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# The Potential For Greek Housing To Shape Diet And Exercise Patterns: An Exploratory Intra-Greek Comparison

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## **ABSTRACT**

*Objective:* The purpose of this study was to explore the differences in diet and exercise patterns in sorority women from campuses with different Greek Life structures. The goal was to determine if the centralization of the sorority through the presence of a chapter sorority house altered these health behaviors for any of the women.

*Methods:* A cross-sectional study design was used to gather data from sorority members at two northeastern universities during October of 2014. Women created a one-week food and exercise record through the MyFitnessPal application for smartphones. They were also asked to complete a survey with questions regarding demographics, eating patterns, and the Body Shape Questionnaire-34 (BSQ). The dependent variables of dietary macronutrient and micronutrient intake, total energy intake, physical activity frequency, calories burned through exercise, and BSQ-based Body Image Score were tested for statistical differences as a function of the presence or absence of centralized sorority housing.

*Participants:* The participants were 44 sorority women from two college campuses. Electronic food and exercise records were collected from 12 women in four sorority chapters with centralized housing arrangements. Electronic food and exercise records were collected from 32 women from the same four sororities in decentralized living arrangements at a different university.

*Results:* Women living in centralized sorority houses had a higher BMI ( $p < 0.05$ ), healthier eating patterns (Diet Score  $p < 0.001$ ), lower total energy intake ( $p=0.020$ ), lower exercise frequency ( $p=0.008$ ), burned fewer calories ( $p=0.015$ ), and had less preoccupation with body size and shape (Body Image Score  $p=0.030$ ) than the women in decentralized sorority living arrangements. Both groups of women under consumed total calories, resulting in diets deficient in most micronutrients. Both groups of women exceeded sodium and saturated fat recommendations.

*Conclusions:* The presence of a campus sorority house influences the diet and exercise habits of sorority women. The results of this research point to a need for further studies to evaluate differences within and between Greek Life populations to better understand the social mediators of health behaviors; the work should also be expanded to explore similar questions in fraternities. It is likely that sorority women, regardless of housing arrangements or campus culture, would benefit from nutrition education regarding total energy and macro- and micro-nutrient requirements.

THE POTENTIAL FOR GREEK HOUSING TO SHAPE DIET AND EXERCISE PATTERNS:  
AN EXPLORATORY INTRA-GREEK COMPARISON

BY  
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B.S., Villanova University, 2013

Master's Thesis  
Submitted in partial fulfillment of the requirements for the degree of  
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Syracuse University  
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## PART 1: LITERATURE REVIEW

### **INTRODUCTION**

As risky health behaviors permeate college campuses,<sup>1-4</sup> researchers are exploring aspects of the built college environment that may facilitate these activities.<sup>5-7</sup> At the same time, membership in Greek Life is being considered as a separate potential mediator for these unhealthy behaviors.<sup>8-10</sup> These studies have concluded that living arrangement, peer influence, and sorority membership all may play a role in the development of an unhealthy lifestyle during the college years.<sup>2,6,9</sup> There is limited evidence, however, to demonstrate the co-influence of these factors on daily eating and physical activity habits in today's college students.

Compelling evidence indicates sorority women are at greater risk for developing eating disorders than their non-Greek peers,<sup>9,11,12</sup> suggesting a need to better understand the social forces influencing this trend. When searching for the causal link between eating disorders and sororities, researchers often compare the attitudes and behaviors of sorority women to those of women outside of the Greek system.<sup>9,11,12</sup> While this approach provides some valuable information, it limits insight into the influences within the Greek system that may impact its members differently. This study was designed to address this knowledge gap through use of an inter-Greek Life comparison to explore the unique social influences exerted on the dietary and health behaviors of sorority women.

The nature and extent of peer influence experienced by women within the Greek system will differ on every college campus as a function of living arrangements. Campus sorority houses provide the means for social pressures to become amplified and for members to be exposed to the numerous beneficial and detrimental influences provided by their Greek

affiliation;<sup>13</sup> however, not all campuses provide chapter houses for the students of Greek Life. The sorority members of these houseless chapters are not exposed to the same strength of social influences as their counterparts due to the lack of constant community centralization. According to the Social Network Theory, the presence of a centralized sorority house isolates members from outside connections, leaving members susceptible to a distorted view of normalcy due to the limited diversity of social influences to which they are exposed,<sup>14,15</sup>; however, without this centralization, the sorority women are exposed to a diverse number of peer and environmental influences, reducing the power of Greek affiliation to skew their view of normalcy. No study has conducted research on the women in these varying forms of Greek Life, and a lifestyle-approach with focus on eating, physical activity, alcohol consumption, and body image is necessary to understand interactions between influences and motivations for the habits presented.

## **SORORITY LIFE**

### **A. NATIONAL SORORITY STRUCTURE**

Sororities exist in social, professional, special interest, national, and local forms with the goal of providing women with networks and connections during and after college.<sup>16</sup> National sororities are the most common form of Greek Life seen on college and university campuses embodied as sorority chapters, each of which is governed by a national organization.<sup>16</sup> The chapters are named based on the Greek alphabet and order in which they were established nationwide. Each national organization has a unique set of rites, rituals, and symbols that must be upheld by each of the chapters.<sup>16</sup> The new member pledging process was created to provide

members with the opportunity to learn these organizational values as well as individual chapter histories. To ensure sorority standardization in recruitment and pledging, all national organizations function as members of the National Panhellenic Conference (NPC), a council that supports, oversees, and advocates for all nationally affiliated organizations and their chapters. Membership in the NPC qualifies a national organization to be classified as a national sorority and begin establishing chapters on college campuses nationwide. There are 26 national NPC sororities, four of which will be further explored in this study.<sup>16</sup>

## B. SORORITY MEMBERSHIP

Sororities significantly shape the college experience of many women in the United States. In 2013, over 325,700 women were active sorority members in 3,127 chapters across 666 campuses nationwide.<sup>17</sup> According to national data, approximately 14% of new students express intent to join a sorority; studies have shown sorority and fraternity membership is perceived by new students to be strongly beneficial socially and scholastically both during and after college.<sup>18,19</sup> These perceived benefits of membership are exemplified by the success of sorority women like Maya Angelou, Katie Couric, and the current Supreme Court Justices Ruth Bader Ginsberg and Sonia Sotomayor.<sup>20-22</sup> The powerful influence of the Greek system extended to Syracuse University (SU) in 1871, when the first chapter house was built by the Alpha chapter of Alpha Phi.<sup>23</sup> Sorority participation has grown at SU to contemporarily include 27% of all undergraduate women.<sup>24</sup> Similarly, Greek Life at Villanova University (VU) was founded in 1902, with 37% of all undergraduate women participating in the 14 on-campus

sororities today.<sup>25,26</sup> From leadership to scholarship, the impact of sorority participation is powerful for both individuals and the surrounding community.

### C. SORORITY CHAPTER HOUSES

Chapter houses are perhaps the most recognizable feature of Greek Life. There are two types of chapter housing: club houses and lodges.<sup>13</sup> The club houses consist of public gathering rooms and numerous sleeping rooms, while the lodges act solely as meeting locations. At SU, the tradition of Greek Life club housing began in 1871 with Alpha Phi, the first chapter to build on Syracuse land.<sup>13,23</sup> Today, all NPC sorority chapters affiliated with SU have their own chapter club houses located in two distinct sections of campus. In his book on the American Greek Life system, Baird explains that Greek communities lodging in live-in houses exert numerous beneficial and detrimental influences on the members.<sup>13</sup> They provide an opportunity to foster mutual helpfulness, promote social discipline, and develop ambition and pride, while also encouraging social exclusiveness and facilitating arrogance and narcissism.<sup>13</sup> Despite their foundational role in Greek Life, some schools, such as VU, opt to not have sorority and fraternity houses on their campuses, eliminating these house-related sources of influence.<sup>26</sup> Whether the decision is monetarily driven or legally mandated, sorority members of houseless chapters are not exposed to the same strength of social influences due to the lack of constant community centralization. This discrepancy in social structure impacts the experiences of chapter members through the level of influence exerted by their organization.

Sorority chapter houses also provide unique meal opportunities for their residents. The SU sorority houses employ chefs who cook meals for all sisters in the house and stock the

refrigerator and pantry with snacks. All chapters serve breakfast in a continental fashion with instant oatmeal, yogurt, bagels, and fruit available on all weekdays. Lunch and dinner schedules vary slightly between houses. Some chapters serve lunch from 11:30am until 1:00pm Monday through Thursday, while others serve Monday through Friday from 12pm until 1:30pm. Dinner is served from 4:30pm/5:00pm to 6:30pm on all five weekdays. No one is allowed to cook for herself at the house with the exception of using the microwave and toaster ovens. The sorority members have access to cereal, fruit, granola bars, sandwich supplies, and meal leftovers at all times. All meals are served buffet-style in a community dining room. This culture of food availability and presentation in a sorority house is unlike any other and has great potential to influence eating behaviors and body image.

The different approaches to Greek life adopted by Syracuse and Villanova Universities provide a unique opportunity to examine the effects of centralization imposed by sorority houses compared to the complete lack thereof, and the contrasting diet and exercise patterns, alcohol intake, and perceptions of body image of women living in the two environments.

### **SORORITY MEMBER FOOD CONSUMPTION**

In 2012, Mize and Valliant conducted the first study tracking the food consumption of sorority women eating meals in a communal house.<sup>27</sup> The researchers conducted a 24-hour dietary recall interview and had participants complete a Questionnaire of Eating Behaviors regarding obstacles to eating in the sorority house. The participants were 72 sorority women from nine sororities at the University of Mississippi. All intakes were compared to the USDA MyPyramid guidelines for college-age women. The results indicated that women consuming six

or more meals in the sorority house each week consumed more calories (1,958 kcal) than those members who ate in the house less than six times each week (1,483 kcal). Those eating six or more meals in the house were below the recommended intakes for fruit, dairy, protein, and fats/oils; however, those eating less than six meals in the communal house were below recommendations for every group (fruit, vegetables, dairy, protein, fats/oils, grains). The Questionnaire revealed that the two largest nutritional barriers in the sorority house were a dislike of the food offered or a schedule conflict with meal times. This study concluded that members who ate six or more meals in the house not only had higher calorie intake but were also more likely to meet the MyPyramid recommendations and have a lower BMI.<sup>27</sup> The study did not address eating attitudes or disordered eating tendencies. Further research is therefore necessary to explore the reported relationship between the higher energy intake and lower average BMI.

Mize and Valliant's study is the only one of its kind to track food consumption in sorority women,<sup>27</sup> but it did not assess the women's eating attitudes or specific living arrangements. The present study hopes to build on these findings by tracking food intake of sorority women while expanding our understanding of eating behaviors through an assessment of body image attitudes and exercise patterns specific to sorority living arrangements.

## **SORORITY MEMBERSHIP AND ALCOHOL CONSUMPTION**

The culture of Greek Life has developed to include binge drinking as a social norm.<sup>28</sup> Alcohol consumption and alcohol-related consequences are more prevalent among sorority women than non-Greeks.<sup>28,29</sup> It is speculated that the regularly organized social events and

increased availability of alcohol for sorority women leads to an increased number of drinking opportunities.<sup>30</sup> Simultaneous with the pressure from social norms to consume alcohol, college women are expected to maintain a slim physique and avoid weight gain<sup>31</sup>—a task made difficult by excess consumption of empty calories from alcohol. A new phenomenon involving calorie restriction prior to alcohol consumption, termed “drunkorexia”, describes a technique employed by many college women to prevent weight gain despite alcohol consumption.<sup>32</sup> In their assessment of 274 undergraduates, Bryant et al. determined that 43.0% and 18.8% of women eat less or skip a meal before alcohol consumption, respectively, to account for calories consumed through alcohol in at least 25% of their drinking events.<sup>33</sup> Eisenberg and Fitz also concluded that undergraduate students engaged in drunkorexia in 29.2% of all drinking events.<sup>34</sup> Of those who utilized drunkorexia, 67% indicated weight concern as their motivation for restriction.<sup>35</sup> Although an undergraduate poster presentation revealed no significant difference between sorority members and non-Greek individuals in their use of drunkorexia,<sup>36</sup> no additional peer reviewed studies were available to corroborate these findings. To date, studies have indicated the widespread use of caloric restriction on days with alcohol consumption as a means to control weight by college students, but limited information exists for this phenomenon in an exclusively Greek setting or based on living arrangements. The present study should provide insight into this understudied area by examining the dietary patterns of sorority women living in two different living arrangements on days with and without alcohol consumption.

## EXERCISE PATTERNS OF SORORITY WOMEN

Physical activity is an important factor of a healthy lifestyle and is necessary for maintenance of good physical and mental health.<sup>37-39</sup> An examination of the physical activity habits of college women revealed that this population exercises an average of 3.10 days each week for 37.21 minutes per day.<sup>40</sup> Meanwhile, thirty percent of Greek men and women exercise more than twice each week, while 13% never exercise.<sup>41</sup> Scott-Sheldon et al. determined there was no significant difference in physical activity level between Greeks living in or outside of fraternity or sorority housing;<sup>41</sup> no other studies were found to provide verification for this particular result, as college physical activity patterns are generally understudied.<sup>42</sup> There is some indication that college students decrease physical activity when living off campus, but these studies did not include Greek affiliation in their analyses.<sup>43,44</sup> The present study helps fill this gap by examining physical activity levels of the Greek population as well as exploring living arrangements as a possible determinant for activity level.

Predictors of physical activity level in college students report vary widely depending on individual demographic and behavioral factors.<sup>45</sup> Physical activity has been shown to have a positive association with alcohol consumption in university undergraduates.<sup>46</sup> Studies have shown an increase in binge drinking frequency with increased activity levels in both male and female college students.<sup>47,48</sup> Greek status can also be a significant moderator of this trend; Buscemi et al. found a positive relationship between alcohol and physical activity for Greek undergraduate freshmen.<sup>48</sup> Perceived weight status and appearance are also common extrinsic motivating factors influencing collegiate exercise habits.<sup>45,49,50</sup> This study thus includes an



assessment of both alcohol consumption and body image in conjunction with physical activity levels.

## **SORORITY MEMBERSHIP AND BODY IMAGE**

### **A. SORORITY MEMBERS VERSUS NON-GREEK COMMUNITY**

Although many positive aspects of sorority membership are well documented,<sup>17,51-56</sup> there are also notable risks.<sup>28,29,37,57</sup> One of the most widely recognized negative consequences associated with sorority life is the prevalence of disordered eating patterns and eating disorders.<sup>11</sup> Sororities often place importance on body size and shape, increasing the potential risk for extreme dieting and binge eating.<sup>58</sup> Sorority women have a greater fear of being overweight, are more preoccupied with their weight, and are more concerned with dieting than non-Greek college women.<sup>59</sup> A study completed by Basow and her colleagues determined that sorority women not only had an increased risk of developing eating disorders, also have heightened perceptions of societal pressure and increased body consciousness compared to women unaffiliated with Greek Life.<sup>11</sup> These unhealthy attitudes and perceptions increase the risk for developing eating-related disorders, as the sorority structure itself exerts a negative influence on weight related behaviors on their members.<sup>12</sup> In their study on the differences between sorority and non-sorority women, Alison and Park found no difference prior to recruitment between the two groups of women in terms of body dissatisfaction, dieting, and bingeing and purging; however, after the women affiliated with a sorority, their scores for preoccupation with dieting became significantly higher than the non-affiliated group.<sup>9</sup> This result suggests that women attracted to life in a sorority are no different at baseline than the

rest of the college population, and eating behavior changes occur during the time women are affiliated with the sorority. Similarly, Basow et al. concluded that women intending to rush a sorority scored equally to sorority women in their drive to be thin and overall body dissatisfaction, but disordered eating and actual bulimic behaviors did not present themselves until after admission into a sorority.<sup>11</sup> It is evident that affiliation with a sorority is a highly influential factor for developing disordered eating behaviors regardless of eating attitude prior to membership.

Studies examining the impact of Greek affiliation on eating habits revealed potential sources for the adoption of eating disorders. Beerman et al. suggested that students living in Greek housing are expected to be present and participate in “family style” meals daily, and students living in a sorority or fraternity house were significantly less likely to skip a meal than those living elsewhere.<sup>60</sup> Meanwhile, the research done by Meilman and his team indicated that 72.2% of all students who reported purging after eating were in the Greek system.<sup>61</sup> Prior research, however, has not examined the relationship between increases in overall meal consumption and the frequency of disordered eating tendencies in this population. The present study includes an exploration of the relationship between the caloric intake of sorority women in the response to amplified pressures to maintain a certain body size and shape due to their living arrangements.

## B. SORORITY MEMBER LIVING ARRANGEMENTS

In most cases, the relationship between sorority living arrangement and disordered eating patterns is not clear. Hoerr et al. assessed disordered eating behaviors in 1620 college

students (including 14 sororities) using a version of the EAT-26 survey.<sup>62</sup> The results of this study indicated that one group of women who lived together in a particular sorority house had the highest risk (15%) of eating disorder development, while no significant difference was found between the rest of the sorority women (12.9%) when compared to non-sorority women living in residence halls (10.1%).<sup>62</sup> These findings necessitate further investigation, as one particular sorority house appeared to dramatically increase the risk of disordered eating. The results suggest that some interactions between communal living and sorority membership might influence the risk of developing disordered eating patterns. Additionally, Kashubeck and her team studied bulimic symptomology in four groups: sorority women and non-sorority women living on campus and sorority members and non-members living off campus.<sup>63</sup> Their results show no statistical significance between bulimic symptoms and campus residences; the main predictor of these disordered eating tendencies appeared to be sorority membership, independent of living arrangement.<sup>63</sup> The authors suggest that campus pressures are experienced to the same degree by students despite living location, indicating that the presence of a centralized campus sorority house may be enough to influence all members of the sorority.<sup>63</sup> This literature review suggests the degree of influence the sorority house exerts on eating attitudes is clearly not well understood; studies on this topic have been scarce and the research findings mixed. Although these studies explore the relationship between increased cognitive distress created by sorority membership and the amplification of these symptoms caused by living in a communal house, they do not address the impact of sorority membership in the absence of a centralized sorority house.

## **SOCIAL NETWORK INFLUENCE IN SORORITIES**

The appeal of Greek Life is tied to its ability to provide a strong social network for new members; however, the structure, values, and culture of this network require members to undergo continuous socialization in order to gain understanding of how to appropriately fulfill social expectations.<sup>64-66</sup> Sororities are unique from more informal peer group aggregations in that members of the newest pledge class are expected to adopt established values and traditions, and conformity is required.<sup>64,67,68</sup> The newcomers are often uncertain of accepted attitudes and behaviors and will imitate experienced members or look to them for guidance and acceptance.<sup>69</sup> The social structure of the new member pledging period creates opportunity for upperclassmen to pass along disordered eating behaviors and body image attitudes.<sup>15,64,70,71</sup> Using the example of binge eating as a symptom for bulimia, Crandall explains: “The social norms of the sorority, in combination with the presence of models, are likely to make the costs associated with binge eating appear less severe and increase the likelihood of higher levels of binge eating.”<sup>58</sup> Once the new members adopt these practices and begin to embody the expectations of the community, it is likely they will receive social reinforcement in the form of compliments or improved status within the group.<sup>64</sup> The desire to continue the unhealthy behaviors is further reinforced once acceptance within the group is achieved. New sorority members are usually in their first year of college and at a highly impressionable age, making the membership of a sorority a powerful influence on their young adult development.

Members of sororities spend the vast majority of their time with other Greeks; sleeping, eating, socializing, and studying are all done with the same group.<sup>15</sup> This lack of interaction outside of the group reinforces the need for sorority members to embody the values and

traditions associated with the organization, including those of weight and physical appearance.<sup>64</sup> A foundational study of sorority women showed that eating behaviors displayed by groups of friends, over time, came to be accepted by the individuals in the group as norms.<sup>58</sup> Since sorority women receive little influence outside their group, symptoms of disordered eating spread through the population unchallenged, leaving members susceptible to a distorted view of normal eating patterns due to the limited diversity of social influences to which they are exposed.

The centralization provided by the structure of a sorority house ensures limited external contact and maintains group norms. This is the dynamic provided by the Greek Life system at SU. Conversely, the lack of centralism through elimination of the sorority house, seen at VU, permits the infiltration of influence from outside the sorority group, allowing the opportunity for change in behaviors and beliefs that would otherwise be considered appropriate in the sorority setting. This study focuses on the impact of the centralization of this social network, imposed through campus sorority houses, on the eating behaviors, physical activity patterns, alcohol consumption, and body image attitudes of the sorority women.

## **SOCIAL NETWORK INFLUENCE IN OTHER POPULATIONS**

### **A. ADOLESCENTS**

Social networks influence eating behaviors in individuals of all ages. Longitudinal studies indicate that the tendencies leading to obesity and eating disorders spread through social ties in adults and adolescents. Peers have been widely identified as the 'sociocultural determinant' for these behaviors,<sup>58,72,73</sup> as studies on adolescents have shown that intragroup BMI have

statistically less variance than intergroup BMI.<sup>74,75</sup> Adolescent friend groups attract others with similar BMIs to the group average and impose an influence on members to maintain that BMI. Similarly, studies on obesity have shown that despite a child's BMI, the child is at increased risk of becoming obese if his/her best friend is obese.<sup>76,77</sup> Peers seemingly dictate the behaviors needed to achieve similar intragroup BMI. Paxton et al. found that dieting, extreme weight loss behaviors, and body image concerns all displayed significantly higher variance between groups than among a group of peers.<sup>74</sup> Eight years later, Hutchinson and Rapee supported these results and added binge eating as a factor that displayed significant within-group similarity.<sup>75</sup> Additionally, studies have shown that during grades 9 through 12, peer-related activities like expressing conflict in friendship and social anxiety are significant predictors of developing bulimia.<sup>78</sup> These results indicate that peers influence one another's eating behaviors. Such social influences could potentially have long-lasting effects on the eating behaviors of adolescents, as research studies have shown that students form friend groups with individuals of similar BMI and with similar eating attitudes, and the social influence of peers on one another maintains this commonality.

## B. CHILDREN

Children as young as eight years old have expressed feeling pressure from their peers concerning their eating and body image.<sup>79</sup> Body image and eating behaviors can be traced to modeling by and discussion with peers, throughout childhood and early adolescence.<sup>80</sup> Research has shown that childhood weight management and disordered eating behaviors correlate directly with the frequency individuals talk about dieting with peers and the

frequency that their peers diet.<sup>81</sup> Fifteen percent of boys and girls in grades three through six have indicated that they believe their peers would like them more if they were thinner, directly leading them towards an increased risk of developing a disordered eating pattern.<sup>82</sup> Oliver and Thelen determined that peer likability was the strongest influence in predicting eating behaviors, and this influence was strongest in young girls.<sup>80</sup> Girls who were revered as popular by their peers are more likely to utilize disordered eating patterns, influencing the young girls' ideals about the driving force behind popularity and success.<sup>69</sup> This method of social modeling coupled with peer body image discussion fuels the increased social pressure felt by children to remain thin. These findings regarding the pressures felt by children are necessary to understand in order to contextualize the behaviors and outcomes seen in late adolescence and adulthood.

### C. ADULTS

Peer pressure to achieve a certain body type is not limited to sorority women during the college years. Meyer and Waller assessed women living in an assigned college living community for body image attitudes, dietary restraint, and bulimic tendencies (e.g. binge eating).<sup>83</sup> The researchers found that attitudes converged for ideas that were socially valued (body image attitudes and dietary restraint), while divergence between group members was displayed for behaviors not valued by the group (bulimic tendencies).<sup>83</sup> These results display the conformity of eating behaviors and attitudes within groups in the college setting independent of sorority affiliation. In 2006, Zalta and Keel performed groundbreaking research on college students that presented results displaying similarities in eating attitudes and behaviors due to prolonged exposure to peers followed by a divergence in these characteristics when the peer exposure

was removed.<sup>84</sup> These results indicate that the peers directly influenced the change seen in eating attitudes and behaviors. Vartanian and Hopkinson suggest that the reason these shifts in attitude are seen is because conformity is a risk factor for internalization of societal standards of attractiveness.<sup>85</sup> They explain that women who want to fit in are more likely to pursue the thin-ideal as a means of conformity, which requires the adoption of unhealthy eating patterns. These studies demonstrate the force of social contact and desire for conformity on the eating ideology of college women and their role in increasing prevalence of disordered eating.

Community eating arrangements also present a unique set of social influences. Individuals physically present at a meal impact the consumption decisions of those around them.<sup>86</sup> Eating with family increases meal speed and overall consumption, while eating with friends increases duration only.<sup>87</sup> Additionally, the presence of males produced a larger social impact of mealtime behavior on women than women had on each other.<sup>87</sup> Food choices convey a desire to give a certain impression or obey social norms, and to fulfill this desire, individuals anchor their food choices on others in their immediate environment.<sup>88</sup> The amount one eats then depends upon the portion standard that has been set by those around them, instead of relying on internal cues or habits.<sup>86</sup>



## PART II: THESIS MANUSCRIPT

### INTRODUCTION

Studies have successfully shown relationships between diet and physical activity patterns with various living arrangements, peer influences, and sorority membership.<sup>2,6,9</sup> Often, when researchers are investigating these interactions, they compare the attitudes and behaviors of sorority women to those of women outside of the Greek system.<sup>9,11,12</sup> While this approach provides valuable insight into areas of concern, it eliminates the possibility for understanding the role of variables within the Greek system that may be impacting its members differently. An intra-Greek Life comparison is the next step in understanding the variation in the influences exerted on sorority women.

Studies have shown that eating behaviors displayed by groups of friends, over time, come to be accepted by the individuals in the group as norms.<sup>58</sup> Since sorority women with centralized housing receive little influence outside their group, these norms often go unchallenged. The sorority members of houseless chapters, on the other hand, are not exposed to the same strength of social influences as their counterparts due to the lack of constant community centralization. The Social Network Theory explains that the presence of a centralized sorority house isolates members from outside connections, leaving members susceptible to a distorted view of normalcy due to the limited diversity of social influences to which they are exposed.<sup>14,15</sup> The symptoms of disordered eating can then be spread unchallenged through the population with the force of social influence, and the closed nature of the group can substantially increase the strength of this force.<sup>58</sup> No study has explored the

results of these varying forces on eating patterns, physical activity, alcohol consumption, and body image in sorority women.

The purpose of this study was to explore the differences in diet and exercise in sorority women from campuses with different Greek Life structures. The goal was to determine if the centralization of the sorority through the presence of a chapter sorority house altered these health behaviors for any of the women. Furthermore, alcohol consumption and body image were assessed in an attempt to understand additional motivations for dietary and physical activity habits, as a lifestyles approach to understanding health behavior patterns has not been conducted in this population. This work is foundational in these regards, as no study has previously determined if a centralized sorority house impacts body image, diet, exercise, or alcohol consumption nor determined how these variables work together to manifest as the behaviors seen in sorority women today.

## **METHODS**

### **A. STUDY DESIGN**

A cross-sectional study design was used to gather data from sorority members at both Syracuse and Villanova Universities during October of 2014. The research was carried out with a pool of 83 sorority women from both campuses. A total of 35 participants from four campus sorority chapters at Syracuse University represented individuals living in a centralized living arrangement, while 48 participants from the same four sororities at Villanova University represented dispersed, decentralized living. Women were asked to create a one-week food and exercise record from October 1, 2014, to October 7, 2014, through the MyFitnessPal application

for smartphones. They were also asked to complete a survey with questions regarding demographics, eating patterns, and the Body Shape Questionnaire-34 (BSQ) once during that week. The dependent variables tested, as a function of housing type, include dietary macronutrient and micronutrient intake, overall caloric intake, alcohol consumption, calories burned through exercise, and BSQ-based Body Image Score.

## B. PARTICIPANT RECRUITMENT

The focal universities were identified as study sites based on their relatively close proximity and significantly different Greek Life living arrangements. The five sororities selected for participation were chosen due to their presence on both college campuses. Sororities from each campus were matched to compare communal living arrangements with dispersed living arrangements while controlling for sorority-specific behaviors, cultures, and values.

On the campus with dispersed living arrangements, recruitment began with email correspondence with all chapter presidents. The initial email provided detailed information about the scope of research and requested a time to speak to the potential participants during a chapter meeting. Once a presentation time was chosen, the presidents informed the chapter of an upcoming research opportunity one week prior to the principal investigator's attendance at the chapter meeting. The following week, the researcher gave a presentation on the research topic and methods to the sorority members during their chapter meeting. Attendees were asked to provide their contact information as an indication of desire for further information regarding participation in the study. Potential participants provided their names and email addresses on a piece of paper after the chapter meeting to allow for further contact between

the researcher and participant; this information was used to arrange the informed consent process.

On the campus with centralized housing, recruitment also began with email correspondence with all chapter presidents to arrange a one-on-one meeting to discuss details of the methods and the purpose of the research study. At this meeting, the president was provided with a detailed outline of the methods and the requirements for participation to ensure an accurate understanding of what the research would entail. After this meeting, one campus sorority president indicated that her sorority would decline further participation, as she believed the methods were too burdensome to participants. The chapter presidents for the remaining four sororities presented the research opportunity to their chapters and requested volunteers. A process similar to that described for the first campus was used to gather contact information from individuals interested in participating in the study. Contact information for potential participants was provided to the researcher by each sorority president to permit direct correspondence for the informed consent process.

Once all contact information for potential participants was received by the researcher, an email was sent to all interested individuals to inform them of a four hour timeframe during which the researcher would be available on their campus to complete the consenting process. Outside arrangements were made on a case-by-case basis for individuals unable to attend this meeting. Written informed consent was received from 83 of the 123 individuals who initially expressed interest during the chapter meetings.

### C. STUDY POPULATION

All participants volunteered from among the active members of the four chosen sororities for the 2014-2015 academic year. The inclusion criterion for the sample from the campus with decentralized housing was that the participant had to be an active member of a selected chapter on campus. The exclusion criterion for this campus sample was that a potential participant was not a member of the sorority or held an inactive member status in one of the selected sororities. The inclusion criteria for the sample from the campus with centralized housing were that the participant had to be an active member of one of the focal chapters on campus while living in the campus sorority house for the 2014-2015 academic year. The exclusion criteria for this campus sample included: potential participants who were not a member of one of four target sororities, any inactive members in one of the included sororities on campus, or an active sorority member of the selected sororities who was not living in the campus sorority house during the 2014-2015 academic year. The participant sample sizes for each sorority on both campuses are shown in Table 1. There were 35 total participants representing centralized living to be compared to 48 sorority women experiencing decentralized housing.

### D. MEASUREMENTS

#### *1) Qualtrics® Survey*

The survey (Survey 1; Appendix A) was administered online through the Qualtrics® platform; all program options to ensure anonymity were utilized. The web-link providing access to the Survey 1 was emailed to participants on October 1, 2014, along with a request to

complete the attached survey during the same week that they were generating their food record. The assessment began with two questions regarding campus and sorority affiliations. For participants who identified as sorority members living in centralized housing, three questions prompted information regarding average number of meals eaten each week, the number of meals eaten in the sorority house each week, and the number of snacks eaten each week. Participants from decentralized housing were excluded from sorority house-related questions; they were asked instead only about weekly total meal consumption and total snack intake only. Upon completion, all participants were then prompted to enter anthropometric values for height, weight, and age.

The last 34 questions were taken directly from the published, full length BSQ. No modifications were made to the questionnaire; the validity and reliability of the tool has been previously assessed.<sup>89,90</sup> All questions were provided with a six-point Likert Scale ranging from never to always. The participants were instructed to indicate the frequency with which they had completed each of the listed activities in the prior six weeks, which equated with the amount of time they had been in residence in their current college living arrangements.

Two additional Qualtrics® surveys were administered to gather more information about the population. The second Qualtrics® survey (Survey 2; Appendix B) was sent in December 2014 while the participants were living away from their college campuses. This survey contained all of the same questions included in the October version, with the addition of six new questions. Two new questions for students in decentralized living conditions were added regarding the Greek affiliation of their roommates and the location/source from which they usually obtained their meals. Three additional questions were asked of all participants

regarding their usual alcohol intake habits. The questions regarding alcohol consumption patterns were taken directly from the Center for Disease Control's 2014 Behavior Risk Factor Surveillance System (BRFSS) Questionnaire.<sup>91</sup> The final new question requested each participant to list the study MyFitnessPal username associated with her research study to allow the linking of survey data to food records. The third and final survey (Survey 3; Appendix C) was administered in March 2015 with five total questions in an attempt to capture all missing information from participants. For example, MyFitnessPal username was again requested, along with height, weight, age, and race/ethnicity. The information from all surveys was used together to fully inform the researcher about the study population.

## *2) MyFitnessPal Records*

Each participant created a food and physical activity record through MyFitnessPal, a free smartphone application and website that allowed participants to log dietary and exercise choices by selecting foods and activities from one of the world's most comprehensive databases. Participants were asked to log their food intake and energy expenditure for one week in October 2014 while living on their respective college campuses.

Each participant was assigned a general username within the MyFitnessPal application that identified only the sorority and campus of affiliation; this permitted individual, yet confidential, identification of diet records. The researcher set up each account to ensure all privacy settings were appropriately selected. This configuration allowed the researcher to input generic height and weight information for each participant and utilize the corresponding campus zip code for all users from each university. A novel email address was also set up for

each username to prevent the need to link the usernames to an existing email or Facebook profile. The number of available profiles for each campus and sorority were created based on the number of individuals who expressed interest. The username and corresponding email address and passwords were written on a notecard and put into a campus- and sorority-specific envelope. The notecards were randomly selected by each participant, and the selection made by each individual was never revealed to the researcher. Each notecard also included instructions on how to change the account passwords after the initial log in as well as reminders to log all foods, drinks, and exercise. This administering of accounts was completed during the on-campus meeting set up by the researcher immediately after written informed consent was received.

The MyFitnessPal application has a social media feature that allowed the researcher to ‘friend’ the anonymous study profiles of each of the participants. The researcher was thus able to access the food and activity logs of each participant without the need to log back into any participant profiles or contact participants to obtain their records. The friendship between researcher and participant profiles was established during username set up and settings were selected so only friends could view the records to ensure privacy.

## E. STATISTICAL ANALYSES

### *1) Qualtrics® Survey*

Responses for all surveys were downloaded from Qualtrics® and entered into the IBM® SPSS® Statistics Version 22.0.0.0 (IBM®, 2013). Individual responses were assessed for completeness and the number of missing values was determined. When less than five percent



of the possible responses were missing for a given respondent, the traditional method of mean substitution was used to complete responses.<sup>92,93</sup> Due to the limited sample size, the researcher chose this approach to retain as many individuals within the statistical analysis as possible. Respondents missing more than five percent of the possible responses were removed from the analysis.

The BSQ is a 34-question, self-reporting tool that measures body shape anxieties that have been associated with bulimia nervosa and anorexia nervosa. For this study, the BSQ was scored according to author recommendations to determine participant occupation with body shape.<sup>89,90</sup> Each of the 34 questions were administered with a six-point Likert scale, and the possible responses were assigned a score of one through six. A value of one was awarded for a response of “never”, while a six indicated “always”. The total score ranges from a possible minimum score of 34 points to a maximum score of 204 points.

The questions regarding weekly meal and snack consumption patterns were scored using an original scoring scheme to indicate healthfulness of eating patterns. For students living in centralized housing, meals consumed in the house were considered more healthful than those eaten outside of the house, based on the findings of Mize and Valliant.<sup>27</sup> Based on a review of food records on both campuses, evening snacks were considered less healthful than those consumed earlier in the day. In all populations, consumption of a meal or snack was considered more healthful than non-consumption at an eating event, and meal consumption was considered more important than snack consumption overall. Meals consumed were awarded one point, and all snacks eaten were awarded 0.5 points. Meals eaten outside of the sorority house resulted in a deduction of 0.5 points, and 0.25 points were subtracted from the

overall score for evening snacks since they tended to be of poorer quality (high fat, high sodium). Zero points were given for any meal or snack not consumed, including “house meals” for students from the campus with decentralized housing. The algorithm used to compute scores is as follows:

$$\begin{aligned} \text{Total Score} = & \\ & 1 * (\text{AllBreakfast} + \text{AllLunch} + \text{AllDinner}) \\ & - \frac{1}{2} * (\text{OutsideHouseBreakfast} + \text{OutsideHouseLunch} + \text{OutsideHouseDinner}) \\ & + \frac{1}{2} * (\text{MorningSnack} + \text{AfternoonSnack} + \text{EveningSnack}) \\ & - \frac{1}{4} * \text{EveningSnack} \end{aligned}$$

The total score was then divided by 31.5, or the highest possible score, and multiplied by 100.

This additional step provides a total score out of a possible 100 points, thus making the scale for the diet score more intuitive. A sensitivity analysis was done to determine the impact of the deduction for evening snacks. The results were statistically significant with and without the evening snack handicap, thus the negative coefficient was retained in the algorithm

[Independent Sample 2-Tailed T-test,  $F=14.81$ ,  $df=28.26$ ,  $t=3.61$ ,  $p=0.000$ ].

## 2) *MyFitnessPal Records*

The researcher’s MyFitnessPal profile was ‘friends’ with all participant profiles allowing all food and exercise data to be viewable by selecting the “View Diary” option for all friends. The inputted food, beverage, and exercise data was arranged in the user diary by date, where it was downloaded as a Common Separated Value (CSV) file through the use of a Google Chrome MyFitnessPal plug in. The downloaded files displayed all food and beverage entries and their nutrient analyses in the following format: Date, Meal, Foods, Calories, Carbs, Fat, Protein, Cholesterol, Sodium, Sugars, Fiber. All physical activity data were displayed as: Date, Exercise,

Calories, Minutes, Sets, Repetitions, Weight. This information was used to enter the data into ESHA Food Processor as accurately as possible.

### *3) ESHA Food Processor*

All data collected from the MyFitnessPal application was manually entered into the ESHA Food Processor software for nutrient analysis. The Food Processor has over 55,000 food items with data from the USDA Standard Reference database coupled with manufacturer, restaurant, and literature data.<sup>94</sup> Food Processor requires entry of anthropometric and activity level details for each profile created in order to accurately estimate individual recommendations. The Qualtrics® survey data containing height, weight, and age was averaged for each sorority and campus, allowing entry of chapter-specific averages for this requirement. The researcher then entered data from the MyFitnessPal food records into Food Processor with as much accuracy and detail as possible. The exact foods listed in the MyFitnessPal records were selected in Food Processor whenever possible. The closest similar item was selected for prepared or unique foods with no identical match. Under the circumstance where a similar item had to be selected, portion sizes were adjusted to match the original caloric value of the food. All exercises entered had corresponding exact matches. All available data were entered for each study participant. Upon completion, the “Spreadsheet” dietary analysis was run to estimate intake values for 58 nutrients. The output was expanded so all meals for all days were viewable, each with a unique nutrient breakdown. The exercise spreadsheet was also generated to show values for metabolic equivalents (METs), exercise duration, resting energy expenditure (REE) calories, activity calories, and total calories burned. These analyses were

exported and compiled as a Microsoft Excel spreadsheet with a column for each nutrient, exercise duration, and total calories burned.

Data cleanup was completed once all nutrient analyses were run and compiled. In an attempt to control for outliers due to underreporting, daily caloric intake was inspected for each participant. Daily records were removed from the weekly and group totals if daily caloric intake was uncharacteristically low (less than 60% of the average of five or more days) and had less than three eating events (meals or snacks) recorded. Any intake that appeared uncharacteristically high (more than 35% of the average of five or more days) was reviewed in Food Processor by the research to ensure no data entry error was made. Once complete, the file was uploaded to IBM® SPSS® Statistics Version 22.0.0.0 for further dietary and exercise pattern analysis.

#### *4) Data Analysis*

Descriptive statistics were run to compile means, frequencies, standard deviations, and minimum and maximum values for continuous variables between each campus living condition. All means were reported with standard deviations and all significance tests were reported at 95% confidence level ( $\alpha=0.05$ ). Normality tests were done for each sample population. The study's small sample size produced non-normal distributions for most variables (Appendix D), necessitating the use of nonparametric statistical tests (Independent Samples Mann-Whitney U Test) to compare BMI, average alcoholic drinks per drinking event, and net calories after exercise between campuses. IBM® SPSS® Statistics Version 22.0.0.0 does not permit the use of a distribution-free ANCOVA, so parametric statistics were used when deemed necessary by the

presence of covariates. Total energy intake and Body Image Score were compared between campuses with BMI as a covariate. Average nutrient intakes were compared between living arrangements with total energy intake as a covariate. Parametric statistics were also run to compare the number of days with exercise, number of burned calories through exercise, Diet Score, and recorded alcohol consumption between groups because these data violated the assumption of equal variances. An Independent Samples T-Test was run for these variables, as this test provides an adjustment for the unequal variance violation unavailable for a distribution-free test. All analyses were run in IBM® SPSS® Statistics Version 22.0.0.0 (IBM®, 2013). Statistical significance was determined by a p-value less than 0.05.

## **RESULTS**

### A. SORORITY LIFE

#### *1) Chapter Living Arrangements*

Syracuse and Villanova Universities represent centralized and decentralized living arrangements, respectively. Sorority women living in the centralized campus sorority house completed 24 responses to Survey 1 and 12 food records. Alternatively, women living in decentralized living arrangements within the campus community completed 45 responses to Survey 1 and 32 food records. Each of the centralized sorority houses acts as home to approximately 30 sorority women and one adult House Mother. The living arrangements for students on the decentralized campus (n=21) is more variable, with 59.1% of participants living with at least one of their sorority sisters, 40.9% of participants living with at least one person from another sorority, and 22.7% living with someone not affiliated with Greek Life (Table 2).

The diet, physical activity, and body image differences created by these variations in group living arrangements were explored in this study.

## 2) Chapter Demographics

No significant differences in sorority demographics reported by food records were found between women in centralized housing (n=12) and women in decentralized housing (n=32) (Table 3). Demographics were found to be similar [age  $U=0.450$ ,  $df=2$ ,  $p>0.05$ , at the 95% confidence interval, height  $U=0.342$ ,  $df=2$ ,  $p>0.05$ , at the 95% confidence interval, weight  $U=0.924$ ,  $df=2$ ,  $p>0.05$ , at the 95% confidence interval, BMI  $U=0.368$ ,  $df=2$ ,  $p>0.05$ , at the 95% confidence interval] between all participants. Racial and ethnic background was reportedly similar for participants on both campuses (Table 4). All participants, with the exception of two on each campus, identify as non-Hispanic Caucasian. One individual from the campus with centralized housing (n=12) identifies as Asian or Pacific Islander and another as Hispanic or Latino, and the campus with decentralized housing (n=32) has one participant who identifies as Hispanic or Latino and another who identifies as both Caucasian and Asian. These findings indicate the sample is not representative of the population at large on either campus (Table 4).

A significant difference in BMI was determined between the women in centralized housing (n=24) and decentralized housing (n=45) when data from Survey 1 were analyzed (Table 5). This difference [ $U=0.033$ ,  $df=2$ ,  $p<0.05$ , at the 95% confidence interval] indicates that sorority women living in centralized housing have a significantly higher average BMI ( $23.2 \pm 2.2$ ) than the sorority women living in decentralized housing ( $21.9 \pm 2.1$ ). Similar to the food record data, no other significant differences [age  $U=0.391$ ,  $df=2$ ,  $p>0.05$ , at the 95% confidence

interval, height  $U=0.127$ ,  $df=2$ ,  $p>0.05$ , at the 95% confidence interval, weight  $U=0.645$ ,  $df=2$ ,  $p>0.05$ , at the 95% confidence interval] in demographics between campuses were found.

## B. SORORITY MEMBER FOOD CONSUMPTION

### *1) Eating Patterns*

Diet scores were calculated to assess frequency of healthy eating events (Table 6). The mean score for women living in centralized housing ( $n=24$ ) was  $45.5 \pm 14.5$ , while sorority women in decentralized housing ( $n=45$ ) scored  $34.2 \pm 6.6$  out of 100 possible points. The difference between the mean diet scores for each living arrangement was significant [ $t(28.3)=3.607$ ,  $p=0.001$ ], which indicates that sorority women in centralized housing, with access to meals in sorority houses, maintained a healthier eating schedule than the women in decentralized housing. This healthier eating schedule for women in centralized housing, demonstrated by the higher diet score, is likely attributed to the structured meal times provided by the rules of the centralized house.

The sorority women in centralized housing ( $n=24$ ) were assessed for how frequently they eat each meal in the sorority house each week. Results varied greatly by meal and sorority chapter (Table 7). Only 30.8% of breakfasts consumed by the women were done so in the sorority house, but 84.0% of dinners were consumed in the house. Consumption of all meals in the house ranged from 61.5% to 85.7% between sororities. Participants of all sororities reported eating breakfast and lunch less than seven days each week, with breakfast consumption being the lowest ranging from only two to five days per week. Only one sorority

chapter reported consuming dinner each day of the week. Despite the variation, the centralized living arrangements resulted in the same overall eating pattern trends among all chapters.

Since sorority house meals are unavailable for participants living on a campus with decentralized housing, these women (n=21) were questioned regarding the alternate sources from which they obtain their meals and snacks (Table 8). Results revealed that more than half of the population (54.5%) always obtain their food from campus facilities with their On-Campus Meal Plan, while 18.1% never utilize the campus facilities for their meals or snacks. Sixty-three percent of participants do some sort of cooking for themselves, and 59.1% of those in decentralized housing state that they eat from a restaurant “often.” Only 13.6% of participants indicated that they get their food from a source other than these three options, and these alternate sources were specified to be fast food establishments and the cooking of friends or roommates. The decentralized nature of their living arrangements allowed for this variation in food sources among members.

## *2) Diet Composition*

Total caloric intake was found to be significantly different between campuses. Women in centralized living arrangements (n=12) had an average consumption of  $1258.8 \pm 441.7$  kilocalories each day, while the women in decentralized housing (n=32) consumed  $1389.4 \pm 465.5$  kilocalories per day (Table 9). The significant difference between group BMI acted as a confounding factor between campus and caloric intake; therefore, control for BMI was completed in the analysis. Centralized housing resulted in a significantly lower [ $f_{2,264}=0.378$ ,  $p=0.020$ ] caloric intake than decentralized housing when BMI was controlled.



Despite the difference in caloric intake, both living conditions consumed diets of similar composition (Figures 1-2). Both groups consumed exactly 32% of calories from fat and approximately half of their calories as carbohydrates. Protein contributed to 17 and 19 percent of total calories for women in centralized and decentralized housing, respectively. Differences in housing and BMI had no effect on the diet macronutrient composition of this population. Nutrient analysis was conducted for both groups, and intakes were compared between the two housing conditions and national recommendations (Table 9). The two housing conditions differed significantly [ $f_{2,264}=3.588$ ,  $p=0.006$ ] in fiber consumption, but no other significant differences were found between groups for macro- or micro-nutrient consumption patterns when total caloric intake was used as a covariate to control for the significant difference in total intake between the groups.

When comparing each group to the United States Department of Agriculture (USDA) recommendations set forth in the Dietary Guidelines for Americans 2010, many statistical differences were found (Table 9). Protein intake ( $f_{1,59}=1.569$ ,  $p=0.016$ ) and carbohydrate intake ( $f_{1,59}=1.380$ ,  $p=0.002$ ) were significantly higher than their recommended intake for women in centralized housing, but only carbohydrate intake ( $f_{1,205}=1.655$ ,  $p=0.002$ ) was significantly elevated in women in decentralized housing. Women in both housing arrangements had intakes that were significantly lower than the USDA recommendations for vitamin D (centralized housing  $f_{1,59}=3.248$ ,  $p<0.001$ , decentralized housing  $f_{1,205}=0.467$ ,  $p<0.001$ ), choline (centralized housing  $f_{1,59}=0.530$ ,  $p=0.005$ , decentralized housing  $f_{1,205}=0.677$ ,  $p<0.001$ ), magnesium (centralized housing  $f_{1,59}=2.061$ ,  $p=0.004$ , decentralized housing  $f_{1,205}=1.473$ ,  $p=0.043$ ), and potassium (centralized housing  $f_{1,59}=1.717$ ,  $p<0.001$ , decentralized housing  $f_{1,205}=1.490$ ,

$p < 0.001$ ). In addition, only the women in centralized housing had intakes of vitamin E ( $f_{1,59} = 0.703$ ,  $p = 0.035$ ) significantly lower than the USDA recommendation. Average intakes for all other nutrients were within the recommended target range for both groups of women when total caloric intake was controlled as a covariate. The wide variability in sources of intake within groups contributed to the limited number of significant differences between groups and with the national guidelines; however, it can be concluded that the limited caloric intake by women living in centralized sorority houses reduces their ability to consume the necessary vitamins and minerals to a larger extent than those in decentralized housing.

### C. SORORITY MEMBERSHIP AND ALCOHOL CONSUMPTION

Daily, weekly, and monthly alcohol patterns were assessed in both groups (Figure 3). Sorority women in centralized housing ( $n = 6$ ) indicated that they consume one or more drinks  $2.5 \pm 1.8$  days each week and  $8.5 \pm 6.4$  days per month. Women in decentralized housing ( $n = 21$ ) reported similar averages of  $2.8 \pm 1.1$  days each week and  $11.2 \pm 5.6$  days each month with one or more drinks. A significant difference [ $U = 0.003$ ,  $df = 2$ ,  $p < 0.05$ , at the 95% confidence interval] was found between the reported average number of drinks consumed on the days of drinking. Women living in decentralized living conditions reported  $5.9 \pm 3.7$  drinks on these days, while those in the centralized house consumed  $1.8 \pm 1.7$  drinks on each of their drinking days. These results indicate that the sorority women on each campus drink at the same frequency; however, sorority women in decentralized housing consume more alcohol each time they drink. This finding is supported by the alcohol reported in the food records, where women in decentralized housing reported significantly more alcohol consumption ( $p < 0.001$ ) than those in

centralized housing (Table 10). Thus, the food records supported the trend observed in the survey data, suggesting a higher level of alcohol consumption by sorority women in decentralized housing.

Energy intake on days with planned alcohol consumption shows variation between groups (Table 11). Women living in centralized housing (n=12) restrict their calories from  $1268 \pm 442.8$  to  $855.7 \pm 378.7$  on days they consumed alcohol. Women in decentralized housing (n=32) do not show a similar pattern of restriction. This group of women consume  $1390.1 \pm 422.1$  on days they drink alcohol and  $1333.9 \pm 439.0$  on days without alcohol consumption. This pattern suggests that women in centralized housing are restricting their food intake to accommodate their consumption of empty calories from alcohol.

#### D. EXERCISE PATTERNS OF SORORITY WOMEN

Exercise patterns were assessed as a means through which sorority women may be influencing and altering caloric intake. The sorority women in centralized housing (n=12) exercised significantly less frequently ( $p=0.008$ ) than women in decentralized housing (n=32) (Table 12). Women in centralized housing exercised an average of  $1.92 \pm 0.52$  days each week, with 16.7% of participants never exercising during the week, 75% exercising once or twice each week, and 6.3% exercising more than three days each week. Women in decentralized housing exercised an average of  $2.22 \pm 0.83$  days each week, with 25.0% of women never exercising during the week, 28.1% exercising one or two days each week, and an astonishing 46.9% of women exercising three or more days each week. Despite the difference in exercise frequency, the average number of minutes spent exercising each week did not significantly differ between

groups, with  $83.92 \pm 99.26$  minutes for women in centralized housing and  $110.31 \pm 104.41$  minutes for women in decentralized housing. Although the time spent exercising is similar, the number of calories burned between groups is significantly different ( $p=0.015$ ). Women in centralized housing burned an average of  $373.67 \pm 316.99$  calories each week through exercise, while women in decentralized housing burned  $754.55 \pm 685.385$  calories each week with exercise. The difference between calories burned despite similar minutes spent exercising indicates that women in decentralized housing are exercising more vigorously for a shorter duration on a more regular basis than women in centralized housing.

Both groups altered their eating patterns on days they exercised. The daily caloric intake increased to  $1458.25 \pm 454.27$  calories each exercise day for women in centralized housing ( $n=12$ ), and women in decentralized housing ( $n=32$ ) increased their intake to  $1519.12 \pm 441.23$  calories for these days. Both groups burned more calories than was necessary to return their net caloric intake to the level of a non-exercise day, but women living in a centralized house appear to stop exercise most near this level (Figure 4). When calories are adjusted for all calories burned through exercise, difference in caloric intake is still significantly different [ $U=0.024$ ,  $df=2$ ,  $p<0.05$ , at the 95% confidence interval] between groups (Table 12). The women living in decentralized housing still have a greater number of net calories ( $1272.16 \pm 468.90$ ) than those living in a centralized living arrangement ( $1117.81 \pm 471.68$ ) suggesting that overcompensation in exercise by those in decentralized housing is not enough to account for their overall higher daily caloric intake.

## E. SORORITY MEMBERSHIP AND BODY IMAGE

A Body Image Score (BIS) was calculated for each participant based on their responses to a 34-question body image questionnaire (Table 13). The mean BIS for individuals living in centralized housing (n=24) was  $104.75 \pm 35.56$ , and the mean BIS for the women in decentralized housing (n=45) was  $113.87 \pm 26.16$ . The minimum score for women in centralized housing was 35 (with lowest possible score being 34) and the highest score was 191 out of a possible 204. Interestingly, both of these extremes came from one sorority, indicating high intra-sorority variation in this population. Sorority women in decentralized housing demonstrated less variation both within and among sororities with more consistent scores throughout the population. The trend in BMI differed between centralized and decentralized housing, so it was used as a covariate in this analysis. When BMI was controlled for statistically, sorority women in decentralized housing had a significantly higher level of preoccupation with body size and shape than the women in centralized housing [ $f_{46,22}=3.365$ ,  $p=0.030$ , Table 13].

## **DISCUSSION**

### A. DIETARY HABITS

Women often join sororities to gain access to the strong social network provided by Greek Life. Members, however, are expected to conform to established traditions and patterns of the organization.<sup>64,67,68</sup> Studies have shown that eating behaviors displayed by groups of friends become accepted as norms by all individuals in the group. These norms go unchallenged due to the demand for conformity and are subsequently adopted and incorporated into the behavior patterns of the women living in these centralized living

arrangements.<sup>58,64</sup> In this study, women living and eating in centralized sorority houses had significantly lower caloric intake than the women living in decentralized housing. This result is consistent with prior research that has shown that the presence of social models and peer observers at a meal can cause individuals to decrease intake, especially when the social interaction is motivated by goals of affiliation.<sup>88,95</sup> The women living in centralized sorority houses are subjected to a stronger pressure to comply with the social norm of decreased caloric intake because they consume many of their meals in the presence of peers under the same obligation for reduction; the closed nature of the sorority house further discourages the women from deviating from the prescribed behavior. It is important to note that the opportunity for development of individualized cultures within sororities that may cause one sorority to promote unhealthy behaviors more strongly than others. Hoerr et al. demonstrated this idea when their study on eating disorder development produced results showing one group of women who lived together in a particular sorority house had the highest risk (15%) of eating disorder development, while no significant difference was found between the rest of the sorority women (12.9%) when compared to non-sorority women living in residence halls (10.1%).<sup>62</sup> Although the present study attempted to control for variation in sorority-specific cultures by matching sororities on each campus, college campus and housing may also act as collinear variables that contribute to unique cultures within individual sorority chapters. Future studies should expand the current study design to include house and non-house members on multiple campuses with centralized housing and compare them to campuses with decentralized housing to explore this idea as a potential mediator for health behaviors.

This study found a trend for women living in centralized housing to report a lower caloric intake than women living in decentralized housing. The women in centralized housing also had a higher BMI and consumed a diet that met fewer of the recommendations of the Dietary Guidelines for Americans 2010. In a similar study, Mize and Valliant concluded the exact opposite: women consuming a majority of their meals in the sorority house had higher caloric intake, lower BMI, and a diet that more closely meets the MyPyramid recommendations.<sup>27</sup> The population studied by Mize and Valliant, however, included only women from sororities with campus houses available,<sup>27</sup> and all subjects would therefore be classified as “centralized housing” for the present study. The BMI values reported for the decentralized housing condition in this study ( $21.8 \pm 2.1$ ) are lower than those reported for the centralized housing condition in Mize and Valliant’s study ( $24.12 \pm 3.43$ ),<sup>27</sup> which supports the trends reported in this study. These results, however, must be interpreted cautiously as there is a notable difference in dietary analysis between the two studies. The Mize and Valliant study made use of the MyPyramid recommendations, which focus on food groups,<sup>27</sup> while the Dietary Guidelines for Americans 2010 used by the present study takes a nutrient approach to diet quality. Furthermore, the potential exists for sorority house chefs to prepare foods differing in quality. A comparison of house menus between all sororities and campuses would be necessary to eliminate this potential confounding factor.

Despite the difference in study populations and dietary analysis, the results regarding dietary intake and BMI reported by both this study and by Mize and Valliant are equally paradoxical. It is expected that a lower caloric intake should lead to a lower BMI. Recent studies, however, have shown that women age 17 to 25 years have lower overall adiposity

when they consume diets that closely follow the recommendations of the Dietary Guidelines for Americans 2010.<sup>96</sup> The large variability in dietary intake and the small sample sizes reported in this study preclude the possibility of a reliable statistical test for significant differences in average nutrient intakes between the study group and the Dietary Guidelines for Americans 2010 recommendations. It should be noted, however, that this study did find that the average diet of women living in centralized housing was deficient in fiber, folate, calcium, and iron, when compared to the recommendations, while saturated fat was consumed in excess. The observed deviation from the recommended intake is more profound for women in the centralized housing due to their overall lower caloric intake. These results are consistent with previous findings, suggesting these nutrients are under-consumed by all of the college women assessed.<sup>97,98</sup> One possibility for the observed increased BMI in the women living in centralized living arrangements in this study could be a reduced diet quality in the presence of a reduced caloric intake. Future studies should address the possibility that a degradation of diet quality underlies the apparent paradox between BMI and caloric intake in similar sorority populations.

Beside its puzzling relationship with BMI, the caloric intake in both groups of women present a startling trend. The practical significance of college women consuming  $1258.8 \pm 441.7$  and  $1389.4 \pm 465.5$  calories daily is that overall, they are consuming too few calories to meet the metabolic demands of daily life. This raises concerns about the women's ability to consume a quality diet in such few calories. The reduced bioavailability of nutrients such as iron and calcium in many low quality nutrient poor foods could further reduce the absorption of already low levels of these key components of a healthy diet. Such a restrictive eating pattern may also contribute to the likelihood of periods of binge eating or yo-yo dieting; unfortunately, the



current study's small sample size and limited time frame did not permit further exploration of the potential for these behaviors to arise. Furthermore, it would be of interest to explore many of these ideas in areas outside the strict purview of nutrition. For example, it would be helpful to understand if these women consciously choose to restrict intake or whether peer influence is altering their subconscious and subsequent behaviors. Additional studies that make use of intra-Greek comparisons would be helpful to determine the circumstances and potential repercussions of the habit of diet restriction and under-consumption of nutrients and calories.

Although the women in centralized housing had reduced diet quality, they did maintain a healthier eating pattern than the women in decentralized housing. The women in centralized housing reported eating more meals each day and consumed fewer late night snacks. This is consistent with other findings that living in a sorority house reduces the number of skipped meals,<sup>60</sup> likely reducing the need of residents to snack late at night. Daytime nibbling, or unplanned eating between planned meals,<sup>99</sup> was also reported more frequently by women in centralized housing. Studies have shown no negative impact of daytime nibbling on BMI or weight concerns,<sup>99,100</sup> indicating that it is unlikely that the increased frequency of an eating event in this living arrangement contributes to the increased BMI in this group. The benefit of nibbling comes not from the meal frequency itself, but instead, it allows for the avoidance of binge eating or late night snacking.<sup>101</sup> Consistent with the findings for women in decentralized housing in this study, late night snacking has been associated with higher total calorie consumption in women.<sup>102</sup> Consumption of a greater proportion of fat after 8pm is associated with a higher BMI, while consumption of more carbohydrates after 8pm is only associated with higher total calories.<sup>103</sup> Many late night calories consumed by women in decentralized housing

came from refined grains and alcohol, which may help explain the increased caloric intake without an equal increase in average BMI.

## B. ALCOHOL CONSUMPTION

Given that the focus of this research study was college students, the role alcohol consumption might play in overall caloric intake could not be ignored. Membership in Greek Life is associated with an increased alcohol intake overall,<sup>104</sup> and the influence of a centralized sorority house on alcohol consumption has not been previously assessed. When surveyed, sorority women from both groups reported similar alcohol consumption on a weekly and monthly basis; however, women in decentralized housing consumed significantly more alcohol during each drinking event and reported consuming significantly more grams of alcohol in their one-week food record than women from centralized housing. However, similar to the limitations of other studies assessing alcohol intake through self-report methods, it is likely that the statistical difference between groups is due to underreporting; many of the participants were under 21 years of age at the time of data collection and may have worried about consequences of reporting alcohol consumption.<sup>105</sup> Additionally, sorority houses prohibit storage of alcohol on the premises nationwide, making access to alcohol more difficult for women living in centralized living arrangements. This decreased availability may also play a role in the difference in alcohol consumption between the groups. It would be of interest to compare alcohol intake in male Greek life members living in centralized and decentralized living arrangements, as this limitation on alcohol does not exist for fraternity housing. The wide variation in responses and small sample from which the data was derived placed limitations on

its interpretation; nonetheless, it can be concluded that both groups are consuming empty calories in the form of alcohol on a regular basis. It is the women's response to this fact that is most fascinating.

Women living in centralized housing consumed  $855.7 \pm 378.7$  total calories on days with reported alcohol intake—an astonishing 413 calories less than average intake on days without alcohol consumption ( $1268.8 \pm 442.8$  calories). This social phenomenon, termed drunkorexia, suggests caloric restriction as a countermeasure for caloric intake through alcohol consumption. Interestingly, women in decentralized housing showed no signs of drunkorexic eating patterns; their eating patterns were consistent in both the presence and absence of alcohol. Although the small sample size and wide variation observed in this study prohibit any generalization of the findings, the results point to an intriguing idea; specifically, that without the centralized influence of a sorority house, women may be less likely to use drunkorexia tactics as a means for weight management.

Drunkorexia has only recently been identified as a mechanism through which some individuals manipulate their diets, so peer reviewed literature is scarce at this time. In one peer-reviewed analysis of diet records, however, researchers found a reduced number of eating events but no change in overall caloric intake before alcohol consumption in college women.<sup>32</sup> Despite the lack of significant caloric reduction, Bryant et al. found that the women in their study deviated from their normal eating patterns and demonstrated an active attempt to control intake in preparation for alcohol consumption. This is similar to the pattern observed in the women from centralized housing in the present study. Unfortunately, Greek affiliation and living arrangements were not available for the prior study, precluding further comparison.

When Bryant et al. assessed living arrangement as an influence on the prevalence of drunkorexia, their results revealed that individuals living with friends (in a sorority house or in an apartment) had a higher rate of use of compensatory behaviors than individuals living alone or with parents or spouse.<sup>33</sup> This finding differs from the observations from the current study as there was an observed difference between sorority house (centralized housing) and apartment living (decentralized housing). Bryant et al., however, conducted their research on a single campus suggesting that women living in apartments may be influenced by affiliation to sororities with centralized houses despite dispersed living. It would be beneficial for future studies to focus on drunkorexia as a function of living arrangement to clarify these findings.

### C. EXERCISE PATTERNS

Exercise patterns were explored due to their widespread use by sorority women as a tool for weight management. Their inclusion in this study resulted as a request from the participants. Upon receiving informed consent from participants, they selected a MyFitnessPal username while I reminded them of the study protocol. The women on both campuses had the same reaction when they realized I was studying caloric intake: concern of judgment without equal record of caloric burn. This resounding concern of measuring dietary habits without the context of exercise habits demonstrates the increased preoccupation with their weight and higher concern with dieting seen in Greek women in the literature.<sup>9,59</sup>

Results of the women's exercise records indicated women in decentralized housing exercised significantly more days and burned more calories each week than women living in centralized housing. During their study of exercise behaviors in the Greek community, Sheldon

et al. found no significant difference in exercise frequency between students living in and outside the sorority house on the same campus.<sup>41</sup> These findings support the current hypothesis that the presence of a centralized sorority house influences all chapter members, and the effect on behaviors is not exclusive to the members living in the house. Research has also shown that physical activity levels in college students increase as alcohol consumption increases.<sup>46</sup> This relationship, too, supports the current findings, as women in decentralized housing consumed larger amounts of alcohol and burned more calories through physical activity than women living in centralized housing. No other studies have explored the influence of housing on physical activity levels in college students.<sup>42</sup>

Despite the difference in number of days with physical activity and calories burned between the women in centralized and decentralized housing, there was no difference in the total duration of exercise reported in the exercise records throughout the week between groups. In her analysis of health patterns of members of Greek Life, Dinger reported a higher rate of vigorous exercise than moderate physical activity by individuals living in Greek houses.<sup>106</sup> The difference in intensity of physical activity could explain the equal duration of exercise yet difference in total calories burned between groups. This difference in intensity could reflect a variation in motivation for exercise, as women in decentralized housing appear to exercise more frequently and more vigorously to excessively burn calories, while women in centralized housing use less frequent, moderate intensity physical activity to maintain a consistent net caloric intake every day. Further research should explore the motivations behind the use of exercise in these groups, as it may be an indicator of weight preoccupation or other body image disturbances.<sup>107,108</sup>

#### D. BODY IMAGE

Women in decentralized housing demonstrated a significantly higher preoccupation with body size and shape than women in centralized housing. In a study on body objectification and disordered eating in college women, Basow and her team concluded that living in a sorority house increased the likelihood of bulimia and body dissatisfaction when compared to sorority women living outside of the centralized house.<sup>11</sup> This differs from the current findings that women living in centralized housing scored lower on the Body Image Questionnaire than sorority women in decentralized housing; however, Basow et al. provided no comparison group of Greek women in decentralized housing, so the present findings are still of interest.<sup>11</sup>

Studies have shown negative body image impacts other health behaviors, such as physical activity and binge drinking.<sup>109-112</sup> Frequency of physical activity has been shown to be negatively associated with body image.<sup>109-111</sup> The present study demonstrates this association, as women from decentralized housing received a higher body image score, indicating a more negative self body image, and an increased frequency of physical activity. Increased prevalence of binge drinking has been linearly related to body dissatisfaction<sup>112</sup>—another trend embodied by the women in decentralized housing. The increased consumption of alcohol during drinking events may be associated with the group's increased preoccupation with body size and shape. The impact of a negative body image on health behaviors appears to be multifaceted, and future studies should focus on determining the interrelated nature of these attitudes and behaviors in sorority women.

## E. SOCIAL NETWORK THEORY

The Social Network Theory suggests that strong ties to a limited number of other individuals creates a closed network of influence that prevents access to outside opportunities, resources, and information.<sup>14</sup> The structure of Greek Life isolates members from outside connections and social influences, leaving them susceptible to a distorted understanding of how to conduct normal health behaviors.<sup>15</sup> It was predicted that women living in centralized housing would have a more tightly linked social network, thus further enhancing the distortion of reality experienced by members of Greek Life. The results supported this notion, as women in centralized housing differed significantly from the sorority women in decentralized housing for many attitudes and behaviors. Sorority women living in centralized housing consumed fewer calories, had a higher BMI, had a diet deficient in more nutrients, consumed less alcohol, exercised less frequently, and were less preoccupied with body size and shape than women in decentralized housing. This pattern suggests that the influence on sorority members living in centralized housing is not equal for all aspects of nutrition; caloric intake appears to be tightly regulated, but habits regarding alcohol, exercise, and body image appear to be less strictly enforced. Additional studies are needed to allow for a better understanding of the selective nature of this influence.

In light of the present findings, it is hypothesized that women in decentralized housing may be exposed to a greater diversity of individuals to which they can compare themselves, resulting in an increased level of body dissatisfaction and triggering a cascade of compensatory behaviors that may include increased exercise and alcohol consumption.<sup>113</sup> This hypothesis could be confirmed or modified by additional intra-Greek Life comparisons.

## F. STRENGTHS AND LIMITATIONS

The use of two separate college campuses allowed comparisons to be made within and between Greek communities—a unique feature that provided new insight into social influences on dietary intake, exercise patterns, alcohol consumption, and body image in sorority women. The reviewed literature described significant differences in the influences on the aforementioned factors as a result of Greek affiliation. The traditional comparisons to non-Greeks, however, are unable to distinguish the importance of variation in these influences within the Greek system itself. This study focused on the social and environmental factors that may influence and shape eating patterns and body image perceptions within and between individual sororities to offer a new and previously unexplored perspective. The assessment of dietary habits in conjunction with alcohol consumption and exercise patterns on an individual level allowed for exploration of potential interactions between these behaviors. The mixed methods and multivariate analysis provided information beyond dietary intake to create a comprehensive picture of lifestyle habits in this understudied population.

Improvements in methodology would have strengthened the reported results; the small sample size led to limited demographic diversity and a limited response rate, while the cross-sectional design prohibits establishment of causal relationships. The diet and exercise records relied on participants to self-report food and activity, a method that often results in dramatic underreporting. This limitation was likely further compounded by the use of a week-long diet record; as a result, participant fatigue may have contributed to underreporting. Additionally, an error in survey administration led to an inability to link dietary records with survey responses, preventing some comparisons at the individual level. Finally, due to limited time and resources,



two private northeastern universities were compared, limiting the potential to generalize the study findings.

## **CONCLUSION**

To my knowledge, this is the first study to conduct an intra-Greek Life comparison about the influence of living in a centralized sorority house on dietary and exercise habits of sorority women. From the information gathered, education programs and interventions can be tailored to the practices and influences unique to the campus population of women. For women living in a centralized sorority house, nutrition education should focus on lessening the preoccupation with caloric intake and improving overall diet quality. For women living on a campus with decentralized living conditions, nutrition education is needed to alleviate or modified attitudes about negative body image and eliminating or reduce caloric compensatory behaviors. The findings from this study showed that both groups could also benefit from basic nutrition education regarding average total energy and macro- and micro- nutrient requirements.

This study also identified interactions between diet and other lifestyle factors, including alcohol, body image, and exercise, in sorority women, filling a literature gap regarding potential influences on dietary patterns in sorority women. In light of this new information, focus should be placed on a lifestyle intervention to improve overall dietary habits and prevent eating disorders in this vulnerable population.

## TABLES AND FIGURES

**TABLE 1.** Participant sample sizes for each sorority and campus included in the study of the influence of Greek housing conditions on sorority member diet and exercise patterns

Sorority	Centralized Housing (n)	Decentralized Housing (n)
Sorority 1	12	9
Sorority 2	8	9
Sorority 3	8	17
Sorority 4	7	13
Total	35	48

**TABLE 2.** Greek affiliation of roommates of women in the decentralized housing condition for comparison to centralized housing conditions when examining sorority member diet and exercise patterns<sup>1</sup>

Roommate Affiliation	0 Roommates	1-2 Roommates	3-4 Roommates	5+ Roommates
Same Sorority	40.9%	32.8%	13.6%	13.6%
Other Sorority	59.0%	40.9%	0.0%	0.0%
Non-Greek	77.3%	22.7%	0.0%	0.0%

<sup>1</sup> Gathered in Survey 2 from women in decentralized living arrangements where n = 21

**TABLE 3.** Demographics (age, height, weight, BMI) collected through food records to examine the influence of housing on sorority member diet and exercise patterns

Variables	Sorority 1	Sorority 2	Sorority 3	Sorority 4	Total/Mean
Centralized Housing					
N	6	2	1	3	12
Age (yrs)	20.6 ± 1.3	21.0 ± 0.0	21.0	21.0 ± 1.0	20.8 ± 1.0
Height (in)	63.0 ± 3.3	68.0 ± 1.4	67.0	64.7 ± 0.6	64.7 ± 3.0
Weight (lb)	129.4 ± 12.1	142.5 ± 10.6	135.0	135.7 ± 14.4	134.3 ± 11.8
BMI	22.9 ± 1.7	21.7 ± 0.7	21.1	23.0 ± 2.6	22.6 ± 1.8
Decentralized Housing					
N	6	7	9	10	32
Age (yrs)	20.8 ± 0.8	20.4 ± 1.4	20.1 ± 0.9	20.6 ± 1.1	20.5 ± 1.1
Height (in)	65.8 ± 3.0	66.1 ± 2.9	65.5 ± 2.1	65.5 ± 2.6	65.8 ± 2.4
Weight (lb)	131.83 ± 16.2	141.1 ± 16.7	139.1 ± 19.9	127.8 ± 15.3	134.7 ± 17.3
BMI	21.3 ± 1.8	22.7 ± 1.9	22.5 ± 2.5	20.9 ± 2.1	21.8 ± 2.1

**TABLE 4.** Racial and ethnic backgrounds of participants and campuses surveyed to examine the influence of housing on sorority member diet and exercise patterns

Race/Ethnicity	Centralized Housing		Decentralized Housing	
	Participants	Campus*	Participants	Campus*
N	12	15,200	32	7,000
American Indian / Alaska Native	0.0%	0.8%	0.0%	0.0%
Asian	16.7%	8.9%	0.0%	6.9%
Black / African American	0.0%	9.9%	0.0%	4.8%
Hispanic / Latino	8.3%	11.9%	3.1%	7.2%
Multi-Race	0.0%	2.8%	3.1%	2.3%
Native Hawaiian / Pacific Islander	0.0%	0.1%	0.0%	0.0%
White	66.7%	61.4%	90.6%	76.9%
Unknown	8.3%	4.3%	3.1%	2.0%

\* Source: CollegeData.com<sup>114,115</sup>

**TABLE 5.** Demographics (age, height, weight, BMI) collected through Survey 1 to examine the influence of housing on sorority member diet and exercise patterns

Variables	Sorority 1	Sorority 2	Sorority 3	Sorority 4	Total/Mean
Centralized Housing					
N	7	6	5	6	24
Age (yr)	20.0 ± 0.8	20.2 ± 0.8	20.8 ± 0.5	20.5 ± 0.8	20.3 ± 0.8
Height (in)	63.7 ± 3.0	65.5 ± 2.9	65.4 ± 1.5	62.7 ± 1.6	65.3 ± 2.6
Weight (lbs)	142.1 ± 24.3	142.2 ± 13.0	132.4 ± 9.3	126.5 ± 12.2	136.2 ± 16.9
BMI	24.5 ± 3.1	23.3 ± 1.0	21.8 ± 2.1	22.6 ± 1.1	23.2 ± 2.2*
Decentralized Housing					
N	9	9	14	13	45
Age (yrs)	20.4 ± 0.7	20.6 ± 0.9	19.6 ± 0.8	20.1 ± 1.0	20.1 ± 0.9
Height (in)	64.1 ± 3.4	65.6 ± 2.5	65.8 ± 2.6	65.4 ± 2.1	25.3 ± 2.6
Weight (lbs)	130.3 ± 17.2	139.2 ± 15.6	138.8 ± 16.6	125.9 ± 15.1	133.5 ± 16.5
BMI	22.3 ± 2.7	22.8 ± 1.9	22.5 ± 1.8	20.6 ± 1.8	21.9 ± 2.1*

\*Statistical significance, Independent Samples Mann-Whitney U Test [U=0.033, df=2, p < 0.05, at 95% confidence interval]

**TABLE 6.** Diet scores to assess the frequency of healthy eating events compared across campus living arrangements for sororities on two different college campuses

Living Arrangement	N	Mean	Std. Dev.	Minimum <sup>1</sup>	Maximum <sup>2</sup>
Centralized Housing	24	45.5*	14.5	20.0	71.0
Decentralizing Housing	45	34.2*	6.6	12.0	52.0

\* Statistical significance , Independent Samples T-Test [t(28.3)= 3.607, p=0.001]

<sup>1</sup> Minimum Possible Score = 0

<sup>2</sup> Maximum Possible Score = 100

**TABLE 7.** Frequency of meal consumption<sup>1</sup> inside and out of the sorority house by women living in centralized on campus housing

Meal	Sorority 1	Sorority 2	Sorority 3	Sorority 4	Total	% Eaten In House
N	7	6	5	6	24	--
Breakfast	2(0)	5(2)	3(1)	3(1)	13(4)	30.8
Lunch	5(4)	6(5)	6(4)	5(5)	22(18)	81.8
Dinner	6(4)	7(5)	6(6)	6(6)	25(21)	84.0
Total	13(8)	18(12)	15(11)	14(12)	60(43)	71.7
% Eaten in House	61.5	66.7	73.3	85.7	71.7	--

<sup>1</sup> Consumption patterns listed as T(H) where T = total number of each meal consumed overall and H = total number of each meal consumed in the sorority house

**TABLE 8.** Alternate sources of meals and snacks for sorority women in living in decentralized campus housing<sup>1</sup>

Location	Always (%)	Often (%)	Sometimes (%)	Never (%)
Campus Meal Plan	54.5	4.5	22.7	18.1
Cooking at Home	36.3	13.6	13.6	40.9
Restaurant/Take Out	0.0	59.1	31.8	9.1
Other	0.0	9.1	4.5	86.4

<sup>1</sup> Gathered in Survey 2 from women in decentralized living arrangements where n = 21

**TABLE 9.** Average nutrient consumption of sorority women living under two different campus housing conditions compared with USDA daily recommendations

Nutrients	Centralized Housing	Decentralized Housing	USDA Recommendation*
N	12	32	--
BMI (kg/m <sup>2</sup> )	22.6 ± 1.8	21.8 ± 2.1	< 25
Calories (kcal)	1258.8 ± 441.7 <sup>1</sup>	1389.4 ± 465.5 <sup>1</sup>	2,000
<b>Macronutrients</b>			
Protein (g)	55.9 ± 26.4 <sup>1</sup>	62.9 ± 25.5	46 <sup>1</sup>
Carbohydrate (g)	158.0 ± 54.9 <sup>2</sup>	170.6 ± 66.7 <sup>2</sup>	130 <sup>2</sup>
Total Fiber (g)	11.9 ± 6.6 <sup>2</sup>	17.3 ± 10.4 <sup>2</sup>	28
Saturated Fat (% kcal)	11.3 ± 5.7	10.3 ± 4.8	< 10
Cholesterol (mg)	171.4 ± 184.0	152.3 ± 112.0	< 300
<b>Vitamins</b>			
Vitamin A (mcg)	294.6 ± 322.8	309.0 ± 469.4	700
Vitamin D (mcg)	1.1 ± 1.6 <sup>3</sup>	0.9 ± 2.1 <sup>3</sup>	15 <sup>3</sup>
Vitamin E (mg)	2.8 ± 5.0 <sup>1</sup>	3.4 ± 5.3	15 <sup>1</sup>
Vitamin C (mg)	51.2 ± 47.5	58.2 ± 84.5	75
Thiamin (mg)	0.7 ± 1.0	0.8 ± 2.0	1.1
Riboflavin (mg)	0.7 ± 0.7	0.7 ± 0.9	1.1
Niacin (mg)	9.0 ± 8.9	8.5 ± 11.3	14
Folate (mcg)	174.1 ± 188.2	191.6 ± 215.3	400
Vitamin B <sub>6</sub> (mg)	0.8 ± 0.7	0.9 ± 2.2	1.3
Vitamin B <sub>12</sub> (mcg)	1.5 ± 1.8	1.5 ± 2.8	2.4
Choline (mg)	59.7 ± 111.1 <sup>2</sup>	60.2 ± 82.1 <sup>3</sup>	425 <sup>2,3</sup>
Vitamin K (mcg)	39.1 ± 95.1	70.1 ± 192.0	90
<b>Minerals</b>			
Calcium (mg)	553.4 ± 341.7	548.0 ± 375.8	1000
Iron (mg)	9.0 ± 5.6	9.1 ± 7.3	18
Magnesium (mg)	72.1 ± 71.8 <sup>2</sup>	97.4 ± 88.0 <sup>1</sup>	310 <sup>1,2</sup>
Phosphorus (mg)	353.2 ± 321.7	368.0 ± 286.9	700
Potassium (mg)	719.7 ± 582.0 <sup>3</sup>	924.0 ± 747.2 <sup>3</sup>	4700 <sup>3</sup>
Sodium (mg)	2259.2 ± 1273.8	2261.1 ± 1079.1	< 2,300
Zinc (mg)	3.3 ± 4.1	3.5 ± 4.3	8
Copper (mcg)	0.3 ± 0.3	0.4 ± 0.5	0.9
Selenium (mcg)	21.0 ± 30.0	22.5 ± 25.0	55

\* Source: Dietary Reference Intakes stated in Dietary Guidelines for Americans 2010<sup>116</sup>

<sup>1</sup> Statistical significance [p < 0.05]

<sup>2</sup> Statistical significance [p < 0.01]

<sup>3</sup> Statistical significance [p < 0.001]

**TABLE 10.** Average alcohol consumption (in grams) recorded in food records collected from sorority women living under two different campus housing conditions

Living Arrangement	N	Mean	Std. Dev.	Minimum	Maximum
Centralized Housing	12	0.5*	3.0	0.0	18.57
Decentralized Housing	32	6.9*	20.9	0.0	123.5

\* Statistical significance, Independent Samples T-Test [ $p < 0.001$ ,  $t(252.3) = -5.358$ ]

**TABLE 11.** Sorority women living under different campus housing conditions alter their energy intake as a function of planned alcohol consumption

Living Arrangement	N	Calories from Food on Days with Alcohol <sup>1</sup>	Calories from Alcohol	Calories from Food on Days without Alcohol
Centralized Housing	12	855.7 ± 378.7	114.2 ± 23.3	1268.8 ± 442.8
Decentralized Housing	32	1390.1 ± 422.1	367.1 ± 218.4	1333.9 ± 439.0

<sup>1</sup> Calculated by subtracting calories from alcohol from the total caloric intake for days with alcohol reported

**TABLE 12.** Weekly exercise patterns reported by sorority women living under two different campus housing conditions

Exercise Patterns	Centralized Housing	Decentralized Housing
N	12	32
Number Days with Exercise (days)	1.92 ± 0.52 <sup>1</sup>	2.22 ± 0.83 <sup>1</sup>
0 Days (% N)	16.7%	25.0%
1-2 Days (% N)	75%	28.1%
3+ Days (% N)	6.3%	46.9%
Duration of Exercise (min)	83.92 ± 99.26	110.31 ± 104.41
Calories Burned (kcal)	373.67 ± 316.98 <sup>2</sup>	757.30 ± 684.37 <sup>2</sup>
Net Calories (kcal)	1117.8 ± 671.7 <sup>3</sup>	1272.2 ± 468.9 <sup>3</sup>

<sup>1</sup> Statistical significance, Independent Samples T-Test [ $p = 0.008$ ,  $t(39.2) = -2.771$ ]

<sup>2</sup> Statistical significance, Independent Samples T-Test [ $p = 0.015$ ,  $t(235.3) = -4.103$ ]

<sup>3</sup> Statistical significance, Independent Samples Mann-Whitney U Test ( $U = 0.024$ ,  $df = 2$ ,  $p < 0.05$ , at the 95% confidence interval)

**TABLE 13.** Body Image Score (BIS) reflecting preoccupation with body size and shape of sorority women as a function of living arrangement and sorority membership

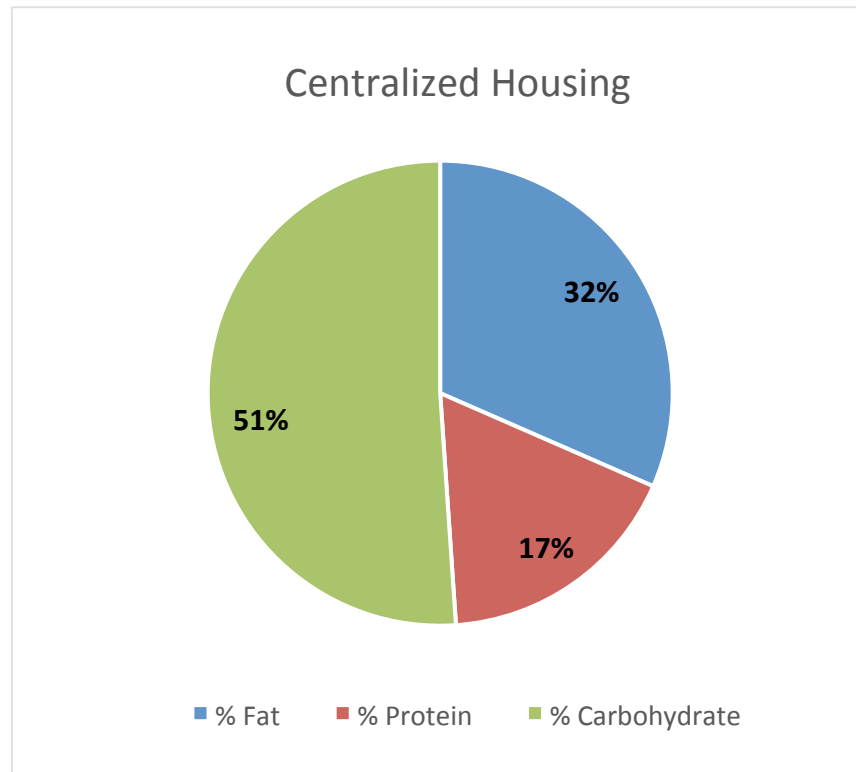
Variables	Sorority 1	Sorority 2	Sorority 3	Sorority 4	Total/Mean
<b>Centralized Housing</b>					
N	7	6	5	6	24
Mean	95.9	124.8	77.4	117.8	104.8*
Std. Dev.	53.2	17.4	21.9	22.8	36.6
Minimum <sup>1</sup>	35	100	47	95	35
Maximum <sup>2</sup>	191	148	97	160	191
<b>Decentralized Housing</b>					
N	9	9	14	13	45
Mean	107.1	115.4	119.9	110.9	113.9*
Std. Dev.	14.2	24.5	25.5	34.3	26.2
Minimum <sup>1</sup>	78	83	86	49	49
Maximum <sup>2</sup>	120	155	164	145	164

<sup>1</sup> Minimum possible score is 34.

<sup>2</sup> Maximum possible score is 204.

\* Statistical significance, ANCOVA [ $p=0.030$ ,  $f_{46,22}=3.365$ ]

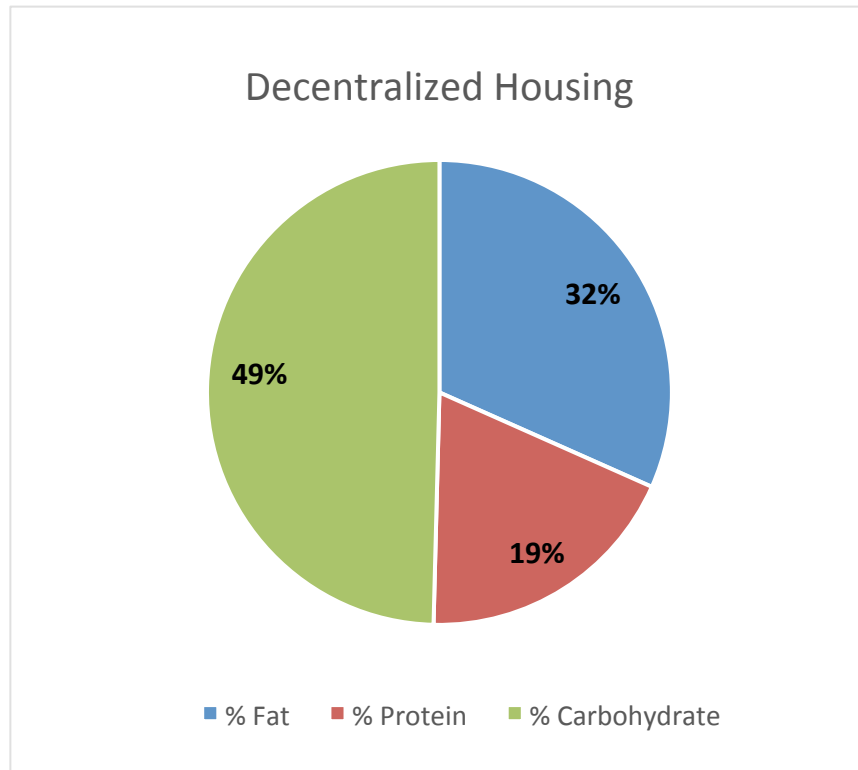
**FIGURE 1.** Macronutrient composition of the daily dietary intake of sorority women living in centralized campus housing<sup>1</sup>



<sup>1</sup> Derived from Food Records where n=12

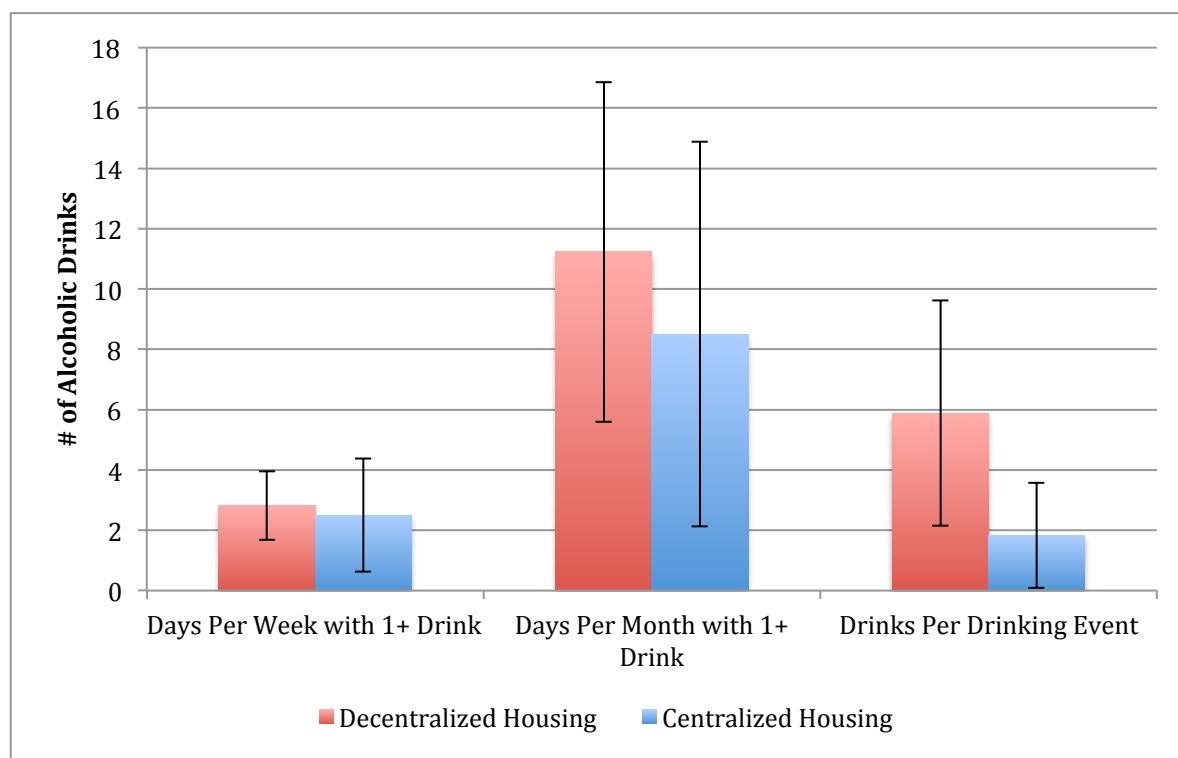


**FIGURE 2.** Macronutrient composition of daily dietary intake of sorority women living in decentralized campus housing<sup>1</sup>



<sup>1</sup> Derived from Food Records where n=32

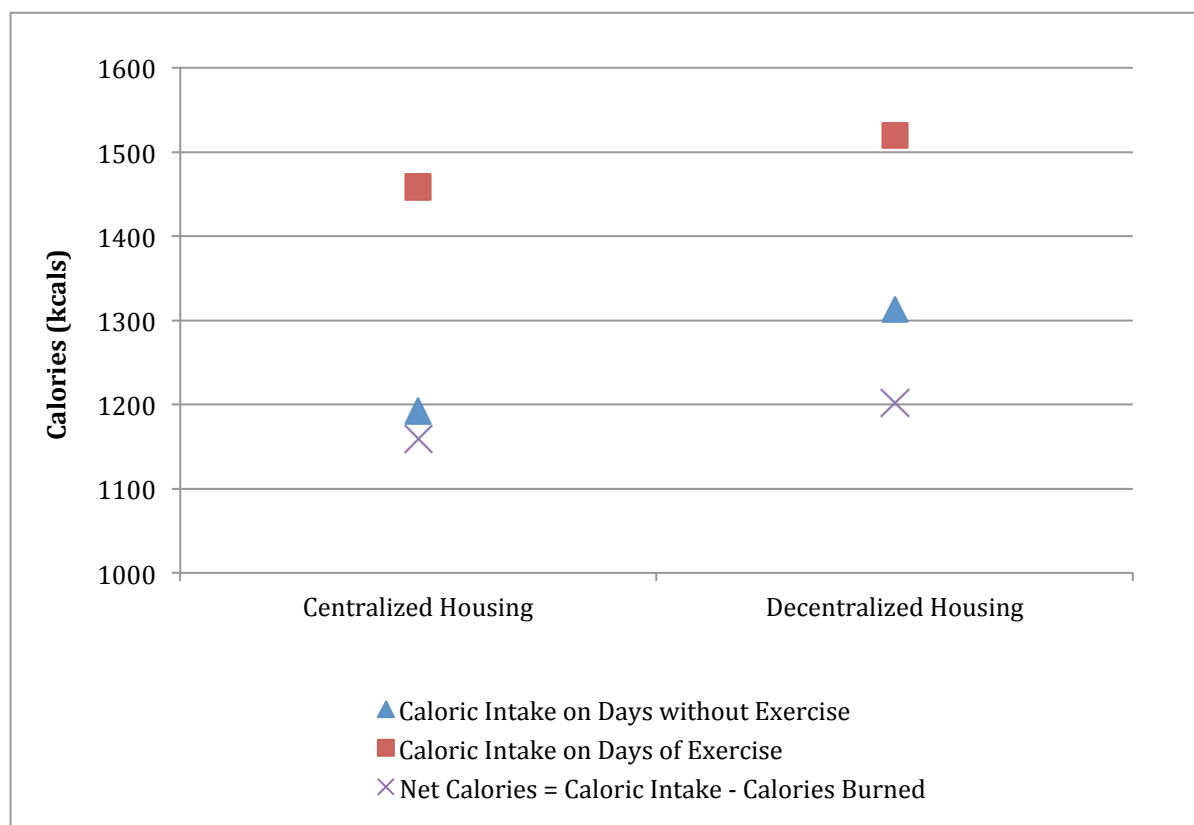
**FIGURE 3.** Daily, weekly, and monthly alcohol consumption patterns of sorority women as a function of campus living arrangement<sup>1</sup>



<sup>1</sup>Derived from Survey 2 where n=21 for decentralized housing and n=6 for centralized housing.

\*Values are reported as mean  $\pm$  standard deviation as error bars

**FIGURE 4.** Caloric intake (kcal) as a function of exercise patterns of sorority women in centralized and decentralized housing<sup>1</sup>



<sup>1</sup> Derived from Survey 2 where n=21 for decentralized housing and n=6 for centralized housing

**APPENDICES**

**APPENDIX A. Survey 1 Instrument**

Q#	Name	Survey Question	Values
1	Sorority	Which sorority are you a member of?	1 = Sorority 1
			2 = Sorority 2
			3 = Sorority 3
			4 = Sorority 4
2	Campus	Which school do you attend?	1 = Centralized Living
			2 = Decentralized Living
3	SUAIB	How many days each week do you eat the following meals (in or out of the house)?-Breakfast	0 = Zero days / week
			1 = One day / week
			2 = Two days / week
			3 = Three days / week
			4 = Four days / week
			5 = Five days / week
			6 = Six days / week
7 = Seven days / week			
4	SUAIB	How many days each week do you eat the following meals (in or out of the house)?-Lunch	0 = Zero days / week
			1 = One day / week
			2 = Two days / week
			3 = Three days / week
			4 = Four days / week
			5 = Five days / week
			6 = Six days / week
7 = Seven days / week			
5	SUAIB	How many days each week do you eat the following meals (in or out of the house)?-Dinner	0 = Zero days / week
			1 = One day / week
			2 = Two days / week
			3 = Three days / week
			4 = Four days / week
			5 = Five days / week
			6 = Six days / week
7 = Seven days / week			
6	SUHouseB	How many days each week do you each the following meals prepared by your sorority house chef?-Breakfast	0 = Zero days / week
			1 = One day / week
			2 = Two days / week
			3 = Three days / week
			4 = Four days / week
			5 = Five days / week
			6 = Six days / week
7 = Seven days / week			

7	SUHouseL	How many days each week do you each the following meals prepared by your sorority house chef?-Lunch	0 = Zero days / week
			1 = One day / week
			2 = Two days / week
			3 = Three days / week
			4 = Four days / week
			5 = Five days / week
			6 = Six days / week
			7 = Seven days / week
8	SUHouseD	How many days each week do you each the following meals prepared by your sorority house chef?-Dinner	0 = Zero days / week
			1 = One day / week
			2 = Two days / week
			3 = Three days / week
			4 = Four days / week
			5 = Five days / week
			6 = Six days / week
			7 = Seven days / week
9	VUAIB	How many days each week do you eat the following meals?-Breakfast	0 = Zero days / week
			1 = One day / week
			2 = Two days / week
			3 = Three days / week
			4 = Four days / week
			5 = Five days / week
			6 = Six days / week
			7 = Seven days / week
10	VUAII	How many days each week do you eat the following meals?-Lunch	0 = Zero days / week
			1 = One day / week
			2 = Two days / week
			3 = Three days / week
			4 = Four days / week
			5 = Five days / week
			6 = Six days / week
			7 = Seven days / week
11	VUAIID	How many days each week do you eat the following meals?-Dinner	0 = Zero days / week
			1 = One day / week
			2 = Two days / week
			3 = Three days / week
			4 = Four days / week
			5 = Five days / week
			6 = Six days / week
			7 = Seven days / week

<b>12</b>	SnackB12	How many times each day do you eat a snack?-Before noon	0 = Zero snacks / day
			1 = One snack / day
			2 = Two snacks / day
			3 = Three snacks / day
			4 = Four snacks / day
			5 = Five snacks / day
			6 = Six snacks / day
			7 = Seven snacks / day
			8 = Eight snacks / day
			9 = Nine snacks / day
10 = Ten snacks / day			
<b>13</b>	Snack125	How many times each day do you eat a snack?-From 12pm to 5pm	0 = Zero snacks / day
			1 = One snack / day
			2 = Two snacks / day
			3 = Three snacks / day
			4 = Four snacks / day
			5 = Five snacks / day
			6 = Six snacks / day
			7 = Seven snacks / day
			8 = Eight snacks / day
			9 = Nine snacks / day
10 = Ten snacks / day			
<b>14</b>	SnackA5	How many times each day do you eat a snack?-After 5pm	0 = Zero snacks / day
			1 = One snack / day
			2 = Two snacks / day
			3 = Three snacks / day
			4 = Four snacks / day
			5 = Five snacks / day
			6 = Six snacks / day
			7 = Seven snacks / day
			8 = Eight snacks / day
			9 = Nine snacks / day
10 = Ten snacks / day			
<b>15</b>	DietScore	Calculated Diet Score	Continuous Variable
<b>16</b>	Ht	What is your height? (in)	Continuous Variable
<b>17</b>	Wt	What is your weight? (lbs)	Continuous Variable
<b>18</b>	Age	What is your age? (yrs)	Continuous Variable
<b>19</b>	BMI	Calculated BMI	Calculation based on formula: BMI = (wt / ht <sup>2</sup> ) x 703
<b>20</b>	Q1	Have you ever felt so worried about your appearance that you thought you should diet?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always

21	Q2	Has boredom ever brought you to agonize over your shape?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
22	Q3	Have you ever thought your thighs, hips, or bottom are too large for the rest of you?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
23	Q4	Have you ever been afraid that you may become fatter?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
24	Q5	Have you ever worried about a certain part of your body not being firm enough?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
25	Q6	Does feeling full (after eating a large meal) made you feel fat?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
26	Q7	Have you ever felt so bad about your shape that you have cried?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
27	Q8	Have you ever avoided doing physical activity out of fear of your fat bouncing around?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always

<b>28</b>	Q9	Has being with thin women made you feel self-conscious about your shape?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
<b>29</b>	Q10	Have you worried about your thighs spreading out when sitting down?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
<b>30</b>	Q11	Has eating even a small amount of food made you feel fat?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
<b>31</b>	Q12	Have you noticed the shape of other women and felt your own shape compared unfavorably?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
<b>32</b>	Q13	Has thinking about your shape interfered with your ability to concentrate (e.g. while watching television, reading, listening to music or conversations)?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
<b>33</b>	Q14	Has being naked made you feel fat?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
<b>34</b>	Q15	Have you avoided wearing certain clothes because they make you particularly aware of the shape of your body?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always



35	Q16	Do you ever wish certain parts of your body could be removed?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
36	Q17	Has eating sweets or high calorie food made you feel fat?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
37	Q18	Have you avoided going out to social occasions because you have felt bad about your shape?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
38	Q19	Have you ever felt excessively large and rounded?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
39	Q20	Have you felt ashamed of your body?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
40	Q21	Has worry about your shape made you diet?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
41	Q22	Have you felt happiest about your shape when your stomach was empty (e.g. in the morning)?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always

42	Q23	Have you thought that you are in the shape you are because of your lack of self-control?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
43	Q24	Have you worried about other people seeing your stomach?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
44	Q25	Have you felt that it is not fair that other women are thinner than you?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
45	Q26	Have you ever vomited in order to feel thinner?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
46	Q27	When in company, have you worried about taking up too much room (e.g. sitting on a couch or airplane seat)?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
47	Q28	Have you worried about the appearance of cellulite?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
48	Q29	Has seeing your reflection or a photograph of yourself made you feel bad about your shape?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always

49	Q30	Have you ever pinched areas of your body to see how much fat there is?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
50	Q31	Have you avoided situations where people can see your body (e.g. communal dressing rooms or swimming pools)?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
51	Q32	Have you ever taken laxatives in order to feel thinner?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
52	Q33	Have you been particularly self-conscious about your shape when in the company of other people?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
53	Q34	Has worry about your shape made you feel that you should exercise?	1 = Never
			2 = Rarely
			3 = Sometimes
			4 = Often
			5 = Very Often
			6 = Always
54	tBIS	Total Calculated Body Image Score	Total score from Q1-Q34 ranging from score of 34 to 204.

## APPENDIX B. Survey 2 Instrument

Q#	Name	Survey Question	Values
1	Sorority	Which sorority are affiliated with?	1 = Sorority 1
			2 = Sorority 2
			3 = Sorority 3
			4 = Sorority 4
2	Campus	Which school do you attend?	1 = Centralized Living
			2 = Decentralized Living
3	VULivingSS	Who do you live with?-Number of sorority sisters	Continuous Variable
4	VULivingOS	Who do you live with?-Number of members from another sorority	Continuous Variable
5	VULivingNG	Who do you live with?-Number of Non-Greeks	Continuous Variable
6	VUEatingCMP	Rank the frequency of the locations from which you get your food. – On campus from Campus Meal Plan	0 = Location Not Used
			1 = Most Frequent
			2 = Relatively Frequent
			3 = Sometimes Frequent
7	VUEatingH	Rank the frequency of the locations from which you get your food. – From home (cooking for yourself)	0 = Location Not Used
			1 = Most Frequent
			2 = Relatively Frequent
			3 = Sometimes Frequent
8	VUEatingR	Rank the frequency of the locations from which you get your food. – Takeout from restaurant	0 = Location Not Used
			1 = Most Frequent
			2 = Relatively Frequent
			3 = Sometimes Frequent
9	VUEatingO	Rank the frequency of the locations from which you get your food. – Other	0 = Location Not Used
			1 = Most Frequent
			2 = Relatively Frequent
			3 = Sometimes Frequent
			4 = Not Frequent

10	Alcohol1W	During the past 30 days, how many days per week/month did you have at least one drink of any alcoholic beverage such as beer, wine, a malt beverage or liquor? = Days per week with 1+ alcoholic beverage	0 = Zero days / week
			1 = One day / week
			2 = Two days / week
			3 = Three days / week
			4 = Four days / week
			5 = Five days / week
			6 = Six days / week
			7 = Seven days / week
11	Alcohol1M	During the past 30 days, how many days per week/month did you have at least one drink of any alcoholic beverage such as beer, wine, a malt beverage or liquor? = Days per month with 1+ alcoholic beverage	Continuous Variable (0-31 days)
12	AlcoholAvg	One drink is equivalent to a 12-ounce beer, a 5-ounce glass of wine, or a drink with one shot of liquor. During the past 30 days, on the days when you drank, about how many drinks did you drink on the average?	Continuous Variable

#### APPENDIX C. Survey 3 Instrument

Q#	Name	Survey Question	Values
1	MFP	What was the MyFitnessPal username you were assigned for the study?	String Variable
2	Height	What is your height? (ft' in")	Continuous Variable
3	Weight	What is your weight? (lbs)	Continuous Variable
4	Age	What is your age? (yrs)	Continuous Variable
5	Race Ethnicity	With which racial or ethnic group do you identify?	1 = Caucasian/ White (non-Hispanic)
			2 = Black / African American (non-Hispanic)
			3 = Hispanic or Latino
			4 = Asian / Pacific Islander
			5 = Native American
			6 = Other (Please Specify)
6	Race EthnicityO	Specifications for "other" in Race Ethnicity variable	String Variable

**APPENDIX D. Normality Tests for Variables Analyzed**

Variable	Centralized Housing			Decentralized Housing		
	<i>N</i>	<i>Skewness</i>	<i>Kurtosis</i>	<i>N</i>	<i>Skewness</i>	<i>Kurtosis</i>
BMI (Survey 1)	24	1.570	5.008	45	0.351	-0.444
Age (Survey 1)	24	-0.024	-0.224	45	-0.363	-1.347
Height (Survey 1)	24	-0.049	-0.960	45	-0.297	-0.238
Weight (Survey 1)	24	1.311	3.229	45	0.306	0.165
BMI (Food Record)	11	0.027	-1.824	31	0.572	-0.310
Age (Food Record)	12	-0.346	-0.587	32	-0.330	-0.527
Height (Food Record)	12	-0.544	-0.700	32	-0.283	-0.433
Weight (Food Record)	12	-0.242	-1.235	32	0.259	0.511
Diet Score	24	-0.394	-0.465	45	-0.354	2.499
Caloric Intake	12	-0.158	-1.427	32	-0.428	0.642
Protein (g)	12	-0.019	-0.944	32	-0.410	0.085
Carbohydrate (g)	12	-0.046	-1.537	32	-0.039	0.856
Total Fiber (g)	12	1.576	2.980	32	1.455	3.868
Saturated Fat (% kcal)	12	-0.568	0.125	32	0.182	0.135
Cholesterol (mg)	12	-0.057	-1.605	32	0.223	0.191
Vitamin A (mcg)	12	1.128	-0.150	32	3.715	16.656
Vitamin D (mcg)	12	1.233	0.124	32	1.650	2.345
Vitamin E (mg)	12	2.707	7.941	32	1.319	1.178
Vitamin C (mg)	12	1.077	1.089	32	3.202	14.192
Thiamin (mg)	12	0.769	-0.714	32	4.187	20.032
Riboflavin (mg)	12	1.246	0.351	32	0.908	0.193
Niacin (mg)	12	1.324	0.949	32	0.640	0.547
Folate (mcg)	12	1.129	0.198	32	1.172	1.244
Vitamin B <sub>6</sub> (mg)	12	1.262	0.398	32	3.397	15.140
Vitamin B <sub>12</sub> (mcg)	12	0.924	-0.663	32	1.141	0.611
Choline (mg)	12	0.976	-0.850	32	2.323	7.475
Vitamin K (mcg)	12	0.813	-0.826	32	2.241	5.244
Calcium (mg)	12	-0.125	-1.386	32	0.262	-0.821
Iron (mg)	12	1.025	0.214	32	0.995	0.420
Magnesium (mg)	12	1.094	-0.499	32	1.148	1.754
Phosphorus (mg)	12	1.287	0.197	32	0.698	-0.421
Potassium (mg)	12	1.221	0.017	32	1.145	2.240
Sodium (mg)	12	0.679	0.785	32	-0.229	-0.789
Zinc (mg)	12	1.487	1.239	32	0.769	-0.549
Copper (mcg)	12	1.337	0.683	32	1.331	1.424
Selenium (mcg)	12	1.242	0.018	32	1.222	1.571
Alcohol (g)	12	2.157	3.393	32	1.087	-0.221
Days Per Week with Alcohol	6	0.000	-1.200	22	1.027	1.318
Days Per Month with Alcohol	6	-0.135	-2.020	22	0.152	-1.167
Alcoholic Drinks Per Drinking Event	6	0.839	-0.059	22	2.798	9.726
Number of Days with Exercise	12	0.441	0.234	32	0.094	-1.051
Duration of Exercise	12	1.522	1.266	32	1.372	2.613
Calories Burned	12	0.482	-1.256	32	0.906	0.551
Net Calories	12	-0.115	-1.587	32	-0.285	0.329
Body Image Score	24	0.252	0.212	45	-0.419	0.032

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<i>Education</i>	<p><b>Syracuse University</b> MS, Nutrition Science <span style="float: right;"><b>May 2015</b></span></p> <p><b>Villanova University</b> BS, Comprehensive Science <span style="float: right;"><b>May 2013</b></span></p>
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<i>Honors &amp; Awards</i>	<p>Nutrition Science Graduate Program Marshal <span style="float: right;"><b>May 2015</b></span></p> <p>Outstanding Graduate Assistant in Nutrition Science <span style="float: right;"><b>May 2015</b></span></p>
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<i>Work Experience</i>	<p><b>Syracuse University</b></p> <p><i>Nutrition Department Teaching Assistant</i> <span style="float: right;"><b>August 2014-May 2015</b></span></p> <ul style="list-style-type: none"> <li>• Perform grading and content development for undergraduate Community Nutrition and Nutrition Education classes</li> </ul> <p><i>Nutrition Department Research Assistant</i> <span style="float: right;"><b>June 2014-May 2015</b></span></p> <ul style="list-style-type: none"> <li>• Conduct 24-hour recalls through telephone calls and input recall data into the ASA24 system as part of the Syracuse Lead Study</li> <li>• Develop methods and content to create a new Mediterranean Food and Culture course</li> </ul> <p><i>Biology Department Teaching Assistant</i> <span style="float: right;"><b>August 2013-May 2014</b></span></p> <ul style="list-style-type: none"> <li>• Facilitated two Introductory Biology laboratory sessions independently</li> <li>• Created and grade weekly laboratory quizzes and one laboratory report</li> <li>• Clarified course material through weekly laboratory presentations</li> </ul>
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<i>Volunteer Experience</i>	<p><b>Neighborhood Involvement Program Community Clinic – Minneapolis</b></p> <p><i>Student Dietitian</i> <span style="float: right;"><b>June-August 2014</b></span></p> <ul style="list-style-type: none"> <li>• Performed 1-on-1 diet counseling for clinic patients</li> <li>• Assisted patients in adopting a healthy lifestyle change</li> </ul> <p><b>Syracuse University – Florence</b></p> <p><i>Food Service Assistant</i> <span style="float: right;"><b>May 2014</b></span></p> <ul style="list-style-type: none"> <li>• Aided in the preparation and cooking of two multi-course meals for 20+ students</li> <li>• Ensured proper safety and sanitation procedures were followed in the industrial kitchen</li> </ul> <p><b>Delta Delta Delta Sorority</b></p> <p><i>National Body Image 3D Ambassador</i> <span style="float: right;"><b>May 2012-May 2013</b></span></p> <ul style="list-style-type: none"> <li>• Wrote monthly newsletters to sorority members nation-wide to encourage maintenance of health and a positive body image</li> <li>• Provided pictures and video clips about Body Image 3D to spread the message of positive body image and proper health throughout the country</li> </ul>
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<i>Professional Involvement</i>	<ul style="list-style-type: none"> <li>• Member of the Academy of Nutrition and Dietetics</li> <li>• Member of the Association for Size Diversity and Health</li> <li>• Citi Human Subjects Research Certification</li> <li>• SerSafe Certification</li> <li>• Syracuse University Nutrition Counseling Certification</li> </ul>

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