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Comparison: Perception and knowledge of protein consumption in female athletes for post weight lifting recovery

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Comparison: Perception and Knowledge of Protein Consumption in Female Athletes for Post
Weight Lifting Recovery

A Project Presented to
the Faculty of the Undergraduate
College of Health and Behavioral Studies
James Madison University

in Partial Fulfillment of the Requirements
for the Degree of Bachelor of Science

by Samantha Lofton

December 2014

Accepted by the faculty of the Department of Health Sciences, James Madison University, in partial fulfillment of the requirements for the Degree of Bachelor of Science.

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Abstract

A study was conducted on James Madison University's campus to assess the knowledge, beliefs, perceptions and habits of protein consumption post resistance training in female student athletes. Sixty-two female athletes who regularly partake in resistance training filled out a recovery-cue questionnaire containing 10 statements/questions on the subject of protein consumption. The data was analyzed using IBM SPSS, Version 21.0 and Microsoft Office Excel. Eight percent of respondents stated they are aware of how much protein they should be consuming post workout, and 21% feel what they consume post workout is an adequate amount of protein for muscle recovery. Forty-six percent of athletes attribute their eating habits to a lack of time, and only 16% list protein shakes as a number one choice of food after resistance training.

If more females were aware of the benefits of protein as well as the low risk of excessive muscle growth, protein shakes/supplements could serve as a convenient protein source for proper recovery. This knowledge could help the 69% of female athletes who typically fail to consume 20 grams of protein after lifting.

CHAPTER 1

INTRODUCTION

Females have been involved in sports for years, but weight lifting, also known as resistance training, in females seems to be on the rise in recent years. New weight lifting routines such as Cross Fit are blossoming, and with the public eye paying more attention to the "female fitness model" it seems as though there are more females beginning to take part in weight lifting than ever before. In order to determine a trend of female weight lifting, the Center for Disease Control surveyed the adult population in 1998-2004. There was a significant increase in the amount of females that took part in weight lifting at least twice a week, as the amount rose from 17.7% to 19.6% between the years of 1998 and 2004 (CDC, 2006). The goal of the CDC was to raise awareness of the positive health benefits of weight lifting, and to raise the amount of participants by 30% by 2010 (CDC, 2006). As more females begin to take part in the exercises, more attention should be put on them and their habits that come along with the gym.

Studying the perception and knowledge of female weight lifters in regards to consuming protein post workout is important to better inform our understanding of their

motivations to weight lift, to improve education available for weight lifters, providing the best opportunity for health, and to reduce risk of injury from not properly recovering. If an individual has a lack of knowledge on how to properly perform the exercises, as well as how to properly recover, resistance training can lead to injuries. This baseline knowledge could open the door to new industries and education opportunities. Weight lifting supplements or diets tailored specifically to the female weight lifter, as well as education programs directed at females and any athletes who have interest in beginning a resistance-training program could arise with this type of data. Such attention on the exercise could also promote and encourage more women to take action and begin resistance training, leading to a healthier society.

As the trend of the female weightlifter seems to be on the rise, a few questions come alongside of it. Specific questions addressed in this thesis are, do females take the necessary steps to refuel their bodies after a weight lifting session? Do females know what the proper steps are to refuel their bodies after a weight lifting session? And lastly, what is the female perception of consuming protein after a weight lifting session? The research hypothesis is that there is a lack of knowledge in the female population of the effects of lifting and the benefits of consuming appropriate levels of protein post workout. A

second hypothesis is that females' perception of consuming supplements or adequate amounts of protein will lead to an undesirable gain of excess muscle ("bulking up"). This research was done to determine the level of knowledge of protein effectiveness/usage by female athletes on James Madison University's campus. There is a gap in the current research on the amount of protein used by the general population of females, and with the growing trend of weight lifting, this research is important in developing baseline data of education/motivations in order to begin a healthy habit of recovery for female weight lifters.

CHAPTER 2

A literature review was conducted to fully understand the importance of protein for muscle recovery, and as an attempt to discover the current female usage of protein post resistance training.

REVIEW OF LITERATURE

What happens to your body after a weight lifting session:

"Skeletal muscle is composed of thread-like myofibrils and sarcomeres that form a muscle fiber and are the basic units of contraction" (Leyva, 2013). Following a weight lifting session, the body's skeletal muscles incur microscopic damage due to excessive strain of being overused. Microscopic tears form in the fibers and connective tissue of the muscles which creates the soreness and muscle fatigue that is experienced after resistance training (Leyva, 2013). This microscopic damage causes inflammatory molecules to be released, as well as immune system cells, that activate satellite cells to take action (Leyva, 2013). Satellite cells are resident cells in adult skeletal muscle that are largely responsible for the regeneration of the muscles (Hawke & Garry, 2001). These cells reside in indentations in the muscle and are differentiated such that muscle growth and repair are their main functions (Hawke & Garry, 2001). The damage incurred, along with muscle activation,

stimulates protein turnover in order to repair the muscle (Wilborn, Taylor, Outlaw, Campbell, Foster & Smith-Ryan, 2013). However, this damage can take a week or longer to heal, which may overlap with the next workout depending on the intensity of an individuals workout routine (Wilborn, et al., 2013).

What you can do to help your body repair after a weight lifting session:

According to a 2010 study, 20 grams of protein should be consumed within 30 minutes of finishing a workout to maximize recovery and gain the maximum benefits from the work out (Clark, 2011). Without high enough levels of protein in the system, muscle wasting and delayed exercise recovery can occur. The correct nutrients (protein, carbohydrates and fats) will allow the body to properly rebuild its muscles, increase size, strength and muscle capacity (Wilborn, et al., 2013).

Protein is a natural part of a typical diet, and the daily requirements for protein intake are set by the amount of amino acids that are irreversibly lost (Phillips, 2004). Athletes participating in resistance training need to consume larger amounts of protein to accommodate for the excess protein that is needed on a cellular level to support muscle protein accretion (Phillips, 2004). Athletes participating in strength training should aim to consume 12%-14% of their energy intake from

protein (Phillips, 2004). An everyday diet should consist of the Recommended Dietary Allowance (RDA) for protein of 0.8 g/kg bodyweight of protein daily for any persons not weight training to maintain muscle mass, hormones and enzyme production (Evans, 2004). An individual participating in weight training should increase intake to 1.2-1.7 g/kg (0.5-0.8 g/lb) bodyweight of protein as this may help enhance the hypertrophic response to resistance exercise (Evans, 2004).

How protein can help your muscles recover:

To repair the damage done to your muscles after a workout, the body replaces the damaged fibers through a cellular process where muscle fibers are fused together to form new myofibrils, or muscle protein strands (Leyva, 2013). Supplied amino acids (by ingesting protein) provide the tRNA necessary for translation of amino acids to proteins, driving protein muscle synthesis (Tipton & Wolfe, 2001). Hypertrophy is noted because the new myofibrils increase in number and thickness, resulting in larger muscles (Leyva, 2013). To accomplish muscle growth, there must be a positive protein balance noted, which can be lost if the correct nutrients aren't ingested following the workout (Tipton & Wolfe, 2001). While an individual rests following resistance training, muscle growth occurs only if the rate of muscle protein synthesis is higher than the rate of

muscle protein breakdown. Without proper rest and nutrition, the anabolic process can be reversed to a catabolic process, and muscles will not be able to grow. The muscle response following resistance training lasts about 24-48 hours, so this is the most crucial time period for the reaction of protein metabolism. Any meals consumed during this time period have a high impact on the amount of muscle hypertrophy (Leyva, 2013). "The interaction of post exercise metabolic processes and amino acid availability maximizes the stimulation of muscle protein synthesis and results in even greater muscle anabolism than when dietary amino acids are not present." (Tipton & Wolfe, 2001).

With sufficient amounts of protein, a proper nitrogen balance can be achieved and muscle hypertrophy will be experienced (Wilborn, et al., 2013). "Muscles need protein for recovery and growth, and the best time to deliver protein appears to be right after exercise. Providing high-quality protein after exercise gives your muscles the fuel and the building blocks needed for both repair and for growth" (Zelman, 2005).

The current trend of consuming protein post weight lifting:

A literature review was also conducted to determine the current trend of protein supplements used by weight lifters. A study done by Herbold, Visconti, Frates and Bandini in 2004 found that 65.4% of female athletes used some form of supplement at least once a month, but that only 12% reported that the supplement was some form of amino acid/protein. Of the reported 12%, only 0.2% reported using protein daily. The study determined the perceptions behind not using protein supplements were due to the fact that the athletes were not participating in predominantly strength-training sports, and were not interested in bulking up (Herbold, et al., 2004). Another study found male athletes were likely to take supplements to improve performance and build muscles, where as their female counterparts who took supplements would do so because it was recommended by their family members (Froiland, Koszewski, Hingst and Kopecky, 2004).

In an article published in the Journal of Science and Medicine in Sport, it was found that 89% of all collegiate athletes use some form of protein supplement post workout, and approximately 52% of the general public do as well (Dascombe, Karunaratna, Cartoon, Fergie & Goodman, 2010).

CHAPTER 3

METHODOLOGY

Identification of samples

This study was conducted at James Madison University in Harrisonburg, Virginia. Participants were 62 female student athletes from the women's soccer, volleyball and field hockey teams. The subjects were all above the age of 18, of undergraduate status, with remaining NCAA eligibility in their respective sport. If athletes require a special diet related to a decrease in the amount of protein consumed for any health reasons, they were cautioned to exclude themselves from the study. Student athletes followed their normal training schedule for each sport. Resistance training occurred mainly three times a week of fairly intense nature.

Methods

Interaction with the 62 participants came in the form of a recovery-cue questionnaire done with pen and paper (Appendix B). The survey asked 10 questions in relation to the participants' knowledge of recovery nutrition, beliefs, weight lifting goals, personal efforts, and personal choices of food/supplement consumption post workout. A Recovery-Cue questionnaire created in 1999 by researchers Kellman, Botterill and Wilson was modified to create the Recovery-Cue for this study in order to

maintain internal validity. The original questionnaire was made to evaluate effort and overtraining as well as recovery in weight lifting athletes, and was modified to meet the needs of this study. Data collection began in the summer of 2014 and continued through the fall semester of 2014. Access to the athletes was done with the assistance of the JMU athletic staff, including coaches and trainers, as well as the respective teams' seniors or captains. IRB approval was achieved before the start of the research (Appendix A). The participants completed the survey after filling out an appropriate consent form. The surveys were stored separately from the consent form to maintain anonymity. The research required no external or internal funding and recorded no private, identifiable information. The research also presented no physical risk to the participants. Data was saved on a password-protected computer, only accessible by the researcher and the advisor.

Data analysis

Questions 1-7, and 10 were analyzed using IBM SPSS Version 21.0, Armonk, NY. These questions examined the beliefs, knowledge, and habits of protein usage after resistance training. The scale on the survey of 1-6 represented the participants level of agreement, 1 representing strongly disagree up to 6 representing strongly agree. The responses were

entered into SPSS as numeric values, and the average response to each question as well as the frequency of each response for each question were noted (Appendix C). The bar graphs (Figures 1-8) indicate the percent of respondents who shared common levels of agreement for each question. Questions 8 and 9 were analyzed using Microsoft Office Excel. Question 8 asked the participants to describe their decision-making process for how they choose to what eat after a weight lifting session. The responses were used to categorize typical motivations (Figure 9). Question 9 asked the participants to list specifically what they eat after weight lifting and the responses were used to assign an amount of protein consumed in grams for each participant (Appendix D).

CHAPTER 4

RESULTS

The responses to each question were entered into IBM SPSS and the percentages of each response, 1-6, were recorded in bar graph form.

The results of the first statement "I am aware of the benefits of consuming protein post weight lifting workout" came back with 8.1% disagreeing, 16.1% somewhat disagreeing, 14.5% somewhat agreeing, 41.9% agreeing and 19.4% strongly agreeing (Figure 1). The average response was a 4 ± 1.2 .

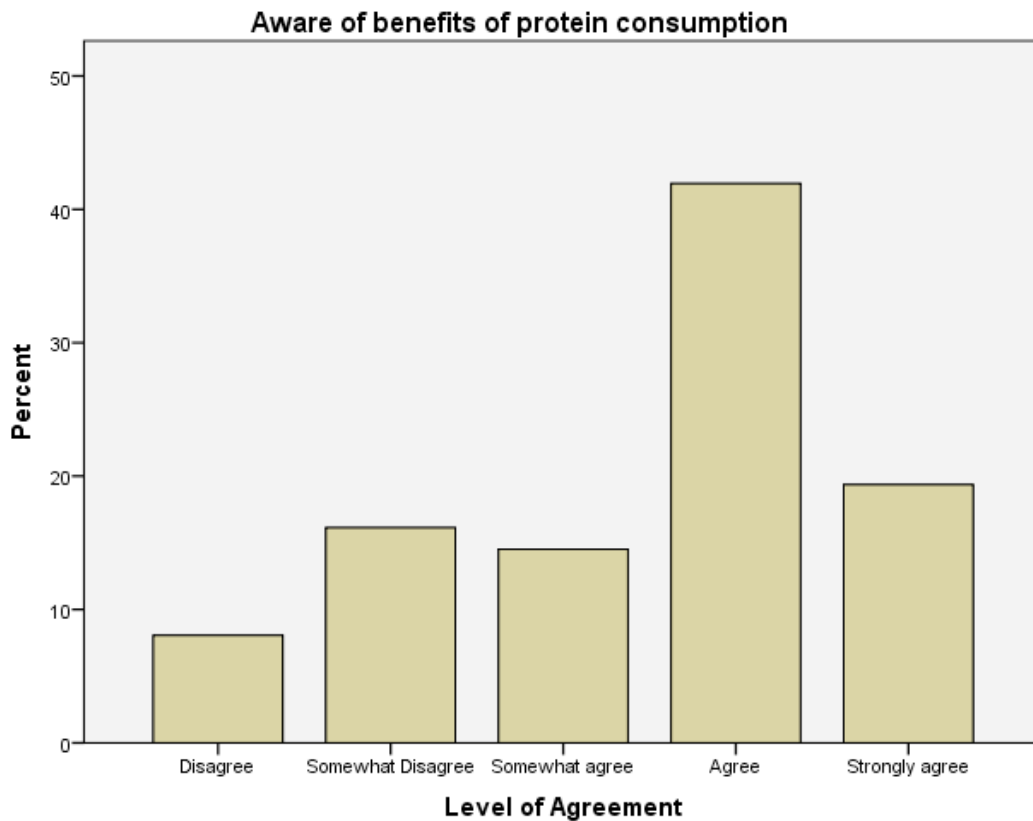


Figure 1. Representation of the percents of each response for statement 1 in the recovery-cue questionnaire.

The results of the second statement "I am aware of how much protein I would need to consume after weight lifting for maximum recovery" resulted in 8.1% of responders strongly disagreeing, 27.4% disagreeing, 29% somewhat disagreeing, 24.2% somewhat agreeing, 8.1% agreeing and 3.2% strongly agreeing (Figure 2). The average response was 3 ± 1.2 .

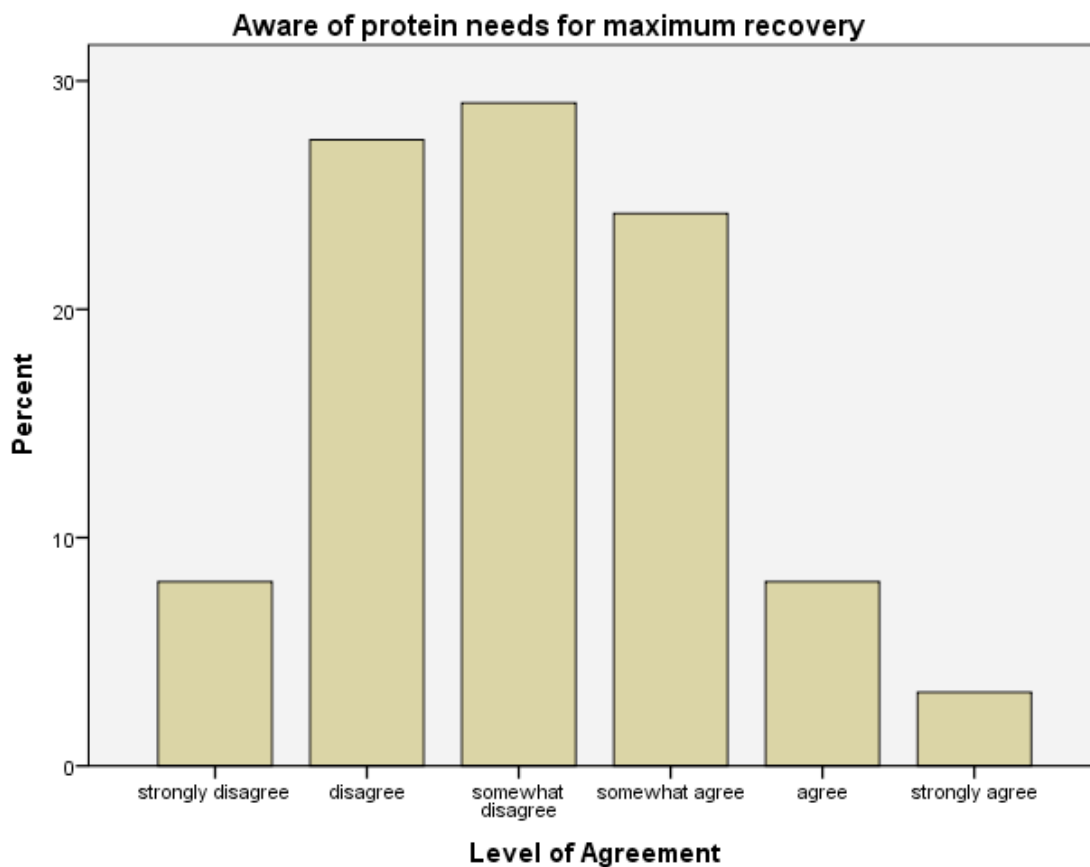


Figure 2. Representation of the percents of each response for statement 2 in the recovery-cue questionnaire.

The results of the third statement "I believe that it is beneficial to my personal improvement to consume protein (food and/or supplement) after weight lifting" came back with 3.2%

disagreeing, 16.1% somewhat disagreeing, 11.3% somewhat agreeing, 33.9% agreeing and 35.5% strongly agreeing (Figure 3). The average response was a 5 ± 1.2 .

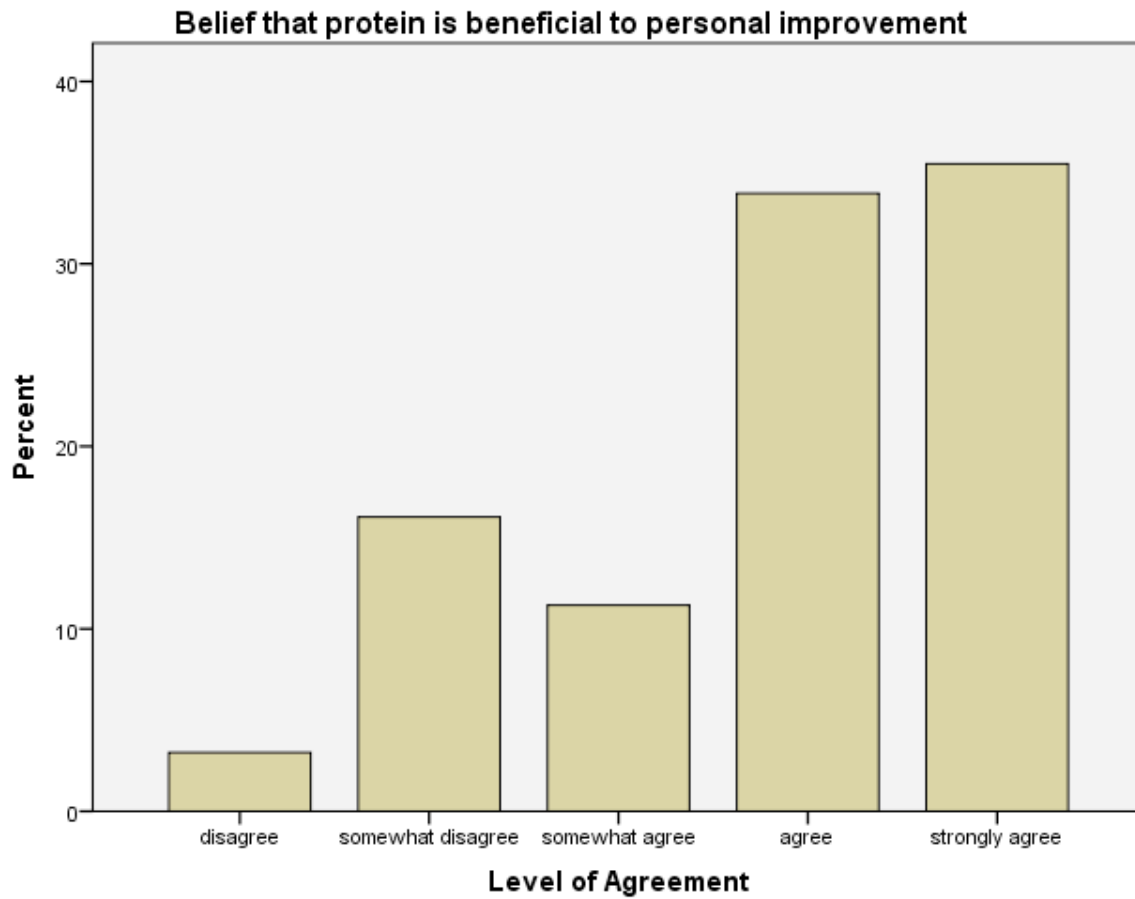


Figure 3. Representation of the percents of each response for statement 3 in the recovery-cue questionnaire.

The result of the fourth statement from the questionnaire, "I see making an effort to consume protein as an effort to bulk up" showed that 11.3% of respondents strongly disagreed, 16.1% disagreed, 25.8% somewhat disagreed, 22.6% somewhat agreed, 21% agreed and 3.2% strongly agreed with an average response of 3 ± 1.4 (Figure 4).

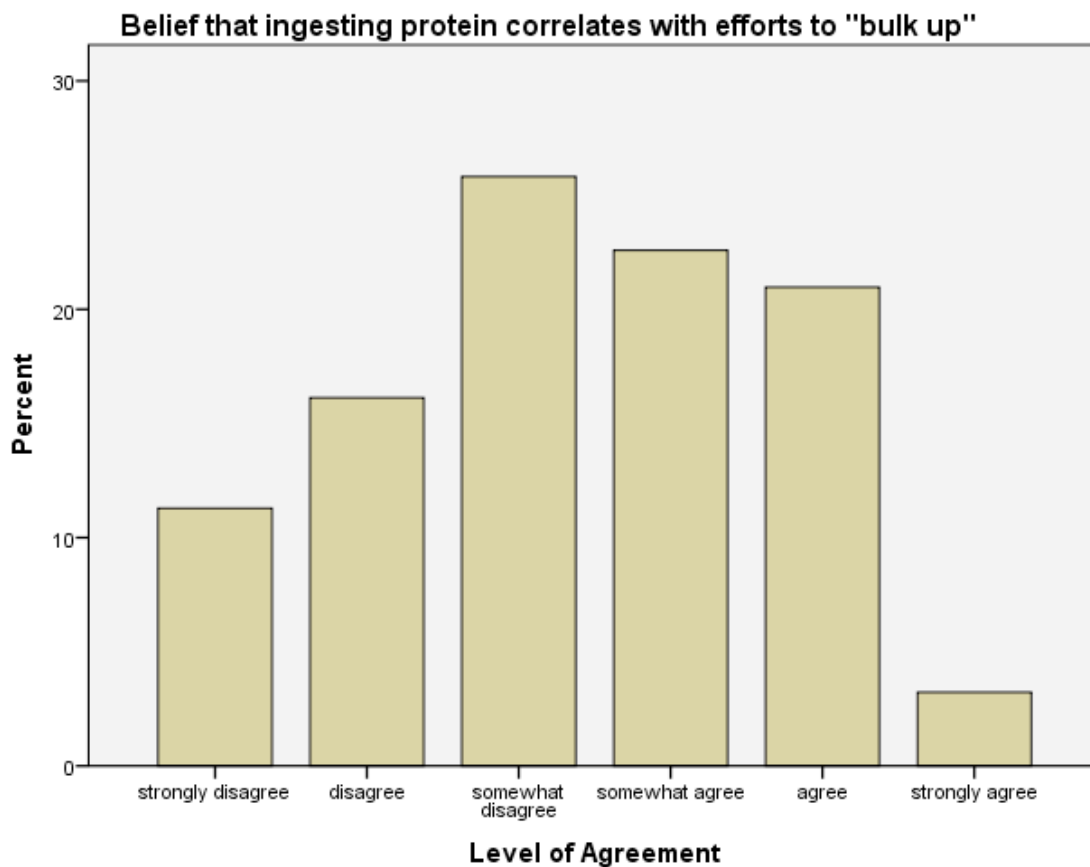


Figure 4. Representation of the percents of each response for statement 4 in the recovery-cue questionnaire.

The result of the fifth statement, "I would like to bulk up" showed that 33.9% of respondents strongly disagreed, 30.6% disagreed, 9.7% somewhat disagreed, 12.9% somewhat agreed, 8.1%

agreed and 4.8% strongly agreed with an average response of 2 ± 1.5 (Figure 5).

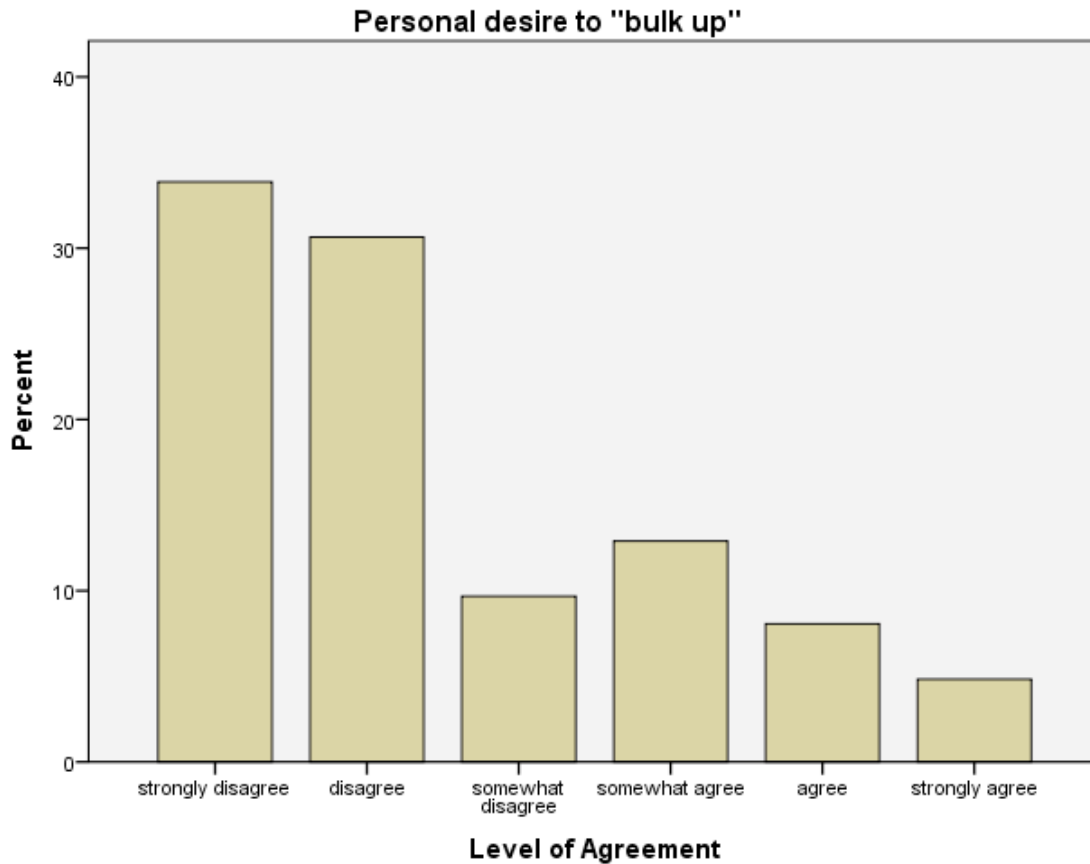


Figure 5. Representation of the percents of each response for statement 5 in the recovery-cue questionnaire.

The result of the sixth statement, "I make an effort to consume food within 30 minutes of every weight lifting session" showed that 3.2% of respondents strongly disagreed, 8.1% disagreed, 24.2% somewhat disagreed, 33.9% somewhat agreed, 25.8% agreed and 4.8% strongly agreed with an average response of 4 ± 1.1 (Figure 6).

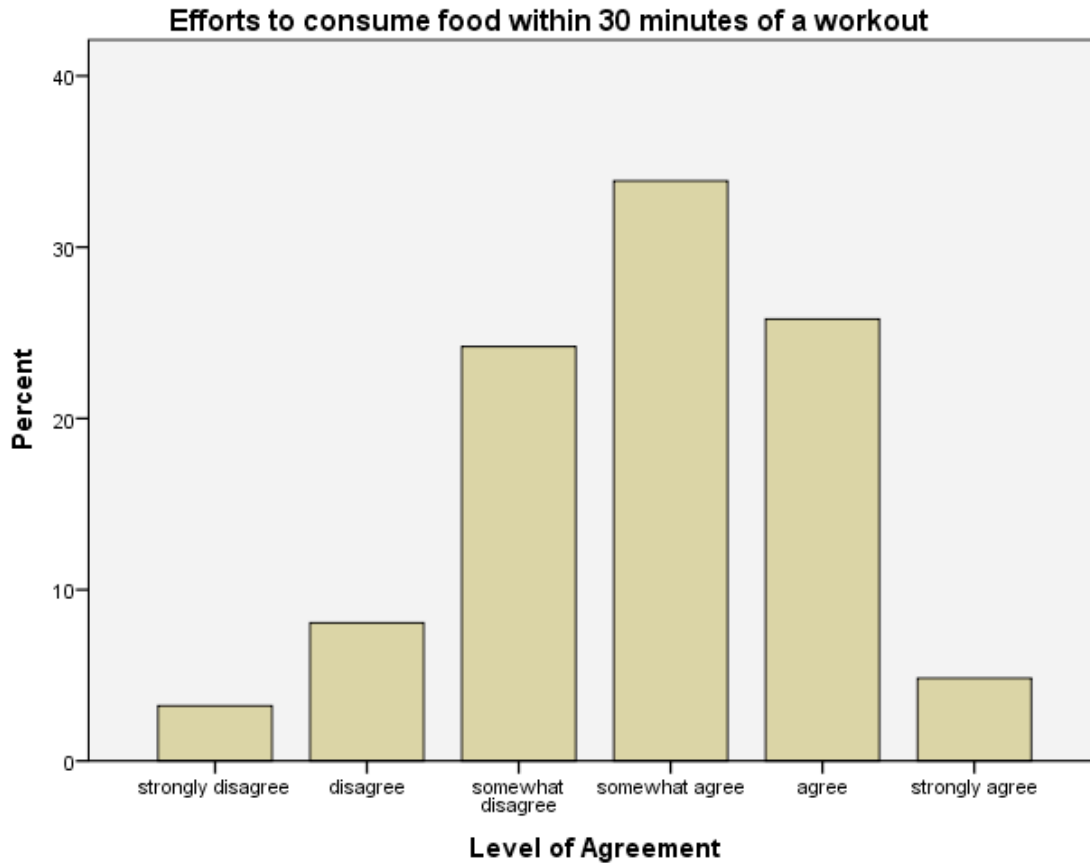


Figure 6. Representation of the percents of each response for statement 6 in the recovery-cue questionnaire.

The result of the seventh question, "How recovered do I typically feel from my last weight lifting session before I begin my next lift" showed that 1.6% of respondents felt definitely not recovered, 9.7% felt not recovered, 30.6% somewhat not recovered, 37.1% felt somewhat recovered, 17.7%

felt recovered and 3.2% felt very recovered and energized, with an average response of 4 ± 1.0 (Figure 7).

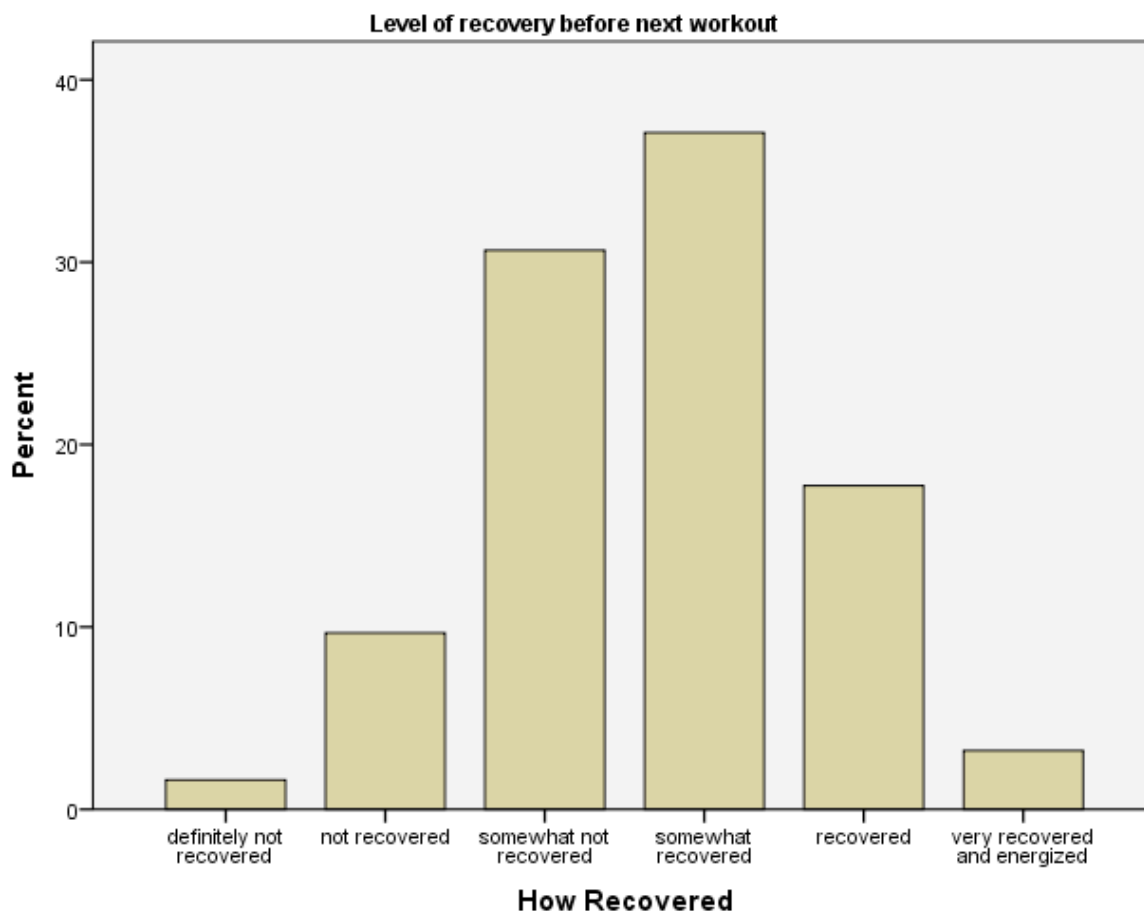


Figure 7. Representation of the percents of each response for statement 7 in the recovery-cue questionnaire.

The result of the tenth statement, "I feel that what I typically consume is an adequate amount of protein for muscle recovery" showed that 3.2% of respondents strongly disagreed, 24.2% disagreed, 21% somewhat disagreed, 29% somewhat agreed, 21% agreed and 1.8% strongly agreed with an average response of 3 ± 1.2 (Figure 8).

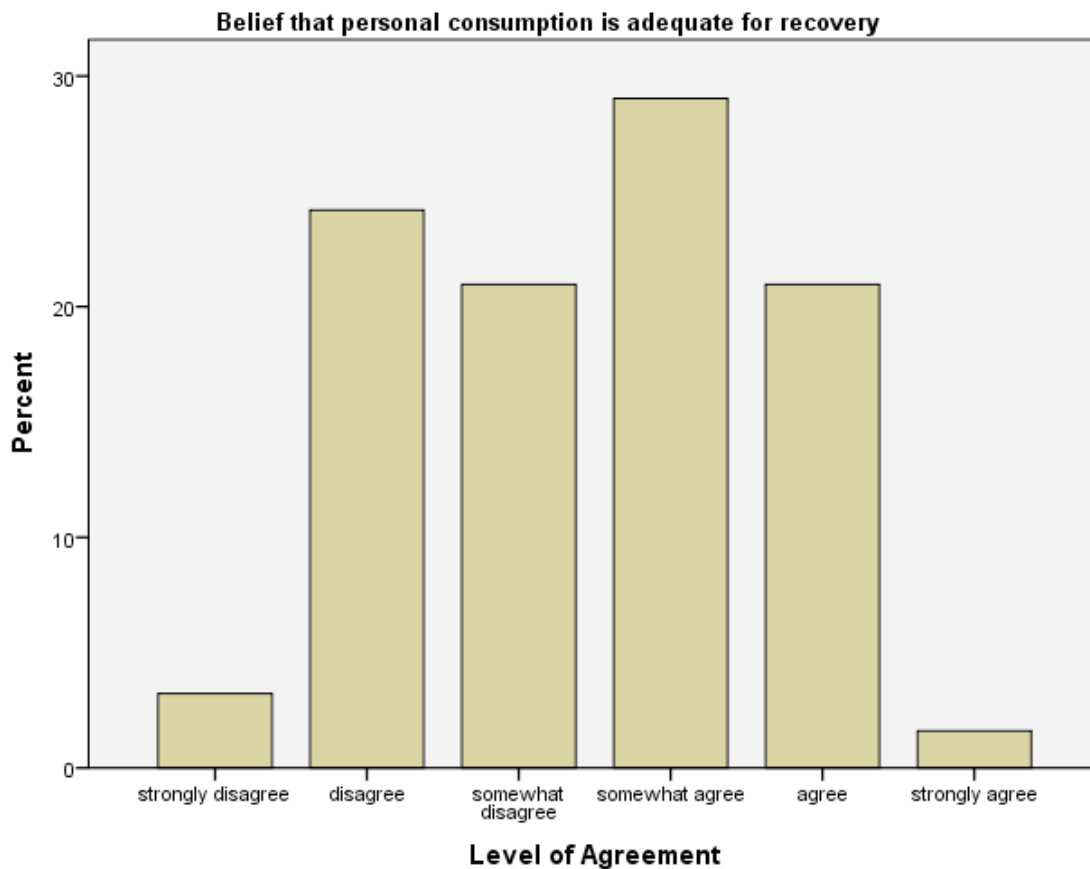


Figure 8. Representation of the percents of each response for statement 10 in the recovery-cue questionnaire.

The motivations of the respondents in terms of foods consumed after resistance training sessions were identified and displayed in Figure 9. Twenty-nine out of 62 respondents answered that what they eat is based on the amount of time they have after lift and before class or other obligations. Twelve out of 62 respondents answered that they choose what to consume based on what will provide them with the maximum amount of

recovery. Ten out of 62 responded that they choose what to eat based on what is most available, mainly, what is served at the dining halls. Seven of 62 responded that they choose what is healthiest, at home or on campus, and the final four of 62 responders said they don't make an effort to consume food after a weight lifting session (Figure 9).

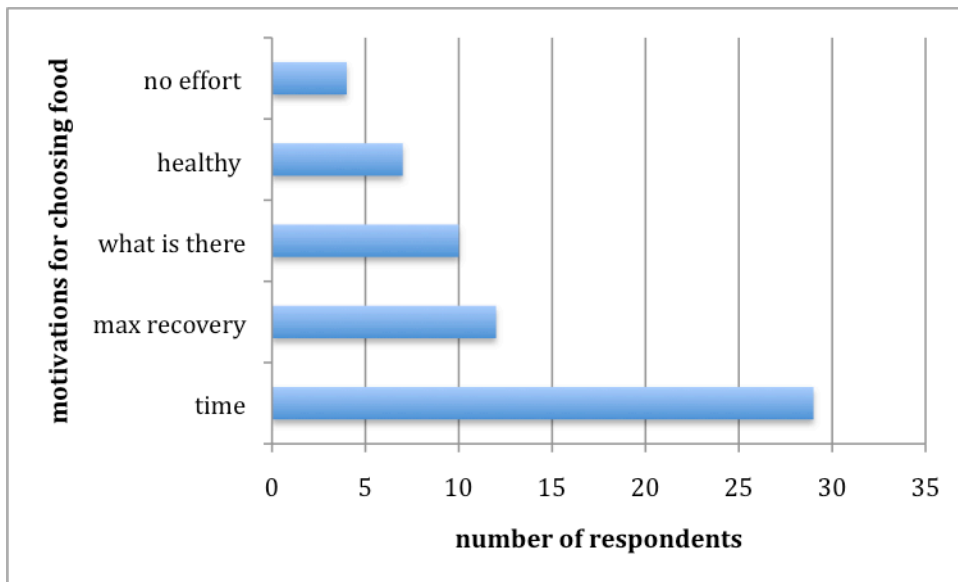


Figure 9. Representation of motivations to consume food post weight lifting sessions.

The remainder of the questionnaire assessed protein intake and choices of the athletes. Of those who participated, only 10 responders, or 16%, reported consuming a protein shake as their top choice after a lifting session.

Figure 10 represents the number of individuals who consume zero to nine grams of protein, 10 to 19 grams of protein, and above 20 grams of protein. The data is similar, with 21 (33.8%) respondents falling into the lowest amount consumed, 22 (35.4%) in the middle amount, and 19 (30.6%) in the highest category.

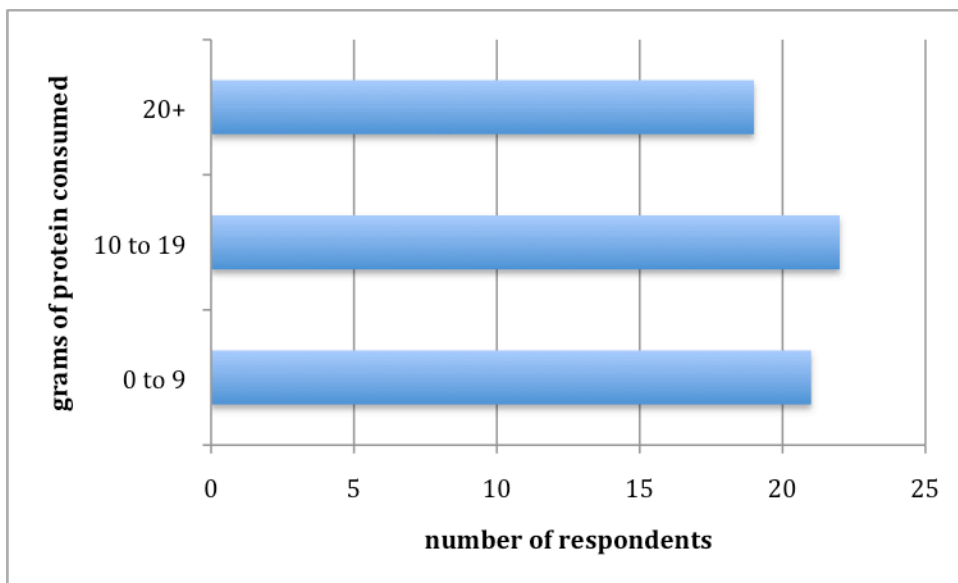


Figure 10. Number of respondents who consumed varying grams of protein.

CHAPTER 5

DISCUSSION

Figure 1 addresses the question whether or not the participants are aware of the benefits that come along with consuming protein post resistance training. Approximately 42% of the responders agreed to this statement and approximately 19% strongly agreed with this statement. This informs the researchers that the majority of the student athletes that participated in this study have at some point gained the knowledge that consuming protein after a weight session has its benefits. However, the benefits that come along protein consumption were not questioned, so the knowledge of the athletes in this regard is not known. As seen in Figure 3, the majority of the participants state that they are aware that consuming protein post weight lifting would have a positive benefit on their personal improvement. With an average response of 5, it was determined that a strong majority of the participants had a belief that protein would have a positive effect on their performance. However, only 8% of the responders agree and only 3% strongly agree that they are aware of how much protein they should be consuming for maximum recovery (Figure 2). The average response for this statement was a 3, which corresponds to somewhat disagreeing. This shows that the athletes are aware that protein is beneficial and would help

them to personally improve, but they are unaware of the amount that needs to be consumed to reap these benefits. This is also supported by the results that only 30.6% of respondents reported consuming the recommended 20g or more of protein.

When asked if the participants see consuming protein as an effort to "bulk up" as shown in Figure 4, the responses were nearly half and half. 53% of the responders disagreed with this statement in varying degrees, with the majority (25.8%) somewhat disagreeing, and 47% agreed with varying levels, with the majority being somewhat agreeing (22.6%). When asked if the participants then had their own desire of "bulking up, 64.5% of the responders answered in the strongly disagree/disagree category. This indicates that even though approximately 61% of respondents agree that they are aware that protein is important for recovery, 47% at least somewhat believe that the main role of protein usage is for "bulking up".

When looking at the habits of the individuals, Figure 6 shows the efforts of the participants to eat food within 30 minutes of a weight lifting session. About 30% of the respondents answered that they agree/strongly agree, and this answer can be supported by the analysis of questions 8 and 9 (Figure 9). As stated, about 30% of the responders make a strong effort to consume foods 30 minutes after a session, but as determined by Figure 9, this can present a problem in a student

athlete's life. This is supported by the fact that 29 out of 62 responders (46.7%) choose what to eat based on what amount of time they have after their work out and before their next obligation.

When analyzing if the athletes feel adequately recovered prior to the next weight lifting session, Figures 7 and 8 address whether or not they feel recovered and if they believe that what they typically eat contains enough protein for recovery. The largest amount of responders said they normally feel somewhat recovered (37%), but 40% make up the not recovered/somewhat not recovered category. Only 20% feel recovered/fully recovered, so there is room for improvement for about 80% of the participants.

CONCLUSION

The research study found that many of the respondents believed that protein is beneficial to consume post workout, and that it would in fact help them improve their weight lifting. However, only 11% of the respondents were comfortable in their knowledge of how much protein they should actually be consuming, leading to only 30.6% of the athletes consuming 20g of protein or more. This supports the researchers' hypothesis that many female athletes have not been properly informed on how they should be attending to recovery. Along with being unaware of how

much protein should be consumed, only 30% could say they make an effort to consume food within 30 minutes of a session. The majority (46.7%) of all respondents attribute their eating habits to a lack of time, so a conclusion could be that if more of the athletes were aware of the positive impacts of protein supplements/shakes, the number who consume those could rise from 16% due to its convenience. This amount of 16% is similar to the amount noted in the literature, where it was found that 12% of females ingest a protein/amino acid supplement (Herbold, et al., 2004). However, it is much lower than the collegiate athlete rate of protein use, which was determined to be 89% of all male and female athletes (Dascombe, et al., 2010). Not only could a protein shake/supplement address the time and protein level needs as a simple solution, it could also help to reduce the 40-80% of athletes who feel as though they aren't fully recovered before their next weight lifting session.

The portion of the survey dedicated to body image and "bulking up" specifically was somewhat inconclusive. About half of the participants answered that they do not see consuming protein as an effort to "bulk up", which does not corroborate the hypothesis that females avoid protein because they believe this will lead to increased muscle mass. However, about half of the participants to some extent do see consuming protein as an effort to bulk up. In order to further support or reject the

body image hypothesis, a more in depth question would have to be presented to the females. For example, questioning one's belief in the ability of a female weight lifter to put on excess muscle mass, and if they believe this would happen to them if they had a high protein/supplement diet would help to further determine if females believe that they would have the ability to excessively "bulk up".

A main limitation of this study would be the biases that females would face when participating in this study. For example, a female might have an idea of the kinds of things she should be eating to properly refuel herself, although she may only partake in this recovery process once in a while. Using a hand written survey forms gives more room to the participants to write what they would normally aim to consume, but due to a number of factors they may only consume these foods occasionally. Also, limited populations of weight lifters were reached for this specific study, and the population that took part may all have similar motivations, as they are all student athletes on James Madison University's campus.

Future research could be done to determine the level of education for the specifics of protein consumption, for example, how much and when should it be ingested. Also, to further understand the females' perceptions of the effect of weight lifting and protein usage, more specific questions on this topic

could be asked. These questions could determine if they are aware of the hormonal differences between men and women that allow men to add excess muscle, or if they believe that with heavy lifting and protein they will look manly. The best way of educating females on these matters could also be studied. Future research could determine if a trial of protein samples for the athletes would be beneficial to the females, allowing them to experience the results for themselves.

Appendix A

IRB Approval

Dear Samantha,

I want to let you know that your IRB protocol entitled, “***Comparison: Perception and knowledge of post lifting recovery in female athletes who consumed food or supplement vs. those who do not***” has been approved for you to begin your study. The signed action of the board form, approval memo, and close-out form will be sent to your advisor via campus mail. Your protocol has been assigned No. 15-0003. Thank you again for working with us to get your protocol approved.

As a condition of the IRB approval, your protocol is subject to annual review. Therefore, you are required to complete a Close-Out form before your project end date. You *must* complete the close-out form unless you intend to continue the project for another year. An electronic copy of the close-out form can be found on the Office of Research Integrity web site at the following

URL: <http://www.jmu.edu/researchintegrity/irb/forms/index.shtml>.

If you wish to continue your study past the approved project end date, you must submit an Extension Request Form indicating an extension request, along with supporting information. Although the IRB office sends reminders, it is ultimately ***your responsibility*** to submit the continuing review report in a timely fashion to ensure there is no lapse in IRB approval.

If you have any questions, please do not hesitate to contact me.

Best Wishes,
Carrie

Appendix B
Recovery Cue- Questionnaire

1. I am aware of the benefits of consuming protein post weight lifting workout	<p style="text-align: center;">Disagree Agree</p> <p style="text-align: center;">1 2 3 4 5 6</p>
2. I am aware of how much protein I would need to consume after weight lifting for maximum recovery	<p style="text-align: center;">Disagree Agree</p> <p style="text-align: center;">1 2 3 4 5 6</p>
3. I believe that it is beneficial to my personal improvement to consume protein (food and/or supplement) after weight lifting	<p style="text-align: center;">Disagree Agree</p> <p style="text-align: center;">1 2 3 4 5 6</p>
4. I see making an effort to consume protein as an effort to "bulk up"	<p style="text-align: center;">Disagree Agree</p> <p style="text-align: center;">1 2 3 4 5 6</p>
5. I would like to "bulk up"	<p style="text-align: center;">Disagree Agree</p> <p style="text-align: center;">1 2 3 4 5 6</p>
6. I make an effort to consume food within 30 minutes of every weight lifting session	<p style="text-align: center;">Disagree Agree</p> <p style="text-align: center;">1 2 3 4 5 6</p>
7. How recovered do I typically feel from my last weight lifting session before I begin my next lift?	<p style="text-align: center;">Not recovered Recovered and energized</p> <p style="text-align: center;">1 2 3 4 5 6</p>
8. Briefly describe your decision-making process in how you choose what you eat after a weight lifting session if	

<p>8. Briefly describe your decision-making process in how you choose what you eat after a weight lifting session if applicable</p> <p>(ex. You choose something that provides maximum recovery, you go to vending machine b/c of time or you don't eat because you have class etc.) Be specific. Use back if needed.</p>	
<p>9. List any foods in detail (brand of product, amount etc.) that you would typically consume within an hour of finishing lifting. Be specific and use back of paper if needed. You can provide a variety of examples, just make sure we can distinguish option 1 from 2 or 3 etc.</p>	
<p>10. I feel that what I typical</p>	<p>Disagree Agree</p>

APPENDIX C

Table 1. Mean and mode of respondents per question

		Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 10
N	Valid	62	62	62	62	62	62	62	62
	Missing	0	0	0	0	0	0	0	0
	Mean	4.4839	3.0645	4.8226	3.3548	2.4516	3.8548	3.6935	3.4516
	Median	5.0000	3.0000	5.0000	3.0000	2.0000	4.0000	4.0000	4.0000
	Mode	5.00	3.00	6.00	3.00	1.00	4.00	4.00	4.00
	Std. Deviation	1.21118	1.21292	1.18078	1.36822	1.51146	1.14300	1.03367	1.21030
	Skewness	-.619	.329	-.755	-.121	.890	-.387	-.081	-.084
	Std. Error Skewness	.304	.304	.304	.304	.304	.304	.304	.304
	Percentiles								
	25	3.7500	2.0000	4.0000	2.0000	1.0000	3.0000	3.0000	2.0000
	50	5.0000	3.0000	5.0000	3.0000	2.0000	4.0000	4.0000	4.0000
	75	5.0000	4.0000	6.0000	4.2500	4.0000	5.0000	4.0000	4.0000

Table 2. Question 1 response percentages

QUESTION 1	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Disagree	5	8.1	8.1	8.1
Somewhat Disagree	10	16.1	16.1	24.2
Somewhat agree	9	14.5	14.5	38.7
Agree	26	41.9	41.9	80.6
Strongly agree	12	19.4	19.4	100.0
Total	62	100.0	100.0	

Table 2a. Question 2 response percentages

QUESTION 2	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly disagree	5	8.1	8.1	8.1
disagree	17	27.4	27.4	35.5
somewhat disagree	18	29.0	29.0	64.5
somewhat agree	15	24.2	24.2	88.7
agree	5	8.1	8.1	96.8
strongly agree	2	3.2	3.2	100.0
Total	62	100.0	100.0	

Table 2b. Question 3 response percentages

QUESTION 3	Frequency	Percent	Valid Percent	Cumulative Percent
Valid disagree	2	3.2	3.2	3.2
somewhat disagree	10	16.1	16.1	19.4
somewhat agree	7	11.3	11.3	30.6
agree	21	33.9	33.9	64.5
strongly agree	22	35.5	35.5	100.0
Total	62	100.0	100.0	

Table 2c. Question 4 response percentages

QUESTION 4	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly disagree	7	11.3	11.3	11.3
disagree	10	16.1	16.1	27.4
somewhat disagree	16	25.8	25.8	53.2
somewhat agree	14	22.6	22.6	75.8
agree	13	21.0	21.0	96.8
strongly agree	2	3.2	3.2	100.0
Total	62	100.0	100.0	

Table 2d. Question 5 response percentages

QUESTION 5	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly disagree	21	33.9	33.9	33.9
disagree	19	30.6	30.6	64.5
somewhat disagree	6	9.7	9.7	74.2
somewhat agree	8	12.9	12.9	87.1
agree	5	8.1	8.1	95.2
strongly agree	3	4.8	4.8	100.0
Total	62	100.0	100.0	

Table 2e. Question 6 response percentages

QUESTION 6	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly disagree	2	3.2	3.2	3.2
disagree	5	8.1	8.1	11.3
somewhat disagree	15	24.2	24.2	35.5
somewhat agree	21	33.9	33.9	69.4
agree	16	25.8	25.8	95.2
strongly agree	3	4.8	4.8	100.0
Total	62	100.0	100.0	

Table 2f. Question 7 response percentages

QUESTION 7	Frequency	Percent	Valid Percent	Cumulative Percent
Valid definitely not recovered	1	1.6	1.6	1.6
not recovered	6	9.7	9.7	11.3
somewhat not recovered	19	30.6	30.6	41.9
somewhat recovered	23	37.1	37.1	79.0
recovered	11	17.7	17.7	96.8
very recovered and energized	2	3.2	3.2	100.0
Total	62	100.0	100.0	

Table 2g. Question 10 response percentages

QUESTION 10	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly disagree	2	3.2	3.2	3.2
disagree	15	24.2	24.2	27.4
somewhat disagree	13	21.0	21.0	48.4
somewhat agree	18	29.0	29.0	77.4
agree	13	21.0	21.0	98.4
strongly agree	1	1.6	1.6	100.0
Total	62	100.0	100.0	

APPENDIX D

Table 3. Grams of protein consumed by each respondent, concluded from questions 8 and 9

# of survey	g of protein
1	8
2	7
3	2
4	6
5	16
7	4
8	42
9	27
10	29
11	35
12	23
13	8
14	40
15	10
16	15
17	20
18	10
19	20
20	25
21	20
22	0
23	30
24	20
25	8
26	10
27	10
28	8
29	10
30	30
31	20
32	15
33	20
34	17
35	25
36	20
37	18
38	20
39	25
40	8
41	13
42	8
43	8

44	8
45	15
46	10
47	15
48	17
49	10
50	12
51	6
52	13
53	4
54	20
55	14
56	10
57	8
58	12
59	9
60	25
61	8
62	10
AVERAGE	15.34
STDEV	9.02

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