Northern Illinois University

A Comparison of Eating Patterns and Nutrition Knowledge Of Athletes and Non-Athletes at Northern Illinois University

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Abstract

Objectives. This study compared eating patterns, basic nutrition knowledge, patterns of food label utilization, and dietary supplement use of athletes and non-athletes at Northern Illinois University (NIU).
Methods. A questionnaire was administered to volunteers from NIU's men's swimming (n=19), women's swimming (n=21), and women's gymnastics teams (n=13), as well as a control group of males (n=17) and females (n=41).
Results. Nearly all of the athletes (92.5%) reported that their physical activity level was either heavy or exceptional, while only 58.5% of FC and 58.8% of MC subjects reported similarly. The MS group reported eating most often, at 3.1±0.9 meals per day. Members of the WS, GT, and MC groups reported meal numbers at 2.8±0.9, 2.8±0.9, and 2.8±0.6, respectively. The FC group consumed the least number of meals per day, at 2.7±0.8. There were positive correlations between level of physical activity and number of daily meals for all groups (MS=0.2, WS=0.2, FC=0.1, MC=0.6) except the GT group (-0.2). In the nutrition knowledge section, the FC group had the highest total mean percent correct (76.7%), followed by MC (69.8%), WS (66.8%), MS (64.9%), and GT (62.3%) groups.
Conclusions. There appeared to be minimal differences in eating patterns between groups of athletes and the control groups, and only a very small correlation between number of meals consumed per day and level of physical activity. In addition, the hypothesis that the athlete groups would demonstrate superior nutrition knowledge was rejected, as each athlete group scored lower than controls in overall nutrition knowledge. The results of this study provide useful information for those individuals working with elite athletes, specifically of the National Collegiate Athletic Association (NCAA) Division I level.

A COMPARISON OF EATING PATTERNS AND NUTRITION KNOWLEDGE OF ATHLETES AND NON-ATHLETES AT NORTHERN ILLINOIS UNIVERSITY

T.J. Shields

Introduction

With the exception of genetics and physical potential as a result of training, no other single factor plays a larger role in athletic performance than nutrition (1,2). As a result, sports nutrition has become a primary focus of nutritionists, physiologists, coaches, trainers, athletes, and a variety of other professionals in the field of sports and human performance in the past 35 years (2).

There also has been a great deal of information regarding perceptions and misunderstandings surrounding nutrition and physical performance within athletic circles. Unfortunately, one of the misconceptions that have surfaced is that many athletes assume that achievement is linked with low body weight or fat content (3). Individuals involved with sports also face a myriad of other pressures, including emphasis placed on the body within the sports context, personality characteristics of athletes, early start of sport specific training, and the pressure from coaches, parents, and other participants to reduce body size for competition (4,5).

It has been suggested that certain sports attract certain individuals who are anorexic, at least in attitude, before they even begin to participate in the sport. In addition, some suggest that many anorexics are attracted to sports in which they can "hide" their illness and impede intervention, such as in endurance sports, which emphasize leanness and high training volume. These individuals abuse exercise to expend extra calories or to justify their abnormal eating behavior. This "attraction to sport" hypothesis seems valid in that it covers those individuals who already have an eating disorder, or those who are at high risk for developing one (4).

Another hypothesis centers around the personality characteristics that athletes and individuals with eating disorders share. Competitiveness, perfectionism, compulsiveness, drive, and self-motivation are just a few of these traits (5). Athletes, especially the elite, are often described as compliant, successful, academically over-achieving, obsessive, shy, introverted, and anxious. It seems that the same qualities that make one an exceptional athlete also influence one to be an "exceptional" anorexic (4,6).

Athletes with eating disorders have been shown to begin sport-specific training much earlier than the athletes who do not meet eating disorder criteria. As the 20th century has progressed, children have begun sport participation at earlier ages. The disadvantage to this early sport-specific training is that such focus at a prepubertal age may prevent a child from choosing the sport that is most suitable for his or her adult body type. Also, there is alignment of personal or familial history of overweight as a risk factor for eating disorders because it places a barrier to achieving the thinness demanded by some sports, such as gymnastics and long distance running (4).

A final consideration into the reasons an athlete may develop an irregular eating pattern focuses on the pressure to reduce weight. This pressure can come from a number of sources, not limited to coaches, parents, other participants, and from within the individual. Coaches probably have the biggest impact on athletes' perceptions. In 1988,

Rosen and Hough reported that 75% of athletes who were told by their coaches that they were too heavy started using pathogenic weight loss methods. Several researchers have found that too few coaches and trainers responsible for athletes have a formal education in sport or eating disorders (4). As a result, professionals studying athletes have become concerned that an increased pressure for body weight loss and enhanced athletic performance may lead to eating disturbances or even subclinical eating disorders in this population (3).

Although many studies have shown that athletes and coaches think nutrition is important, the results of many of these studies demonstrate an overall lack of nutrition knowledge (6). The purpose of this capstone study was to evaluate the eating patterns, frequency of food label use, and fundamental nutrition knowledge of a group of intercollegiate athletes at Northern Illinois University, and then compare this information with a control group of undergraduate, non-athletes within the university. It was predicted that the eating patterns of the athletes and non-athlete controls would differ considerably, specifically in regards to the correlation between physical activity and number of meals consumed daily. Also, it was hypothesized that the athlete groups would demonstrate superior nutrition knowledge, attributed primarily to the identifiable link between nutrition and physical performance (1,2).

Method

Subjects

This study surveyed 112 undergraduate students attending Northern Illinois University in DeKalb, Illinois. Participation in the study was voluntary, and subjects were divided into two groups, athletes versus non-athlete controls. Non-athlete controls were recruited in their introductory nutrition course or at their place of residence, and those willing to participate completed a subject informed consent document and questionnaire. All participants were guaranteed complete confidentiality. The control group consisted of 42 female and 17 male students. One female participant in this group was currently involved in sport beyond the recreational level, and was subsequently removed from the study. The final control group sample consisted of 41 females (FC) and 17 males (MC).

Collegiate athletes were approached at team practices, and those willing to participate signed a subject informed consent document and completed the questionnaire. The athlete group consisted of 19 males on the men's swimming team (MS), 21 females on women's swimming (WS), and 13 females from the gymnastics team (GT). All athletes who were approached agreed to participate in the study. The Institutional Review Board of Northern Illinois University approved all procedures for use of human subjects.

Each participant completed a detailed questionnaire concerning eating patterns, extent of food label use, basic nutrition knowledge, and dietary supplement use. The questionnaire took between five and ten minutes to complete.

Data Collection Instrument

The questionnaire consisted of five sections: 1) collection of demographic and anthropometric data, 2) eating patterns, 3) basic nutrition knowledge, 4) patterns of food label use, and 5) extent of dietary supplement use. The first section of the questionnaire assessed self-reports of demographic data, such as athletic team participation, sex, age,

place of residence during the academic year, and anthropometric data, such as height, weight, feelings regarding ideal body weight, recent body weight change, and level of physical activity. From the reported height and weight, body mass index (BMI), a measure of relative morbidity, was calculated.

In the second section of the questionnaire, typical eating patterns were evaluated. Subjects were asked to record the total number of meals and snacks consumed per day, as well as the location where most (>1/2) of their meals are prepared each day. Subjects were also asked to report the average number of weekly meals consumed at fast food restaurants. Factors influencing food consumption were reported using a five-point, Likert-type scale, with subject responses ranging from *always* to *never*. Also included in this section was incidence of vomiting as a weight control method and frequency of dieting. Types of diets that study participants used to control weight were also reported.

Basic nutrition knowledge was evaluated in the third section of the questionnaire. Ten *true* or *false* questions were used for this evaluation. Percentage correct for each individual question and total percent correct for all ten questions were calculated and reported. The fourth section featured questions relating to the "Nutrition Facts" panel of food labels. Specifically, use frequencies of specific sections of the label were solicited from participants (e.g., calorie content, cholesterol content, sodium content, etc.), again using a five-point, Likert-type scale, with responses ranging from *always* to *never*.

The final section of the questionnaire focused on dietary supplement use. Subjects were asked about current and past supplement use, as well as specific supplements used (e.g., multivitamin, protein, creatine, etc.). In addition, participants were asked about their belief regarding dietary supplement efficacy.

Results

Table I shows the mean (±standard deviation), median, and range of height (in inches), weight (in kilograms), age (in years), and Body Mass Index of each subject group. BMI was calculated from self-reported heights and weights [BMI=weight(kg)/height2(m)]. In comparing these sets of data, the MS group reported being taller and heavier (71.8±2.6 in., 77.5±7.8 kg) than the MC group (69.7±2.7 in., 79.4±14.0 kg), but had a lower BMI, with means of 23.3±2.1 and 25.2±3.9, respectively. The WS group also reported being both taller and heavier (67.4±2.5 in., 64.7±4.7 kg) than both the GT (62.1±2.2 in., 57.8±4.0 kg) and FC (64.4±2.8 in., 62.6±14.9 kg) groups, and also had a lower mean BMI, at 22.1±1.4, than their female counterparts. The FC group reported taller heights and heavier weights than the GT group, but both groups had approximately the same mean BMI, at 23.3±2.3 and 23.3±5.0, respectively. Ages, in years, of the FC group ranged from 19 to 30 (20.3±1.9), the MC group ranged from 19 to 25 (21.8±1.8), the MS group ranged from 18 to 23 (20.1±1.5), the WS group ranged from 18 to 22 (20.1±1.2), and the GT group ranged from 19 to 21 (20.0±0.8).

During the academic year, place of residence was found to be very similar among all groups. The most common residence of all subject groups was an off-campus apartment, with the exception of the MC group, the majority of whom live in a residence hall. Table II shows the place of residence of each subject group.

Participants were asked to rate their ideal body weight, described as the amount they would like to weigh, as either more or less than their current body weight. Most (52.9%) of the MC group stated their ideal body weight as greater than their current body

weight. A large percentage of the MS group (42.1%) also reported their ideal body weight as greater than their current weight. In contrast, most members of each of the female groups (WS, GT, and FC) reported their ideal body weight as less than their current weight (81.0%, 92.3%, and 75.6%, respectively). Study participants were also asked to describe their normal daily level of physical activity, including exercise, by circling *light*, *moderate*, *heavy*, or *exceptional*. Nearly all of the athletes (92.5%) reported that their physical activity level was either heavy or exceptional, while only 58.5% of FC and 58.8% of MC subjects reported similarly. Most MC subjects (76.5%) and nearly every FC subject (92.7%) reported levels of physical activity as either light or moderate (Table III).

To assess eating patterns, participants were asked to report the number of meals and snacks they consumed each day, as well as the location where most (>1/2) of them were prepared. Subjects were also asked to report the number of meals from fast food restaurants they eat each week. Table IV summarizes this data. The mean number of meals per day did not vary considerably between groups. The MS group reported eating most often, at 3.1±0.9 meals per day. WS, GT, and MC all reported similar meal numbers, at 2.8±0.9, 2.8±0.9, and 2.8±0.6, respectively. The group consuming the least number of meals per day was the FC group, at 2.7±0.8. The MS group reported the most snacking per day (3.1±1.7), followed by WS (2.7±1.1), MC (2.3±1.4), FC (2.1±1.0), and GT (1.9±0.9). All groups reported that most of their daily meals were prepared at home most often.

There were small, positive correlations between level of physical activity and number of daily meals for all groups (MS=0.2, WS=0.2, FC=0.1, MC=0.6) except the GT group (-0.2). The MS and GT groups had a small, positive correlation between body weight and number of daily meals, at 0.4 and 0.2, respectively. A positive correlation was determined between number of daily meals and number of daily snacks for MS (0.4), WS (0.1), FC (0.4), and MC (0.2), while there was a negative correlation for the GT group (-0.2). Interestingly, there was a negative correlation between level of physical activity and number of daily snacks for the MS and WS groups (-0.1), while the GT group (0.4) and MC group (0.2) had a small, positive correlation. No correlation was found for the FC group (0.0).

Using a five point, Likert-type scale, with responses ranging from *always* to *never*, participants rated factors influencing their food choices. This data is summarized in Table V. Participants were asked were asked whether they had ever vomited in an attempt to control body weight. Although no male subjects reported using this pathogenic method, 19.0% of the WS group, 23.1% of the GT group, and 14.6% of the FC group responded affirmatively. Frequency of dieting revealed that most MC (82.4%), MS (68.4%), and WS (66.7%) participants, and to a lesser extent FC (41.5%) group members, had not dieted at all within the past year. In contrast to this, 92.3% of the GT group was either currently dieting or had dieted within the past month, six months, or year. In fact, 61.5% of this group was either currently dieting or had been within the month previous to the survey. Types of diets used by participants are displayed in Table VI.

The nutrition knowledge section consisted of ten statements for which subjects were asked to respond *true* or *false*. For each question, the percent of members of each group answering correctly was calculated. Total percent correct for each group was also

calculated. The FC group tallied the highest mean percent correct (76.7%), followed by MC (69.8%), WS (66.8%), MS (64.9%), and GT groups (62.3%). Results for each statement and total percent correct are displayed in Table VII.

With responses ranging from *always* to *never*, a Likert-type, five point scale was used by study participants to rate how often they use the "Nutrition Facts" portion of the food label the first time they purchase a food. The GT group uses this feature most often (2.2±1.3), followed by WS (2.6±1.3), FC (2.8±1.4), MC (3.3±1.2), and MS (3.7±1.3). In regard to the use of specific nutrients listed on the "Nutrition Facts" panel of the food label, participants were given a list of seven items and were asked to rate their use on an identical Likert-type, five point scale with responses ranging from *always* to *never*. These results are listed in Table VII. Subjects were also asked to identify whether ingredients were listed on the food label by weight from *most to least* or from *least to most*. The MS group had the highest percentage of group members answer correctly (100%), followed by the WS (90.5%), MC (82.4%), FC (75.0%), and GT groups (61.5%).

To evaluate dietary supplement use, study participants were asked about their current dietary supplement use. The GT group (46.2%) reported the largest percentage of group members currently using a dietary supplement, followed by the FC group (30.0%), the WS group (28.6%), the MS group (27.8%), and the MC group (23.5%). Types of dietary supplements that subjects reported using are included in Table VIII. All subjects were also asked whether they believe that taking a dietary supplement could significantly improve athletic performance. While more than half of the MS group (55.6%), WS group (65.0%), and FC group (69.2%) feel that taking a dietary supplement will not significantly improve athletic performance, 61.5% of the GT group and 52.9% of the MC group believe that it can. Also, there was a positive correlation between current dietary supplement use and belief that it will significantly improve athletic performance for all groups (MS=0.4, WS=0.4, GT=0.4, MC=0.2) except the FC group, which was found to have no correlation (0.0).

Discussion

Many athletes, specifically those engaged in aesthetic, endurance, and weight class events, believe that success is linked with low body fat or body weight (3). Picard found that all athletes in her study reported their ideal body weight as less than or equal to their actual body weight (7). Following this pattern, most members of both the GT and WS groups reported that their ideal body weight was also less than their current weight. On the contrary, more than half of the MS group and almost half of the MC group considered their ideal body weight to be higher than their current body weight. This contrasting difference in body image may be attributed to societal values. Although both males and females are taught to value leanness, females are encouraged to be thin while males are taught to value muscularity (5). Despite these feelings, the mean body weight of athletes in this study is within the ranges reported by previous researchers for both males (61-88 kg) and females (51.7-66 kg) (2).

A large difference in physical activity was reported by participants in this study. While 92% of female controls and 76% of male controls reported their daily physical activity level as light or moderate, over 92% of all athletes surveyed reported a level of heavy or exceptional. These results agree with previous research on college students,

which have reported low levels of regular physical activity (7). In addition, athletes in this study were recruited from aesthetic (gymnastics) and endurance (men's and wormen's swimming) sports. In a study by Sundgot-Borgen, athletes competing in aesthetic and endurance sports were found to have significantly higher training volumes than athletes competing in other types of sports (1). Thus, it would be reasonable to conclude that in comparison to NIU athletes competing in weight-dependent and ballgame sports, the athletes in this study have a significantly higher training volume.

It has been reported that athletes in training may require up to five times more calories than normal per day, depending on the sport and the intensity of exertion. Unfortunately, on days of high intensity competition, many athletes do not have a sufficient appetite to compensate for their energy expenditure (8). For athletes in this study, correlation between degree of physical activity and number of meals per day was very small, and likely was insignificant. The GT group even had a negative correlation between these variables. In addition, the average number of meals consumed per day for each athlete group was not much higher than the control groups. From these results, it can be inferred that most athletes probably are not meeting their caloric demands through regular meals.

Fortunately, both the MS and WS groups reported snacking more often than the control groups. This snacking probably helps to replete calories expended during intense training. On the other hand, the GT group reported less snacking and consumed approximately the same number of meals per day. There are conflicting opinions of why athletes such as this can continue to compete at a high level of intensity despite undernutrition. Some researchers have suggested that this is due to increased metabolic efficiency of their bodies in an attempt to conserve energy (1), while others have refuted this explanation (2). Regardless, it should be of some concern that athletes at the elite level may not be meeting their metabolic demands, despite any adaptations that may or may not be occurring within their bodies.

To reach an ideal weight, pathogenic weight control techniques, including laxatives, vomiting, fasting, and diet aides, can be used by individuals to comply with societal expectations of thinness. Use of these methods can also lead to disordered eating behaviors, including anorexia nervosa, bulimia nervosa (5), and specifically with athletes, anorexia athletica (4). Anorexia athletica has been used to describe athletes who show significant symptoms of eating disorders, but who do not meet the established criteria for anorexia nervosa, bulimia nervosa, or eating disorders not otherwise specified (NOS). Athletes with this disorder are categorized by having an intense fear of weight gain, restrictive energy intake, excessive or compulsive exercise, and binge eating followed by the use of pathogenic weight control techniques (4).

The use of pathogenic weight control techniques by athletes has been well documented in the scientific literature, with prevalence ranging from approximately 10% to 62% of athletes surveyed using at least one method (1,3,5,10). In addition, binge and purge trigger factors are thought to include too few meals per day that are spaced too far apart (1). In the current study, 14.6% (n=6) of the FC group, 19.0% (n=4) of the WS group, and 23.1% (n=3) of the GT group have vomited at least once in an attempt to control weight. In contrast, no members of the MS or MC group reported previous vomiting. The use of this technique can be very detrimental to athletes in intense training, as vomiting can reduce caloric retention by 50% (1). The possible caloric

inadequacy of many of the athletes in this study would be even more pronounced when considering those who may use vomiting on a regular basis.

Athletes are discovering what they perceive to be advantages of participating in sport activities at a reduced body weight. In addition, the demands of competition will often pressure the athlete to begin dieting (8). While most of the participants in this study had not dieted in over a year, 61.5% of the GT group was either currently dieting or had been on a diet within the last month. These results agree with previous research that has shown that a greater number of athletes who participate in sports where a thin build is advantageous, such as in gymnastics, express a desire to lose weight and are consistently or currently dieting compared with athletes participating in sports where a thin build is not advantageous (8).

The athletes in this study demonstrated an acceptable level of nutrition knowledge, as each group answered nearly two thirds of the questions correctly. However, it is of some concern that only slightly more than half of the athletes correctly answered "false" when given the statement, "protein supplements are needed in addition to the diet for normal muscle growth and development." Nearly three fourths of the controls identified this correctly. This would suggest that a large number of athletes are probably taking protein supplements with the false belief that their performance would be negatively impacted without them. While protein needs increase with physical activity (6), even the highest protein requirements can be adequately met through a balanced diet that includes a variety of foods (10). In addition, a low percentage of participants in all groups correctly identified carbohydrates and protein as having the same caloric value. This could suggest that more students need to take a basic nutrition course at some point during their college experience, or that athletic departments should require all collegiate athletes to take such a course.

The Nutrition Labeling and Education Act of 1990 (NLEA) was written to provide accurate and truthful labeling to consumers on a variety of food products. The "Nutrition Facts" portion of the label was designed to be used by consumers to apply the principles of the Dietary Guidelines for Americans and the Food Guide Pyramid in making informed food choices and comparing nutrient content of different foods. In a 1999 study, Marietta et al. found that 70.2% of students in their study looked at the Nutrition Facts panel of the food label at least sometimes when purchasing a product for the first time (11). Results of the current study revealed similar habits, with 63.9% reporting looking at the Nutrition Facts panel of the food label at least sometimes when purchasing a product for the first time. This may suggest that most participants in this study eat healthier diets and have more nutrition knowledge than non-label readers (12).

In addition to general food label use, participants were asked to report how often they used specific items on the food label. In agreement with previous research (11,12), participants in this study looked for calorie and total fat content much more often than other specific items. This may suggest that they find label information for these nutritional factors more important to their health than others, such as sodium, cholesterol, or sugar content (11). With the athletes, attention to fat content of foods in the diet may be attributed to coach recommendations. Coaches in several studies have reported tendencies to recommend very low levels of fat in the diet (13).

Overall, only about one third of athletes in this study reported current dietary supplement use. Interestingly, nearly 45% of athletes in this study stated they believed

that taking a dietary supplement could significantly improve athletic performance. This was supported through a small, positive correlation between supplement use and belief that it can improve performance. While most research has tended to discourage supplement use by athletes (1,6,10), there are some occasions when it should be recommended. Some athletes find it difficult to meet nutrition needs through meals alone. In this case, liquid supplements and sports bars containing carbohydrates, protein, and fat can provide a simple way to increase caloric intake. Also, for vegetarian and vegan athletes, liquid protein supplements are an excellent way to meet protein needs. In most cases, however, it is best to advise the athlete that money is better spent on foods necessary for a well balanced diet, rather than dietary supplements, which can cost more than $50 a month if used as recommended by the manufacturer (6).

The most popular dietary supplement by athletes in this study was by far a multivitamin. While physical activity does increase the need for some vitamins and minerals, individuals can easily meet needs by consuming a balanced diet. For athletes consuming a diet adequate in vitamins and minerals, there is no evidence that vitamin/mineral supplementation can improve athletic performance. It is possible, however, that consuming a diet inadequate in vitamins and minerals may cause marginal deficiencies, resulting in impaired physical performance (2). In this case, it may be advantageous to supplement the diet with a multivitamin that contains less than, or not much more than, 100% of the Recommended Daily Allowance (RDA) (2,6).

Conclusions

There appeared to be minimal differences in eating patterns between groups, and only a very small correlation between number of meals consumed per day and level of physical activity. To more accurately assess these differences, t-tests reporting level of significance are necessary. In addition, the hypothesis that the athlete groups would demonstrate superior nutrition knowledge was rejected, as each athlete group scored lower than controls in overall nutrition knowledge. The results of this study provide useful information for those individuals working with elite athletes, specifically of the National Collegiate Athletic Association (NCAA) Division I level.

Recommendations

Research has established that certain groups of athletes are at increased risk for development of disordered eating patterns and eating disorders (1,3,4,5,8,9). To prevent this, nutrition programs specific to the needs of collegiate athletes should be implemented. The principles of proper nutrition, methods to achieve ideal body composition for health, eating disorder warning signs, medical complications, and long term risks associated with these disorders are some of the issues that should be addressed (4,5).

In addition, coaches need to assume a more active role in the assessment and education of their athletes, as well as in the application of principles of nutrition and sound weight loss in their training (5,9,13). While some universities have well-established sports nutrition programs for their athletes, the majority still do not (6,14). When establishing such programs, however, it is essential that athletic directors, coaches, athletic trainers, and team physicians recognize that the registered dietitian specializing in sports nutrition is the most qualified professional to provide nutrition information to athletes (6,10).

Appendix

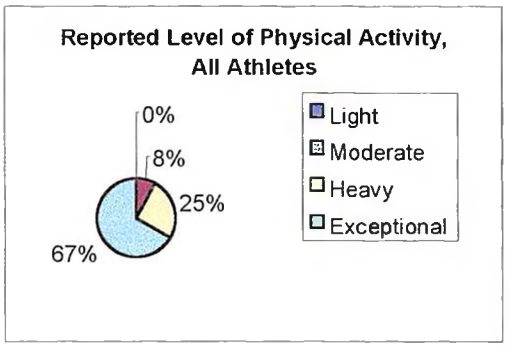
Table I. Anthropometric Data, all subjects

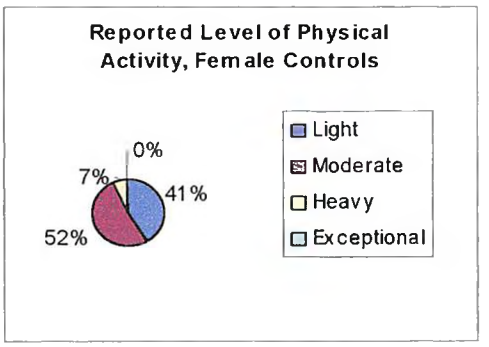
	MS (n=19)	*WS (n=21)*	*GT (n=13)*	*FC (n=41)*	*MC (n=17)*
HEIGHT (in)					
Mean	71.8±2.6	67.4±2.5	62.1±2.2	64.4±2.8	69.7±2.7
Median	72.0	67.0	62.0	64.0	69.0
Range	67-76	63-71	59-67	60-71	66-75
WEIGHT (kg)					
Mean	77.5±7.8	64.7±4.7	57.8±4.0	62.6±14.9	79.4±14.0
Median	79.6	63.6	56.8	59.1	77.3
Range	55.5-88.6	56.8-72.7	54.1-68.2	47.3-136.4	61.4-102.3
BMI					
Mean	23.3±2.1	22.1±1.4	23.3±2.3	23.3±5.0	25.2±3.9
Median	23.1	22.0	22.2	22.2	24.4
Range	18.6-28.2	19.4-24.4	21.2-29.4	18.0-47.1	20.0-33.7
AGE (yrs)					
Mean	20.1±1.5	20.1±1.2	20.0±0.8	20.3±1.9	21.8±1.8
Median	20.0	20.0	20.0	20.0	22.0
Range	18-23	18-22	19-21	19-30	19-25

Table II. Place of Residence During Academic Year, all subjects

RESIDENCE	*MS (n=19)*	*WS (n=21)*	*GT (n=13)*	*FC (n=41)*	*MC (n=17)*
Residence Hall	5	3	3	13	7
%	26.3%	14.3%	23.1%	31.7%	41.2%
Apartment	13	17	9	19	5
%	68.4%	81.0%	69.2%	46.3%	29.4%
Home	0	1	0	5	3
%	0.0%	4.8%	0.0%	12.2%	17.6%
Frat./Sor. House	1	0	0	4	2
%	5.3%	0.0%	0.0%	9.8%	11.8%

Table III.





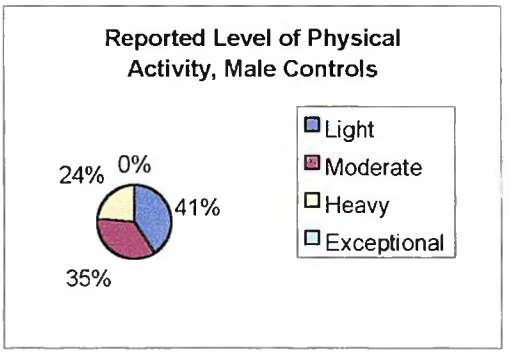


Table IV. Reported Eating Patterns, all subjects

	MS (n=19)	*WS (n=21)*	*GT (n=13)*	*FC (n=41)*	*MC (n=17)*
meals per day					
mean	3.1±0.9	2.8±0.9	2.8±0.9	2.7±0.8	2.8±0.6
range	2.0-6.0	1.0-4.0	1.0-4.0	1.0-5.0	2.0-4.0
snacks per day					
mean	3.1±1.7	2.7±1.1	1.9±0.9	2.1±1.0	2.3±1.4
range	0.0-5.0	0.0-5.0	1.0-3.0	0.0-5.0	0.0-5.0
weekly fast food					
mean	2.2±1.3	1.0±0.9	1.2±1.3	1.7±1.5	2.1±0.9
range	0.0-5.0	0.0-3.0	0.0-4.0	0.0-7.0	1.0-4.0

Table V. Factors Influencing Food Choices, all subjects (mean response*)

STATEMENTS	MS (n=19)	WS (n=21)	GT (n=13)	FC (n=41)	MC (n=17)
When eating meals at home, I eat pre-packaged, frozen dinners.	3.2±1.0	3.5±0.7	3.5±1.0	3.7±0.9	3.6±0.8
Convenience is the most important factor for me in choosing what foods I eat.	2.6±1.0	2.8±0.9	2.9±0.9	3.0±0.8	2.8±0.9
I avoid eating when I am hungry.	4.6±0.8	4.1±1.2	3.8±0.8	4.1±0.8	4.3±0.7
I am aware of the caloric content of foods I eat.	3.8±1.3	2.6±1.2	2.3±0.9	2.8±1.3	3.6±1.2
I think about the calories I am burning while exercising.	4.0±1.2	3.0±1.5	2.0±1.0	2.6±1.4	3.7±1.1
I avoid foods with fat in them.	3.8±1.2	3.2±1.2	2.8±0.8	3.1±1.0	3.8±1.0
I display self-control when I am around food	2.9±1.4	3.0±0.8	2.6±0.5	2.4±0.6	3.0±0.6
I enjoy trying new foods, regardless of fat or calorie content.	1.7±0.7	2.3±1.0	2.9±1.2	2.6±1.0	2.3±1.0

* 1=ALWAYS, 2=USUALLY, 3=SOMETIMES, 4=RARELY, 5=NEVER

Table VI. Types of Diets, all subjects

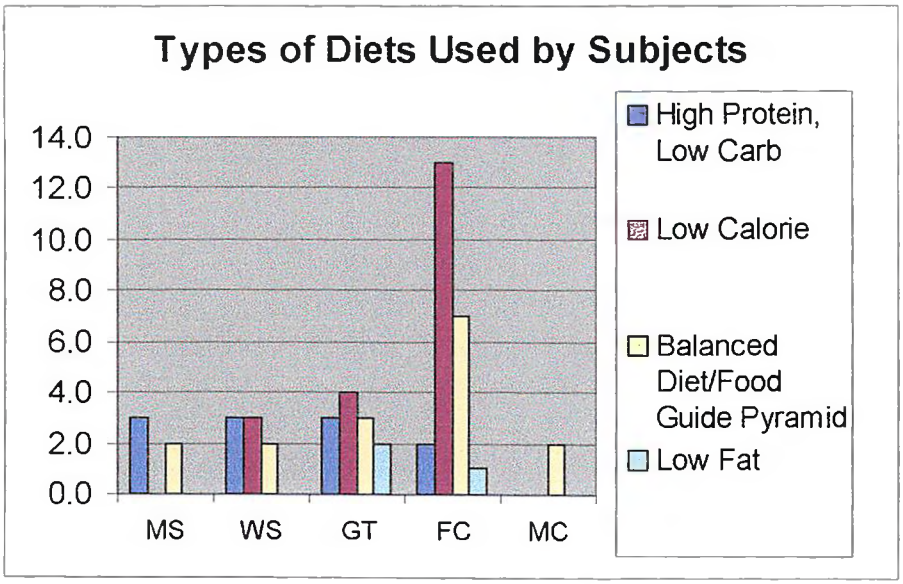


Table VII. Nutrition Knowledge, all subjects (percentage correct*)

STATEMENTS	MS (n=19)	WS (n=21)	GT (n=13)	FC (n=41)	MC (n=17)
Regular aerobic exercise and a low fat diet is most desirable for achieving body composition and body weight changes.(T)	89.5%	100.0%	92.3%	97.6%	88.2%
It is acceptable to lose more than two pounds per week.(F)	68.4%	76.2%	61.5%	90.2%	70.6%
Athletes may require more than twice the RDA for protein.(T)	84.2%	90.0%	92.7%	87.8%	88.2%
Carbohydrates provide the same number of calories as protein.(T)	16.7%	42.9%	7.7%	34.1%	29.4%
Certain vegetables can contain large amounts of cholesterol.(F)	63.2%	47.6%	61.5%	65.9%	47.1%
Calcium is important in the prevention of osteoporosis.(T)	100.0%	100.0%	100.0%	100.0%	100.0%
HDL cholesterol is "good" cholesterol.(T)	52.6%	70.0%	53.8%	30.8%	64.7%
Eating carbohydrates will make you fat.(F)	83.3%	55.0%	69.2%	90.0%	70.6%
According to the food guide pyramid, Americans should consume 5-7 servings of milk, yogurt, and cheese daily.(F)	27.8%	35.0%	30.8%	87.8%	62.5%
For muscle growth and development, protein supplements are needed in addition to the diet.(F)	58.8%	50.0%	53.8%	80.5%	76.5%
TOTAL (% CORRECT)	**64.9%**	**66.8%**	**62.3%**	**76.7%**	**69.8%**

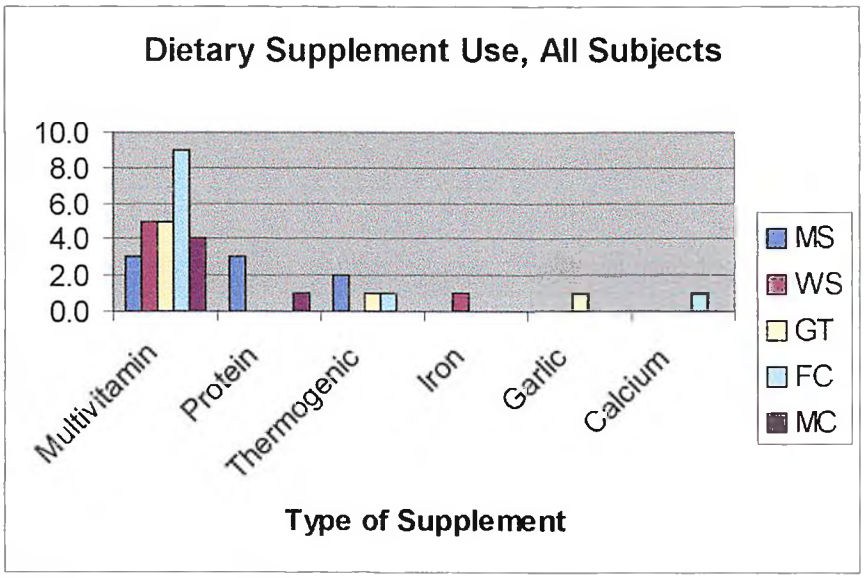
* Subjects responded by circling either "TRUE" or "FALSE". Correct response in parentheses.

Table VIII. Food Label Item Use, all subjects (mean response*)

NUTRIENT	MS (n=19)	WS (n=21)	GT (n=13)	FC (n=41)	MC (n=17)
Calorie Content	3.6±1.4	2.2±1.4	1.8±1.1	2.3±1.3	3.2±1.3
Cholesterol Content	3.6±1.5	3.4±1.2	3.5±1.1	3.4±1.2	3.4±1.2
Total Carbohydrate Content	3.4±1.6	3.1±1.2	2.4±1.2	3.1±1.3	3.4±1.2
Sugar Content	3.7±1.4	3.0±1.2	2.5±1.4	3.0±1.3	3.7±1.3
Protein Content	3.4±1.4	2.4±1.1	2.5±1.2	3.4±1.1	3.3±1.5
Sodium Content	3.8±1.4	3.4±1.3	2.8±1.2	3.1±1.2	3.6±1.2
Total Fat Content	3.3±1.7	1.8±1.1	1.8±1.1	2.0±1.3	2.5±1.4

* 1=ALWAYS, 2=USUALLY, 3=SOMETIMES, 4=RARELY, 5=NEVER

Table IX.



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University Honors Program

Capstone Approval Page

Capstone Title: (print or type):

A Comparison of Eating Patterns and Nutrition Knowledge of Athletes and Non-Athletes at Northern Illinois University

Student Name (print or type): Thomas J. Shields

Faculty Supervisor (print or type): Dr. Josephine Umoren

Faculty Approval Signature: Josephine Umoren

Department of (print or type): School of Family, Consumer, & Nutrition Sciences

Date of Approval (print or type): May 4, 2001