

A CORRELATION AMONG NUTRITION KNOWLEDGE, EATING HABITS, AND
EATING BEHAVIORS IN UNIVERSITY DANCERS

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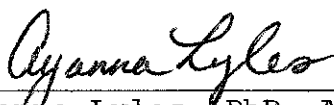
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INTRODUCTION

Nutrition has been studied for years in sport's settings due to its ability to optimize performance,¹⁻⁶ reduce the likelihood of injury,^{3,5} and help the body recover from exercise and stress. Athletes today strive to gain the competitive advantage over their opponents, and in many cases, proper nutrition plays a key role. Nutrients work to supply active body systems with sufficient energy stores to be used in physical activity, thus reducing fatigue and allowing the athlete to perform longer. Proper nutrition also aids in restoring muscle and blood nutrients for the body to efficiently recover from physical exertion. Nutrition can be considered an important component in any athlete's daily training and must be addressed properly, meeting the specific needs of an individual athlete.

The needs for caloric and nutrient intake are higher in the physically active population due to their high energy expenditure.^{1-4,7,8} An athlete's increased physical activity requires their physiological systems to work at a higher rate and for longer time periods, resulting in an energy expenditure considerably higher than a sedentary

individual. A physically active population includes sport athletes participating in power or endurance training, as well as dancers.¹⁸ Although dancers may not compete in the typical way a sport athlete does, they are just as active physically trying to meet the demands of their environment and performance/practice schedules.¹⁸ For the purposes of the current study, dancers are considered both athletes and addressed as being members of the physically active population.

In order for a physically active population to remain healthy and see positive gain in performance they must meet their energy expenditure with proper energy intake. According to research, athletes at the university level fail to demonstrate proper nutrition practices.^{5,6,9} Time, finances, and sufficient room to prepare nutritious meals can be difficult in a school setting. Results of various studies also conclude student athletes lack nutrition knowledge and good eating behavior as a whole.⁵

Research has shown a higher trend in disordered eating in female athletes over their male counterparts.^{11,12} Females participating in sports or activities emphasizing physique are significantly more likely to practice disordered eating or improper nutrition habits according to past research.^{11,12} Dance is particularly targeted in the research for

participants being more likely to suffer from eating disorders or disordered eating habits.¹⁴⁻¹⁸ Many studies have been conducted on participant groups in only one form of dance, are considered adolescents, or dancers in a strictly professional track. There is limited research on dancers participating at the university level who may not be on the professional track or who perform multiple forms of dance. Reportedly, dancers who perform mainly one form of dance respond differently in regards to their nutrition knowledge or eating behaviors.¹⁷ According to research, collegiate ballet dancers have a higher risk of disordered eating than their modern dance counterparts.¹⁷ Previous research information provides an interesting starting point for the current study done on dancers that perform multiple forms of dance.

The goal of the current study was to examine an experience level that had not been focused on extensively in the literature, the typical university dancer, many of whom may not pursue a professional dance career or a specific form of dance. The current study sought to create a nutritional profile of these dancers in order to determine if anomalies lie in their nutrition knowledge, eating habits, and eating behaviors. Since adolescent and professional track dancers have shown to be at risk for

disordered eating and associated problems according to previous literature, establishing a profile at the university level could provide further insight into any potentially similar or dissimilar issues occurring at this level of participation.

By creating a nutritional profile, instructors and clinicians will be able to identify areas of weakness in the nutritional status of university dancers. Medical personnel may then also determine the best way to provide education, intervention, or offer help where there are discrepancies. Nutrition habits of the dancers could then be enhanced, injury could be reduced, and recovery from physical activity could be at a more optimal level in the student dancer.

METHODS

The primary purpose of this study was to examine the nutritional profile of Division II university dancers. The following sections are included: research design, subjects, instruments, procedures, hypotheses, and data analysis.

Research Design

The current study used a correlational research design to examine nutrition knowledge, eating habits, and eating behaviors in a sample of university dancers. Nutritional knowledge and eating habit scores were determined using a revised, 32-item questionnaire. Reliability coefficients for the nutritional knowledge section consisting of 22 questions was reported at 0.88, while the 10 questions designed to measure eating habits had a reliability coefficient of 0.81. Eating behavior scores were determined using the Dutch Eating Behaviors Questionnaire.²¹ Cronbach's alpha coefficients of the scales for restrained eating, emotional eating, and external eating contained in the DEBQ are reported at or above .80.

The current study was designed to potentially expose deficits in nutrition knowledge, habits, and behaviors in university dancers resulting from disordered eating tendencies.

Results were limited to university dancers that were defined as being dance majors or dance minors at their respective university, and having 5 or more years of formalized dance instruction. Universities considered for this study were all members of the Pennsylvania State Athletic Conference (PSAC). All PSAC schools are considered NCAA Division II universities with similar size in student body. Formalized dance instruction was operationally defined as having taken classes in private or preprofessional studios, companies, and/or post secondary schools, as well as be currently taking classes and performing at their respective university.

Subjects

Subjects were university dancers from universities within the same demographic in Pennsylvania, both in size and location, and all a part of the Pennsylvania State Athletic Conference (PSAC). Each university also offered major or minor program tracks in dance. Subjects were

healthy, which was deemed as regularly participating in dance, and had a specified amount of dance background. Participants were required to have at least 5 or more years of formalized dance training, currently taking classes and performing, and be categorized as a dance major or minor at their respective university. Only volunteer participants were considered for this study.

Informed consent was waived but implied by completing an electronic survey for the study. Participation could be ceased at any time without penalty to the participant by not submitting the survey. The dance departments received notice of the survey and information regarding the research via a cover letter sent prior to email notification to the dancers (APPENDIX C1).

Participants were made aware of the survey first through notification from their instructors or dance departments and then directly via their email addresses. The departments and instructors however were unaware of the dancers decision to participate in the survey. Participants were also provided a cover letter before beginning the online survey via Survey Monkey (APPENDIX C2). All participants were required to complete a demographic section (APPENDIX C3) and two surveys (APPENDIX C4-C5), that took approximately 25 minutes total as reported in

previous research.²⁰ Participant confidentiality was maintained at all times and no identifying information was asked of the participants. The study was approved by California University of Pennsylvania's Institutional Review Board prior to taking place (APPENDIX C6).

Instruments

The study utilized a section for pertinent demographic information and two surveys. The first survey was a two-part, 32-question Nutrition Knowledge and Eating Habits Questionnaire developed by Marino¹⁹, and revised by Shepard²⁰ (2007) (APPENDIX C4). The current study updated terminology from www.mypyramid.gov to www.myplate.gov, however reliability was believed to have been unaffected by the changes as the two are used interchangeably. There were no other changes to the questionnaire. Reliability coefficients for the nutritional knowledge section consisting of 22 questions was reported at 0.88, while the 10 questions designed to measure eating habits had a reliability coefficient of 0.81. Any questions that referenced the government nutritional guidelines were updated with current terminology based on www.myplate.gov rather than www.mypyramid.gov, which are still used

interchangeably and is believed to have no effect on validity or reliability of the questionnaire.

The nutritional knowledge section of the questionnaire consisted of the first 22 questions, asking each participant to what degree they agreed with a specific statement provided. Answers ranged from Strongly Disagree (1) to Strongly Agree (4) on a four-point Likert scale, and were developed by Marino originally. All questions were scored according to their reported value. If a participant selected 4 as an answer they were awarded 4 points toward their end total. Scores on this 22-question section ranged from 22-88. An overall percentage was found for each participant by dividing his or her total point score by 88.²⁰ Participant percentages were then categorized into a range from poor to excellent nutrition knowledge. The ranges for the categories were as follows: poor (54% or below), fair (55-69%), good (70-84%), and excellent (85-100%).²⁰ Higher scores in this section indicated that a participant had a higher knowledge of sports nutrition.²⁰

The second section of the Nutrition Knowledge and Eating Habits Questionnaire contained 10 questions intended to test the quality of eating habits of each participant. Participants were asked to indicate how often they consume particular foods or engage in certain eating habits using a

four-point Likert scale, originally developed by Marino, with answers ranging from always to never. Always indicated that the participant did that eating habit 5-7 days a week, Often indicated 3-4 days a week, Sometimes indicated 1-2 days per week, and Never indicated that the habit did not occur at all. Questions numbering 2, 3, and 6 were reverse scored. Reverse scoring occurs when a participant answers a question with a 4, but is awarded 1 point. All other questions were scored according to their value; if the participant answered with a 4, they were awarded 4 points. Scores on this section ranged from 10 - 40 points total. Each participant's total was divided by 40 and reported as: excellent (85 - 100%), good (70 - 84%), fair (55 - 69%), or poor (54% or below). Higher scores on this section indicated that a subject exhibited increased positive eating habits.²⁰

The second survey, and the third part of the nutrition profile completed by the participants assessed their eating behaviors as measured by the Dutch Eating Behavior Questionnaire²¹ (DEBQ). The DEBQ developed by van Strien (1986) is composed of three types of subscales: one measures restrained eating, three measure emotional eating, and one measures external eating. Cronbach's alpha coefficients of the scales for restrained eating, emotional

eating, and external eating contained in the DEBQ are reported at or above .80. Restrained eating was found to have a coefficient of .95 while the three measures of emotional eating were .94, .93, and .86. External eating was the lowest at .80.

Scoring for the DEBQ was calculated by finding two numeric values for each subscale, one overall raw score and one scale score. The DEBQ subscales are listed below:

Emotional Eating Diffuse Emotions (4 items): 3, 8, 10, 28

Emotional Eating Clearly Labeled Emotions (9 items): 1, 5, 13, 16, 20, 23, 25, 30, 32

Emotional Eating (13 items): 1, 3, 5, 8, 10, 13, 16, 20, 23, 25, 28, 30, 32

External Eating (10 items): 2, 6, 9, 12, 15, 18, 21, 24, 27, 33

Restrained Eating (10 items): 4, 7, 11, 14, 17, 19, 22, 26, 29, 31

Raw score totals are calculated by totaling up the item scores for each DEBQ-scale. Scale scores are obtained by dividing the raw scale score by the total number of items in that scale endorsed by the participant. For example, the restrained scale contains ten items. If the raw score was 36 and all ten items were endorsed the scale score was calculated by $36/10 = 3.6$. If nine items were

endorsed it would then have been $36/9 = 4$. If less than nine items were endorsed, scale scores were not to be computed as validity was believed to be lost (as reported in the DEBQ manual).²¹ For the purposes of the current study the subscale scores of restrained eating were considered.

According to previous research on dancer participants, often times disordered eating is prevalent. In order to measure this in the current study the most closely related subscale in the DEBQ was the one measuring restrained eating. Thus, the restrained eating subscale was chosen to represent the eating behavior portion of this study. Restrained eating is defined as the intent to limit food intake in order to prevent weight gain or promote weight loss. In the current study, once a scale score for the restrained eating subscale was calculated the scores were categorized as being very high = ≥ 4.01 , high = 3.51-4.00, above average = 3.23-3.50, average = 2.78-3.22, below average = 2.31-2.77, low = 1.30-2.30, or very low = ≤ 1.29 for being at risk of restrained eating.

Procedures

The researcher first notified the university program directors and/or dance departments for email addresses of

potential participants through use of an electronic cover letter. The cover letter explained the study and demographic requirements of the participants. The letter also asked for their participation in forwarding email address lists of their dance majors and/or minors. However, it became clear during this procedure privacy restrictions resulted in limited access to the dancers and participants in this study.

Each participant accessed Survey Monkey through a link in his or her email, as directed by an email received from the primary researcher. After having read a cover letter, each participant was asked to fill out Marino's Revised Nutrition Knowledge and Eating Habits Questionnaire¹⁹ and Dutch Eating Behaviors Questionnaire (DEBQ)²⁰. The surveys, along with the short demographic page, took approximately 25 minutes to complete based upon previous research.²⁰

Results were kept confidentially on California University of Pennsylvania's server. Data was held on a password-protected file in order to maintain its safety, with access being limited to the researcher and chairperson only. Scores for all three variables, nutritional knowledge, eating habits, and the subscale of restrained eating behavior from the DEBQ were compiled into SPSS and analyzed according to the data analysis.

Hypotheses

The following hypotheses were based on previous research and the researcher's intuition after a review of the literature.

1. There will be no correlation among nutrition knowledge scores and eating habits scores in university dancers.
2. There will be a positive correlation between the restrained eating behavior subscale of the DEBQ scores and eating habits scores in university dancers.
3. There will be an inverse correlation between nutrition knowledge scores and the restrained eating behavior subscale of the DEBQ scores in university dancers.

Data Analysis

All data was analyzed using SPSS version 14.0 for Windows at an alpha level of ≤ 0.05 . The research hypotheses were analyzed using a Pearson Product Moment Correlation.

RESULTS

The purpose of the study was to examine the nutritional profile of dancers at the university level. This section will explain: Demographic Information, Hypothesis Testing, and Additional Findings. Participants were asked to fill out a Revised Nutrition Knowledge and Eating Habits Questionnaire, a Dutch Eating Behaviors Questionnaire, and a demographic section as a part of participating in this study.

Demographic Information

Data includes information from 18 Division II university dancers. Schools represented are PSAC educational institutions with major or minor programs in dance. Due to the nature of increased privacy laws, gaining access to email addresses of potential participants was more challenging than anticipated. The potential number of participants of this study was no more than 40. Due to the small number of universities willing to participate, along with strict requirements of this study, the potential n was

smaller than predicted. In order to analyze results the researcher was seeking at least a return rate of 40% in order to justify the study. A total number of 18 participants volunteered their time for this study, which was a return rate of 45%.

Of the 18 dancers, 17 completed demographic information. All demographic questions were optional for the privacy of the participants. The average age of participants was 20 years old. The age range was 18-22, with one outlier of age 26. The average height of the dancers was 63.69 ± 1.54 years, with an average weight of 140.31 ± 25.25 lbs. All academic years were represented with a total of 3 seniors, 4 juniors, 6 sophomores, and 3 freshman; 2 dancers chose not to disclose which academic class they were in. In order to participate in the current study dancers must have had at least 5+ years of formalized dance background. The majority of dancers (n=9) had 12+ years of dance background according to the demographic response. Four dancers had 9-12 years experience and four had 5-8 years experience. Each of the participants reported themselves as dance minors at their respective university.

The majority of participants (n=12) indicated that a medical professional had never talked to them about their nutrition previously. Out of those who had (n=5), two had

said a Certified Athletic Trainer had spoken to them about their nutrition, one had spoken to a Medical Doctor, one had spoken to a Registered Dietician, and one failed to respond to this question. Only 2 out of the 17 dancers answered yes when asked whether or not they have ever consulted a medical professional about nutrition.

All participants completed the two surveys addressing nutrition knowledge, eating habits, and eating behavior. Their scores on the nutrition knowledge and eating habits questionnaire overall were poor while their scores on the restrained eating subscale of the Dutch Eating Behavior Questionnaire (DEBQ) were categorized as being at average risk of restrained eating (Table 1).

Table 1. Descriptive Statistics for Survey Scales

Test Name	Test Average Score	Standard Deviation	Range of Scores
Nutrition Knowledge	42.68%	0.077	27.27 - 59.09%
Eating Habits	53.47%	0.074	37.50 - 67.50%
Restrained Eating Subscale of DEBQ	3.22	0.667	1.7 - 4.0

Classifications of the percentage scores on the nutrition knowledge and eating habits portions of the

participants responses were categorized as excellent = 85-100%, good = 70-84%, fair = 55-69%, and poor = 54% or below.²⁰ Of the 18 participants, only one was classified as having fair nutrition knowledge, while the remainder were in the poor category. Ten participants were in the fair category for eating habits while the remainder was categorized as poor. Overall, none of the participants were categorized as having good or excellent nutrition knowledge or eating habits.

The scores for the restrained eating subscale of the DEBQ were categorized as being very high = ≥ 4.01 , high = 3.51-4.00, above average = 3.23-3.50, average = 2.78-3.22, below average = 2.31-2.77, low = 1.30-2.30, or very low = ≤ 1.29 for being at risk of restrained eating.²¹ Five participants were categorized as being in the high risk of restrained eating category, 6 in the above average, 4 in the average, and 3 in the low category. None of the participants were categorized in the very high, below average, or very low category of the restrained eating subscale of the DEBQ portion of this study.

Hypothesis Testing

Testing was performed on the data using SPSS version 14.0 for Windows at an alpha level of ≤ 0.05 . The research hypotheses were analyzed using a Pearson Product Moment Correlation.

Hypothesis 1: There will be no correlation among nutrition knowledge scores and eating habits scores in university dancers.

Hypothesis 2: There will be a positive correlation between the restrained eating behavior subscale of the DEBQ scores and eating habits scores in university dancers.

Hypothesis 3: There will be an inverse correlation between nutrition knowledge scores and the restrained eating behavior subscale of the DEBQ scores in university dancers.

Conclusion: A Pearson correlation was calculated for the relationships between (1) participant's nutrition knowledge scores and eating habit scores, (2) participant's restrained eating behavior subscale scores of the DEBQ and eating habit scores, and (3) participant's nutrition

knowledge scores and restrained eating behavior subscale scores of the DEBQ.

A weak positive correlation that was not significant was found between nutrition knowledge and eating habits ($r(16)=.177, P>.05$). Thus, this hypothesis was supported.

A weak positive correlation that was not significant was found between restrained eating as measured by the DEBQ subscale and eating habits ($r(16)=.064, P>.05$). Thus, hypothesis 2 was not supported.

A weak positive correlation that was not significant was found between restrained eating as measured by the DEBQ subscale and eating habits in university dancers ($r(16)=.234, p>.05$). Thus, hypothesis 3 was not supported.

Additional Findings

Demographic data was analyzed against the participant's results scores for nutrition knowledge, eating habits, and the restrained eating subscale of the DEBQ. No statistically significant Pearson Product Moment Correlations were found between participant's weight, age,

year in school, or the fact that they had or had not taken a nutrition course and their scores on the three survey components.

It was interesting, however, that only 3 of the 17 participants had taken a nutrition course; 2 sophomores and 1 senior. When participants were asked if they had a question about nutrition and whom would they first consult the results were also interesting. Their answers in descending order were as follows: parents (n=4), medical doctor (n=4), registered dietician (n=3), dance instructor (n=2), non-dance friend (n=2), and Certified Athletic Trainer (n=2).

DISCUSSION

The following discussion is divided into three sections: Discussion of Results, Conclusions, and Recommendations.

Discussion of Results

This study was designed to establish a nutritional profile of PSAC Division II university dancers by collecting data about their nutrition knowledge, eating habits, and their possible eating behavior risk of restrained eating.

Gaining participants for such a study proved to be more difficult than expected. Due to the nature of increased privacy laws, research was negatively affected. Gaining access to email addresses of potential participants was challenging because of institutions not wanting to release the information. While understandable, it then reduced the potential number of participants of this study to no more than 40 participants. In order to analyze results the researcher was seeking at least a return rate

of 40% in order to justify the study. A total number of 18 participants volunteered their time for this study, which was a return rate of 45%.

Nutrition plays a key role in athlete's performance, but can also reduce injury and fuel their bodies for sustained physical activity.¹⁻⁶ Dancers are no different in that they too demand a lot physically from their bodies in order to perform, and are also at risk to injury and fatigue because of those demands. Thus, the caloric and nutrient needs of athletes and dancers are higher due to their high energy expenditure when compared to a sedentary individual.^{1-4,7,8}

In order for dancers to remain healthy and see positive gain in performance they must meet their energy expenditure with proper energy intake. According to previous research however, athletes at the university level fail to demonstrate proper nutrition practices.^{5,6,9} Results of these various studies also conclude student athletes lack nutrition knowledge and good eating behavior as a whole.⁵ The results of this study support previous research and provide an insight into the university dancer.

Based on previous research the current study hypothesized that university dancers would have tendencies of restrained eating and poor eating habits. It was also

hypothesized that university dancers' nutrition knowledge would be ambiguous to their habits and behaviors, again according to previous research and the researchers intuition.

Participants in the current study revealed poor nutrition knowledge and eating habits as a whole and individually. Only one dancer was categorized as having fair nutrition knowledge while the remainder scored into the poor category. Of the 18 participants, in regards to eating habits, all scored into the fair or poor categories. This could be the cause of many different contributing factors, one being that all participants were dance minors. In this study, dance minor programs have only dance class requirements to fulfill the minor and lack coursework in nutrition or physiology, which relates to the body's function or health. Without education requirements addressing nutrition or body function dancers might not have optimal opportunities to gain such information. Thus, university dancers remain uneducated about their health as seen by their lack of nutrition knowledge and proper eating habits in the current study.

The individuals participating as dance minors in college may have other passions, which allows them to pay less attention to nutrition and their physique as a dancer.

If this is true, then profiles of similar university dancers might also reflect a lack of nutrition knowledge and proper eating habits as opposed to past research that has shown dancers to have better knowledge about nutrition than non-dancers.

Research has also shown a higher trend in disordered eating in female athletes over their male counterparts.^{11,12} Females participating in sports or activities emphasizing physique are significantly more likely to practice disordered eating or improper nutrition habits according to past research.^{11,12} Dance is particularly targeted in the research for participants being more likely to suffer from eating disorders or disordered eating habits.¹⁴⁻¹⁸ It was because of this previous research that the current study sought to discover what was occurring in the university dancer in regards to eating behaviors and disordered eating.

The current study considered risk of restrained eating as a measure of eating behaviors occurring in the NCAA Division II university dancer. Participants as a whole were at average risk of restrained eating, however there were 11 out of the 18 participants who displayed above average risk of restrained eating, 5 of which who were in the high risk category. These findings support previous research of

disordered eating being present in a dance setting but not to the extreme in research on professional dancers.

It is also interesting to note that the literature suggests that dancers who perform mainly one form of dance respond differently in regards to their nutrition knowledge or eating behaviors.¹⁷ According to research, collegiate dancers who study primarily ballet have a higher risk of disordered eating than their counter parts who primarily study modern or alternative types of dance.¹⁷ When asked in the current study what the foundation of their dance minor was, either ballet, modern or mixed, most dancers responded mixed. Due to the majority of the dancers in the current study having a mixed minor they are receiving classes and influences from several types of dance. This supports the previous research by examining a different aspect of the collegiate dancer, one who falls in the middle between ballet and modern, which shows new information about nutrition in this population.

Dancers at the university level often have a full schedule of requirements to meet their dance major or minor ranging from classical ballet to alternative or modern dance. Since research has shown ballet to be more at risk for disordered eating than modern it can be rationalized that dancers at the university level will also show to have

varying nutritional profiles because of varying program requirements.

By creating this nutritional profile, instructors and medical professionals are able to identify areas of weakness in the nutritional status of university dancers. From this study medical professionals can also determine the best way to provide education, intervention, or offer help where there are discrepancies in the dancers they work with now or in the future. There is plenty of room for improvement in the nutrition habits of the dancers, which will enhance performance, reduce injury, and overall provide the dancers a healthier lifestyle.

Another important component to this research is the discovery of the lack of utilization of ATC's by dancers. Education should also address the qualifications of Certified Athletic Trainers and how they can assist dancers health and well being. It also provides an insight for medical professionals to approach the subject with university dancers knowing they may need more direction for their nutritional health.

Conclusions

Findings suggest that PSAC Division II university dancers lack proper nutrition knowledge, eating habits, and indicate that some are potentially at risk for restrained eating behaviors. Results indicate that dancers require education about nutrition and proper care for their active bodies in general. If nutrition or physiology coursework was added to their requirements for their dance minor, the results of future studies like this may show positive outcomes. Dance instructors, certified athletic trainers, and any other personnel working with university dancers should work to increase the nutrition knowledge of dancers in hopes to positively affect their eating habits and decrease their risk of restrained eating. With improved nutrition knowledge and eating habits, restrained eating risk may decrease, performance quality may increase, and dancers may be healthier with less fatigue and potential injury.

Recommendations

Future research is needed to look at different divisions of university dancers, perhaps Division I where dancers are more likely to be dance majors performing in more competitive programs or considering dance as a career, and/or receiving scholarship money for their education. Future research should also consider education institutions outside of the PSAC Division II schools. Results may differ due to geographic location, or in competitive conservatories.

Another key component to the current study was placing the demographics section at the end of the online survey. It was believed that data would better represent the dancer if they did not first identify themselves as such. This was believed to create less biased answers from the participants and is suggested in replicating for future studies. Lastly, in regards to the demographics section of this study it is recommended to add the answer of "Internet information" to the question regarding whom dancers would consult if they had a nutrition question. Due to technology and the use of smart phones increasing it would be

beneficial to see where the Internet falls in the opinion of participants seeking information.

General recommendations however include adding nutrition and/or physiology coursework to dance major and minor program tracks at universities to educate dancers on their personal nutrition habits. Also, educating individuals who work closely with the university dance population would be beneficial as they may assist in optimizing dancer performance through encouraging proper eating habits and behaviors.

Another useful tool typically under-utilized by the dance community is the use of Certified Athletic Trainers. Each of the schools asked to participate in this study have traditional athletic programs staffed by ATC's who could also benefit the university dancer while providing nutrition education within their scope of practice.

The visibility of Certified Athletic Trainer needs to be increased in regards to the dance population if benefits are to be gained. From this study the ATC can recognize a need for nutrition education and the opportunity to approach a sometimes elusive community through offering to help. Historically dancers had avoided athletic training rooms because they do not recognize themselves as athletes. Ideally this would change so dancers may recognize that

they demand a lot from their bodies and on occasion need treatment like any other type of athlete. Through collaboration of university ATC's, dance instructors, and dancers nutrition education may be provided and the health and wellbeing of the dancers' improved.

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APPENDICES

APPENDIX A

Review of Literature

REVIEW OF LITERATURE

The purpose of this literature review is to inform the reader of the necessary background information regarding nutrition in the physically active young adult population. The literature review examines the influence of nutrition as it relates to sport, nutrition knowledge and habits of the physically active, disordered eating in the athlete population, specifically dance, nutrition education, as well as measurements for nutrition and eating behaviors.

Sports Nutrition

Adequate nutrition is a crucial component of optimal sports performance in the physically active. In order to keep one's physiological systems running effectively, an individual must have sufficient nutrient and caloric intake.¹⁻⁸ In the athletic population these requirements increase due to higher energy expenditure during physical activity.¹⁻⁴ Although proper nutrition habits should be promoted for every individual, it is even more important for an athlete. Poor eating habits have the potential to

lead to compromised performance, decreased endurance, and in some cases, injury.^{3,5}

Athletes' physiological systems perform at a higher rate than that of a sedentary population, thus their nutritional needs are greater. Age and activity level play an important role in the athlete's energy consumption in order to remain healthy. Energy input through caloric intake is considered on an individual basis, taking into account the variables of activity. While there are no fixed number of calories an athlete should consume, it is recommended they meet the energy expended from activities in order to maintain a healthy body composition.⁸

Previous research has also indicated an importance of diet and timing of nutrient ingestion for optimal athletic performance.¹⁻³ According to a joint statement from the American College of Sports Medicine, American Dietetic Association, and the Dietitians of Canada, athletes participating in high energy expenditure or prolonged training need to consume adequate fuel for optimal performance.⁸ Failure to do so may result in loss of muscle mass, menstrual dysfunction, loss or failure to gain bone density, increased risk of fatigue, injury, or illness, and a longer recovery process.⁸ While all nutrients serve important roles for a balanced diet, athletes specifically

need to concentrate on consuming enough carbohydrates, proteins, fats and fluids in order to sustain peak performance. The following are recommendations taken from the position statement "Nutrition and Athletic Performance",⁸ "Current knowledge about sports nutrition",¹ and "ISSN exercise and sport nutrition review: research and recommendations".²

Carbohydrates for Energy

Carbohydrates are one of the most important macronutrients for athletes to consider and supply their working bodies. The main function of carbohydrates is to provide energy for cellular metabolism by maintaining blood glucose levels during exercise and replacing muscle glycogen.^{1,8} Carbohydrates must be of the type that supplies glucose rather than fructose, which may upset the body and work counteractively against the athlete.⁸ The consumption guidelines vary based on the athletes gender, sport, environmental condition and total energy expenditure.^{1,2,8} Typically though, it is recommended that athletes consume 6-10g/kg of body weight per day, with high endurance athletes needing to consume on the higher end of that range.⁸ Carbohydrates are to be consumed before, during and after exercise due to their powerhouse qualities of

igniting systems to perform and helping them recover after physical activity has occurred.^{1,8}

Proteins for Repair and Recovery

An increased intake of protein is recommended for athletes because it is effectively used for maintenance, repair, and synthesis of muscles in response to training or performance.^{1,2,8} Protein is most recommended after training has occurred in order to facilitate this production in skeletal muscle.⁸ Athletes rarely have to supplement protein into their diet as it is in many foods typically consumed. The dietary guidelines for adults over the age of 18 is for protein to make up 10-35% of ones diet, with athletes consuming more on the high end of that range.^{1,8} Endurance athletes are suggested to ingest approximately 1.2-1.4g/kg/day, higher than the typical 0.8g/kg/day for a sedentary population.⁸ Some evidence about protein loading is inconclusive because of how protein is used in the body and not being stored like carbohydrates.

Fats as Fuel

The dietary guidelines of fat intake for athletes are only slightly higher for athletes than it is for a sedentary population.^{1,2,8} The recommended daily allowance

for total fat has not yet been established, however an acceptable macronutrient distribution range for all adults is 20-35% of daily energy intake.⁸ Intakes of healthily fats assist physiologic processes in the body to function properly. The body uses fats as a source of energy, especially as exercise intensity decreases.⁸ Research has shown a low fat diet, consisting of less than 15% total calories as fat, does not have a positive effect on an athlete's performance.⁸ An exceptionally low fat diet can also negatively affect hormonal secretions in female athletes, creating menstrual cycle complications.⁸

Nutrients have the ability to assist with proper physiologic functioning, which means it is important for athletes to play an active role in eating correctly. Higher energy expenditures require athletes to increase calorie consumption to offset the loss from exercise or training. Nutrition also plays a key role in injury prevention as well as helping an athlete recover from activity.^{3,5}

Sports nutrition is a key component to the health and performance of athletes. Care should be given continually to the nutrition needs of athletes on an individual basis in order to meet the demands of their respective sport.

Nutrition Knowledge, Eating Habits, and Eating Attitudes in
the Physically Active Population

Although nutrition plays an important role in sports performance it has been shown that the knowledge of a proper diet eludes many athletes.⁵⁻²¹ Dunn et al,⁹ performed a study on college athletes' nutritional knowledge and attitudes and found they seemed to lack the ability to translate their nutrition knowledge into good eating habits.⁹ Dunn reported overall, the eating attitudes of athletes were positive with a low risk for having an eating disorder, but there was much room for improvement when it came to diet and disease relationships.⁹ Dunn attributes some of the knowledge and habit disconnect to the collegiate environment itself, which creates a lack of time and space to prepare proper meals.⁹

The research shows a lack of knowledge and poor eating habits is not solely a problem in the United States (US), but abroad as well. Yahya Ozdogan⁵ evaluated nutrition knowledge of university students of sports departments in three universities in Ankara, Turkey yielded similar results to the research in the US. The students in the study were first and fourth years at their university. Results were significantly different between the two

classes. The fourth year students mean score was 13.460 ± 3.703 while the first years mean score was only 11.150 ± 2.962 .⁵ The fourth year students had taken a nutrition class so knowledge gained from the nutrition class may be the reason for better scores on the nutrition scales used in the study. Overall, however, the students only had fair knowledge of proper nutrition knowledge and habits. Ozdogan,⁵ similar to Dunn,⁹ attributes these discrepancies in knowledge and habits to lack of information, disinterest in making a change to ones diet, or barriers such as finances, time, and food preference.⁵

Peerkhan Nazni et al⁶ studied knowledge, attitude and practice of athletes participating in volleyball, weightlifting and running in private colleges in India. He found of the three disciplines, runners were the most knowledgeable about nutrition but at only 29% scoring in the "very good" category.⁶ Nazni concluded sportsman have better than fair knowledge of nutrition but the statistics show that less than half of them would fall into this classification. Nazni completed research using the Knowledge, Attitude, and Practice questionnaire⁶, which was different from Dunn and Ozdogan, but had similar results. They concluded a lack of knowledge is prevalent in the collegiate age group as a whole.

Dancers eating attitudes have also been shown to be less than optimal in the literature.¹⁴⁻¹⁸ Hidayah¹⁸ evaluated the eating attitudes, body image, body composition and dieting behavior among dancers and found dancers are at a higher risk for disordered eating compared to a control group. Hidayah reported that of the 23 dancers, 21.74% had a high prevalence of risk of eating disorder while only 12.00% of the 50 lean subjects, which was the control condition, were in the same category.¹⁸ The results were statistically significant and suggest dancers have more concerns in regards to gaining weight and overall body image.¹⁸

Similarly, Schluger¹⁷ compared eating attitudes and behaviors in female college dance students majoring in two forms of dance, either modern or ballet. It was reported out of the modern dance majors, 12.2% scored ≥ 20 on the EAT26, a measure for disordered eating, indicating a high level of risk for disordered eating. Ballet majors scored 24.4% on the same scale, found to be significantly higher, indicating a higher risk for disordered eating.¹⁷

Although the research has offered opinions on why athletes, dancers, or the physically active population are displaying inadequate nutrition habits, further research is needed to determine why this occurs. Schluger¹⁷ and

Penniment¹⁶ both evaluated perfectionism scales in order to see the role it played on disordered eating in dancers. According to Schluger and Penniment dancers as a population have statistically significantly higher tendencies of perfectionism, which could contribute to the prevalence of disordered eating among dancers.

Association to Eating Disorders and Disordered Eating

Many researchers have established female athletes having a higher risk of developing disordered eating habits according to their findings.¹¹⁻¹⁸ Reportedly, sports with an aesthetic component, such as gymnastics or dance, resulted in an even higher risk.^{11,12} Reinking¹² describes this higher risk population as lean-sport athletes, or those in which a larger body type is discouraged. One of the many issues of improper nutrient intake in females is the female athlete triad consisting of disordered eating, amenorrhea, and osteoporosis.¹² At the root of the triad is disordered eating, according to Reinking; this may mean it is an issue to be addressed with these lean-sport athletes. This study concluded lean-sport athletes had a lower body weight and desired body weight compared to their non-lean sport athlete peers as well as higher scores on body dissatisfaction scales.¹²

Greenleaf¹¹ also examined the prevalence of disordered eating patterns in female collegiate athletes, which provided similar results. According to Greenleaf, out of 204 athletes, 2% were classified as having an eating disorder and 25.5% were symptomatic.¹¹ Greenleaf states that there was a significant amount of the asymptomatic athletes that fell below the clinical definition of disordered eating,¹¹ which may mean the results could be underestimating the problem. In this research study it was reported about half of the female participant pool was dissatisfied with their current weight and most believed they were overweight.¹¹ It is believed in many cases, appearance is considered more by females than males. This may pose an increased risk for athletes who need a higher energy intake to balance their expenditure.

Dancers have shown to be at high risk for improper eating habits due to the nature of their environment. Anshel¹⁴ looked at the dance environment to better define these sources leading to a cultural issue according to other research. Anshel found the scores for perfectionism, decreased body satisfaction, and desire for thinness were higher in the dancing group when compared to the non-dancers. This was attributed to the significance placed on thinness for success in the studio as well as the

performance time required of dancers.¹⁴ Anshel described the energy expenditure for dancers as being lower than other female high intensity sports. This may be interpreted as dancers would not decrease their weight from exercise alone, making extreme dieting a viable option in this population.¹⁴

Both Anshel¹⁴ and Nordin-Bates¹⁵ noted that disordered eating in the dance community traces back to a young age. Nordin-Bates found in her study of 347 young talented dancers aged 10-18 scores of perfectionism were quite high in the young dancers, and 15% of the females were showed symptoms of disordered eating and menstrual problems.¹⁵ Besides perfectionism, Nordin-Bates discussed the influence self-esteem can have on the development of disordered eating. This study discovered self esteem to moderately correlate with disordered eating, which may also be a developing issue to emerge later in life.¹⁵

Nutrition Education

Previous research has shown subjects respond positively to nutrition education programs.⁶⁻⁹ With nutrition being so important to optimal performance it should be a priority to provide education to athletes at

any level. Abood et al¹⁰ looked at how an education program affected a collegiate population. The purpose of this research was to evaluate the efficacy of a nutrition education program for collegiate female athletes in order to improve nutrition knowledge.¹⁰ In this pretest-posttest design, 30 athletes completed a nutrition knowledge test, self-efficacy scale, and dietary practices questionnaire. Results reflected a positive trend in habits and knowledge following the intervention, concluding that those athletes would be less at risk for the effects of poor nutrition.¹⁰ If programs are shown to work on sport athletes than it could have implications for also educating dancers.

Upon looking into previous research on nutrition intervention, several studies supporting its application. Torres-McGehee²¹ and a team of researchers conducted an intervention program for Division I dancers on proper diet and nutrition intake. This study was also a pretest-posttest design that assessed the effectiveness of a nutritional education program on the college dancer. After a 4-week program, there was a significant increase in nutrition knowledge.²¹ Mean scores for depression, drive for thinness, body dissatisfaction and maturity fears all decreased in the intervention group, showing its success as a program.²¹ Yannakoulia²⁰ looked at a similar intervention

but in younger pre-professional dancers. This study examined professional dance students as opposed to collegiate dancers. The aim of the study was to evaluate the effectiveness of an intervention program that combined nutrition education and prevention of disordered eating.²⁰ There were 32 dancers and the data was from a set of questionnaires that were taken on three occasions.²⁰ Significant increase in knowledge and decreased in disordered eating were seen in the intervention group even six months after the intervention, demonstrating its effectiveness.²⁰

The development and evaluation of a nutrition education program has also been documented in the literature for adolescent dancers.¹⁹ Through a pre-recorded lecture series shown to youth ballet dancers at a summer intensive program, the researchers sought to educate the dancers on sports nutrition, healthier diets and the female athlete triad.¹⁹ Each participant completed demographic information, a sports nutrition knowledge questionnaire, and a food frequency questionnaire before and after the nutrition education program. The program was shown to be statistically significant in increasing knowledge and perceived susceptibility to the female athlete triad.¹⁹ Self-efficacy also improved along with better dietary

habits of the experimental group,¹⁹ both of which are important in reducing disordered eating in the dance population as a whole.

Although much of the focus in this area is on eating disorders, the greater problem is with disordered eating itself. Many athletes and dancers stay clear of a diagnosed eating disorder like anorexia nervosa or bulimia but are not eating properly for their activity level. Nutrition education programs would benefit dancers and clinicians working with dancers to better address these issues.

APPENDIX B

The Problem

STATEMENT OF THE PROBLEM

The purpose of the study was to examine the nutritional profile of dancers at the university level by examining their nutrition knowledge, eating habits and eating behavior in regards to tendency of restrained eating. As disordered eating has frequently been associated with the dance community, assessing nutrition knowledge and eating behavior overall might shed more light on problem areas. It was beneficial to see where anomalies lie in a university population for the use of education provided by instructors or medical personnel who work with the dancers.

If this study can identify levels of nutrition knowledge, and expose possible deficits in nutrition habits and eating behaviors in the dancers, perhaps the frequency of disordered eating cases would decrease, benefiting the performance and health of that dancer. Much of the research focusing on an adolescent population, professional dancers, or dancers performing only one specific form of dance, there is a gap in information about the university level dancer. It will also be beneficial to see if disordered eating persists in a demographic that may or may not be on the professional track to a dance career. Many of the university dancers are serious about dance but perhaps have

other career ambitions, which could change the results from past research, done on individuals whose livelihood was dance.

Definition of Terms

The following definitions of terms were defined for this study and are operational definitions within the context of the study:

- 1) Eating Behavior - reported as a score (%), used to assess the behaviors each dancer has in regards to restrained eating.
- 2) Eating Disorder - Eating disorders are clinically diagnosed syndromes characterized by significant disturbances in eating behavior and by distress or excessive concern about body shape or weight.
- 3) Eating Habits - reported as a score (%), used to assess the quality of eating habits for each dancer.
- 4) Disordered Eating - a term used to describe less severe forms of eating disorders, where the dancer may reach just at or below the criteria for a diagnosed eating disorder.
- 5) Formal Dance Experience - in order to participate in the current study, formal dance experience is defined as those dancers enrolled as a dance major or minor

student at their university, or have had 5+ years of formal experience. A setting appropriate for this prerequisite is a dance studio where they paid for lessons and trained with an educated instructor of that form of dance. Multiple settings or studios are acceptable but each must together total five or more years experience.

- 6) Nutrition Knowledge - reported as a score (%), measuring the quality and background knowledge each dancer has about pertinent sports related nutrition.
- 7) Restrained Eating - a term used to describe the restriction of food by way of dieting, absence of eating, or eating in smaller quantities than needed by the dancer.

Basic Assumptions

The following were basic assumptions of this study:

- 1) The participants will be honest when they complete their demographic sheets.
- 2) The participants will be honest when they complete the questionnaires assessing nutritional knowledge, eating habits, and eating attitudes.
- 3) All scales, measurements, and software used in this study were considered valid and reliable.

Limitations of the Study

The following were possible limitations of the study:

- 1) Results may be limited to Division II university dancers that fit the operational definition for participation.
- 2) Results may be limited to schools that offered dance major or minor programs.
- 3) Results may be limited to schools by which email addresses could be obtained.

Significance of the Study

The results of this study showed the basic nutrition knowledge, eating habits, and eating behaviors of university dancers. The clinician and instructor then saw where the dancers needed to be educated for the purposes of reaching optimal performance and minimize injury. A nutritional profile was also beneficial to the dancers for the purposes of self-assessment, so they became more aware of inconsistency in their diets and could make changes accordingly.

The literature for university dancers is limited. This study sought to fill in a gap in the research, and give a better understanding of what is occurring nutritionally in

the university dancer. A nutritional profile is a good starting point to explore how this population differs or is similar to other participants in previous studies.

Education programs on proper nutrition habits have been shown in the literature to be beneficial in educating a dance population, thus such an education program could be implemented at the Division II university level. Nutrition plays a key role in a dancers health and performance.

Collecting data on what they know in regards to nutrition will be an excellent initiative to correcting any discrepancies.

APPENDIX C

Additional Methods

APPENDIX C1

Cover Letter to Dance Instructors and University
Departments



March 14, 2013

Dear dance educators and/or department chair:

My name is Sarah Florida and I am a certified athletic trainer who is currently a graduate student at California University of Pennsylvania pursuing a Master of Science in Athletic Training. Part of the graduate study curriculum is to complete a research thesis through conducting research. I am conducting survey research in order to examine the nutritional profile of dancers at the university level. I will be studying any correlations among nutritional knowledge, eating habits, and eating behavior in the participants. By creating a general profile of the dancers nutrition, instructors and clinicians can see possible discrepancies in order to address them properly through education or intervention.

Dancers from selected universities meeting the criteria of being dance majors or minors, and having 5+ years formalized dance experience will be asked to participate in this research. However, their participation is voluntary and they do have the right to choose not to participate. They also have the right to discontinue participation at any time during the survey completion process at which time their data will be discarded with no penalty. The California University of Pennsylvania Institutional Review Board has reviewed and approved this project. The approval is effective 03/11/2013 and expires 03/10/2014.

I would greatly appreciate it if you could forward email addresses for dance majors/minors within your department or other students participating in dance classes and/or productions that fit the criteria for participation. I ask that you inform the dancers to please take this survey at their earliest convenience as it will take approximately 25 minutes to complete. All survey responses are anonymous and will be kept confidential, an informed consent to use the data collected will be assumed upon return of the survey. Aggregate survey responses will be housed in a password-protected file on the CalU campus. Minimal risk is posed by participating in this study and might only involve self-reflection in the participant. The survey will take approximately 25 minutes to complete.

If you have any questions regarding this project, please feel free to contact the primary researcher, Sarah Florida at FLO6062@calu.edu. You can also contact the faculty advisor for this research, Dr. Rebecca Hess at 724-938-4356 or through email at hess_ra@calu.edu. Dancers can use the following link to access the survey:
<https://www.surveymonkey.com/s/WGRYBZT>

Thank you for taking the time to take part in my thesis research. I greatly appreciate your time and effort put into this task.

Sincerely,

Sarah Florida, ATC
Primary Researcher
California University of Pennsylvania
734.255.9764 FLO6062@calu.edu

APPENDIX C2

Cover Letter in Email Sent to Participants Prior to
Participation



March 14, 2013

Dear Participant:

My name is Sarah Florida and I am currently a graduate student at California University of Pennsylvania pursuing a Master of Science in Athletic Training. Part of the graduate study curriculum is to complete a research thesis through conducting research. I am conducting survey research in order to examine the nutritional profile of dancers at the university level. I am studying any correlations among nutritional knowledge, eating habits, and eating attitudes in university dancers. By creating a general profile of dancers nutrition, instructors and clinicians can see possible discrepancies in order to address them properly through education or intervention.

Dancers from selected universities meeting the criteria of being dance majors, dance minors, and/or having 5+ years formalized dance experience have been asked to participate in this research. However, your participation is voluntary and you do have the right to choose not to participate. You also have the right to discontinue participation at any time during the survey completion process at which time your data will be discarded without penalty. The California University of Pennsylvania Institutional Review Board has reviewed and approved this project. The approval is effective 03/11/2013 and expires 03/10/2014.

Please be honest as all survey responses are anonymous and will be kept confidential. An informed consent to use the data collected will be assumed upon return of the survey. Aggregate survey responses will be housed in a password-protected file on the CalU campus. Minimal risk is posed by participating as a participant in this study. I ask that take this survey at your earliest convenience as it will take approximately 25 minutes to complete. If you have any questions regarding this project, please feel free to contact the primary researcher, Sarah Florida at FLO6062@calu.edu. You can also contact the faculty advisor for this research, Dr. Rebecca Hess at 724-938-4356 or through email at hess_ra@calu.edu. Thanks in advance for your participation in my survey. The survey can be accessed at the following link: <https://www.surveymonkey.com/s/WGRYBZT>

Thank you for taking the time to take part in my thesis research. I greatly appreciate your time and effort put into this task.

Sincerely,

Sarah Florida, ATC
Primary Researcher
California University of Pennsylvania
250 University Ave
California, PA 15419
734.255.9764
FLO6062@calu.edu

APPENDIX C3
Demographic Sheet

Demographic Sheet

Please answer the following questions honestly and to the best of your knowledge. All of your responses and the results of this study will be kept strictly confidential. Thank you for your time.

1. Height_____ Weight_____
2. Age_____
3. Academic year in college (Please select one)
 Freshman Sophomore Junior Senior
4. How many years experience do you have dancing in a formal setting combined? (For example paid instruction, classes, studios, colleges/universities)
 5-8 9-12 12+
5. Are you a dance major or minor at your university (please select one)
 Dance Major Dance Minor
6. Was there an audition for your dance major or minor?
 Yes No
7. Is your dance minor ballet based, modern based, mixed or other?
 Ballet Modern Mixed Other, specify
8. Have you ever taken a nutrition course? yes* no
 *If yes, how many nutrition courses have you taken?_____
9. Has a medical professional ever talked to you about nutritional habits? yes* no *If yes, who? (Please check all that apply):
 Certified Athletic Trainer Registered Dietician
 Medical Doctor Other(Please specify):_____
10. Have you ever consulted a medical professional about nutrition/diet? yes* no *If yes, who?
 (Please check all that apply)

___ Certified Athletic Trainer ___ Registered Dietician

___ Medical Doctor ___ Other(Please specify): _____

*If yes, for what purpose? (Please check one):

___ To lose weight ___ Supplementation

___ To gain weight ___ Other(Please specify): _____

7. If you had a question about nutrition, whom would you most likely consult? (Please check only one):

___ Certified Athletic Trainer

___ Teammate ___ Coach

___ Parents ___ Friend

___ Medical Doctor ___ Counselor

___ Registered Dietician

___ Other (Please Specify): _____

APPENDIX C4
REVISED NUTRITIONAL KNOWLEDGE AND EATING HABITS
QUESTIONNAIRE & SCORING KEY

Revised Nutritional Knowledge and Eating Habits
Questionnaire

SECTION 1: Please choose the number for each statement indicating to what extent you agree or disagree with each of the following statements.

4 - Strongly Agree

3 - Agree Somewhat

2 - Disagree Somewhat

1 - Strongly Disagree

1. Skipping breakfast can negatively affect athletic performance.

4 3 2 1

2. Nutrition affects mental performance.

4 3 2 1

3. Calcium excretion from the body increases with alcohol consumption.

4 3 2 1

4. According to myplate.gov (previously mypyramid.gov), it is recommended that females, age 18-25, who engage in more than 60 min. of exercise per day, should consume 8 daily ounce equivalents from the grains group.

4 3 2 1

5. According to myplate.gov, females age 18-25, who engage in more than 60 min. of exercise per day, should consume 2 cups of fruit daily.

4 3 2 1

6. According to myplate.gov, females age 18-25, who engage in more than 60 min. of exercise per day, should consume 3 servings from the dairy group each day.

4 3 2 1

7. According to myplate.gov, females age 18-25, who engage

in more than 60 min. of exercise per day, should consume 6.5 ounce equivalents from the meat/bean group every day.

4 3 2 1

8. Eating breakfast can improve concentration.

4 3 2 1

9. Excess vitamin consumption can be toxic.

4 3 2 1

10. Anemia is a deficiency of iron.

4 3 2 1

11. Average percentage of body fat in females is 20-25%.

4 3 2 1

12. Cereal, bread, bagels, and pasta are good sources of carbohydrates.

4 3 2 1

13. Tofu, nuts, and beans are good sources of protein.

4 3 2 1

14. Athletes tend to consume twice as much protein as recommended.

4 3 2 1

15. The best sources of iron come from animal products and fish.

4 3 2 1

16. Eating cereals or breads enriched with iron should be eaten with a source of vitamin C to enhance absorption of iron.

4 3 2 1

17. Proteins act to repair and build muscle tissue and make hormones to boost the immune system.

4 3 2 1

18. Fats are essential in all diets.

4 3 2 1

19. If a diet is lacking in carbohydrates, proteins are then used for energy.

4 3 2 1

20. Oatmeal, legumes, and fruits are sources of soluble fiber.

4 3 2 1

21. The recommended amount of iron for females is 18-23 milligrams per day.

4 3 2 1

22. Vitamin C is also known as ascorbic acid.

4 3 2 1

SECTION 2: Please choose the number that applies to each of the following questions. Refer to the scale below to determine the number of days per week defined in each rating. All of the results will be strictly confidential. Thank you for your cooperation.

- 4 - Always: Occurs 5-7 days per week
- 3 - Often: Occurs 3-4 days per week
- 2 - Sometimes: Occurs 1-2 days per week
- 1 - Never: Does not occur at all

1. How often do you eat breakfast in the morning?

4 3 2 1

2. How often do you take vitamin supplements?

4 3 2 1

3. How often do you take mineral supplements?

4 3 2 1

4. How often do you eat three base meals per day?

- 4 3 2 1
5. How often do you record what you eat?
- 4 3 2 1
6. How often are you on a "diet"?
- 4 3 2 1
7. How often do you eat fruits, such as apples, bananas,
or oranges?
- 4 3 2 1
8. How often do you eat vegetables, such as broccoli,
tomatoes, carrots, or salad?
- 4 3 2 1
9. How often do you eat dairy products such as milk,
yogurt, or cheese?
- 4 3 2 1
10. How often do you seek out nutrition information?
- 4 3 2 1

Scoring Key: Revised Nutritional Knowledge and Eating Habits Questionnaire

SECTION 1:

1. Skipping breakfast can negatively affect athletic performance. 4
2. Nutrition affects mental performance. 4
3. Calcium excretion from the body increases with alcohol consumption. 4
4. According to myplate.gov (previously mypyramid.gov), it is recommended that females, age 18-25, who engage in more than 60 min. of exercise per day, should consume 8 daily ounce equivalents from the grains group. 4
5. According to myplate.gov, females age 18-25, who engage in more than 60 min. of exercise per day, should consume 2 cups of fruit daily. 4
6. According to myplate.gov, females age 18-25, who engage in more than 60 min. of exercise per day, should consume 3 servings from the dairy group each day. 4
7. According to myplate.gov, females age 18-25, who engage in more than 60 min. of exercise per day, should consume 6.5 ounce equivalents from the meat/bean group every day. 4
8. Eating breakfast can improve concentration. 4
9. Excess vitamin consumption can be toxic. 4
10. Anemia is a deficiency of iron. 4
11. Average percentage of body fat in females is 20-25%.
4
12. Cereal, bread, bagels, and pasta are good sources of carbohydrates. 4
13. Tofu, nuts, and beans are good sources of protein. 4
14. Athletes tend to consume twice as much protein as recommended. 4

15. The best sources of iron come from animal products and fish. 4
16. Eating cereals or breads enriched with iron should be eaten with a source of vitamin C to enhance absorption of iron. 4
17. Proteins act to repair and build muscle tissue and make hormones to boost the immune system. 4
18. Fats are essential in all diets. 4
19. If a diet is lacking in carbohydrates, proteins are then used for energy. 4
20. Oatmeal, legumes, and fruits are sources of soluble fiber. 4
21. The recommended amount of iron for females is 18-23 milligrams per day. 4
22. Vitamin C is also known as ascorbic acid. 4

RANGE OF SCORES: 22-88

SECTION 2:

1. How often do you eat breakfast in the morning? 4
2. How often do you take vitamin supplements? 1
3. How often do you take mineral supplements? 1
4. How often do you eat three base meals per day? 4
5. How often do you record what you eat? 4
6. How often are you on a "diet"? 1
7. How often do you eat fruits, such as apples, bananas, or oranges? 4
8. How often do you eat vegetables, such as broccoli, tomatoes, carrots, or salad? 4
9. How often do you eat dairy products such as milk, yogurt, or cheese? 4

10. How often do you seek out nutrition information? 4

RANGE OF SCORES: 10-40

CLASSIFICATIONS:

*Excellent = 85-100%
*Good = 70-84%
*Fair = 55-69%
*Poor = 54% or below

APPENDIX C5

DUTCH EATING BEHAVIORS QUESTIONNAIRE & SCORING PROCEDURE

Dutch Eating Behaviors Questionnaire

Please choose the number for each statement indicating to what extent you act in the matter of the following statements.

5 - Very Often

4 - Often

3 - Sometimes

2 - Seldom

1 - Never

1. If you have put on weight, do you eat less than you usually do?

5 4 3 2 1

2. Do you try to eat less at mealtimes than you would like to eat?

5 4 3 2 1

3. How often do you refuse food or drink offered because you are concerned about your weight?

5 4 3 2 1

4. Do you watch exactly what you eat?

5 4 3 2 1

5. Do you deliberately eat foods that are slimming?

5 4 3 2 1

6. When you have eaten too much, do you eat less than usual the following days?

5 4 3 2 1

7. Do you deliberately eat less in order not to become heavier?

5 4 3 2 1

8. How often do you try not to eat between meals because you are watching your weight?

5 4 3 2 1

9. How often in the evening do you try not to eat because you are watching your weight?

5 4 3 2 1

10. Do you take into account your weight with what you eat?

5 4 3 2 1

11. Do you have the desire to eat when you are irritated?

5 4 3 2 1

12. Do you have a desire to eat when you have nothing to do?

5 4 3 2 1

13. Do you have a desire to eat when you are depressed or discouraged?

5 4 3 2 1

14. Do you have a desire to eat when you are feeling lonely?

5 4 3 2 1

15. Do you have a desire to eat when somebody lets you
down?

5 4 3 2 1

16. Do you have a desire to eat when you are mad?

5 4 3 2 1

17. Do you have a desire to eat when you are approaching
something unpleasant to happen?

5 4 3 2 1

18. Do you get the desire to eat when you are anxious,
worried, or tense?

5 4 3 2 1

19. Do you have a desire to eat when things are going
against you or when things have gone wrong?

5 4 3 2 1

20. Do you have a desire to eat when you are frightened?

5 4 3 2 1

21. Do you have a desire to eat when you are disappointed?

5 4 3 2 1

22. Do you have a desire to eat when you are emotionally
upset?

5 4 3 2 1

23. Do you have a desire to eat when you are bored or
restless?

5 4 3 2 1

24.If food tastes good to you, do you eat more than usual?

5 4 3 2 1

25.If food smells and looks good, do you eat more than usual?

5 4 3 2 1

26.If you see or smell something delicious, do you have a desire to eat it?

5 4 3 2 1

27.If you have something delicious to eat, do you eat it straight away?

5 4 3 2 1

28.If you walk past the bakery do you have the desire to buy something delicious?

5 4 3 2 1

29.If you walk past a snackbar or café, do you have the desire to buy something delicious?

5 4 3 2 1

30.If you see others eating, do you also have the desire to eat?

5 4 3 2 1

31.Can you resist eating delicious foods?

5 4 3 2 1

32.Do you eat more than usual when you see others eating?

5 4 3 2 1

33. When preparing a meal are you inclined to eat
something?

5 4 3 2 1

Dutch Eating Behaviors Questionnaire Scoring Procedure

All scores for participants are transferred from Survey Monkey to Microsoft Excel. For each participant two scores are calculated: a raw score total for each scale and an overall scale score for each scale. The DEBQ scales are listed below:

Emotional Eating Diffuse Emotions (4 items): 3, 8, 10, 28

Emotional Eating Clearly Labeled Emotions (9 items): 1, 5, 13, 16, 20, 23, 25, 30, 32

Emotional Eating (13 items): 1, 3, 5, 8, 10, 13, 16, 20, 23, 25, 28, 30, 32

External Eating (10 items): 2, 6, 9, 12, 15, 18, 21, 24, 27, 33

Restrained Eating (10 items): 4, 7, 11, 14, 17, 19, 22, 26, 29, 31

Raw score totals are calculated by totaling up the item scores for each DEBQ-scale. Scale scores are obtained by dividing the raw scale score by the total number of items in that scale endorsed by the participant. For example, the restrained scale contains ten items. If the raw score is 36 and all ten items have been endorsed the scale score is calculated by $36/10 = 3.6$. If nine items are endorsed it would then be $36/9 = 4$. If less than nine items

are endorsed scale scores should not be computed because it will no longer be valid. A participant's classification of scale score is then obtained by putting the score in the norm site of Boom test uitgevers.

APPENDIX C6

Institutional Review Board -
California University of Pennsylvania

Institutional Review Board
California University of Pennsylvania
Morgan Hall, Room 310
250 University Avenue
California, PA 15419
instreviewboard@calu.edu
Robert Skwarecki, Ph.D., CCC-SLP, Chair

Dear Ms. Sarah Florida:

Please consider this email as official notification that your proposal titled "Correlation Among Nutrition Knowledge, Eating Habits and Eating Behaviors in University Dancers" (Proposal #12-050) has been approved by the California University of Pennsylvania Institutional Review Board as amended, with the following stipulations:

--: In the consent form the text equivalent must be included: Discontinuation of participation at any time will go without penalty.

Once you have add this to your consent form, you may immediately begin data collection. You do not need to wait for further IRB approval. At your earliest convenience, you must forward a copy of the consent form for the Board's records.

The effective date of the approval is 3/11/13 and the expiration date is 3/10/14. These dates must appear on the consent form .

Please note that Federal Policy requires that you notify the IRB promptly regarding any of the following:

- (1) Any additions or changes in procedures you might wish for your study (additions or changes must be approved by the IRB before they are implemented)
- (2) Any events that affect the safety or well-being of subjects
- (3) Any modifications of your study or other responses that are necessitated by any events reported in (2).
- (4) To continue your research beyond the approval expiration date of 3/10/14 you must file additional information to be considered for continuing review. Please contact instreviewboard@cup.edu

Please notify the Board when data collection is complete.

Regards,
Robert Skwarecki, Ph.D., CCC-SLP
Chair, Institutional Review Board

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ABSTRACT

TITLE: A Correlation Among Nutrition Knowledge, Eating Habits, and Eating Behaviors in University Dancers

Researcher: Sarah A. Florida

Advisor: Dr. Rebecca Hess

Date: April 2013

Research Type: Master's Thesis

Context: There is limited research comparing nutritional knowledge, eating habits, and eating behaviors of university dancers. The current study considered dance major or minors at neighboring Pennsylvania State Athletic Conference (PSAC) schools that were similar in size to California University of Pennsylvania, also a member of the PSAC. The potential n due to restricted access to the dancers email addresses because of privacy was 40. A total 45% return rate left the current study's n=18.

Objective: The purpose of this study was to examine the nutritional profile of dancers at the university level and determine if correlations existed between their nutrition knowledge, eating habits, and eating behaviors.

Design: Correlational research design.

Setting: Pennsylvania State Athletic Conference (PSAC) schools with major or minor programs in dance with total potential n of 40. All participants completed the study through the use of surveymonkey.com

Participants: A total of 18 responses were collected. All participants must have had 5+ years of formalized dance experience, and either a dance major or minor at their university. All participants in this study, however, were dance minors.

Interventions: The researcher obtained email addresses of the university dancers after receiving permission from dance departments or dance instructors. An electronic cover letter was sent to the departments, instructors, and participants. It was clearly explained in the cover letter that participation was voluntary and discontinuing the survey at any time was without penalty. By completing the survey on surveymonkey.com consent was given for use of data in analysis.

Main Outcome

Measures: Nutrition knowledge and eating habits were obtained through the use of a two part survey, the Revised Nutritional Knowledge and Eating Habits Questionnaire. The participant's eating behaviors were measured through the use of the Dutch Eating Behaviors Questionnaire restrained eating subscale.

Results: There were no correlations between nutrition knowledge scores and eating habit scores, eating habit scores and restrained eating subscale scores, or restrained eating subscale scores and nutritional knowledge scores in the university dancers.

Conclusion: University dancers were found to have poor nutrition knowledge, fair eating habits, and to be at an average risk of restrained eating according to data analysis. This implicates a need for proper nutrition education and a need for certified athletic trainers to become involved in interacting with dancers at this level to improve their health and wellbeing.

Word Count: 415