The Effects of Exercise on Eating, Sleeping, and Wellbeing

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Executive Summary

The goal of this research is to tie physical health and psychological health together to contribute to a holistic model of health. To examine the relationship between eating and sleeping habits and wellbeing, we conducted a survey of University of British Columbia (UBC) students measuring these three constructs in addition to several control and demographic variables, including exercise habits and living arrangements. Students were approached in public areas on the UBC's Vancouver campus and asked to fill out an online survey. The results found that exercise habits had unexpectedly significant correlations with aspects of eating and sleeping habits, as well as wellbeing. Exercise behaviours were also shown to be more significant than either sleeping or eating habits to wellbeing scores by a multiple regression, leading us to conclude that exercise could be a very important contributor to both physical and psychological wellbeing.

The Effects of Exercise on Sleeping, Eating, and Wellbeing

Introduction

A holistic approach to health acknowledges the role of both physical and psychological welfare in producing wellbeing. The relationship between the mind and body has consequences for how positive health can be produced, be it psychologically or physically. Our study seeks to explore the interdependence of these two aspects of the holistic model of health. Our definition of wellbeing borrows from the work of Diener, Emmons, Larson, and Griffin (1985), who conceptualized wellbeing as the summation of emotional and cognitive components. Therefore, we designed our study to address self-rated views of life satisfaction, which has been argued to be equivalent to the judgemental component of wellbeing (Diener, Emmons, Larson, & Griffin, 1985), and also to measure the cognitive component of wellbeing through the occurrence of positive and negative emotions. Consequently, wellbeing is necessarily dependent on how self reported levels of wellbeing are impacted by two essential components of physical health: eating and sleeping habits. The determination of positive sleeping and eating habits were taken from guidelines issued by Health Canada (2011), while quality of behaviours was determined by personal satisfaction ratings.

The research question that we chose to address in our study was "how do eating habits and sleeping habits influence wellbeing?" We hypothesized that students who reported healthy sleeping and eating habits would score higher on measures of wellbeing. Additionally, based on previous research which connects sleeping and eating habits with exercise and obesity (Nishitani, Sakakibara, & Akiyama 2012), (Evans, Kennedy, & Wertheim. 2005), we hypothesized that exercise could also be a predictor, where more exercise would have a positive correlation with wellbeing. Due to the nature of the research question and lacking the resources and capability to experimentally manipulate any of wellbeing, exercise, sleeping habits, or eating habits, our study is correlational in nature.

Methods

Participants

Ninety-three students were recruited over a two week period for this study. Male participants accounted for 24% of the sample, while 75% responded as female and one person did not identify with either response (N=93, 22 male, 70 female, 1 unidentified). The average age of participants was 23.11, and the average year of study was 3rd year. 5 participants were excluded from further analysis due to incomplete response sets. Participants for the study were recruited across campus at the University of British Columbia using a convenience sampling method from the Student Union Building, Irving K. Barber Building, as well as the Koerner Library from March 19th - April 2nd every Tuesday and Thursday afternoon between the hours of 11:00am - 12:30pm.

Conditions

The correlational study relies on post-hoc condition determination by subject response. Each participant's response was coded as falling into either a positive or negative health condition based on aggregate subject mean responses for each of the three predictor variables. Responses were marked as above the mean or below the mean to control for any biases to over or

under-report in any of these cases. The result was the creation of 8 conditions based on positive or negative eating, sleeping, and exercise habits (see Figure 1 in Appendix B).

Measures

We created an online survey measuring eating habits, sleeping habits, and wellbeing as well as control factors including exercise, living arrangements, and demographic information such as age and gender. The questionnaire was accessed electronically through Qualtrics. Questions for the survey were drawn from a number of sources and compiled together. The Positive and Negative Affect Schedule (PANAS) (Watson, Clark, & Tellegan, 1998), and Satisfaction With Life Scale (SWLS) (Diener, Emmons, Larson, & Griffin, 1985), were used to measure wellbeing under the direction of Dr. Zhao. The Eating Questionnaire was replicated from the website of the British Heart Foundation (British Heart Foundation, 2012). Questions specific to UBC students, such as "Where is your food most often prepared?" "What are your living arrangements?" and "Does your residence require a meal plan?" were added in order to determine if there were specific effects of frequenting UBC Food Services establishments on eating habits. Other measures for sleeping and exercise habits, as well as certain demographic factors, were also created for the survey according to Public Health Agency of Canada guidelines (2011). (See Appendix C)

Procedure

Participants were approached using a convenience sampling method in common areas of the UBC campus, including the Student Union Building and the Irving K. Barber Learning Centre, and asked to complete a short online survey in exchange for the opportunity to win a gift card to UBC Food Services, which was provided by UBC Social Ecological Economic Development Studies. After reading over a brief consent form at the beginning of the survey, participants were instructed to proceed to the next page of the survey once they had read and understood the form, which indicated that they had accepted the conditions of the study. Participants were given as much time as was required to complete the questionnaire. After the completion of our data collection, responses to each question were correlated to determine important factors within each construct. After scoring the results for each of the three major contributing variables and wellbeing, using the guidelines provided with the PANAS (Watson, Clark, & Tellegan, 1998) and SWLS (Diener, Emmons, Larson, & Griffin, 1985), a multiple regression analysis was conducted to determine the impactfulness of these factors together.

Results

In order to better understand the relationship between our measured variables, we used Pearson's correlations to identify interplay between each question. We quickly noticed patterns of significant correlations between the survey questions, principally between certain elements of eating, sleeping and exercise habits. Of particular note is the relationship between self-rated and comparative eating habits, and the importance of, quantity of, satisfaction from, and self-reported physical health due to exercise (all $p<0.01$). Furthermore, we see a significant relationship between self-reported physical health and self-reported sleep quality, habits, and overall daytime experience (all $p<0.01$). Finally, self-reported and comparative eating habits significantly correlated with self-reported sleeping quality and habits (all $p<0.01$). These results indicate that there is a significant amount of interplay between each factor. (See Appendix E)

We then compared eating, sleeping and exercise habits, correlating those with the SWLS and the PANAS. Our survey shows that self-reported sleep quality, sleep habits, physical health, eating habits, and comparative ratings of eating habits all correlated significantly with various dimensions of the SWLS. These co-occurring correlations provide support for a holistic model of wellbeing in which physical and psychological health are dependent on each other.

By comparing mean wellbeing scores between conditions, we found that every group with above average consolidated exercise scores also scored above the mean on the wellbeing scale (see Figure 1). The significance of this relationship is highlighted by the consistency of the results. While other independent variables showed moderate correlations with specific elements of wellbeing, positive SWLS and the PANAS scores were consistently found to be related to healthy exercise behaviours.

Finally, a multiple regression analysis was conducted, using exercise, sleep habits, eating habits, and each of the control factors, including gender, age, faculty, living arrangements, and year of study as predictor variables of the dependent, wellbeing. Exercise returned the only significant results with a b coefficient of .474 and a constant of .523 at $p= 5.1063*10^{-7}$ (see Figure 2). None of the other factors exhibited significance of $p<.01$. The resulting regression equation is $Y= .474X_1+.523$ where X_1 = exercise. R was reported at .597 and R^2 at .356, therefore an increase of 1 in exercise is associated with an increase of .474 in wellbeing, and these factors account for 35.6% of the variation in wellbeing (see Figure 3).

Discussion

Our study demonstrates that significant correlations exist between aspects of eating and sleeping behaviours, and self-reports of wellbeing. Importantly, our findings address how wellbeing is impacted in a population that is often unable to adequately satisfy these behaviours. Students are often required to sacrifice positive health behaviours in order to comply with the demands placed on them by the education system (McKinzie, Burgoon, Altamura, & Bishop, 2006). This became clear when we analyzed responses to our survey, where many students indicated that their living arrangements negatively affected their sleeping and eating habits. Further to the evidence of a clear relationship between eating habits, sleeping habits, and wellbeing, we also see a high level of comorbidity between these components, suggesting that they are responsive to influence from other factors.

Healthy sleep habits are important to overall self reports of wellbeing (McKinzie et al., 2006) As our results suggest, there is a significant interaction between quality, quantity, and sanitation of sleep behaviours and dimensions of life satisfaction, especially those that also correlate highly with healthy eating and exercise tendencies. Those who scored their sleeping quality as high also reported having a better daytime experience and greater SWLS scores.

The relationship between eating and sleeping habits is of particular interest. Our findings confirm a significant interaction between these two dimensions, specifically that poor eating habits, such as skipping meals or maintaining an unbalanced diet, are negatively correlated with sleep satisfaction. The implication of this finding is that positive eating and sleeping factors that correlate highly with wellbeing may be innately associated before or because of this relationship.

An additional finding is that exercise correlates highly with the PANAS and SWLS. We found that particular components of the eating and sleeping behaviours were highly correlated with questions that addressed levels of physical fitness and exercise. An examination of previous literature on the topic of wellbeing suggested that exercise could play a crucial role in self reported wellbeing (McKinzie et al., 2006) Beyond simply replicating the conclusions of

preceding studies, our results suggest that there is a significant link between exercise, eating habits, sleeping habits, and broader understandings of wellbeing.

We argue that self reflected judgments of wellbeing may be intrinsically bound to social and cultural expectations of physical health and fitness. Particularly, we postulate that conceptualizations of health are dualistic in nature, and thus psychological and physical health are inherently associated. As evidenced by our research, physical fitness may be both a product and outcome of positive dietary and sleep conditions. Furthermore, wellbeing is the aggregate total of multiple dimensions of health.

Owing to the limitations of correlational data we are unable to determine the direction of causality between the measured responses, however we can confidently conclude that an interaction between the eating, sleeping and exercise habits exists. For the purposes of this research it is of less significance to provide a causal link between any particular factor and more important to expose co-occurring determinants to wellbeing. With the goal of increasing student wellbeing, we argue that determining causality is second to the stated goal, and therefore that improving either eating, sleeping, or exercise habits provides a viable route for improving student health.

We found that self reports and quantitative responses to eating and exercise habits correlated well with Health Canada guidelines for physical health (Public Health Agency of Canada, 2011). This suggests that while respondents may have internalized social and cultural cues from peers, it also implies that these indicators are being fed by a broader social network. Importantly, this provides for UBC the opportunity to be an agent of change. Some ideas to enact this change will be discussed further below.

There were several limitations to our study. In our survey, we asked people to rate the percentage of carbohydrates, proteins, fruits, and vegetables they had in an average meal. However, while distributing the survey, we found that many students were uneducated on what exactly a carbohydrate or protein was, for example. We felt this may have skewed our data, since many participants grew confused and chose to answer randomly, and as a result we eliminated this question when calculating our results.

In addition, by collecting the data only at certain times during the week, we may not have reached out to a representative sample of UBC students. The places where we chose to collect our data may have also affected our results. Many students who frequent the Student Union Building do so to buy a quick and easy lunch, and we felt that the students who took the time to pack a healthier lunch, or find a healthier eating venue, may not have frequented that location.

Finally, we were limited in the amount of time we had to collect our data. Collecting only 93 responses, our data may not be representative or generalizable to the entirety of UBC's student population. If we were to replicate this study, we would collect data with a much larger time frame, ideally two months, and would gather participants at various venues across campus, at differing times of the day and week, in order to create the most representative sample possible. Future studies should utilize non-correlational designs to improve the generalizability of the research on wellbeing. By addressing the challenges faced by all correlational research, one can begin to assign causality to factors that improve student wellbeing and therefore provide recommendations to positively impact those areas of health.

Recommendations for UBC

Since a main finding of our study was the positive effect of exercise on wellbeing, we recommend UBC implements programs that focus on the development of a different attitude

towards the importance of exercise. By emphasizing the importance of healthy lifestyle behaviours, such as proper eating and sleeping habits, to the benefits experienced from exercise, UBC can develop a multi-faceted approach to building better student wellbeing. Through this approach, positive eating and sleeping behaviours become components of a broader campaign to increase the physical fitness of the student population. By encouraging students to incorporate healthy eating and sleeping habits into a broader exercise regimen, we expect to see improved wellbeing scores.

A recommendation would be to have specific locations, maybe of a smaller size, that focus on short circuits or workouts, which could encourage people to begin adding a short workout to their day. On campus currently, there are very limited exercise facilities available to students, and many of these charge a fee. Although many of the residences on campus have free facilities on the ground floor, the equipment is often in poor condition and very limited. It would be beneficial to students if UBC were to eliminate fees to the facilities on campus, such as the BirdCoop Fitness Centre, as well as to improve the exercise facilities that are currently offered.

Due to the correlation between wellbeing and sleeping habits, it is also encouraged that UBC give some thought into making morning classes later in the day, since many participants on our survey responded that their academic schedule negatively affected their sleeping habits.

Finally, to improve students eating habits, a recommendation would be for UBC to work on a better variation of food options, as well as more of a consistency regarding the menu between the cafes on campus. The available options are not always apparent because of the rushed pace of the cafes and their incomplete menus. At the Student Union Building currently, there is very little selection for healthy foods that are also inexpensive, so often students are forced to purchase food venues such as White Spot or to purchase pizza at PiR^2, as this is more convenient, as well as easier on their finances.

As many of these recommendations may be hard to make a reality due to factors such as financial constraints, we also suggest that UBC make a stronger effort to inform the student body about their wellbeing, and how it can easily be affected by their eating, sleeping, and exercise habits. These encouragements could range from a webpage link on UBC's homepage, to educating the individuals who work at UBC's Wellness Centre on the significance of these factors on wellbeing. We believe that in making these recommendations a reality, the students at UBC will be much more healthy, in both body and mind.

Appendix A:

References

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Appendix B: Figures

Figure 1

SLEEP HABITS	EATING HABITS	EXERCISE HABITS	# OF PARTICIPANTS	AVERAGE WELLBEING
-	-	-	16	.5783 (-)
+	+	+	24	.7081 (+)
+	-	-	7	.5916 (-)
+	+	-	9	.5422 (-)
-	-	+	13	.7030 (+)
-	+	+	3	.7262 (+)
-	+	-	13	.5699 (-)
+	-	+	3	.8215 (+)

There are 8 conditions, in which participants are either above the mean (+) or below the mean (-) for each of the three constructs; sleeping, eating, and exercise habits.
The average wellbeing score across all participants was .6416

Figure 2

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.523	.143		3.671	.000
	SLEEPHABITS01	-.023	.238	-.011	-.095	.924
	HEALTHYEATING01	-.264	.124	-.228	-2.135	.036
	EXERCISEWOIMPORTANCE	.474	.087	.583	5.474	.000
	V11_A	.006	.012	.058	.526	.600
	V12_A	.025	.037	.065	.656	.514
	V13_A	-.002	.003	-.073	-.719	.474
	V14_A	-.005	.010	-.044	-.465	.644
	V22	-.031	.057	-.067	-.544	.588
	V24	.044	.025	.224	1.769	.081

a. Dependent Variable: Wellbeing

Figure 3

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.597[a]	.356	.282	.13584

a. Predictors: (Constant), V24, EXERCISEWOIMPORTANCE, V14_A, V13_A, V12_A, HEALTHYEATING01, V11_A, SLEEPHABITS01, V22

Appendix C: Survey

Welcome to our study. We are running a survey on wellbeing as our group project for the PSYC 321-Environmental Psychology course. The survey will take about 20 minutes to complete. You will answer a series of questions on eating and sleeping habits in the survey. Your participation in this survey is entirely voluntary and anonymous. You can refuse to participate or withdraw from the survey at any time. Your identity will be kept strictly confidential. All documents will be identified only by code number and stored securely. You will not be identified by name in any reports of this study. Data in this survey will only be accessed by the students, the course instructor, and the teaching assistant. Results of this study will be used to write a research report. There are no risks associated with participating in this survey. If you have any questions about the study, please contact us below. Name: Lauren Blackburn Email: laurenblackburn78@hotmail.com Phone: 604-220-1506 Name: Melissa Gaudette Email: m.gaudette25@hotmail.com Phone: 778-847-2200Name: Kyle Gooderham Email: kyle.gooderham@outlook.com Phone: 778-388-5961 Name: Katie Heys Email: kt.heys.92@gmail.com Phone: 604-802-3463You can also contact the course instructor, Dr. Jiaying Zhao, assistant professor in the Department of Psychology and the Institute for Resources, Environment and Sustainability at UBC. Dr. Zhao can be reached at at 604-827-2203, orenvironmentalpsychology321@gmail.com. If you consent to participate in this study, please proceed to the next page.

Thank you for your participation! You may enter your name into a draw for a gift card to UBC Food Services. If you would like to enter the draw please provide your email address below. If not, please proceed to the next page.

What year of post-secondary school are you in?
- ❍ 1st
- ❍ 2nd
- ❍ 3rd
- ❍ 4th
- ❍ 5th +
- ❍ Graduate Studies

What gender do you identify as?
- ❍ Male
- ❍ Female
- ❍ Other

How old are you?
_____ Age

Appendix C: Survey

What faculty are you in?

- ❍ Arts
- ❍ Science
- ❍ Business
- ❍ Medicine
- ❍ Engineering
- ❍ Other

What are your living arrangements?

- ❍ Off Campus/At Home
- ❍ Campus/Residence Single Occupancy
- ❍ Campus/Residence Shared Living Space

How often do you do the following?

	Never	Once per week	Twice per week	Three times per week	Four times per week	Five times per week	Six times per week	Daily
Skip one or more meals per day?	❍	❍	❍	❍	❍	❍	❍	❍
Skip meals and snack instead?	❍	❍	❍	❍	❍	❍	❍	❍
Eat more than 5 portions of fruit and/or vegetables?	❍	❍	❍	❍	❍	❍	❍	❍
Consume sugary drinks?	❍	❍	❍	❍	❍	❍	❍	❍
Eat pre-prepared meals? For example, pre-prepared sandwiches, ready meals, or canned soups.	❍	❍	❍	❍	❍	❍	❍	❍

Appendix C: Survey

How would you rate your eating habits?
- ❍ 1 - Very unhealthy
- ❍ 2 - Quite unhealthy
- ❍ 3 - Somewhat unhealthy
- ❍ 4 - Neither healthy nor unhealthy
- ❍ 5 - Somewhat healthy
- ❍ 6 - Quite healthy
- ❍ 7 - Very healthy

Are you on a meal plan?
- ❍ Yes
- ❍ No

Does your residence require a meal plan?
- ❍ Yes
- ❍ No

Where is your food most often prepared?
- ❍ On campus
- ❍ Off campus
- ❍ I prepare my own meals

Compared to your fellow students, how would you rate your eating habits?
- ❍ 1 - Very unhealthy
- ❍ 2 - Quite unhealthy
- ❍ 3 - Somewhat unhealthy
- ❍ 4 - Neither healthy nor unhealthy
- ❍ 5 - Somewhat healthy
- ❍ 6 - Quite healthy
- ❍ 7 - Very healthy

What percentage of your meals are the following?
_____ Carbohydrates
_____ Proteins
_____ Fruits
_____ Vegetables

How many hours of sleep do you get per night?
_____ Average Hours
_____ Work/School Night

Appendix C: Survey

I feel my best when I get ____ hours of sleep per night.
_____ Hours

How would you rate the quality of your sleep?
- ❍ Very Dissatisfied
- ❍ Dissatisfied
- ❍ Somewhat Dissatisfied
- ❍ Neutral
- ❍ Somewhat Satisfied
- ❍ Satisfied
- ❍ Very Satisfied

How would you rate your sleeping habits?
- ❍ 1 - Very unhealthy
- ❍ 2 - Quite unhealthy
- ❍ 3 - Somewhat unhealthy
- ❍ 4 - Neither healthy nor unhealthy
- ❍ 5 - Somewhat healthy
- ❍ 6 - Quite healthy
- ❍ 7 - Very healthy

Does your class or work schedule affect your sleep schedule?
- ❍ Yes
- ❍ No

Do your living arrangements negatively affect your sleep habits?
- ❍ Not At All
- ❍ Occasionally
- ❍ Frequently

How would you rate your daytime experience?
- ❍ I always feel tired and lethargic
- ❍ I often feel tired and lethargic
- ❍ I sometimes feel tired and lethargic
- ❍ Neither
- ❍ I sometimes feel energetic and alert
- ❍ I often feel energetic and alert
- ❍ I always feel energetic and alert

Appendix C: Survey

How would you rate your physical health/fitness?

- ❍ 1 - Very unhealthy
- ❍ 2 - Quite unhealthy
- ❍ 3 - Somewhat unhealthy
- ❍ 4 - Neither healthy nor unhealthy
- ❍ 5 - Somewhat healthy
- ❍ 6 - Quite healthy
- ❍ 7 - Very healthy

On average, how many minutes of physical activity do you get per week?

- ❍ Less than 75
- ❍ 75-125
- ❍ 125-175
- ❍ 175-225
- ❍ More than 225

How important is exercise and fitness to you?

- ❍ Not at all Important
- ❍ Very Unimportant
- ❍ Somewhat Unimportant
- ❍ Neither Important nor Unimportant
- ❍ Somewhat Important
- ❍ Very Important
- ❍ Extremely Important

Are you satisfied with the amount of exercise you get?

- ❍ Very Dissatisfied
- ❍ Dissatisfied
- ❍ Somewhat Dissatisfied
- ❍ Neutral
- ❍ Somewhat Satisfied
- ❍ Satisfied
- ❍ Very Satisfied

Appendix C: Survey

Below are five statements that you may agree or disagree with. Using the 1 - 7 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

	1. Strongly Disagree	2. Disagree	3. Slightly Disagree	4. Neither Agree nor Disagree	5. Slightly Agree	6. Agree	7. Strongly Agree
In most ways my life is close to my ideal.	❍	❍	❍	❍	❍	❍	❍
The conditions of my life are excellent.	❍	❍	❍	❍	❍	❍	❍
I am satisfied with my life.	❍	❍	❍	❍	❍	❍	❍
So far I have gotten the important things I want in life.	❍	❍	❍	❍	❍	❍	❍
If I could live my life over, I would change almost nothing.	❍	❍	❍	❍	❍	❍	❍

Appendix C: Survey

This scale consists of a number of words that describe different feelings and emotions. Read each item and then select the option from the choices below next to each word. Indicate the extent you have felt this way over the past week.

	1. Very Slightly or Not at All	2. A Little	3. Moderately	4. Quite a Bit	5. Extremely

Interested	❍	❍	❍	❍	❍
Distressed	❍	❍	❍	❍	❍
Excited	❍	❍	❍	❍	❍
Upset	❍	❍	❍	❍	❍
Strong	❍	❍	❍	❍	❍
Guilty	❍	❍	❍	❍	❍
Scared	❍	❍	❍	❍	❍
Hostile	❍	❍	❍	❍	❍
Enthusiastic	❍	❍	❍	❍	❍
Proud	❍	❍	❍	❍	❍
Irritable	❍	❍	❍	❍	❍
Alert	❍	❍	❍	❍	❍
Ashamed	❍	❍	❍	❍	❍
Inspired	❍	❍	❍	❍	❍
Nervous	❍	❍	❍	❍	❍
Determined	❍	❍	❍	❍	❍
Attentive	❍	❍	❍	❍	❍
Jittery	❍	❍	❍	❍	❍
Active	❍	❍	❍	❍	❍
Afraid	❍	❍	❍	❍	❍
Depressed	❍	❍	❍	❍	❍
Capable	❍	❍	❍	❍	❍
Anxious	❍	❍	❍	❍	❍
Competent	❍	❍	❍	❍	❍

Appendix D: Problems and Difficulties Encountered

The original intention was to distribute the survey through Student Housing and Hospitality Services. Our hope was that this would give us access to a large student population who all lived on campus but, most importantly, would have similar dietary and sleeping conditions. The intention was that we could control for a large degree of variability in eating and sleeping habits by eliminating students who lived off campus or in some way were not restricted by the limitations of the UBC campus. With that in mind, our survey was designed to be widely distributed in a quick timeframe.

Our stakeholders gave us their assurance that they would be able to distribute the survey through SHHS as soon as the questions were finalized. This proved not to be the case.

As a result of this miscommunication, we were delayed in distributing our survey and received far fewer responses than we had initially hoped for. In addition, our survey includes several elements which were geared toward collecting and comparing data from students who live in UBC residences. We would have liked to compare the responses of students in different types of residences and those who relied largely on UBC Food Services for their nutrition, such as those students who were required to take part in a meal plan, versus those who were able to prepare their own meals if they chose to. Unfortunately, due to our lack of access to students in residences and the small number of respondents who lived in residence, and even fewer who used a meal plan, such analysis was impossible.

Appendix E: Correlations, please see attached .pdf

Appendix F: Complete Data Set, please see attached .csv