand

Primary Investigator
University of Minnesota
Department of Food Science and Nutrition-Masters Candidate

170 FSCN
1334 Eckles Ave
St. Paul, Minnesota 55108

Phone: 612-423-0380
Fax: 612-625-5272 attn: Andy Strand
E-mail: stra0463@umn.edu

Consent to Solicit Athletes:

Name of College or University_____

Name of Head Wrestling Coach and/or Athletic Director Completing This Form (Print Name)

_____

_____

_____ Date: _____
Signature of Head Coach

_____ Date:_____
Signature of Athletic Director
(if applicable)

UNIVERSITY OF MINNESOTA

Twin Cities Campus

Department of Food Science and Nutrition
College of Food, Agricultural, Natural Resource Sciences

Food Science and Nutrition
1334 Eckles Avenue
St. Paul, MN 55108-1038

CONSENT FORM
Minnesota Wrestling Nutrition Study

You are invited to participate in a research study on nutritional and dietary patterns of collegiate NCAA wrestlers. You were selected as a possible participant because of your current NCAA eligibility status at your institution. We ask that you read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by: Andrew T. Strand and Linda J. Brady, Department of Food Science and Nutrition (University of Minnesota)

Background Information

The purpose of this study is: To determine if there is a difference in food consumption and attitudes toward eating during the competitive wrestling season and during the "off" season or non-collegiate wrestling season.

Procedures:

If you agree to be in this study, we would ask you to do the following things:

Toward the end of this competitive wrestling season you will be asked to complete an online Diet History Questionnaire (45-60 minutes), and a second online survey assessing your demographic information, eating attitudes, and weight loss practices (15-20 minutes).

After the collegiate wrestling season you will, again, be asked to complete another online Diet History Questionnaire (45-60 minutes), and a second online survey assessing this seasons wrestling record, and eating attitudes (15-20 minutes). Depending on the results of the eating attitudes survey, you may be asked to complete an additional survey on your more specific eating attitudes (an additional 10 minutes if applicable).

Total Time commitment: 2 hours to 2 hours 40 minutes

Risks and Benefits of being in the Study

The study has several risks: Completing these surveys could potentially cause anxiety based on the probing nature of the questions. The Diet History Questionnaire will ask you specific questions about what foods you eat and the frequency. The eating attitudes survey (EAT-26) and potentially, the Eating Disorder Diagnostic Survey will ask you probing questions on your attitudes regarding food and eating. The weight-loss practices form will ask you to divulge your weight loss practices. The risk level is relatively low, and participation in any portion of these surveys is completely voluntary. You will not need to respond to any question that you feel is inappropriate.

The benefits to participation are: There are no direct benefits to you as a study participant.

Compensation:

You will not receive payment or compensation for your participation in this study.

Confidentiality:

The records of this study will be kept private. In any sort of report we might publish, we will not include any information that will make it possible to identify a subject. Research records will be stored securely and only researchers will have access to the records.

Voluntary Nature of the Study:

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota or your respective wrestling institution [Augsburg College, St. Cloud State University, St. Johns University, Minnesota State University-Mankato, Minnesota State University-Moorhead, Concordia College, or Southwest Minnesota State University]. If you decide to participate, you are free to not answer any question or withdraw at any time with out affecting those relationships.

Contacts and Questions:

The researchers conducting this study are: Andrew Strand and Linda J. Brady. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact them at the University of Minnesota, phone 612-423-0380 or 612-624-9211, or e-mail Stra0463@umn.edu or LBrady@umn.edu.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), **you are encouraged** to contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.

You will be given a copy of this information to keep for your records.

Statement of Consent:

I have read the above information. I have asked questions and have received answers. I consent to participate in the study.

Signature:_____

Date: _____

Signature of Investigator:_____

Date: _____

Appendix B

In-Season Survey [Demographics, EAT-26 and Weight Loss Methods]

Off-Season Survey [Demographics, Follow-up and EAT-26]

Link, Username and Password for Diet History Questionnaire

In-Season Survey (paper format; administered online)

Section 1: **Demographic Information**

Complete this section to the best of your knowledge

1. What is your age? *Circle one* <18, 19, 20, 21, 22, 23, 24, 25+

2. Years on current wrestling team (*circle one)*: 1 2 3 4 5 6+

3. What academic year are you in school (absolute year, count redshirt years)? *Circle one*

Freshman, Sophomore, Junior, Senior, Senior +

4. What race do you identify with (may circle more than one): Hispanic, Asian (non-Hispanic), Black or African American (non-Hispanic), Pacific Islander, White (Caucasian), American Indian (Native American), Other (please specify)_____

5. Weight information: Current weight_____ Highest weight (during season)_____

Lowest weight (during season)_____

How tall are you? ____feet ____inches

What weight class(es) are you competing at this season (indicate if more than 1)? *Circle appropriate weight class*

125, 133, 141, 149, 157, 165, 174, 184, 197 and heavy weight

Were you on the varsity squad last season? Yes or No

6. What NCAA division is your wrestling team (*circle one*)? Division I, Division II, or Division III

Section 2: Eating Attitudes during the Wrestling Season (EAT-26):

Please choose a response for each of the following statements that reflect your current eating attitudes (during the competitive wrestling season), only circle one response per question:

1. Am terrified about being overweight: Always, Usually, Often, Sometimes, Rarely, Never

2. Avoid eating when I'm 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 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 food I eat: Always, Usually, Often, Sometimes, Rarely, Never

7. Particularly avoid food with a high carbohydrate content (bread, rice, potatoes, ect)

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 I'm 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 that 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 my 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. Like my stomach to be empty: Always, Usually, Often, Sometimes, Rarely, Never

25. Have the impulse to vomit after meals: Always, Usually, Often, Sometimes, Rarely, Never

26. Enjoy trying new rich foods: Always, Usually, Often, Sometimes, Rarely, Never

Section 3: **Weight loss-practices**
During this wrestling Season how often do you use the following methods to lose weight? *Check all that apply:*

Method	Daily	3-4 times per week	Once per week	Every 2-4 weeks	Never
Gradual Dieting					
Restricting food or skipping meals (1 or 2 meals)					
Fasting (not eating all day)					
Restricting fluids					
Increased exercise					
Heated wrestling room					
Saunas					
Rubber/Plastics/Sauna Suit					
Spitting					
Laxatives					
Diet Pills					
Diuretics					
Enemas					
Vomiting					

"Off-Season" Survey (paper format; administered online)

Section 1: **Demographic Information**

Complete this section to the best of your knowledge

1. Weight information: Current weight_____ Highest weight (off-season)_____

Lowest weight (off-season)_____

How tall are you? ____feet ____inches

2. What weight class(es) did you compete at this season (indicate if more than 1)?

125, 133, 141, 149, 157, 165, 174, 184, 197 and heavy weight

3. Did you receive a Varsity letter or expect to be a letter winner? Yes or No

What was your competition record for this season: _____ Wins _____ Losses

Were you an All-American this year (if you placed in the top 8 at your national competition)? Yes or No

Section 2: Eating Attitudes during the non-collegiate Wrestling Season (EAT-26):

Please choose a response for each of the following statements that reflect your current eating attitudes during the "non-collegiate" wrestling season or "off-season," only circle one response per question:

1. Am terrified about being overweight: Always, Usually, Often, Sometimes, Rarely, Never

2. Avoid eating when I'm 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 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 food I eat: Always, Usually, Often, Sometimes, Rarely, Never

7. Particularly avoid food with a high carbohydrate content (bread, rice, potatoes, ect)

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 I'm 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 that 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 my 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. Like my stomach to be empty: Always, Usually, Often, Sometimes, Rarely, Never

25. Have the impulse to vomit after meals: Always, Usually, Often, Sometimes, Rarely, Never

26. Enjoy trying new rich foods: Always, Usually, Often, Sometimes, Rarely, Never

DHQ Link and Password

https://riskfactor.cancer.gov/respondent.html
Study Code: Wrestler
Respondent ID: 547402A
Password: ZB3317GA