LEARNED “LOVE HANDLES”
—A NATURAL EXPERIMENT OF PEER INFLUENCE ON OBESITY

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ABSTRACT

Finding the association between social network and obesity has oftentimes been impeded by the homophily problem. However, by using a large randomly-assigned college roommate dataset this study attempts to rule out the peer/self-selection and examine peer influence on college students’ Body Mass Index and obesity-related health risk behaviors including sugary beverage intake and physical exercise. In addition, this study investigates gender difference in peer influence and the association between peer effect and self’s predisposition. The results suggest that while females are more influenced by their peer’s sugary beverage drinking, males are more likely to be influenced by their peer’s physical exercise participation. Also, the study finds that peer effect on obesity-related health behaviors is larger for those who had the predisposition prior to college than those who did not. This study provides a better understanding of the association of social network and obesity and offers further guidance for policy implementation.

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INTRODUCTION

A wealth of research has found that obesity is associated with multiple major health issues ranging from type-2 diabetes, cardiovascular disease to mental disturbance, and even stigmatization that affects life quality (Dixon 2010; Kenchaiah et al.; Mehta and Chang 2009; Mokdad et al. 2001; Mokdad et al. 2003; Sturm 2002; Tchernof et al.; Zimmet et al., 2001). However, despite the abundant and consistent finding that obesity is detrimental to health and much media coverage of fighting against obesity (Heuer et al. 2011; Lariscy et al. 2010), many studies point out that obesity levels have been on the rise nationwide with recent studies finding that “more than one-third of adults and 17% of youth in the United States are obese” (Ogden et al. 2014). Particularly, of all the age groups, even in a college setting, young adults (18-29 years old) have experienced the highest percent of increase of obesity over the recent years (Mokdad et al., 2001; Yakusheva et al. 2011). American College Health Association’s national ACHA-NCHA II survey (2011) reports that 34.1% of college students are overweight and 12.5% of the total surveyed are obese.

Due to the research suggesting that obese adolescents are very likely to remain obese as they transition into adulthood (Desai et al. 2008; Gordon-Larsen 2004; Racette et al. 2005), scholars suggest that it is a critical opportunity for policy interventions in colleges (Deforche et al. 2015; Lloyd-Richardson et al. 2009; Nelson et al. 2008) because individuals in a college setting are vulnerable to the peer-oriented environment (Von Post-Skkegard et al. 2002; Wouters et al. 2010). However, peer influence has been recognized to be difficult to estimate. For instance, since human beings naturally bond and form a network with those who are likeminded, or “homophily” (Fowler et al. 2011; Guo et al. 2015; Kandel 1978; Mouw 2006), the boundary between causal effect of peer influence and peer selection may be unclear.
Empirical studies examining the relationship between obesity and social network offer mixed results. Christakis and Fowler (2007) argue that obesity or weight gain is spreadable within a social network. By using the information of body weight between ego and their friends, family members, and neighbors, they found that the chances of obesity increase if those with close social distance from ego became obese. However, people with social contacts with ego were not randomly chosen; therefore, as Cohen-Cole and Fletcher (2008) and Lyons (2011) later point out that Christakis and Fowler’s study failed to control peer/self-selection (homophily), thus the “induction” of weight gain within social connections is not convincing.

By using data from a natural experiment in which all the respondents had been randomly assigned to a roommate before beginning college, this study intends to rule out the possibility of peer/self-selection and provides a more clear estimation of peer influence on college students’ Body Mass Index (also known as BMI—a recognized indicator of obesity by the Centers of Disease Control and Prevention). In addition, this paper examines whether some obesity-related health risk behaviors including sugary beverage intake and physical exercise are susceptible to peer influence in this randomly-assigned roommate dataset. Furthermore, this study explores how much peer effect depends on self’s pre-college behavioral predisposition and examines gender difference in peer influence. The findings show that peer effect on sugary beverage intake and physical exercise participation differ between male and female students and that peer effect on obesity-related health behaviors are larger to those who had the predisposition prior to college than those who did not. Although no evidence is found on peer influence on college students’ BMI in the study, this study provides a better understanding of the association of social network and obesity and offers further guidance for policy implementation.
BACKGROUND

College Students’ Weight Gain and Obesity

Studies show that “BMI increases progressively from adolescence to young adulthood (Ortega-Alonso et al. 2012),” and it reaches its peak during college age or early adulthood (18-22) (Guo et al. 2000). A survey of National College Health Assessment II (2011) reports that over 30% of college students are overweight and of those roughly 40% are obese.

More specifically, Deforche et al. (2015) examined 291 students from high school to their sophomore year in college and concluded that during these early adulthood years, “on average students gained 2.7 kg,” and boys have an even greater increase than girls. (Gropper et al. 2012) finds that within the first three years college life, about 70% college students gained about 4.3 kg, and the number of over-weight females doubled. Similarly, Lloyd-Richardson et al. (2009) examined about 1400 students’ weight change from freshman to sophomore years and found that 77% participants gained about 3.5 kg, both females and males, in their freshman year. After the first year in college, the participants continue to gain weight in their sophomore year, “with females 4.2 kg and males 4.3 kg heavier than at the start of college.” Moreover, in a national longitudinal study, Gordon-Larsen et al. (2004) finds that a big proportion of adolescents become obese during adulthood. In their results, the number of obese adolescents increased about 10% as they grew into adults. Weight gain in college became a particular concern given that young adults who are obese could potentially transition into long-term obesity and greater health risks later (Finkelstein et al. 2008).
Peer Influence on Obesity

Recently, researchers have shifted their attention from biological explanations and routine habits as the causes of obesity to social network. Nicholas A. Christakis and James H. Fowler (2007) finds that obesity can spread via social networks. In other words, if two people share social ties then one person’s weight gain can influence another’s. More specifically, their results show that having a friend who is obese can increase the likelihood ego becomes obese by 57%. “Among pairs of adult siblings, if one sibling became obese, the chance that the other would become obese increased by 40%. If one spouse became obese, the likelihood that the other spouse would become obese increased by 37%” (p. 370). Simply put, the results of the study show that obesity is “contagious” between people who are close to one another, which can lead to less costly medical interventions.

However, this study was soon challenged because the respondents in the social networks had already known each other or been close to one another. Although the study includes a lagged measurement in the model, it cannot eliminate the self-selection. In other words, the obesity influence through the networks blurs with self-selection or peer-selection issues. Cohen-Cole and Fletcher (2008) point out that “friendship selection could directly lead to the correlation between friends’ weight or weight gain without an individual’s weight through a social network effect” (p.1383). When they controlled for peer selection by using the National Longitudinal Study of Adolescent to Adult Health (Add Health) dataset, the significant correlation of body weight between peers that Christakis and Fowler had found disappeared. Later, Lyons (2011) argues that “people tend to associate with others like themselves (homophily).”
Obesity-Related Health Risk Behaviors

Although many possible causes of obesity have been identified, sugary beverage intake and lack of physical exercise have been found to consistently associate with obesity (Bruijn et al. 2006; Jung et al. 2008; Levitsky et al. 2004; Megel 1994; Mokdad et al. 2001; Morrow et al. 2006). Malik and Hu (2011) examined numerous studies on the association between sugary beverages and obesity and reported that most of the previous studies showed a positive relation of sugary beverage with obesity especially in large samples and longitudinal studies. More recently, Qi et al. (2012) conducted an analysis integrating genetic and social environment study and found that genetic influence on BMI is more evident in people with higher sugary beverage intake than those with lower intake. Ebbeling et al. (2012) randomly selected hundreds of people categorized as obese and divided them into an experimental group and a control group. The former group received noncaloric beverages while the latter group did not. Through this experiment, they found that the BMI of those who were in the experimental group decreased dramatically compared to those in the control group. Popkin et al. (2015) examined the amount of calories in sweetened beverages and found the direct relation between sugary beverage intake and body weight.

Besides the research showing that sugary beverages have a positive association with obesity, both scientific studies and clinical experiments report that physical exercise is another crucial factor in weight loss. Duvigneaud et al. (2008) conducted a cross-sectional study with about 1500 people and found that more physical exercise engagement is associated with lower BMI and smaller waist circumference. Also, to study childhood obesity Mitchell et al. (2009) had about 6000 children wear an accelerometer for a week and found that every hour of sedentary behavior increased the likelihood of obesity. In addition, clinical experimental
treatment reports have shown that there is a clear negative relationship between physical exercise and obesity. For instance, Ergen et al. (2013) conducted an experiment in which patients were assigned to two groups with one group attending the Exercise Physiology Clinic two to three times a month and the other group attending the clinic more than four times a month during their experimental period. The results concluded that the group of patients who exercised more frequently had experienced greater weight loss.

**Peer Influence on Obesity-Related Health Risk Behaviors**

Since certain behaviors have been found to be closely related to obesity, it is important to study whether there is a peer influence on the obesity-related health risk behaviors such as a peer influence on sugary beverage intake or physical exercise within a social network. More importantly, both obesity-related health risk behaviors—sugary beverage intake and physical exercise participation—are very easy to be observed, imitated, and “learned” in a peer network. However, the research of peer influence on sugary beverage intake and physical exercise remains inadequate (Springer et al. 2006; Story et al. 2002).

Wouters et al. (2010) conducted a cross-sectional study to examine peer influence on adolescents’ snacking behavior including sugary soft drink intake at school, and found that majority of the soft drinks were purchased by adolescents whose friends were soft drink consumers. However, in this study, the respondents were asked to indicate their top best friends, which means the “friend groups” of the students were not randomly sampled. Therefore, as the author admits, this study design “entangles peer influence with peer selection.” Similarly, Finnery et al. (2009) used a cross-sectional study to study peer effect on diet of 315 school children in London. Because the children attended the same school they already knew each other before the study and might produce a potential bias in the estimation of peer influence.
Therefore, other than exploring peer influence on obesity in a college setting, this paper also examines peer influence on obesity-related health risk behaviors.

**Theories of Peer Influence**

Peer influence is defined as “the extent to which peers exert influence on an individual’s attitudes, thoughts and behaviors” (Bristol and Mangleburg 2005), and it has been found that peer influence is both powerful and subtle (Coleman 1980; Sutherland 1947). Peer influence is powerful because people who socialize within the same network are generally susceptible to their peers’ influence (Duffy et al. 2006) and can thereafter develop shared or similar social behavior and attitudes (Wellman 1983). For instance, it has been found that delinquency and substance use have a strong link to peer pressure (Haynie 2013). In the meantime, peer influence is also subtle because it often happens through unconscious social learning.

Scholarship on peer influence often attributes it to the social network framework (Fang 2011; Huynh-Hohnbaum 2004) because peer influence involves social learning that usually occurs naturally in a social network (Burgess and Akers 1966; Postman and Sassenrath 1961; Simons-Morton and Farhat 2012) where individuals have the opportunity to spend time together. Brass and Burkhardt (1993) point out that human relationships are formed in a “structured pattern” in a social environment, and interactions between people develop through that pattern. In the course of the interactions, individuals tend to observe and imitate their peers’ social behaviors in an attempt to fit into the social context they belong to (Bandura 1986; Burgess and Akers 1966; Coleman 1980; Erickson 1988; Leenders 2002; Wouters 2010), because usually individuals do not want to feel left out of their social networks. For college students, dormitories do not only form a peer network that allows students to try to fit in and learn from their peers but also provide a platform for students to interact with each other on a daily basis while witnessing
each other’s habits and social behavior in their daily lives. Bandura argues that “In the social learning system, new patterns of behavior can be acquired through direct experience or by observing the behavior of others” (1971: 3).

Recently, some behavioral science research points out that unconscious social influence plays a significant role in people’s decision making and other social behavior (Newell and Shanks 2014). The unconscious social learning indicates that individuals are socially pressured by others or model other people without awareness. This study contends that unconscious social learning can especially take place on individuals’ routine and habitual duties or needs such as sugary beverage intake and physical exercise engagement. For college students, these behaviors can be observed in a dormitory. Because a shared living space can limit the source of peer influence, routine behavior such as diet and exercise are put on display and allow individuals to unconsciously learn from each other.

**Challenges in Estimating Peer Influence**

As what I have stated above, peer influence is a subtle process, and therefore, it is often hard to be discerned or estimated. Firstly, it is not quite clear whether an individual’s current behavior is due to the influence of his/her own past behavior or his/her peer’s current/past influence (Stacy et al. 1992; Robinson et al. 1996). A lot of times, when researchers are observing or studying an individual’s behavior, they are studying his/her peers at the same time (Manski 1993; Mouw 2006). Therefore, it is difficult to precisely define who the influencer of a specific social behavior is. In particularly, if some social behavior is very common or very likely to be committed by anyone like sugary beverage intake or physical exercise, it will be even harder to identify the influencer. Without solving this issue, the result would potentially be an upward bias on the estimated peer influence of a social behavior.
In addition, another difficult issue of estimating peer influence is that it is hard to separate peer influence from “self-selection” or “peer selection” (Bauman and Ennett 1996). People can naturally bond with others who are like-minded, and vice versa, their peers can connect with them if their peers find they share common points (Mcpherson et al. 2001). Although there have been many studies on peer influence, respondents/peers in most of the studies were not randomly chosen (Wouters et al. 2010), which implies the peer pairs consisted of self and his/her peer were possibly “selected” by the respondents, and the peer/self-selection problem could have existed in those studies (Lakon et al. 2012; Stone et al. 1979). For instance, Trogdon et al. (2008) used nominated friends among adolescents to examine peer influence on obesity. This study design might have contained peer/self-selection because it is possible that adolescents tend to make friends with people in the same weight category.

Furthermore, the estimation of peer influence often assumes that the peer influence from an individual to his/her peer and the reciprocal peer influence are on the same level regardless of their different personal characteristics. (Payne and Cornwell, 2007)

Due to the aforementioned challenges in the estimation of peer influence, Mouw (2006) argues that “randomly assigned roommates are, arguably, the cleanest estimates we will get of social capital effects because they avoid the question of friendship choice that complicates the rest of the literature” (p. 97).

Although there have been several attempts in the peer influence studies to use randomly-assigned roommate datasets, oftentimes the subjects in the studies were not fully randomized which could potentially affect the estimation of peer influence. For instance, Sacerdote (2001) used data from Dartmouth freshmen; every freshman “answers yes or no to the following four statements: 1) I smoke; 2) I like to listen to music while studying; 3) I keep late hours; and 4) I
am more neat than messy” (p. 685). After grouping students into different categories according to their answers to the above questions, the Office of Residential Life (ORL) shuffled their housing application slips to randomly assign everyone roommates. In other words, the data were obtained after grouping students non-randomly.

**Gender difference in peer influence**

A number of empirical studies indicate that there might be a gender difference in peer influence, although the results are not consistent and the reasons why there might be a gender difference in peer influence on social behaviors are not identified. For instance, Steinberg and Silverberg’s study (1986) on peer resistance from 865 teenagers with a wide range of socioeconomic backgrounds shows that “adolescent girls are more autonomous than boys …are more resistant to peer pressure (p. 848).” Similarly, Wouters (2010) find that boys are more vulnerable than girls to be affected by the peers in terms of diet behavior. However, different from their findings on gender difference in peer pressure, Brown (1982) asked respondents (both males and females) to identify the extent of peer pressure on different activities. The finding from the study suggests that in general females are more susceptible than males to peer pressure, but the degree of peer pressure differs in different areas. Eisenberg et al. (2014) theorizes that cultural norm changes such as people’s attitudes towards binge drinking can shift female’s reactions to peer influence.

Other than the empirical studies on gender difference in peer influence, some ethnographic research also shows that males and females can experience peer influence differently depending on different perceptions of social behaviors (Nichter et al. 2006). Although the findings on a gender difference in peer influence are not consistent, all of these studies
suggest that there is a gender difference in receiving peer pressure. Therefore, this study also
tests whether there is a gender difference in peer influence on sugary beverage intake and
physical exercise participation in college and to what extent peer influence has an impact on each
gender.

HYPOTHESES

Based on the previous discussion in the literature review especially on the major
challenges in the estimation of peer influence, this paper tests three hypotheses by using the data
from a natural experiment with randomized college roommates (ROOM dataset):

_Hypothesis 1: Peers’ pre-college obesity-related health risk behaviors/BMI have an impact
on self’s sugary beverage intake or physical exercise behavior or obesity status in college._

_Hypothesis 2: The magnitude of peer influence on obesity-related health risk behaviors/BMI
in college hinges upon self’s predisposition._

_Hypothesis 3: There is a gender difference in peer influence on college students’ obesity-
related health risk behaviors/BMI._

SAMPLE

This study uses a large randomly-assigned college roommate dataset (ROOM); the data
were collected in the spring of 2008 in a large public university, comprised of over 2000 college
students ranging from freshmen to seniors in the dataset. Before they resided on campus, they had
been asked by the University Housing Department whether they had any special roommate requests
(e.g. smoking status or a themed housing such as foreign language housing etc.). The Housing
Department then put those students who did not have any special requests into a large database and
gave each student a unique RMS-ID number. The RMS software program was used for random roommate matching based on the students’ gender. Therefore, almost every student in the dataset had a randomly-assigned roommate when they were freshmen (for more details of this dataset, please see Guo et al. 2015). Although there were students who changed their initial roommates throughout their college life, this study only focuses on the initial randomly-assigned roommates because this group was removed from “peer/self-selection” (Duncan et al. 2005).

Of the 2664 students who submitted the online survey in which the students’ current and pre-college social behavior was asked about, 528 individuals whose roommate did not finish the survey were removed for this study. In addition, of the 14 individuals who had two roommates in the sample, one roommate from each dorm room was randomly removed from the sample. In addition, according to the nutrition and well-being study, people whose BMI smaller than 13 “cannot sustain life” (Mackey 2015). In this sample, there is one individual whose self-reported college BMI is 11. Therefore, this observation and subsequently his roommate were deleted from the sample, leaving the remaining 2120 observations to comprise the final sample. Although the students’ names are anonymous, according to the room ids they provided, they were paired into 1061 dorm rooms. Therefore, all of the individuals in the sample are “self”s and “roommate”s at the same time.

There are several advantages of using this dataset: Firstly, the randomly-assigned roommate method eliminates the concern of peer/self-selection which is one of the biggest challenges in estimating peer influence. Secondly, having both pre-college and college social behavior values in the same dataset allows for a more straightforward approach to find the “influencer” and to test how much impact peer influence depends on self’s predisposition. In
addition, having a large sample size with both male and female students in it allows for a test of
gender difference in peer effect on obesity and obesity-related health risk behaviors.

MEASURES

There are three outcome variables in this study: The first one measures self’s college
sugary beverage intake amount per month in Fall 2007 in response to the question “How often do
you drink regular, carbonated soda, soft drinks or juice that contained sugar.” The six options are
“never, less than once a month, once or twice a month, about once a week, 2-4 times a week, and
every day or almost every day” which were coded as 0, 0.5, 1.5, 4.3, 12.9, and 25 respectively
(Duncan et al. 2005; Guo et al. 2015). The second outcome variable measures self’s college
physical exercise participation per month in Fall 2007 in response to the question “How often do
you exercise or participate in physical activity for at least 20 minutes that made you sweat and
breathe hard.” The six options and the coding are the same as the measure of sugary beverage
intake in Fall 2007. The third outcome variable measures self’s college Body Mass Index, also
known as BMI (a recognized indicator of obesity by the Centers of Disease Control and
Prevention) in response to the questions of weight and height by using the formula “weight (kg) /
[height (m)]²” (Centers of Disease Control and Prevention 2015 a).

Similarly, the pre-college measures of the two obesity-related health risk behaviors
(sugary beverage intake and physical exercise participation) for both self and roommate are in
response to the questions “How often did you drink regular, carbonated soda, soft drinks or juice
that contained sugar 12 months prior to college.” “How often did you exercise or participate in
physical activity for at least 20 minutes that made you sweat and breathe hard 12 months prior to
college.” The coding is the same as the outcome variable measures. The measurement of pre-
college of obesity uses a respondent’s pre-college height and weight with the same formula as the outcome variable self’s college BMI.

By using the information from the above three measures, I also divided the students’ obesity status and two obesity-related risk behaviors prior to college into two categories for each outcome variable. According to the Centers of Disease Control and Prevention (2015 b), adults whose BMI is equal to or above 25 are considered overweight. Therefore, for obesity status, BMI equal to or larger than 25 is coded as 1 and otherwise as 0. For the two obesity-related health risk behaviors—sugary beverage drinking and physical exercise, if frequency is more than or equal to once a week, it is coded as 1 and otherwise as 0.

The statistical analyses also control for racial ethnicity, gender, family income, parental education, and college GPA etc. Racial ethnicity was coded as a categorical variable ranging from 0-4 representing white, black, Hispanic, Asian, and others respectively in response to the two questions “What is your race?” and “Are you of Hispanic or Spanish origin?” Gender is a dichotomous variable (0=male and 1=female). Household income is a continuous variable ranging from 1-9 to represent the following categories: <$25,000, $25000-49,999, $50,000-74,999, $75,000-99,999, $100,000-149,999, $150,000-199,999, $200,000-249,999, $250,000-499,999, and $500,000 or more. Both mother’s education and father’s education are coded as continuous variables ranging from 0-6 to represent middle school or less, some high school, high school graduate, some college, college degree, postsecondary school other than college, and graduate or professional coursework or degree respectively. Students’ college GPA is a continuous variable as well. Please see the summary statistics in Table 1.

*Table 1 about here*
STATISTICAL ANALYSIS

In this study, I first conduct a set of random-effect regression analyses to estimate the average/main peer effect of a randomly-assigned roommate’s pre-college obesity-related health risk behaviors (sugary drink intake and physical exercise) and pre-college BMI on the corresponding self’s behaviors/BMI in college by using the STATA Statistical Software. For each outcome variable, the main effect of peer influence is estimated separately for male and female college students. Equation (1) describes the main peer effects models:

\[ (\text{Self’s college obesity-related health risk behaviors/BMI})_{ij} = \beta_0 + \beta_1 \times (\text{Roommate’s pre-college obesity-related health risk behaviors/BMI})_{ij} + \beta_2 \times (\text{Self’s pre-college obesity-related health risk behaviors/BMI})_{ij} + \beta_3 \times \text{Controls}_{ij} + \nu_j + \varepsilon_{ij} \]

where \(i\) denotes individual and \(j\) indicates dorm level. \((\beta_0 + \nu_j)\) refers to the random intercept for each dorm room in the model and \(\beta\) is the coefficient or slope of the predictors. \(\varepsilon_{ij}\) represents errors measured for each individual within the college dorm rooms. Controls include the demographic variables such as gender and racial ethnicity as well as social economic status variables such as college GPA, and respondents’ parents’ education, and household income etc. The main peer effects of a college student’s obesity-related health risk behaviors/BMI with gender difference are presented in Table 2 and the full model in Table 3.

In addition, this study examines how much peer influence of a college student’s obesity-related health risk behaviors/BMI depends on his/her predisposition as measured by his/her behaviors/BMI prior to college. Therefore, an interaction product between self’s pre-college obesity-related health risk behaviors/BMI and roommate’s pre-college obesity-related health risk behaviors/BMI is added into the first set of models. More specifically, in this set of models, regarding the outcome variable “college sugary beverage intake,” the interaction term is between a dichotomous level of roommate’s pre-college sugary drink intake and a dichotomous level of
self’s pre-college sugary drink intake. In terms of the outcome variable “college physical exercise participation,” the interaction term is between a dichotomous level of roommate’s pre-college physical exercise frequency and a continuous measure of self’s pre-college physical exercise frequency. In terms of the outcome variable “college BMI,” the interaction term is between a dichotomous measure of a roommate pre-college BMI and a dichotomous measure of self pre-college BMI. Also, male and female college students are estimated separately. Equation (2) describes the models with the interaction terms:

(2) \( (\text{Self’s college obesity-related health risk behaviors/BMI})_{ij} = \beta_0 + \beta_1 \times (\text{Roommate’s pre-college obesity-related health risk behaviors/BMI})_{ij} + \beta_2 \times (\text{Self’s pre-college obesity-related health risk behaviors/BMI})_{ij} + \beta_3 \times (\text{Roommate’s pre-college obesity-related health risk behaviors/BMI})_{ij} \times (\text{Self’s pre-college obesity-related health risk behaviors/BMI})_{ij} + \beta_4 \times \text{Controls}_{ij} + \nu_j + \epsilon_{ij} \) where \( i \) denotes individual and \( j \) indicates dorm level. \( (\beta_0 + \nu_j) \) refers to the random intercept for each dorm room in the model and \( \beta \) is the coefficient or slope of the predictors. \( \epsilon_{ij} \) represents errors measured for each individual within the college dorm rooms. Controls include the demographic variables such as gender and racial ethnicity as well as social economic status variables such as college GPA, and respondents’ parents’ education, and household income etc. The coefficients of the interaction terms are presented in Table 4 and the full model in Table 5.

Although the percentage of missing values in the data is relatively small, this paper uses a conservative approach and only imputes missing data in the control variables. I compared the results before and after the imputation, and the results are almost the same.
RESULTS

Table 2 shows the estimations of the average peer effect on self’s obesity-related health risk behaviors/BMI in college. Each row in the table represents a regression model which is regressed on self and his/her college roommate’s pre-college obesity-related health risk behaviors/BMI, self’s social economic status, demographic characteristics and school performance in college. The peer influence on both genders was examined separately as well.

Table 2 about here

The results show that self’s college obesity-related health risk behaviors/BMI are all closely associated with his/her corresponding high-school behaviors/BMI. More importantly, a significant and positive roommate effect is found in both college sugary beverage intake and college physical exercise participation. When holding self’s personal and family characteristics constant, the roommate effect of 0.038 with a significant p-value indicates that each sugary beverage a roommate drank before college increases 0.038 drinks of self’s sugary beverage in college per month. Interestingly, this roommate effect is larger and more significant on female students (0.040) than males. Similarly, this study also found a significant and positive roommate effect on self’s college physical exercise participation. The roommate effect of 0.035 indicates that each episode of physical exercise in high school that a roommate took part in increases self’s 0.035 episodes of physical exercise participation in college while holding his/her personal and family characteristics constant. However, no gender difference in this roommate effect was found. Also, this study did not find roommate effect on self’s college BMI either.

Table 3 presents the full models of the main effects of peer influence on college obesity-related risk health behaviors and BMI without gender distinction. Each column is a random
effect model regressing self’s obesity-related risk health behaviors/BMI in college on both self’s and roommate’s high school corresponding behaviors/BMI, adjusting for gender, racial ethnicity, college GPA, and respondents’ parents’ education, and household income etc.

Table 3 about here

Other than the results that I reported in Table 2, Table 3 shows that being an African American increases the likelihood of drinking sugary beverage in college while having higher household income decreases the likelihood of drinking sugary beverage. In addition, having higher household income increases the likelihood of attending physical exercise in college. Moreover, although a direct roommate effect on BMI is not found, college GPA is found to be significantly and negatively associated with college BMI.

Table 4 presents the effect of the interactions between self and roommate’s pre-college obesity-related health risk behaviors/BMI on self’s college obesity-related health risk behaviors/BMI. This table shows that peer influence of obesity-related risk health behaviors/BMI depends on self’s pre-college behaviors/BMI.

Table 4 about here

The interaction term in the model of college sugary drink intake is positive and significant in the female sample which means that the roommate effect increases if self had more than or equal to high 4.3 sugary drinks per month (drinking sugary beverage more than or equal to once a week) before college comparing to fewer than 4.3 sugary drinks (please also see Figure 1). In the college physical exercise model, the interaction term is positive and significant in the male sample which indicates that the roommate effect increases for each one more episode of self’s
physical exercise participation in high school (please also see Figure 2). However, the interaction term between self’s pre-college BMI roommate’s pre-college BMI is not significant.

Table 5 presents the full models of the peer influence by self’s pre-college obesity-related health risk behaviors/BMI interaction on college obesity-related health risk behaviors/BMI with gender distinction.

Table 5 about here

Other than the results that I reported in Table 4, Table 5 also finds that in the female sample, being an African American increases the likelihood of drinking sugary beverage while having higher GPA lowers its possibility. In addition, in terms of college female physical exercise participation, being an African American reduces the likelihood of attending physical exercise episodes while having higher household income increases its possibility. Moreover, in both male and female samples, being an African American increases the possibility to gain weight in college while having a high GPA reduces its possibility.

DISCUSSION AND CONCLUSION

The alarming increase in obesity in the recent years has caught researchers’ attention. Besides finding out the various causes of obesity, much effort has been placed on studying the social influence of obesity. In the meantime, some policy implications have been provided in order to reduce peer influence in a school setting (Nelson et al. 2008) due to the growing number of obese young adults including well-educated people. However, the estimation of peer influence encountered several challenges (please see “challenges in estimating peer influence” under “literature review”) and painted a mixed picture (Christakis and Fowler 2007; Cohen-Cole and
Fletcher 2008; Lyons 2011). In other words, the peer influence on young adults’ obesity remains unclear. Recently, both Mouw (2006) and Lyons (2011) point out that a natural experiment with randomly assigned individuals should be a better option for estimating peer effect. Therefore, this paper uses a randomly-assigned college roommate dataset (ROOM) with a large sample size to investigate peer influence on college students’ BMI and obesity-related health risk behaviors.

The results in this paper provide important implications for understanding the process of peer influence on college obesity and obesity-related health risk behaviors. This study finds that self’s college obesity-related health risk behaviors/BMI are all significantly associated with self’s corresponding behaviors/BMI prior to college. Therefore, self’s predisposition is critical to estimate peer effect. More specifically, the analyses show that peer influence of college sugary beverage intake on female students who drank sugary beverages before entering college is greater than those who did not. Also, peer influence of college physical exercise participation on male students who attended physical activity before entering college is larger than those who did not. More interestingly, this study also finds gender difference in peer influence. For instance, the main effect of peer influence of sugary beverage intake is found on female students. However, peer influence on Body Mass Index is not found in this study. Although this study is conducted in a college setting, the implication of peer influence on sugary beverage intake and physical exercise can be applicable to a broader social network. By providing a more clear estimation of peer influence on obesity and obesity-related health risk behaviors, this study will give a better idea for policy use on campus for reducing obesity.
Table 1: Descriptive Statistics of the Sample

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description/Coding Definition</th>
<th>Mean</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent variables (DV) (college obesity-related health risk behaviors and college BMI)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DV1: college sugary beverage intake: drinks per month in Fall 2007</td>
<td>It is in response to the question: “How often did you drink regular, carbonated soda, soft drinks or juice that contained sugar in Fall 2007?” The variable is coded as: never=0, less than once a month=0.5, once or twice a month=1.5, about once a week=4.3, 2-4 times a week=12.9, and every day or almost every day=25.</td>
<td>8.803</td>
<td>9.326</td>
<td>2105</td>
</tr>
<tr>
<td>DV2: college physical exercise participation: monthly episodes in Fall 2007</td>
<td>It is in response to the question: “How often did exercise or participate in physical activity for at least 20 minutes that made you sweat and breathe hard in Fall 2007?” The variable is coded as: never=0, less than once a month=0.5, once or twice a month=1.5, about once a week=4.3, 2-4 times a week=12.9, and every day or almost every day=25.</td>
<td>10.485</td>
<td>8.488</td>
<td>2104</td>
</tr>
<tr>
<td>DV3: college Body Mass Index (BMI) in Fall 2007</td>
<td>Self’s college BMI in in response to the questions of current college weight and height by using the formula “BMI=weight (kg) / [height (m)]^2” (CDC 2015 a)</td>
<td>23.243</td>
<td>4.014</td>
<td>2095</td>
</tr>
<tr>
<td><strong>Pre-college obesity-related health risk behaviors and BMI</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self’s pre-college sugary beverage intake: drinks per month</td>
<td>It is in response to the question: “How often did you drink regular, carbonated soda, soft drinks or juice that contained sugar 12 months before entering college?” The variable is coded as: never=0, less than once a month=0.5, once or twice a month=1.5, about once a week=4.3, 2-4 times a week=12.9, and every day or almost every day=25.</td>
<td>10.050</td>
<td>9.632</td>
<td>2115</td>
</tr>
<tr>
<td>Roommate’s pre-college sugary drink intake: drinks per month</td>
<td>Same as above</td>
<td>10.050</td>
<td>9.632</td>
<td>2115</td>
</tr>
<tr>
<td>Self’s pre-college sugary beverage intake: drinks per month (dichotomous)</td>
<td>Self’s pre-college sugary beverage intake equal to or more than once a week=1; Otherwise=0</td>
<td>0.652</td>
<td>0.476</td>
<td>2115</td>
</tr>
<tr>
<td>Roommate’s pre-college sugary beverage intake: drinks per month (dichotomous)</td>
<td>Roommate’s pre-college sugary beverage intake equal to or more than once a week=1; Otherwise=0</td>
<td>0.652</td>
<td>0.476</td>
<td>2115</td>
</tr>
<tr>
<td>Variable</td>
<td>Description</td>
<td>Mean</td>
<td>Std Dev</td>
<td>N</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------</td>
<td>---------</td>
<td>----</td>
</tr>
<tr>
<td>Self’s Pre-college physical exercise participation: monthly episodes</td>
<td>It is in response to the question: “How often did exercise or participate in physical activity for at least 20 minutes that made you sweat and breathe hard 12 months before entering college?” The variable is coded as: never=0, less than once a month=0.5, once or twice a month=1.5, about once a week=4.3, 2-4 times a week=12.9, and every day or almost every day=25.</td>
<td>13.444</td>
<td>9.302</td>
<td>2111</td>
</tr>
<tr>
<td>Roommate’s pre-college physical exercise participation: monthly episodes</td>
<td>Same as above</td>
<td>13.444</td>
<td>9.302</td>
<td>2111</td>
</tr>
<tr>
<td>Self’s Pre-college physical exercise participation: monthly episodes</td>
<td>Self’s pre-college physical exercise participation equal to or more than once a week=1; Otherwise=0</td>
<td>0.815</td>
<td>0.388</td>
<td>2111</td>
</tr>
<tr>
<td>Roommate’s Pre-college physical exercise participation: monthly episodes</td>
<td>Roommate’s pre-college physical exercise participation equal to or more than once a week=1; Otherwise=0</td>
<td>0.815</td>
<td>0.388</td>
<td>2111</td>
</tr>
<tr>
<td>Self’s pre-college BMI</td>
<td>It is in response to the questions of weight and height when he/she first entered college by using the formula “BMI=weight (kg) / [height (m)]^2” (CDC 2015 a)</td>
<td>22.766</td>
<td>4.048</td>
<td>2084</td>
</tr>
<tr>
<td>Roommate’s pre-college BMI</td>
<td>Same as above</td>
<td>22.766</td>
<td>4.048</td>
<td>2084</td>
</tr>
<tr>
<td>Self’s pre-college BMI (dichotomous)</td>
<td>Self’s pre-college BMI&gt;=25 is 1’ Otherwise is 0</td>
<td>0.249</td>
<td>0.404</td>
<td>2084</td>
</tr>
<tr>
<td>Roommate’s pre-college BMI (dichotomous)</td>
<td>Roommate’s pre-college BMI&gt;=25 is 1’ Otherwise is 0</td>
<td>0.249</td>
<td>0.404</td>
<td>2084</td>
</tr>
<tr>
<td><strong>Controls</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Racial ethnicity</td>
<td>Respondent’s racial ethnicity: White=0 African=1 Hispanic=2 Asian=3 Other=4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(70.80%) (13.44%) (7.41%) (7.12%) (1.23%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>Respondent’s gender: Female=1, Male=0</td>
<td>0.620</td>
<td>0.485</td>
<td>2120</td>
</tr>
<tr>
<td>Household income</td>
<td>Respondent’s self-reported parents’ or guardians’ total income in the 12 months before college &lt;$25,000=0 $25000-49,999=1 $50,000-74,999=2 $75,000-99,999=3 $100,000-149,999=4 $150,000-199,999=5 $200,000-249,999=6 $250,000-499,999=7</td>
<td>3.623</td>
<td>1.995</td>
<td>2023</td>
</tr>
</tbody>
</table>
$500,000 or more=8

<table>
<thead>
<tr>
<th>Highest education that respondent’s mother obtained:</th>
<th>4.326</th>
<th>1.384</th>
<th>2106</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle school or less=0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some high school=1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school graduate=2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some college=3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>College degree=4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postsecondary school other than college=5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate or professional coursework or degree=6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Highest education that respondent’s father obtained:</th>
<th>4.501</th>
<th>1.493</th>
<th>2065</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle school or less=0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some high school=1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school graduate=2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some college=3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>College degree=4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postsecondary school other than college=5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate or professional coursework or degree=6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| College GPA in Fall 2007                            | 3.238 | 0.545 | 2075 |

GPA
Table 2: The estimation of main or average peer influence (p-value) with gender distinction: In the following random-effect models (in each separate row), self’s college obesity-related health risk behaviors are regressed on roommate’s pre-college behavior, own high school behavior and controls.

<table>
<thead>
<tr>
<th>Obesity-Related Health Behaviors/BMI in College</th>
<th>Sample</th>
<th>Own pre-college Behaviors/BMI</th>
<th>Roommate’s pre-college behaviors/BMI</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>College sugary drink intake: drinks per month in Fall 2007</td>
<td>overall</td>
<td>0.640 (0.016)**</td>
<td>0.038 (0.016)*</td>
<td>2089</td>
</tr>
<tr>
<td></td>
<td>males</td>
<td>0.628 (0.027)**</td>
<td>0.039 (0.027)</td>
<td>791</td>
</tr>
<tr>
<td></td>
<td>females</td>
<td>0.643 (0.021)**</td>
<td>0.040 (0.020)*</td>
<td>1298</td>
</tr>
<tr>
<td>College physical exercise participation: monthly episodes in Fall 2007</td>
<td>overall</td>
<td>0.394 (0.018)**</td>
<td>0.035 (0.018)*</td>
<td>2081</td>
</tr>
<tr>
<td></td>
<td>males</td>
<td>0.440 (0.030)**</td>
<td>0.032 (0.029)</td>
<td>790</td>
</tr>
<tr>
<td></td>
<td>females</td>
<td>0.368 (0.023)**</td>
<td>0.033 (0.022)</td>
<td>1291</td>
</tr>
<tr>
<td>College Body Mass Index (BMI) in Fall 2007</td>
<td>overall</td>
<td>0.913 (0.008)**</td>
<td>0.008 (0.008)</td>
<td>2041</td>
</tr>
<tr>
<td></td>
<td>males</td>
<td>0.913 (0.013)**</td>
<td>0.002 (0.012)</td>
<td>781</td>
</tr>
<tr>
<td></td>
<td>females</td>
<td>0.913 (0.011)**</td>
<td>0.012 (0.011)</td>
<td>1260</td>
</tr>
</tbody>
</table>

Notes: Controls in the regression models include self’s family social economic status (family income, father’s education, mother’s education) and self’s GPA in the fall semester in 2007, and self’s race/ethnicity as well as gender

** p-value<0.01; * p-value<0.05; #p-value<0.1
Table 3: Full models of the main effects of peer influence on college obesity-related health risk behaviors and BMI without gender distinction (each column is a random effect model).

<table>
<thead>
<tr>
<th>Obesity-Related Health Behaviors/BMI in College</th>
<th>College sugary drink intake: monthly episodes in Fall 2007</th>
<th>College physical exercise participation: monthly episodes in Fall 2007</th>
<th>College Body Mass Index (BMI) in Fall 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main effects</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self’s pre-college monthly sugary drink intake</td>
<td>0.640 (0.016)**</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Roommate’s pre-college monthly sugary drink intake</td>
<td><strong>0.038 (0.016)</strong></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Self’s pre-college monthly physical exercise participation</td>
<td>-</td>
<td>0.394 (0.018)**</td>
<td>-</td>
</tr>
<tr>
<td>Roommate’s pre-college monthly physical exercise participation</td>
<td>-</td>
<td><strong>0.035 (0.018)</strong></td>
<td>-</td>
</tr>
<tr>
<td>Self’s pre-college BMI</td>
<td>-</td>
<td>-</td>
<td><strong>0.913 (0.008)</strong></td>
</tr>
<tr>
<td>Roommate’s pre-college BMI</td>
<td>-</td>
<td>-</td>
<td><strong>0.008 (0.008)</strong></td>
</tr>
<tr>
<td><strong>Controls</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African</td>
<td>0.025*</td>
<td>-0.408</td>
<td>-0.038</td>
</tr>
<tr>
<td>Hispanic</td>
<td>-0.801</td>
<td>0.600</td>
<td>-0.068</td>
</tr>
<tr>
<td>Asian</td>
<td>-0.424</td>
<td>-0.668</td>
<td>-0.148</td>
</tr>
<tr>
<td>Other</td>
<td>0.258</td>
<td>0.755</td>
<td>-0.029</td>
</tr>
<tr>
<td>White</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Female</td>
<td>-0.310</td>
<td>-1.144**</td>
<td>-0.165*</td>
</tr>
<tr>
<td>Household income</td>
<td>-0.203*</td>
<td>0.206*</td>
<td>-0.029</td>
</tr>
<tr>
<td>Mother’s education</td>
<td>0.065</td>
<td>0.124</td>
<td>-0.010</td>
</tr>
<tr>
<td>Father’s education</td>
<td>0.032</td>
<td>-0.083</td>
<td>0.041</td>
</tr>
<tr>
<td>GPA</td>
<td>-0.386</td>
<td>0.785</td>
<td>-0.386**</td>
</tr>
<tr>
<td>N</td>
<td>2089</td>
<td>2081</td>
<td>2041</td>
</tr>
</tbody>
</table>

Notes: ** p-value<0.01; * p-value<0.05; #p-value<0.1

The boldface type is used only to highlight the significant effects of peer influence on the primary interest of this paper.
Table 4: Peer influence of college obesity-related health risk behaviors/BMI depends on self’s pre-college obesity-related health risk behaviors/BMI with gender distinction.

In the following random-effect models (in each separate row), self’s pre-college obesity-related health behaviors/BMI is interacted with roommate’s pre-college obesity-related health behaviors/BMI to predict self’s college obesity-related health behaviors/BMI. Self’s college obesity-related health behaviors/BMI is also regressed on roommate’s pre-college behavior, own high school behavior and controls. This table shows the coefficients and standard errors of the interaction terms, the main roommate effect and self’s pre-college effect in each regression.

<table>
<thead>
<tr>
<th>Obesity-Related Health Behaviors in College</th>
<th>Sample</th>
<th>Coefficient (standard error) of the interaction terms</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self college sugary drink intake in Fall 2007</strong></td>
<td>Overall ¹</td>
<td>1.369 (0.765)#</td>
<td>2089</td>
</tr>
<tr>
<td></td>
<td>Males ²</td>
<td>0.113 (1.725)</td>
<td>791</td>
</tr>
<tr>
<td></td>
<td>Females ³</td>
<td>1.804 (0.880)* (figure 1)</td>
<td>1298</td>
</tr>
<tr>
<td><strong>Self college physical exercise in Fall 2007</strong></td>
<td>Overall ²</td>
<td>0.017 (0.046)</td>
<td>2081</td>
</tr>
<tr>
<td></td>
<td>Males ³</td>
<td>0.223 (0.087)* (figure 2)</td>
<td>790</td>
</tr>
<tr>
<td></td>
<td>Females ³</td>
<td>-0.074 (0.054)</td>
<td>1291</td>
</tr>
<tr>
<td><strong>Self college BMI</strong></td>
<td>Overall ³</td>
<td>0.013 (0.374)</td>
<td>2041</td>
</tr>
<tr>
<td></td>
<td>Males ³</td>
<td>0.659 (0.483)</td>
<td>781</td>
</tr>
<tr>
<td></td>
<td>Females ³</td>
<td>-0.325 (0.593)</td>
<td>1260</td>
</tr>
</tbody>
</table>

Notes: Controls in the regression models include self’s family social economic status (family income, father’s education, mother’s education) and self’s GPA in the fall semester in 2007, and self’s race/ethnicity as well as gender)

¹ In the model of “Self college sugary drink intake in Fall 2007,” the interaction term is between a dichotomous level of roommate’s pre-college sugary drink intake (more than or equal to 4.3 drinks per month=1; less than 4.3 drinks per month=0) and a dichotomous level of self’s pre-college sugary drink intake (more than or equal to 4.3 drinks per month=1; less than 4.3 drinks per month=0)

² In the model of “Self college physical exercise in Fall 2007,” the interaction term is between a dichotomous level of roommate’s pre-college physical exercise frequency (more than or equal to 4.3 times per month=1; less than 4.3 times per month=0) and a continuous measure of self’s pre-college physical exercise frequency.

³ In the model of “Self college BMI,” the interaction term is between a dichotomous measure of a roommate pre-college BMI (greater than or equal to 25=1; smaller than 25=0) and a dichotomous measure of self pre-college BMI (greater than or equal to 25=1; smaller than 25=0).
Table 5: Full models of peer influence by self’s pre-college obesity-related health risk behaviors/BMI interaction on college obesity-related health risk behaviors/BMI with gender distinction (each column is a random effect model).

<table>
<thead>
<tr>
<th>Obesity-Related Health Behaviors/BMI in College</th>
<th>College sugary drink intake: monthly episodes in Fall 2007</th>
<th>College physical exercise participation: monthly episodes in Fall 2007</th>
<th>College Body Mass Index (BMI) in Fall 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td><strong>Main effects</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self’s pre-college monthly sugary drink intake</td>
<td>9.922 (1.527)**</td>
<td>8.228 (0.677)**</td>
<td>-</td>
</tr>
<tr>
<td>Roommate’s pre-college monthly sugary drink intake</td>
<td>0.369 (1.524)</td>
<td>-0.213 (0.670)</td>
<td>-</td>
</tr>
<tr>
<td><strong>Self's pre-college monthly sugary drink intake</strong></td>
<td>0.113 (1.725)</td>
<td>1.804 (0.880)*</td>
<td>-</td>
</tr>
<tr>
<td><strong>Roommate’s pre-college monthly sugary drink intake</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self’s Pre-college monthly physical exercise participation</td>
<td>-</td>
<td>-</td>
<td>0.246 (0.082)**</td>
</tr>
<tr>
<td>Roommate’s pre-college monthly physical exercise participation</td>
<td>-</td>
<td>-</td>
<td>-2.541 (1.422)*</td>
</tr>
<tr>
<td><strong>Self's Pre-college monthly physical exercise participation</strong></td>
<td>-</td>
<td>-</td>
<td>0.223 (0.087)*</td>
</tr>
<tr>
<td><strong>Roommate’s pre-college monthly physical exercise participation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self’s pre-college BMI</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Roommate’s pre-college BMI</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Self’s pre-college BMI* Roommate’s pre-college BMI</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Controls</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African</td>
<td>-0.348 (1.152)</td>
<td>1.933 (0.614)**</td>
<td>1.924 (1.003)*</td>
</tr>
<tr>
<td></td>
<td>Hispanic</td>
<td>Asian</td>
<td>Other</td>
</tr>
<tr>
<td>----------------</td>
<td>----------</td>
<td>--------------</td>
<td>--------------</td>
</tr>
<tr>
<td></td>
<td>-1.977</td>
<td>-1.242</td>
<td>-3.188</td>
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<tr>
<td></td>
<td>(1.100)*</td>
<td>(1.177)</td>
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<td>(0.853)</td>
<td>(0.837)</td>
<td>(1.915)</td>
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<td>(1.025)</td>
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<td>(0.838)</td>
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<td>(0.372)</td>
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<td></td>
<td>(0.334)</td>
<td>(0.317)**</td>
<td>(0.834)</td>
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** p-value<0.01; * p-value<0.05; #p-value<0.1

1 In the model of “Self college sugary drink intake in Fall 2007,” the interaction term is between a dichotomous level of roommate’s pre-college sugary drink intake (more than or equal to 4.3 drinks per month=1; less than 4.3 drinks per month=0) and a dichotomous level of self’s pre-college sugary drink intake (more than or equal to 4.3 drinks per month=1; less than 4.3 drinks per month=0).

2 In the model of “Self college physical exercise in Fall 2007,” the interaction term is between a dichotomous level of roommate’s pre-college physical exercise frequency (more than or equal to 4.3 times per month=1; less than 4.3 times per month=0) and a continuous measure of self’s pre-college physical exercise frequency.

3 In the model of “Self college BMI,” the interaction term is between a dichotomous measure of a roommate pre-college BMI (greater than or equal to 25=1; smaller than 25=0) and a dichotomous measure of self pre-college BMI (greater than or equal to 25=1; smaller than 25=0).
Figure 1: Effect of a female student’s pre-college sugary drink intake amount on her own college sugary drink intake amount given her roommate’s high-level pre-college sugary drink intake.

Figure 1 depicts that peer influence of the number of sugary drinks a typical female student has in college also depends on her own pre-college sugary drink intake amount. A typical female student is a white college student whose family income is between $75,000 through $149,999, and both of her parents had a college degree, and her GPA in the last fall semester was about 3.235.

Given her college roommate’s pre-college sugary drink intake amount was on a high level (more than or equal to 4.3 sugary drinks per month), comparing to having a low-level sugary drink intake before college, her having high-level sugary drink intake per month prior to college, she will increase about 10 sugary drinks per month in college.
Figure 2: Effect of a male student’s pre-college physical exercise amount on his college physical exercise amount given his roommate’s high level pre-college physical exercise participation.

Figure 2 shows that peer influence of a typical male student’s college physical exercise also depends on his own pre-college physical exercise frequency. A typical male student is a white college student whose family income is between $75,000 through $149,999, and both of his parents had a college degree, and his GPA in the last fall semester was about 3.242. Given his college roommate’s high-level physical exercise participation before college, the more frequent he attended physical exercise prior to college, the more likely he will increase his college physical exercise participation.
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