Roommate effects in Health Outcomes*

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Abstract

We use randomized roommate assignment in dormitories in a college in Kolkata in India to examine peer effects in weight gains among roommates. We use administrative data on weight, height and test scores of students at the time of college admission and then survey these students at the end of their first and second years in college. We do not find any significant roommate specific peer effect in weight gain. Our results rather suggest that an obese roommate reduces the probability that the other roommates become obese in subsequent years. We examine potential mechanism using survey data on students' eating habits, smoking, exercise, and sleeping patterns. We find that obese roommates sleep longer, which in turn improves the sleep pattern of others, which might explain the weak negative effect of obese roommates on the weight of others in the same room.

Keywords: random dormitory assignment, peer effects, health outcomes, obesity.

JEL Classification: D90, I12, I18.

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1. Introduction

Is a student more likely to become obese if (s)he has frequent contact with a randomly assigned peer in the same college who is obese? Most of the main mechanisms found in the literature on health behaviour would lead one to expect a strongly affirmative answer. Obesity for instance is found to cluster in families and friendship groups (Kling et. al., 2007; Fowler and Christakis, 2008b; Trogdon et. al., 2008; Yuan et. al., 2013). Also, many health behaviours have been found to be contagious within randomly-assigned peer groups, such as binge drinking (Duncan et. al.,2005; Eisenberg et. al., 2013), substance use among adolescents (Gaviria and Raphael, 2001; Powell et. al., 2005; Lundborg, 2006; Clark and Lohéac, 2007; Fletcher, 2010, 2012), sexual behaviour and risky behaviour (Card and Giuliano, 2013), physical activity and dietary intake (Coppinger et. al., 2010), and suicidal ideation and self-injury (Velting and Gould, 1997; Prinstein et. al., 2010). Why would obesity amongst students in a college be the exception?

The results from previous studies using randomised assignment to examine the peer-effects in obesity are mixed. For example, Yakusheva et al (2014) found gender differences in peer effects. They find no peer effects in health outcomes for male students in a dormitory but they observed significant influences among females by their female peers. Similarly, Carrell et al. (2011) found strong peer effects among students at the lower end of the fitness distribution in terms of exercise behaviour. They argue that the results are largely driven by imitation or exercise habits of their least fit friends.

In this paper, we examine peer effects in obesity amongst randomly assigned males in a college campus and inspect various contributing health behaviours. We conducted our own survey on different socio-economic characteristics of the students, including their test scores, eating habits, smoking and sleeping patterns. We also obtained these students' test scores, height and weight from the college authority, collected at the time of their admission into the college. These students were enrolled in an undergraduate degree program during the academic years 2012-2013 and 2013-2014. We take advantage of the fact that the college randomly assigns students to different rooms where they live together for three to four years. These roommates do a lot with each other, often forming study groups and friendship groups, but certainly sharing meals and exercise opportunities. This allows us to see whether in that environment, the initial weight of roommates affects the subsequent weight change of the other roommates.

Overall, our results suggest that there is no strong peer effect of obesity among dormitory students in a developing country setting as in Kolkata in India. We find a (weakly significant) negative causal relation between the initial weight of a roommate and the subsequent weight gain of a student. Given the Indian context, socio-economic status such as income and caste as well as students' region of residence could play an important role in terms of students' social network and relationship among roommates. As such we examine heterogeneity among roommates based on these characteristics. We find heterogeneity in peer effects - in particular, students from rural and lower caste groups are more influenced by their peers. Students enter into college in different years, and their relationship and influence among each other could be different based on the entry cohort. Indeed, we observe there is also a temporal pattern in that results are stronger in the early years of being together as roommates, and dissipate later. Our survey allows us to examine a number of channels including students' food habits, sleeping patterns, smoking habits, and physical activity. Our results suggest that students' sleeping habits could explain a significant portion of the peer effects we observed.

However, our results should be viewed in context given that we are looking at a quite small and particular group (as this is an all-boys college) within a very constrained environment: they are all on a campus, having their meals prepared at the hall canteens and sharing in a single culture of exercise opportunities, away from the prior family culture. This means several 'normal' avenues of contagion are not relevant, including food preparation habits or the social norm of the whole community. What remains is the 'pure' direct effect of the happenstance of whether someone else has a high weight on the subsequent weight gain or loss of roommates (and vice versa). Contagion could then come from the amount of food consumed and exercise engaged in, as well as influences on metabolism from the interactions, which includes the possibility of changes in stress due to weight differences or the impact of weight differences on sleeping patterns. Still, our results are the first direct evidence we know of peer effects in health outcomes in a developing country setting using randomized assignment of roommates in dormitory. Hence, the results set a benchmark for others to study in different contexts (such as students in both male and female dormitories in same settings) using a larger sample of students and their peers.

Common problems in peer-effects studies are that peers are often non-randomly selected, and the Manski (1993) reflection problem wherein one cannot tell from an individual's behaviour in a

group who started and who followed. A related issue is that in differing contexts different things are common, making it hard to know whether effects are due to peer interactions or shared environments. The random assignment circumvents the selection bias problem, and by collecting health and behavioural information prior to entry, we get initial conditions (including initial weight) that are untainted by peer effects from within this campus, allowing us to trace the influence of the initial conditions of peers on subsequent behaviour of the other peers.

The paper proceeds as follows: we first review the literature on peer effects in obesity, after which we describe the survey and data in Section 3. This is followed by a discussion of the methodology in Section 4. Next, Section 5 present the regression results. In Section 5, we test the validity of the random assignment mechanism and then estimate the effects that the initial weight of roommates has on the weight changes of the other roommates. These are followed by falsification tests and robustness checks. In this section, we also look at the possible mechanisms for peer effects in health outcomes. Finally, we conclude the paper in Section 6.

2. Literature Review

The huge costs and health consequences related to the incidence of overweight and obesity has led researchers, public health and policy officials to focus on the determinants of weight gains. Besides genetic, environmental, behavioural and psychological factors (Cutler et. al., 2003; Philipson and Posner, 2003; Fowler and Christakis, 2008a; 2008b; Lakdawalla and Philipson, 2009), social interactions have also come under scrutiny (Kling et. al., 2007; Yuan et. al., 2013). This is partially because social interactions can be affected more easily by policymakers than some of the other factors such as genetics. As Eisenberg et. al. (2013) put it, the spillover effect of social interactions matters to policy because of "potential market failures due to externalities associated with behaviours and intervention". Studying the social influence of friends or family members is quite challenging, due to the non-random nature of such relationships (Plotnikoff et. al., 2010; Yuan et. al., 2013). Individuals usually self-select roommates and neighbourhoods with similar characteristics, which can lead to selection bias and environmental confounding.

Various studies have investigated strong peer effects in behaviours like smoking and drug use among adolescents (Castrucci et. al., 2002; Fletcher et. al., 2008; Go et. al., 2010; Simons et. al.,

2010), crime (Glaeser and Scheinkman, 2001) and in HIV-related unsafe behaviours (Cai et. al., 2008; Simoni et. al., 2011). But the major drawback of these studies lies in the selection bias arising due to non-randomized set up or environmental confounding.

Most studies that focused on the social determinants of obesity found that obese peers increase the probability of an individual becoming obese (Fowler and Christakis, 2008a; 2008b; Cohen-Cole and Fletcher, 2008; Trogdon et. al., 2008; Halliday and Kwak, 2009). Fowler and Christakis (2008a) use the Framingham Heart Study data of 32 years and find strong peer effects in weight gain. That data includes people from all over a medium sized city (Framingham) and follows the influences of friends that people made in their life, i.e., non-random friends. They try to solve the problem of selection bias by controlling for the obesity of peers in the past. A disadvantage of that kind of natural data is that environmental and institutional influences are not random. For example, friends often live in the same neighbourhood and thus have the same influences of a fast food joint or gym near their residential area. Cohen-Cole and Fletcher (2008) attempted to reduce this environmental and institutional bias within the Framingham data, by including neighbourhood-specific fixed effects in their estimation and to more cleanly focus on the time-varying information. Doing so, they find only small and insignificant peer effects in obesity, indeed raising the possibility that the correlation found in cross-sections is largely spurious due to shared environmental circumstances rather than contagion in behaviour.

There are only a few studies examining the peer effects in health outcomes using randomized assignment. Yuan et al. (2013) examined health behaviour among students who were randomly assigned roommates, and found positive contagion in weight-related behaviour among students. Their results show that moderate-intensity exercise is positively associated with their roommate's exercise behaviour. Similar dietary patterns, specifically the eating of sweet food (including candies and chocolate) and roasted/baked/toasted food, were also observed. A difference with our study is that in the college we look at, students do not cook themselves but share food in a canteen, effectively knocking out contagion in food preparation habits as a source of peer effects. Yakusheva et. al. (2011, 2014) examined peer effects in weight gain for males and females in a college using a random roommate assignment design. They found evidence of positive and significant peer effects for females, however no significant results for males. The

authors pointed out that physical activity and eating disorder were not the main channels for peer effects in weight gains. However, they were unable to provide potential channels for their results. Carrell et. al. (2011) examined the role of randomly assigned roommates in physical fitness scores and whether the individual was placed on athletic probation in a US Air Force Academy. The authors concluded that very unfit peers reduced the physical fitness of other students. They hypothesised that in their case the peer effects went via the diet or exercise habits of the least fit friends.

3. Dormitory Assignment, Survey and Data

3.1 Dormitory Assignment

Every year, the Ramakrishna Mission Residential College Narendrapur (also referred to as RKMRC) administration conducts a college level entrance exam during the months of June and July. RKMRC is a major tertiary level educational institution in Kolkata in India. This is an all-boys residential college with students mostly living in one of the three hostels situated inside the college campus. The entrance exam usually consists of a written test and a face-to-face interview with representatives from the Administration Office (AO). It's one of the preferred, if not the most preferred tertiary education for students in West Bengal in India who are interested in pursuing non-engineering and non-medical careers. It is one of the few residential colleges in Kolkata.

Only those students who are eligible to sit for the entrance exam, based on an eligibility criteria set by the Administrative Office, are invited for the exam. Representatives from the AO office collect information on academic ability (i.e. marks from past exams) and also measure weight and height of students themselves at the time of admission. The AO then prepares the final list of all first year admitted students and forwards two separate lists (an undergraduate list and postgraduate list) to the Housing Office for room assignment. Each successful student in the list is then randomly allocated to one of the three hostels by the Housing Office[1], followed by the hostel authorities randomly allocating them to one of the hostel rooms. The room assignment

[1] However, students with disabilities (about 3.74% of the sample) are not randomly assigned a room as the Housing Office and hostel authorities assign particular rooms with specific facilities. The Housing Office only receives limited information from the Administrative Office for the room and hostel assignment. They do not have access to the students' marks, anthropometry or socio-economic demographic characteristics.

process also makes sure that first year students are not assigned to a second year room. There is no preferential treatment for students from different socio-economic groups based on caste or region of residence. Thus, students are randomly assigned to their rooms irrespective of their BMI or weight. Generally the students remain with their initial set of roommates throughout their degree. If students have any serious problems with their existing roommates[2], which is relatively rare, the hostel authority, at its discretion, might assign them to a new room and we take this into account in the analyses.

3.2 Survey and Data

The dataset used in the current paper was collected from dormitory students enrolled in *RKMRC,* for the academic years 2012-2013 and 2013-2014[3]. We administered and conducted the survey with the help of college administration, among all the students in all three dormitories of the college. For the purpose of this paper, we dropped the third year students and the Masters students as anthropometric indicators (e.g., height, weight) for these years of students were not collected by the Administrative Office at the time of their admission. The final dataset used in the paper consists of information from 214 students who were studying either in the first or second year of their undergraduate degree programs during February to May 2014.

The students come from different socio-economic backgrounds in West Bengal — from urban, semi-urban or rural areas, and they belong to different caste groups (such as General caste, Scheduled Tribes (ST), Scheduled Caste (SC) and Other Backward Classes (OBC)). Individual as well as household specific information, such as household income, caste category (General caste or SC/ST/OBC caste category), region of residence (urban/semi-urban and rural area), academic records (Class 10^{th} and 12^{th} Board exam marks) and anthropometric information (height and weight), was collected from the application form which was duly filled in by the

[2] Less than 5 per cent of the students in the sample changed their initial set of roommates, as assigned by the Housing Board and the Hostel Authorities. We obtain similar results when we consider current set of roommates and use initial set of roommates as an instrument for the current set of roommates. Results are available in Appendix Table 2.

[3] The data used here are part of a larger dataset collected at this college that has so far also been used to look at the determinants of exam results(Frijters, Islam, & Pakrashi, 2019), although that paper does not use the key variables looked at here (weight, health, and lifestyles). Relevantly, thatpaper did find strong positive effects of the academic quality of a roommate on the exam outcomes of other roommates, showing that these roommatesdo indeed interact and can strongly affect each other.

students and the AO at the time of admission. This information was merged with the detailed information collected by the enumerators at the time of the survey and semester-wise detailed marks for all the subjects taken from the Examination Office.

The survey comprised of a detailed questionnaire on personal, household characteristics, general health and well-being, social behaviour, time use and activities like hours spent on sleeping (weekdays and weekends), relax/hobby, etc. and lifestyle activities like number of meals taken, frequency of consumption of fruits and vegetables, participation in physical activity and smoking habits. The enumerator also collected detailed anthropometric information such as weight, height, arm circumference, waist and hip measurements from the students at the time of the survey. The enumerators used measuring scales such as tape and weighing scales to collect the specific measures on anthropometry.

We were careful to include all students in dormitories into the survey. If a student was not found in the dormitory at the time of survey, the enumerators collected their contact information (e.g., mobile number), and went back to survey them when they were available during the survey period mentioned above. As a result, non-response in our survey was minimal: among the first and second year students, only three students were not available for health and medical reasons. Out of 251 students surveyed from the first year and second year dormitory students, we did not have administrative records of height and weight for 37 students from the colleague authority. In Appendix Table 15 we show that the students included in the sample and those that were dropped due to missing past anthropometric information are similar in terms of the other socio-economic, demographic, academic information, and also with respect to the anthropometric information collected during the survey.

[Place Table 1 over here]

Table 1 gives descriptive statistics of the information for students whose health records was available from both admission office and our survey[4]. Almost half of the students (47.5%) come from a rural area. About a quarter of the students belong to socially backward or historically disadvantaged classes, such as Scheduled Caste (SC), Scheduled Tribe (ST) or Other Backward

[4] Descriptive statistics of all the other variables that are used in this paper (and not included in Table 1) are made available in Appendix Table 10.

Class (OBC) caste category. The mean past weight and mean past BMI are significantly lower than mean current weight and mean current BMI, respectively, showing that in general students gained weight. Also, the number of overweight and obese students increased from the time of admission to the time when the survey was conducted, though not much: obesity increased from 10% to 11% from the time of admission to the survey.

4. Methodology

In order to estimate the peer effects in health outcomes, we use a linear regression framework:

$$\textit{Current Health Outcome} = \alpha + \beta\,(\textit{Past Health Outcome}) + \gamma\,(\textit{Roommate's Past Health Outcome}) + \delta X + e \quad (1)$$

We are particularly interested in the sign and magnitude of the parameter γ in Equation (1). The parameter γ represents the effect of roommates' health status on an individual's own health outcomes. Like previous studies on peer effects, we control for own past health outcomes[5] prior to joining college, collected at the time of admission. For example, when we consider current BMI of an individual, we control for both his own past BMI as well as the past BMI of his roommate, the main variable of interest.

In equation (1), we consider several dependent variables: weight (in kilograms), body mass index (BMI), which isweight (in kilograms) divided by height (in metres) squared and finally incidence of overweight and obesity. The overweight and obesity dummies were constructed according to the Asian population standard, that is, an individual is considered to be overweight (/*obese*) in terms of Asian standards if their BMI is greater than or equal to 23 kg/m^2 (*/ 27.5 kg/m^2*). This differs from the WHO standards which uses 25 kg/m^2 (*/ 30 kg/m^2*) as the cut-offs. As a variation of the baseline model we use these WHO standards for overweight and obesity. We also control for individual and household level characteristics, captured by X in equation (1). They include individual and household specific characteristics like age, adjusted age squared (age square/100), limiting illness, region of residence (urban/semi-urban area and rural area), caste category

[5] The roommate's characteristics are average characteristics of an individual's roommates, excluding the individual himself. However, as a robustness check, we re-run equation (1) with two separate independent variables, namely, at least one obese (/overweight) roommate and proportion of obese (/overweight) roommates. We obtain results similar to the baseline model. The results are made available in Appendix Table 8.

(General and others like SC, ST and OBC), monthly household income (in ten thousand rupees) and year of study.

As a robustness check, we rerun equation (1) with the current set of roommates rather than initially (and randomly) assigned roommate. Less than 5 per cent of the students in the sample changed their initial set of roommates, as assigned by the Housing Board and the Hostel Authorities. In order to tackle any endogeneity that could arise because some of these roommates chose their own room and did not follow initial assignment, we then use the initial randomized roommate assignment as an instrument for current roommate assignment (see Appendix Table 2).

We examine the heterogeneity in the peer effects on health outcomes, based on individual, socio-economic and geographic characteristics. In order to address the potential concern due to the small sample, we compute the adjusted *p*-values using a wild bootstrap method based on 1000 replications (see Cameron et al. 2008). As many outcomes are examined, we allow for multiple hypothesis testing. To control for false discoveries, we use the multiple hypothesis testing adjustment using the procedure suggested by Anderson (2008), and report the false discovery rate (FDR) sharpened *q*-values (Benjamini et. al., 2006) for the outcomes of interest.[6]

Finally, we examine the mechanisms via which roommates might affect student's health outcomes, by replacing the roommate's health outcome with their eating and lifestyle habits — namely, whether the roommate eats out[7], rarely eats fresh fruits and vegetables[8], participates in physical activity[9], smokes, sleeps a lot on weekdays (8 or more hours), or sleeps a lot on weekends (9 or more hours). We conduct a mediation analysis via a sequential model as a

[6] The interpretation is analogous to interpreting *p*-values – the *q*-values presented denote the lowest critical level at which a null hypothesis is rejected when controlling for the false discovery rate.
[7] A binary variable was constructed which took the value 1 if the roommates ate out 6 to 7 times or more in a week, zero otherwise.
[8] In the survey, the students were asked if they ate fresh fruits and vegetables regularly. The students had to choose from one of the following responses: every day or nearly every day, about once a week, every now and then, and never or hardly ever. A binary variable was constructed which took the value 1 if the roommates ate fresh fruits and vegetables less than once a week, zero otherwise.
[9] The students were asked "*In general, how often do you participate in moderate or intensive physical activity*", with response options: not at all, less than once a week, 1 or 2 times a week, 3 times a week, more than 3 times a week, and every day. A binary variable was constructed which took the value 1 if the roommates did 3 or more days of moderate or intensive physical activity, zero otherwise.

robustness check for the potential channels through which roommate's health outcomes could affect student's health outcomes. As robustness check, we look at mental health captured by the General Health Questionnaire (GHQ-12)[10], life satisfaction on a scale of 0 to 10, and relative academic outcomes or marks as potential confounders. In all the regressions, cluster corrected standard errors at the room-year level are used.

5. Estimation Results

5.1 Randomization Tests: Exogeneity of roommate assignment

We first investigate whether health outcome of a student and his roommates are correlated: whether there exists any statistically significant relationship between the health outcomes of the student and his roommates before they were admitted into the college. In Table 2, we regress own initial health outcomes (e.g., weight, BMI) on roommate's initial health outcomes. At the time of allocation of rooms, the housing office only had access to student's information on which program they are enrolled in (Bachelors Program), year of course (first or second year) and whether the student had any kind of limiting illness.[11] Therefore, we also incorporate these controls in the regression used to test that the roommate assignment is indeed random.

Panel A of Table 2 shows no significant association between a roommate's initial weight and own initial weight variables. As socio-economic characteristics such as region of residence (urban/semi-urban and rural area), caste category (general and SC/ST/OBC), monthly household income and test scores of the roommates could also possibly affect the roommate allocation policy, we also perform similar regression using these characteristics. The results presented in Panel B of Table 2 show that there is no significant association between roommates' characteristics and own characteristics in terms of socio-economic indicators, confirming that assignment was random.

Finally, we use an alternative strategy following Guryan et al. (2009), who showed that the typical test for random assignment of individuals to groups is generally not well-behaved and biased when the set of individuals from which peers are drawn is relatively small, as is the case

[10] GHQ-12 is a commonly used measure in mental health literature (Goldberg and Huxley, 1980; Goldberg, 1985).
[11] Appendix Table 6 reports the peer effect results after excluding the students with disability, which is in line with our findings.

here. However, once we control for the mean weight of all students in the block (referred to as blockmates), excluding individual *i* in the peer effects estimation, in order to correct for a mechanical negative bias, the results are well-behaved. These results are in Panel C of Table 2, which support the null hypothesis of a random assignment.

[Place Table 2 over here]

5.2 Linear Peer Effects

Table 3 reports the regression estimates of the effect of own and roommate's past health outcomes on current health outcomes of students[12]. The results suggest that peer effects through roommates exist in case of current weight, current BMI and current obesity[13]. Unsurprisingly, current weight indicators of an individual depend positively on his own initial weight indicators. The found peer effects are negative: current weight (*and current BMI*) depend negatively and significantly on roommates' past weight (*and roommates past BMI*). Being overweight also depends negatively on the roommates' initial overweight dummy, but not significantly.

These results do not depend on whether we include a large set of controls that one might think would mediate the relationship, such as dietary habits, suggesting that those vary little on this relatively small campus[14].

The last two columns use the WHO's international standards for obesity and overweight, where an individual is considered to be overweight (obese) if their BMI is greater than or equal to 25 (30). Then, the peer effect in overweight is statistically significant at the 5% level. Yet, in case of incidence of obesity, no statistically significant conclusions can be deciphered when using the

[12] Regression estimates with full set of controls is available in Appendix Table 1.
[13] Similar results are obtained after including additional controls like relative marks in the program, mental health scores (GHQ-12) and life satisfaction. These regression estimates are presented in Appendix Table 3.
[14] We also control for additional lifestyle variables like whether the student himself eats out 6 to 7 times or more in a week, eats fresh fruits and vegetables less than once a week, participates in moderate or intense physical activity 3 or more than 3 times a week, smokes cigarettes, sleeps 8 or more than 8 hours on weekdays and sleeps 9 or more than 9 hours on weekends. Similar results are obtained and tabulated in Appendix Table 4.

WHO standard, essentially showing that the strongest negative peer effect lie in the 25-30 BMI range.[15]

[Place Table 3 over here]

5.3 Falsification Tests

As a falsification test, in Table 4, we replace the initial actual set of roommates assigned by the Housing Office with artificially created random new set of roommates, who are not their roommates in reality. That is, we 'created' fake roommates and run the same regression using these fake roommates as peers. If the effects of roommates is due to interactions with actual roommates then we should see no effect of the fake roommates on someone's health status. In that case, we would observe no statistically significant relationship between the student's current health outcome and the artificially created new roommate's past health outcome. Table 4 shows that the artificially created fake roommate specific peer effects are statistically insignificant for all the health outcomes and provide additional evidence that the results obtained in Table 3 are not spurious.

[Place Table 4 over here]

5.4 Heterogeneity Analysis

Possibilities of asymmetries in peer effects between roommates cannot be negated. Yet, we have limited degrees of freedom to run a model with large numbers of interactions. To still examine the possibility of asymmetries in peer effects, we separate out the peer effects based on three different sets of characteristics — namely, individual level characteristics (such as year of study and personality), socio-economic background (household income and caste category) and geographic background (i.e. based on region of residence).

We examine heterogeneity by year of study, students' family background (income and caste), region of residence. As students have entered into college in different years it is natural to

[15] As a robustness check, we estimated the coefficients of the reduced form equation (1) with increase in BMI and decrease in BMI as dependent variables (separately) and the results are available in Appendix Table 9. With assignment of a roommate who weighs more, there is a higher probability of losing weight. Similarly, the probability of losing weight increases and the probability of gaining weight decreases if an individual is assigned an obese roommate.

examine how peer effects vary based on the year of entry into the college. Similarly, socio-economic status such as income and caste play an important role in India. A large number of studies in the context of India uses caste (see for example Islam et al. 2018). Similarly, students from rural and urban background study in different types of schools and could have developed different social networks. Hence, we examine heterogeneity for each of these background characteristics to understand if peer effects is dominant in one or the other groups. Given the lack of large numbers though, we take these results as indicative only.

5.4.1 Peer effects based on individual level characteristics

Tables 5 and 6 present the results of the heterogeneity analysis on the basis of individual level characteristics, mainly, year of study (first year and later years) and personality (introvert and extrovert students). In Table 5, statistically significant and negative influences for each of the health outcomes considered (such as weight, BMI, incidence of overweight and obesity) are observed for first year students only, while the significance disappears for the later periods. This is likely due to the fact that students get to know each other in the first year and they spend more time for the first time with each other. Hence, a lot of things they do are more common in the early year of their dormitory. However, as time progresses students outside the dormitory arguably become more influential and the initial effects of the same roommates diminish.

[Place Table 5 and Table 6 over here]

In Table 6, we examine heterogeneity on the basis of personality (i.e. whether individuals are introvert or extrovert in nature). In case of individuals with an extrovert personality, we observe significant and negative peer effects in all health outcomes, except for the overweight dummy. If a student is randomly allocated a roommate with a high BMI (or more weight), the extrovert students, on an average, tend to become more conscious themselves and apparently have lower BMI (or weight). Similarly, random assignment of an obese roommate leads to a decrease in the probability of being obese for extroverts. Interestingly, when looking at current BMI, a positive and significant regression coefficient is observed for introverts, opposite to that of extroverts. Thus, if the average BMI of roommates is high at the time of roommate allocation, the individual's BMI for introverts in future increases, while for extroverts the BMI declines. This

suggests that if the object would be to keep BMI low, high BMI individuals could be paired with extroverts.

5.4.2 Peer effects based on socio-economic characteristics

Tables 7 and 8 show the heterogeneity analysis results based on socio-economic characteristics, namely, household income (lower relative income versus higher/same relative income) and caste categories (whether they belong to General or SC/ST/OBC). The students with relative household income equal to or greater than the roommate's household income, as in Table 7, have similar results as shown in Table 3. But in case of students with relative income less than the roommates' average household income, there is no significant peer effect, indicating no influence of the roommate's health outcome for people with household income less than their roommate's average household income.

[Place Table 7 and Table 8 over here]

Table 8 reports the results for heterogeneity analysis in case of General caste and SC/ST/OBC caste category. Students who belong to SC/ST/OBC categories are influenced significantly by their roommate's past health outcomes, specifically in the case of weight and BMI. At the time of joining the college, if the mean weight (*/BMI*) of the roommates is high, the weight (*/BMI*) of the individual decreases in future for students from the SC/ST/OBC categories. No statistically significant effect is seen in case of individuals belonging to the General caste.

The results based on caste and income groups might seem contradictory: both higher income groups and lower castes are more (negatively) affected by the weight of their peers. We lack the degrees of freedom in terms of data size to fully tease out what might cause this (a full interactive analysis would have many empty cells), but we note that the income-caste relationship is relatively weak.

5.4.3 Peer effects based on region of residence

Table 9 looks at the role of geography or region of residence before they admitted into college. Individuals who come from an urban area are not influenced significantly by the health status of their roommates. But the non-urban students (rural or semi-urban regions) are effected

negatively and significantly in terms of all four health outcomes. For example, if an obese roommate is assigned to a student at the time of admission, the student's probability of being obese decreases by 0.248 if the student comes from a non-urban background.[16]

[Place Table 9 over here]

5.5 Robustness Checks

The results above use the initial room assignment at the beginning of the first year. This varies subtly from standard peer effects as a small proportion (less than 5%) of the initial roommates have moved rooms before our survey. As a robustness check, we thus consider current roommate assignment to re-estimate the roommate specific peer effects, using initial roommate assignments as an instrument for current roommate assignment. The results for both the OLS as well as the IV estimates associated with current roommate assignment are presented in Appendix Table 2. These results clearly show that the estimated roommate specific peer effects are very similar to those found in Table 3.

We tried adding more pre-admission characteristics of students, to allow for the possibility that we might not be picking up the effects of the weight of roommates, but rather something else that is correlated with weight. Adding indicators for roommate's background characteristics like caste and height prior to joining college did not significantly change the main results reported in the paper[17].

5.6 Mechanisms of Peer Effects

In this section, we examine several channels via which roommates might have affected students' health outcomes. We collected detailed information about students' dietary patterns as well as their lifestyle habits — namely, whether the roommate eats out regularly (6 times or more a week), whether the roommate eats fresh fruits and vegetables rarely (less than once a week), whether the roommate participates in intense physical activity 3 or more times a week, whether

[16] On defining the moderating variables in relative terms to the roommate's average, results similar to Table 6 through Table 9 are observed. The results are made available in Appendix Tables 11 to 14.

[17] Regression estimates with roommate's pre-admission characteristics like roommate's height prior to joining college and roommate's caste as extended controls is made available in Appendix Table 5. Moreover, regression results with student's and roommate's height prior to joining college have been controlled for and the results are made available in Appendix Table 7. Results similar to Table 3 are obtained in both Appendix Table 5 and Appendix Table 7.

the roommate sleeps for more than 8 hours a day on weekdays or 9 hours a day on weekends, and whether the roommate smokes. Table 10 presents the results for the potential channels through which roommates affect health outcomes.

[Place Table 10 over here]

The results suggest that a roommate who eats out regularly and rarely eats fresh fruits and vegetables reduces the weight of others, perhaps because there then is simply less eating taking place in the dormitories to mimic. Relatedly, the probability of being overweight decreases by 0.136 if the roommate smokes cigarette, as opposed to a non-smoking roommate.

Interestingly, we find a strong effect from a roommate's sleeping habits. A student's weight is less by nearly 3.4 kilos if he has a roommate who sleeps 9+ hours as compared to a roommate who sleeps less than 9 hours on weekends. A roommate who sleeps for 9 or more than 9 hours on weekends also reduces others' probability of being obese, suggesting that a roommate who sleeps well improves the lifestyle of others. Yet, these behaviours are not entirely random and hence we should not take these conditional effects as more than indicative of possible peer effect channels.[18]

5.7 Mechanisms: Exploratory Mediation Analysis

We now perform causal mediation analysis as discussed in Imai, Keele, and Yamamoto (2010) and Imai, Tingley, andYamamoto (2013), which is increasingly used in the literature to explore potential intermediate variables that are most likely the determinants of the causal variable of interest. "The aim is to decompose the total effects of the treatment on an outcome into direct and indirect effects. The indirect effect proposes an explanation for why the treatment works, and represents the amount of the total effect that is explained by the mediator" (Islam, Lee, &

[18] Yakusheva et al. (2014) also tested several eating (as well as exercise behaviours) as potential mediators of the peer influence in weight. They did not find any strong evidence that female roommates' eating habit strongly influence the other roommates. In an earlier paper Yakusheva et al. (2011) found some evidence that female students' weight loss could be channelled through the influences in eating, exercise and weight loss supplements of their roommates.

Nicholas, 2018). The direct effect represents all other possible causal mechanisms and explanations for why the treatment works.

Table 11 presents the results of our exploratory causal mediation analysis. The "total effect" presented is the sum of the average causal mediation effect (ACME) and the direct effect. The results using ACME suggest that eating out regularly can explain a weight gain of 4.4%, BMI of 5.2% and obesity of 12.5%. As in the last section, we see the roommate sleeping a lot can explain 14.3% loss of weight and 11.1% of BMI and 17.1% of obesity. These results are in line with the findings in Table 10 - suggesting adequate roommates' sleeping is an important channel through which other roommates benefit from.

[Place Table 11 over here]

6. Conclusion

We study the effect of random dormitory assignment on subsequent health outcomes — namely, weight, body mass index (BMI) and the incidence of being overweight or obese — in a tertiary level education institute in Kolkata. We find a small yet borderline significant (at the 10% level) negative effect of the obesity of a roommate on the subsequent weight gain of other roommates, classified using the Asian BMI categories of 23 and 27.5 for being overweight and obese respectively. We find evidence that this negative effect on their own weight gain is higher in the first year than during later years, higher for extroverted than introverted students, and higher for the relatively wealthier students. In terms of potential channels, we find that those who have comparatively worse lifestyle and dietary patters — i.e. eat out frequently, rarely eat fresh fruits and vegetables, and sleep longer reduce the weight gain of their roommates. This suggests that on a college campus with a canteen, those who are obese in fact eat less in their dormitories than others and perhaps engender less contagion.

The main policy relevance of our findings is that we find no reason to fear contagion of obesity at an Indian college, as was previously found for female college students in the US (Yakusheva et. al., 2011). However, we would like to caution the readers that the results cannot be generalized as our results are based on a quite small sample and particular group (an all-boys college) within a very constrained environment — where they all reside on a residential campus, having their meals prepared at the hall canteens and sharing in a single culture of exercise

opportunities, away from the prior family culture. The results might not hold in a less constrained environment. Our study suggests that food preparation habits and the role of local food outlets, which were the same for all students in our study, strongly limited the role of contagion in weight gains.

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Table 1: Descriptive Statistics

Variables of Interest	Mean	Standard Deviation	Minimum	Maximum
Health Outcomes				
Current Weight (in kg)	64.27	11.96	40.00	109.00
Past Weight (in kg)	60.86	11.45	40.00	92.50
Roommate's Past Weight (in kg)	61.05	8.23	40.00	86.25
Current BMI (in kg/m^2)	22.57	4.07	14.50	36.88
Past BMI (in kg/m^2)	21.89	4.26	11.89	41.49
Roommate's Past BMI (in kg/m^2)	21.98	2.88	14.50	34.44
Current Overweight Dummy	0.43	0.50	0.00	1.00
Past Overweight Dummy	0.36	0.48	0.00	1.00
Roommate's Past Overweight Dummy	0.37	0.48	0.00	1.00
Current Obesity Dummy	0.11	0.32	0.00	1.00
Past Obesity Dummy	0.10	0.30	0.00	1.00
Roommate's Past Obesity Dummy	0.02	0.14	0.00	1.00
Demographic and Socio-economic characteristics				
Age (in years)	19.33	0.86	17.00	23.00
Adjusted age squared	3.74	0.34	2.89	5.29
Rural residence dummy	0.47	0.50	0.00	1.00
Limiting illness dummy	0.06	0.23	0.00	1.00
SC/ST/OBC category dummy	0.21	0.41	0.00	1.00
Household income (in ten thousand INR)	2.30	2.02	0.09	8.00

Note: Number of observations is 214. Overweight and obesity dummy have been constructed according to the Asian standards, whereby an individual with body mass index (BMI) greater than or equal to 23 (*27.5*) is considered overweight (*obese*). Roommate's characteristics like weight, BMI, overweight dummy and obesity dummy are average characteristics of an individual's roommates, excluding the roommate himself. If average past BMI of the roommates is found to be greater than or equal to 23, roommate's past overweight dummy is considered to be 1, and zero otherwise. Similarly, if average past BMI of the roommates is greater than or equal to 27.5, roommate's past obesity dummy is 1, zero otherwise. Adjusted age squared is age squared divided by 100. Rural residence dummy takes the value 1 if the individual comes from a rural area, and 0 if from urban and semi-urban regions. SC/ST/OBC category dummy takes the value of 0 if the individual belongs to General category and 1 if he is either Schedule Caste (SC), Schedule Tribe (ST) or Other Backward Classes (OBC). Household income is monthly household income in ten thousand rupees. It ranges from INR 900 pm (which is approximately 9 pounds or US$15 pm) to INR 80,000 (approximately 800 pounds or US $1,333 pm) using an exchange rate of 1 pound=100 INR and 1 US$=60 INR as of 31st of March 2014 (Source: www.exchangerates.org.uk).

Table 2: Randomization Test

Panel A: Randomization Test with health outcomes as dependent variables								
Variables of Interest	Past Weight		Past BMI		Past Overweight Dummy		Past Obesity Dummy	
Roommate's Past Weight	0.016	-0.023						
	(0.122)	(0.091)						
Roommate's Past BMI			0.027	-0.011				
			(0.124)	(0.097)				
Roommate's Past Overweight Dummy					0.051	0.029		
					(0.082)	(0.071)		
Roommate's Past Obesity Dummy							0.142	0.080
							(0.137)	(0.123)
Observations	214	214	214	214	214	214	214	214
R-squared	0.016	0.281	0.003	0.200	0.008	0.184	0.021	0.095
Panel B: Randomization Test with demographic characteristics as dependent variables								
Variables of Interest	Caste dummy		Region of Residence		Household Income		Cumulative Marks	
Roommate's Caste	-0.003	-0.051						
	(0.142)	(0.153)						
Roommate's Region of residence			0.052	0.010				
			(0.137)	(0.100)				
Roommate's household income					-0.037	-0.099		
					(0.108)	(0.078)		
Roommate's cumulative marks							0.124	0.134
							(0.125)	(0.132)
Observations	214	214	214	214	214	214	213	213
R-squared	0.027	0.080	0.021	0.324	0.028	0.278	0.173	0.188
Panel C: Randomization Test following Guryan et. al., 2009								
Variables of Interest	Past Weight		Past BMI		Past Overweight Dummy		Past Obesity Dummy	
Roommate's Past Weight	0.053	0.002						
	(0.116)	(0.090)						
Blockmate's Past Weight	-	-						
	1.503**	0.983*						
	(0.621)	(0.531)						
Roommate's Past BMI			0.071	0.027				
			(0.118)	(0.094)				
Blockmate's Past BMI			-	-				
			3.707***	3.321***				
			(0.782)	(0.827)				
Roommate's Overweight Dummy					0.054	0.033		
					(0.082)	(0.071)		
Prop of blockmates overweight					-0.955*	-0.881		
					(0.553)	(0.538)		
Roommate's Obese Dummy							0.122	0.064
							(0.130)	(0.112)
Prop of blockmates obese							-2.101**	-2.013**
							(0.878)	(0.808)
Observations	214	214	214	214	214	214	214	214
R-squared	0.042	0.292	0.084	0.262	0.022	0.196	0.062	0.130
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes

Note: Overweight and obesity dummy have been constructed according to the Asian standards, whereby an individual with BMI greater than or equal to 23 (*27.5*) is considered overweight (*obese*). Roommate's characteristics like weight, BMI, overweight dummy and obesity dummy are average characteristics of an individual's roommates, excluding the roommate himself. If average past BMI of roommates is greater than or equal to 23, roommate's past overweight dummy is assigned a value of 1 and zero otherwise. If average past BMI of roommates is greater than or equal to 27.5, roommate's past obesity dummy is 1 and zero otherwise. The housing office, which randomly allocated hostel rooms, had access to only limited student's information such as program of study (undergraduate and postgraduate), year of course (first and second year) and whether the student has any kind of limiting illness or disability. These have been controlled for in the randomization test. Additional controls used in Columns II, IV,

VI and VIII are age, adjusted age squared (age square divided by 100), rural residence dummy (urban/semi-urban and rural area), backward caste dummy (general and SC/ST/OBC) and monthly household income (in ten thousand rupees). Roommate's (/blockmate's) characteristics, namely, roommate's caste, roommate's region of residence, roommate's household income, roommate's cumulative marks, proportion of blockmates who are overweight and proportion of blockmates who are obese are the proportion of roommate's (/blockmate's) having those characteristics. Only the regression coefficients for roommate's past weight, roommate's past BMI, roommate's past overweight dummy and roommate's past obesity dummy have been reported. *, ** and *** denote significance at 0.10, 0.05 and 0.01 levels, with clustered standard errors at the room-year level in parenthesis.

Table 3: Peer Effects in Health Outcomes with Initial Roommate Assignment

Variables of Interest	Current Weight		Current BMI		Current Overweight Dummy[1]		Current Obesity Dummy[1]		Current Overweight Dummy[2]		Current Obesity Dummy[2]	
Past Weight	0.874***	0.921***										
	(0.042)	(0.051)										
Roommate's Past Weight	**-0.117****	**-0.113****										
	(0.056)	**(0.049)**										
Past BMI			0.774***	0.792***								
			(0.044)	(0.051)								
Roommate's Past BMI			**-0.130***	**-0.124****								
			(0.065)	**(0.060)**								
Past Overweight[1]					0.658***	0.654***						
					(0.048)	(0.056)						
Roommate's Past Overweight Dummy[1]					-0.086	-0.081						
					(0.055)	(0.057)						
Past Obesity Dummy[1]							0.622***	0.610***				
							(0.101)	(0.107)				
Roommate's Past Obesity Dummy[1]							**-0.210***	**-0.219***				
							(0.110)	**(0.110)**				
Past Overweight[2]									0.699***	0.685***		
									(0.061)	(0.066)		
Roommate's Past Overweight Dummy[2]									**-0.088****	**-0.085****		
									(0.040)	**(0.042)**		
Past Obesity Dummy[2]											0.695***	0.678***
											(0.227)	(0.223)
Roommate's Past Obesity Dummy[2]											**-0.019****	-0.008
											(0.009)	(0.015)
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	214	214	214	214	214	214	214	214	214	214	214	214
R-squared	0.703	0.719	0.661	0.671	0.404	0.420	0.344	0.360	0.452	0.463	0.379	0.401

Note: Columns II, IV, VI, VIII, X and XII include controls in the OLS regressions, namely, age, adjusted age squared, limiting illness dummy, rural residence dummy (urban/semi-urban and rural area), caste dummy (general and SC/ST/OBC) and monthly household income (in ten thousand rupees). Roommate's characteristics like weight, BMI, overweight dummy and obesity dummy are average characteristics of an individual's roommates, excluding the roommate himself. [1]Overweight and obesity dummies have been constructed according to the Asian standards, whereby an individual with BMI greater than or equal to 23 (*27.5*) is considered overweight (*obese*). If average past BMI of roommates is greater than or equal to 23, roommate's past overweight dummy is 1, zero otherwise. If average past BMI of roommates is greater than or equal to 27.5, roommate's past obesity dummy is 1, zero otherwise. [2] Alternatively, overweight and obesity dummies have been constructed according to the WHO's international

standards, whereby an individual with BMI greater than or equal to 25 (*30*) is considered overweight (*obese*). The regression coefficients for past weight, roommate's past weight, past BMI, roommate's past BMI, past overweight dummy, roommate's past overweight dummy, past obesity dummy and roommate's past obesity dummy have been reported. *, ** and *** denote significance at 0.10, 0.05 and 0.01 levels, with clustered standard errors at the room-year level in parentheses.

Table 4: Falsification Test

	Dependent variables			
Variables of Interest	Current Weight	Current BMI	Current Overweight Dummy	Current Obesity Dummy
Past Weight	0.914***			
	(0.053)			
Roommate's Past Weight[3]	0.051			
	(0.046)			
Past BMI		0.782***		
		(0.054)		
Roommate's Past BMI[3]		0.067		
		(0.042)		
Past Overweight Dummy			0.643***	
			(0.064)	
Roommate's Past Overweight Dummy[3]			0.037	
			(0.056)	
Past Obesity Dummy				0.606***
				(0.109)
Roommate's Past Obesity Dummy[3]				-0.017
				(0.122)
Observations	214	214	214	214
R-squared	0.714	0.666	0.415	0.351

Note: [3] We replace the initial set of actual roommates randomly assigned by the Housing Office with artificially created new set of roommates. This confirms that the peer effects originate from the roommates staying in the same room and this not just a spurious correlation. See footnotes of Table 3.

Table 5: Heterogeneity Analysis: Asymmetries on the basis of year of study (1st year or later year)

Variables of Interest	Current Weight		Current BMI		Current Overweight dummy		Current Obesity dummy	
	1st Year	Later year	1st Year	Later year	1st Year	Later year	1st Year	Later year
Panel A: Regression Estimates								
Past Weight	0.888***	0.946***						
	(0.066)	(0.070)						
Roommate's Past Weight	**-0.220****	-0.039						
	(0.082)	(0.062)						
Past BMI			0.831***	0.775***				
			(0.118)	(0.050)				
Roommate's Past BMI			**-0.222****	-0.053				
			(0.088)	(0.068)				
Past Overweight dummy					0.707***	0.637***		
					(0.096)	(0.072)		
Roommate's Past Overweight dummy					**-0.166***	-0.052		
					(0.083)	(0.069)		
Past Obesity dummy							0.657***	0.587***
							(0.102)	(0.191)
Roommate's Past Obesity dummy							**-0.334*****	-0.073
							(0.067)	(0.058)
Observations	73	141	73	141	73	141	73	141
R-squared	0.799	0.691	0.746	0.639	0.518	0.399	0.539	0.291
Panel B: *p* and *q* values of Roommate's Health Outcomes								
Naïve *p*-value	0.012	0.553	0.018	0.439	0.053	0.455	0.000	0.217
Wild Bootstrap *p*-value	0.016	0.536	0.015	0.447	0.068	0.471	0.000	0.274
FDR Adjusted *q*-values	0.017	1.000	0.017	1.000	0.022	1.000	0.001	1.000
Panel C: *p* value for subgroup difference = 0	**0.055**		**0.093**		0.308		0.292	

Note: The controls used are age, adjusted age squared, limiting illness dummy, rural residence dummy (urban/semi-urban and rural area) and caste categories (general and SC/ST/OBC) and monthly household income (in ten thousand rupees). Overweight and obesity dummies have been constructed according to the Asian standards, whereby an individual with BMI greater than or equal to 23 (*27.5*) is considered overweight (*obese*). If average past BMI of roommates is greater than or equal to 23, roommate's past overweight dummy is 1, zero otherwise. If average past BMI of roommates is greater than or equal to 27.5, roommate's past obesity dummy is 1, zero otherwise. Roommate's characteristics like weight, BMI, overweight dummy and obesity dummy are average characteristics of an individual's roommates, excluding the roommate himself. Naïve p-

values are unadjusted p-values based on the t-distribution. The regression adjusted p-values computed here are the wild bootstrap p-values based on 1000 replications. Anderson's (2008) procedure has been used to calculate the false discovery rate (FDR) sharpened q-values. *p* values for subgroup difference report the p-values of the t-test. The regression coefficients for past weight, roommate's past weight, past BMI, roommate's past BMI, past overweight dummy, roommate's past overweight dummy, past obesity dummy and roommate's past obesity dummy have been reported. *, ** and *** denote significance at 0.10, 0.05 and 0.01 levels, with clustered standard errors at the room-year level in parentheses.

Table 6: Heterogeneity Analysis: Asymmetries on the basis of personality traits (Extrovert or Introvert)

Variables of Interest	Current Weight		Current BMI		Current Overweight dummy		Current Obesity dummy	
	Introvert	Extrovert	Introvert	Extrovert	Introvert	Extrovert	Introvert	Extrovert
Past Weight	0.959***	0.901***						
	(0.066)	(0.069)						
Roommate's Past Weight	0.009	**-0.163****						
	(0.050)	**(0.071)**						
Past BMI			0.874***	0.756***				
			(0.050)	(0.070)				
Roommate's Past BMI			**0.128****	**-0.241*****				
			(0.061)	**(0.075)**				
Past Overweight dummy					0.731***	0.611***		
					(0.095)	(0.079)		
Roommate's Past Overweight dummy					-0.010	-0.116		
					(0.108)	(0.075)		
Past Obesity dummy							0.803***	0.554***
							(0.203)	(0.118)
Roommate's Past Obesity dummy							-0.027	**-0.279*****
							(0.038)	**(0.085)**
Observations	84	130	84	130	84	130	84	130
R-squared	0.794	0.675	0.830	0.608	0.490	0.398	0.634	0.303
Panel B: *p* and *q* values of Roommate's Health Outcomes								
Naïve *p*-value	0.851	0.025	0.040	0.002	0.929	0.127	0.471	0.002
Wild Bootstrap *p*-value	0.864	0.027	0.055	0.002	0.928	0.117	0.434	0.006
FDR Adjusted *q*-values	1.000	0.019	0.283	0.009	1.000	0.038	1.000	0.010
Panel C: *p* value for subgroup difference = 0	**0.045**		**0.000**		0.350		**0.098**	

Note: See footnote of Table 5. The controls used are age, adjusted age squared, limiting illness dummy, rural residence dummy (urban/semi-urban and rural area), caste categories (general and SC/ST/OBC) and monthly household income (in ten thousand rupees).

Table 7: Heterogeneity Analysis: Asymmetries on the basis of income (higher/equal relative income or lower relative income)

Variables of Interest	Current Weight		Current BMI		Current Overweight dummy		Current Obesity dummy	
	Low relative income	High relative income	Low relative income	High relative income	Low relative income	High relative income	Low relative income	High relative income
Past Weight	0.797***	1.049***						
	(0.062)	(0.071)						
Roommate's Past Weight	-0.069	**-0.187****						
	(0.059)	**(0.071)**						
Past BMI			0.750***	0.893***				
			(0.036)	(0.087)				
Roommate's Past BMI			-0.028	**-0.224*****				
			(0.071)	**(0.083)**				
Past Overweight dummy					0.663***	0.633***		
					(0.085)	(0.079)		
Roommate's Past Overweight dummy					-0.069	-0.132		
					(0.079)	(0.088)		
Past Obesity dummy							0.674**	0.660***
							(0.258)	(0.124)
Roommate's Past Obesity dummy							-0.027	**-0.230****
							(0.028)	**(0.105)**
Observations	119	95	119	95	119	95	119	95
R-squared	0.634	0.797	0.652	0.695	0.326	0.470	0.307	0.380
Panel B: *p* and *q* values of Roommate's Health Outcomes								
Naïve *p*-value	0.250	0.011	0.700	0.009	0.382	0.138	0.337	0.033
Wild Bootstrap *p*-value	0.290	0.012	0.722	0.010	0.384	0.145	0.339	0.066
FDR Adjusted *q*-values	1.000	0.025	1.000	0.025	1.000	0.079	1.000	0.047
Panel C: *p* value for subgroup difference = 0	0.181		**0.056**		0.569		0.238	

Note: See footnote of Table 5. The controls used are age, adjusted age squared, limiting illness dummy, rural residence dummy (urban/semi-urban and rural area) and caste categories (general and SC/ST/OBC).

Table 8: Heterogeneity Analysis: Asymmetries on the basis of caste (General versus SC/ST/OBC caste category)

Variables of Interest	Current Weight		Current BMI		Current Overweight dummy		Current Obesity dummy	
	SC/ST/OBC	General	SC/ST/OBC	General	SC/ST/OBC	General	SC/ST/OBC	General
Past Weight	0.908***	0.991***						
	(0.056)	(0.164)						
Roommate's Past Weight	**-0.112****	-0.066						
	(0.050)	(0.126)						
Past BMI			0.806***	0.811***				
			(0.066)	(0.057)				
Roommate's Past BMI			**-0.115***	-0.120				
			(0.061)	(0.137)				
Past Overweight dummy					0.645***	0.703***		
					(0.067)	(0.121)		
Roommate's Past Overweight dummy					-0.089	-0.018		
					(0.061)	(0.174)		
Past Obesity dummy							0.594***	1.079***
							(0.117)	(0.065)
Roommate's Past Obesity dummy							-0.269	-0.059
							(0.189)	(0.065)
Observations	170	44	170	44	170	44	170	44
R-squared	0.723	0.686	0.661	0.751	0.406	0.516	0.367	0.374
Panel B: *p* and *q* values of Roommate's Health Outcomes								
Naïve *p*-value	0.027	0.606	0.065	0.386	0.151	0.919	0.158	0.370
Wild Bootstrap *p*-value	0.026	0.669	0.054	0.428	0.167	0.924	0.236	0.613
FDR Adjusted *q*-values	0.117	1.000	0.117	1.000	0.126	1.000	0.134	1.000
Panel C: *p* value for subgroup difference = 0	0.709		0.964		0.661		0.229	

Note: See footnote of Table 5. The controls used are age, adjusted age squared, limiting illness dummy, rural residence dummy (urban/semi-urban and rural area) and monthly household income (in ten thousand rupees).

Table 9: Heterogeneity Analysis: Asymmetries on the basis of region of residence (Urban or Non-Urban)

Variables of Interest	Current Weight		Current BMI		Current Overweight dummy		Current Obesity dummy	
	Non-Urban	Urban	Non-Urban	Urban	Non-Urban	Urban	Non-Urban	Urban
Past Weight	0.895***	0.978***						
	(0.071)	(0.079)						
Roommate's Past Weight	**-0.164****	-0.058						
	(0.069)	(0.064)						
Past BMI			0.759***	0.870***				
			(0.070)	(0.074)				
Roommate's Past BMI			**-0.228*****	0.031				
			(0.071)	(0.082)				
Past Overweight dummy					0.609***	0.769***		
					(0.082)	(0.075)		
Roommate's Past Overweight dummy					**-0.167****	0.019		
					(0.073)	(0.094)		
Past Obesity dummy							0.609***	0.663***
							(0.122)	(0.240)
Roommate's Past Obesity dummy							**-0.248****	0.002
							(0.098)	(0.029)
Observations	113	101	113	101	113	101	113	101
R-squared	0.716	0.702	0.650	0.696	0.413	0.412	0.354	0.407
Panel B: *p* and *q* values of Roommate's Health Outcomes								
Naïve *p*-value	0.020	0.375	0.002	0.710	0.027	0.843	0.015	0.950
Wild Bootstrap *p*-value	0.018	0.419	0.002	0.715	0.024	0.837	0.038	0.949
FDR Adjusted *q*-values	0.025	1.000	0.009	1.000	0.025	1.000	0.03	1.000
Panel C: *p* value for subgroup difference = 0	0.233		**0.012**		**0.091**		0.131	

Note: See footnote of Table 5. The controls used are age, adjusted age squared, limiting illness dummy, caste categories (general and SC/ST/OBC) and monthly household income (in ten thousand rupees).

Table 10: Potential Channels for Peer Effects in Health Outcomes

Variables of Interest	Current Weight	Current BMI	Current Overweight dummy	Current Obesity dummy
Own Health Outcomes				
Past Weight	0.939***			
	(0.050)			
Past BMI		0.811***		
		(0.048)		
Past Overweight dummy			0.668***	
			(0.054)	
Past Obese dummy				0.619***
				(0.099)
Roommate's Lifestyle Habits				
Roommate eats out regularly	-1.303	**-1.215****	-0.149	**-0.176*****
	(1.992)	**(0.605)**	(0.110)	**(0.065)**
Roommate rarely eats fresh fruits and vegetables	**-2.602****	**-0.743****	0.039	-0.037
	(1.062)	**(0.365)**	(0.056)	(0.037)
Roommate participates in physical activity	-0.895	-0.419	-0.055	0.016
	(0.958)	(0.342)	(0.055)	(0.029)
Roommate sleeps a lot on weekdays	0.768	0.106	-0.092	0.054
	(1.456)	(0.572)	(0.073)	(0.081)
Roommate sleeps a lot on weekends	**-3.367****	-0.967	0.014	**-0.076****
	(1.488)	(0.601)	(0.071)	**(0.035)**
Roommate smokes	-0.453	0.001	**-0.136****	0.031
	(1.009)	(0.380)	**(0.058)**	(0.040)
Observations	214	214	214	214
R-squared	0.734	0.684	0.447	0.381

Note: Roommate's characteristics are average characteristics of an individual's roommates, excluding the individual himself. The roommate's lifestyle habits are average characteristics of an individual's roommates. Roommate eats out regularly is a dummy variable for whether an individual's roommate eats out 6 or more times in a week or not. Roommate rarely eats fresh fruits and a vegetable is a dummy variable which takes the value 1 if the roommate eats fresh fruits and vegetables every now and then or rarely and zero if an individual's roommate eats fresh fruits and vegetables every day, nearly every day or once a week. Roommate participates in physical activity is a dummy variable which takes the value 1 if the roommate participates in moderate or intense physical activity 3 or more than 3 times a week, zero otherwise. A roommate is considered to sleep a lot on weekdays if he sleeps for 8 or more than 8 hours on weekdays. Similarly, a roommate is considered to sleep a lot on weekends if he sleeps 9 or more than 9 hours on weekends. See footnote of Table 3.

Table 11: Mediation Analysis via a sequential model

Variables of Interest	Current Weight	Current BMI	Overweight Dummy[1]	Obesity Dummy[1]
Panel A: Mediator: Roommate eats out regularly				
ACME	-0.005 [-0.023 to 0.007]	-0.007 [-0.028 to 0.008]	0.002 [-0.015 to 0.020]	-0.030 [-0.131 to 0.045]
Direct Effect	-0.110 [-0.211 to -0.013]	-0.120 [-0.245 to -0.000]	-0.085 [-0.202 to 0.027]	-0.193 [-0.461 to 0.064]
Total Effect	-0.115 [-0.213 to -0.016]	-0.127 [-0.251 to -0.005]	-0.083 [-0.200 to 0.030]	-0.223 [-0.492 to 0.039]
% of Total Mediation Effect	**0.044 [0.023 to 0.232]**	**0.052 [0.025 to 0.266]**	**-0.019 [-0.185 to 0.183]**	**0.125 [-0.720 to 1.107]**
Panel B: Mediator: Roommate rarely eats fresh fruits and vegetables				
ACME	0.009 [-0.015 to 0.038]	-0.007 [-0.029 to 0.007]	0.002 [-0.011 to 0.016]	-0.003 [-0.035 to 0.021]
Direct Effect	-0.124 [-0.219 to -0.033]	-0.119 [-0.241 to -0.003]	-0.085 [-0.202 to 0.026]	-0.219 [-0.431 to -0.017]
Total Effect	-0.115 [-0.208 to -0.024]	-0.127 [-0.248 to -0.008]	-0.083 [-0.197 to0.033]	-0.222 [-0.438 to -0.010]
% of Total Mediation Effect	**-0.079 [-0.302 to -0.041]**	**0.054 [0.027 to 0.285]**	**-0.020 [-0.249 to 0.100]**	**0.013 [0.006 to 0.066]**
Panel C: Mediator: Roommate participates in physical activity				
ACME	-0.008 [-0.039 to 0.017]	-0.011 [-0.045 to 0.016]	-0.011 [-0.047 to 0.017]	0.013 [-0.015 to 0.042]
Direct Effect	-0.107 [-0.207 to -0.015]	-0.115 [-0.243 to 0.007]	-0.072 [-0.195 to 0.047]	-0.235 [-0.460 to -0.020]
Total Effect	-0.115 [-0.212 to -0.022]	-0.126 [-0.248 to -0.010]	-0.083 [0.199 to 0.029]	-0.221 [-0.422 to -0.017]
% of Total Mediation Effect	**0.066 [0.035 to 0.253]**	**0.084 [0.042 to 0.501]**	**0.118 [-1.098 to 1.092]**	**-0.059 [-0.374 to -0.028]**
Panel D: Mediator: Roommate sleeps a lot on weekdays				
ACME	0.001 [-0.012 to 0.015]	0.002 [-0.014 to 0.021]	0.004 [-0.015 to 0.027]	0.016 [-0.059 to 0.108]
Direct Effect	-0.116 [-0.214 to -0.022]	-0.128 [-0.249 to -0.013]	-0.087 [-0.201 to 0.021]	-0.239 [-0.464 to -0.024]
Total Effect	-0.115 [-0.216 to -0.021]	-0.126 [-0.249 to -0.011]	-0.083 [-0.199 to 0.027]	-0.223 [-0.425 to -0.017]
% of Total Mediation Effect	**-0.006 [-0.026 to -0.003]**	**-0.014 [-0.078 to -0.007]**	**-0.045 [-0.474 to 0.321]**	**-0.069 [-0.310 to -0.035]**
Panel E: Mediator: Roommate sleeps a lot on weekends				
ACME	-0.017 [-0.053 to 0.006]	-0.014 [-0.051 to 0.008]	-0.001 [-0.015 to 0.010]	-0.039 [-0.105 to 0.009]
Direct Effect	-0.098 [-0.192 to -0.009]	-0.112 [-0.222 to -0.007]	-0.083 [-0.200 to 0.029]	-0.184 [-0.410 to 0.032]
Total Effect	-0.115 [-0.212 to -0.018]	-0.127 [-0.240 to -0.013]	-0.083 [-0.198 to 0.032]	-0.223 [-0.424 to -0.011]
% of Total Mediation Effect	**0.143 [0.077 to 0.665]**	**0.111 [0.058 to 0.574]**	**0.008 [-0.044 to 0.095]**	**0.171 [0.086 to 0.792]**
Panel F: Mediator: Roommate smokes				
ACME	0.006 [-0.031 to 0.012]	-0.002 [-0.029 to 0.022]	-0.023 [-0.062 to 0.003]	0.002 [-0.019 to 0.026]
Direct Effect	-0.109 [-0.209 to -0.014]	-0.124 [-0.248 to -0.006]	-0.060 [-0.177 to 0.051]	-0.224 [-0.437 to -0.021]
Total Effect	-0.115 [-0.214 to -0.013]	-0.127 [-0.247 to -0.003]	-0.083 [-0.199 to 0.033]	-0.222 [-0.436 to -0.011]
% of Total Mediation Effect	**0.050 [0.027 to 0.261]**	**0.019 [0.009 to 0.091]**	**0.245 [-1.997 to 2.590]**	**-0.009 [-0.047 to -0.005]**

Note: ACME = average causal mediation effects. Figures in parenthesis are the 95% confidence intervals (lower and upper limits). The calculation of confidence intervals is based on quasi-Bayesian confidence intervals using 1000 simulations. The analysis was done in Stata software using the medeff command. Overweight and obesity dummy have been constructed according to the Asian standards, whereby an individual with BMI greater than or equal to 23 (*27.5*) is considered overweight (*obese*). If average past BMI of *current* roommates is greater than or equal to 23, roommate's past overweight dummy is 1, zero otherwise. If average past BMI of current roommates is greater than or equal to 27.5, roommate's past obesity dummy is 1, zero otherwise.

Appendix Table 1: Regression Results in Health Outcomes with full set of controls

Variables of Interest	Current Weight		Current BMI		Current Overweight Dummy[1]		Current Obesity Dummy[1]		Current Overweight Dummy[2]		Current Obesity Dummy[2]	
Past Weight	0.874***	0.921***										
	(0.042)	(0.051)										
Roommate's Past Weight	**-0.117****	**-0.113****										
	(0.056)	**(0.049)**										
Past BMI			0.774***	0.792***								
			(0.044)	(0.051)								
Roommate's Past BMI			**-0.130***	**-0.124****								
			(0.065)	**(0.060)**								
Past Overweight Dummy[1]					0.658***	0.654***						
					(0.048)	(0.056)						
Roommate's Past Overweight Dummy[1]					-0.086	-0.081						
					(0.055)	(0.057)						
Past Obesity Dummy[1]							0.622***	0.610***				
							(0.101)	(0.107)				
Roommate's Past Obesity Dummy[1]							**-0.210***	**-0.219***				
							(0.110)	**(0.110)**				
Past Overweight Dummy[2]									0.699***	0.685***		
									(0.061)	(0.066)		
Roommate's Overweight Dummy[2]									**-0.088****	**-0.085****		
									(0.040)	**(0.042)**		
Past Obese Dummy[2]											0.695***	0.678***
											(0.227)	(0.223)
Roommate Obese Dummy[2]											**-0.019****	-0.008
											(0.009)	(0.015)
Age		-26.087*		-3.637		-1.072		0.020		-1.041		0.337
		(13.692)		(5.958)		(0.942)		(0.482)		(0.926)		(0.364)
Adjusted age squared		65.147*		8.902		2.679		-0.066		2.647		-0.852
		(34.539)		(15.210)		(2.410)		(1.237)		(2.381)		(0.920)
Rural residence dummy		0.268		-0.271		-0.074		-0.023		-0.035		-0.008
		(1.091)		(0.389)		(0.064)		(0.048)		(0.051)		(0.022)
Limited illness dummy		-0.797		0.592		0.118		0.086		-0.015		0.113
		(2.745)		(0.903)		(0.106)		(0.105)		(0.063)		(0.103)
SC/ST/OBC caste dummy		-1.368		-0.280		0.011		0.009		-0.073		-0.015
		(1.143)		(0.430)		(0.068)		(0.039)		(0.061)		(0.013)
Monthly Household income		-0.560**		-0.139		-0.004		0.011		-0.001		0.004
		(0.234)		(0.093)		(0.017)		(0.014)		(0.011)		(0.004)
Year fixed effects		2.276**		0.669*		0.126*		0.058		0.051		0.015

		(1.042)		(0.356)		(0.068)		(0.040)		(0.052)		(0.014)
R-squared	0.703	0.719	0.661	0.671	0.404	0.420	0.344	0.360	0.452	0.463	0.379	0.401

Note: [1]Overweight and obesity dummies have been constructed according to the Asian standards, whereby an individual with BMI greater than or equal to 23 (*27.5*) is considered overweight (*obese*). If average past BMI of roommates is greater than or equal to 23, roommate's past overweight dummy is 1, zero otherwise. If average past BMI of roommates is greater than or equal to 27.5, roommate's past obesity dummy is 1, zero otherwise. [2] Alternatively, overweight and obesity dummies have been constructed according to the WHO's international standards, whereby an individual with BMI greater than or equal to 25 (*30*) is considered overweight (*obese*). *, ** and *** denote significance at 0.10, 0.05 and 0.01 levels, with clustered standard errors at the room-year level in parentheses. Regressions include a constant term. (N=214) See footnote of Table 3.

Appendix Table 2: Robustness Check: OLS and Instrument Variable Analysis with Current Roommate Assignment

Variables of Interest	OLS Estimates				IV Estimates			
	Current Weight	Current BMI	Current Overweight dummy	Current Obesity dummy	Current Weight	Current BMI	Current Overweight Dummy	Current Obesity Dummy
Past Weight	0.915***				0.915***			
	(0.050)				(0.049)			
Roommate's Past Weight	**-0.161*** **				**-0.136***			
	(0.056)				**(0.070)**			
Past BMI		0.793***				0.792***		
		(0.051)				(0.050)		
Roommate's Past BMI		-0.088				-0.147		
		(0.068)				(0.094)		
Past Overweight dummy			0.654***				0.664***	
			(0.056)				(0.054)	
Roommate's Past Overweight dummy			-0.037				**-0.165***	
			(0.059)				**(0.090)**	
Past Obesity dummy				0.597***				0.602***
				(0.093)				(0.091)
Roommate's Past Obesity dummy				**-0.199** **				**-0.449*** **
				(0.087)				**(0.108)**
Observations	207	207	207	207	207	207	207	207
R-squared	0.739	0.686	0.424	0.359	0.738	0.685	0.409	0.344

Note: Current roommate's characteristics have been used in this table. Controls in the OLS regressions include age, adjusted age squared, limiting illness dummy, rural residence dummy (urban/semi-urban and rural area), caste category dummy (general and SC/ST/OBC) and monthly household income (in ten thousand rupees). Roommate characteristics like weight, BMI, overweight dummy and obesity dummy are average characteristics of an individual's *current* roommates. Overweight and obesity dummy have been constructed according to the Asian standards, whereby an individual with BMI greater than or equal to 23 (*27.5*) is considered overweight (*obese*). If average past BMI of *current* roommates is greater than or equal to 23, roommate's past overweight dummy is 1, zero otherwise. If average past BMI of current roommates is greater than or equal to 27.5, roommate's past obesity dummy is 1, zero otherwise. The regression coefficients for past weight, roommate's past weight, past BMI, roommate's past BMI, past overweight dummy, roommate's past overweight dummy, past obesity dummy and roommate's past obesity dummy have been reported. *, ** and *** denote significance at 0.10, 0.05 and 0.01 levels, with clustered standard errors at the room-year level in parentheses.

Appendix Table 3: Regression Results with Extra Controls

Variables of Interest	Current Weight	Current BMI	Current Overweight Dummy	Current Obesity Dummy
Past Weight	0.915***			
	(0.050)			
Roommate's Past Weight	**-0.126****			
	(0.052)			
Past BMI		0.780***		
		(0.047)		
Roommate's Past BMI		**-0.137****		
		(0.063)		
Past Overweight dummy			0.645***	
			(0.059)	
Roommate's Past Overweight dummy			-0.086	
			(0.055)	
Past Obesity dummy				0.589***
				(0.108)
Roommate's Past Obesity dummy				**-0.240***
				(0.141)
Observations	214	214	214	214
R-squared	0.720	0.683	0.430	0.367

Note: Life satisfaction, mental health (GHQ-12 score) and relative marks in examination are the additional controls used in the OLS regressions. See footnote of Table 3. The regression coefficients for past weight, roommate's past weight, past BMI, roommate's past BMI, past overweight dummy, roommate's past overweight dummy, past obesity dummy and roommate's past obesity dummy have been reported. *, ** and *** denote significance at 0.10, 0.05 and 0.01 levels, with clustered standard errors at the room-year level in parentheses.

Appendix Table 4: Regression Results with own lifestyle habits as extra controls

Variables of Interest	Current Weight	Current BMI	Current Overweight dummy	Current Obesity dummy
Past Weight	0.923***			
	(0.051)			
Roommate's Past Weight	**-0.116****			
	(0.050)			
Past BMI		0.788***		
		(0.052)		
Roommate's Past BMI		**-0.110***		
		(0.063)		
Past Overweight dummy			0.655***	
			(0.057)	
Roommate's Past Overweight dummy			-0.062	
			(0.058)	
Past Obesity dummy				0.611***
				(0.106)
Roommate's Past Obesity dummy				**-0.214****
				(0.105)
Own Lifestyle Habits				
Eats out regularly	-0.442	-0.545	-0.171*	0.031
	(1.611)	(0.667)	(0.096)	(0.081)
Eats fresh fruits and vegetables rarely	-0.063	-0.212	-0.038	0.018
	(1.048)	(0.384)	(0.053)	(0.040)
Participates in moderate or intense physical activity	-0.027	0.100	0.029	0.040
	(1.084)	(0.415)	(0.057)	(0.034)
Sleeps a lot on weekdays	-0.463	0.026	0.023	-0.038
	(1.097)	(0.413)	(0.066)	(0.033)
Sleeps a lot on weekends	0.710	-0.286	0.045	-0.027
	(1.362)	(0.487)	(0.074)	(0.034)
Smokes	-0.739	0.051	0.029	-0.068
	(1.668)	(0.615)	(0.096)	(0.067)
Observations	214	214	214	214
R-squared	0.720	0.674	0.435	0.374
Adj. R-squared	0.699	0.650	0.392	0.327

Note: The lifestyle habits are the additional controls used in the OLS regressions. They also consist of binary dummy variables, namely whether a student ate out 6 to 7 times or more in a week, eats fresh fruits and vegetables less than once a week or more, participates in moderate or intense physical activity 3 or more than 3 times a week, sleeps for 8 or more than 8 hours on weekdays, sleeps 9 or more than 9 hours on weekends and smokes, or not. Roommate characteristics like weight, BMI, overweight dummy and obesity dummy are average characteristics of an individual's *current* roommates. See footnote of Table 3. The regression coefficients for past weight, roommate's past weight, past BMI, roommate's past BMI, past overweight dummy, roommate's past overweight dummy, past obesity dummy and roommate's past obesity dummy have been reported. *, ** and *** denote significance at 0.10, 0.05 and 0.01 levels, with clustered standard errors at the room-year level in parentheses.

Appendix Table 5: Regression Results with roommate's characteristics as extended controls

Variables of Interest	Current Weight	Current BMI	Current Overweight Dummy	Current Obese Dummy
Past Weight	0.919***			
	(0.051)			
Roommate's Past Weight	**-0.132****			
	(0.056)			
Past BMI		0.793***		
		(0.051)		
Roommate's Past BMI		**-0.139****		
		(0.062)		
Past Overweight Dummy			0.660***	
			(0.056)	
Roommate's Past Overweight			-0.094	
Dummy			(0.058)	
Past Obese Dummy				0.610***
				(0.108)
Roommate's Past Obese Dummy				**-0.214***
				(0.108)
Extended Controls				
Roommate's Past Height	0.037	-0.029	-0.006	0.002
	(0.094)	(0.032)	(0.006)	(0.003)
Roommate's Backward Dummy	-1.089	-0.328	-0.076	-0.022
	(1.836)	(0.688)	(0.089)	(0.068)
Observations	214	214	214	214
R-squared	0.720	0.672	0.424	0.363

Note: See footnote of Table 3. *, ** and *** denote significance at 0.10, 0.05 and 0.01 levels, with clustered standard errors at the room-year level in parentheses.

Appendix Table 6: Regression Results after removing disabled students

Variables of Interest	Current Weight	Current BMI	Current Overweight Dummy	Current Obesity Dummy
Past Weight	0.915***			
	(0.052)			
Roommate's Past Weight	**-0.113****			
	(0.051)			
Past BMI		0.808***		
		(0.058)		
Roommate's Past BMI		**-0.121***		
		(0.062)		
Past Overweight dummy			0.652***	
			(0.061)	
Roommate's Past Overweight dummy			-0.072	
			(0.056)	
Past Obesity dummy				0.573***
				(0.114)
Roommate's Past Obesity dummy				**-0.206***
				(0.104)
Observations	206	206	206	206
R-squared	0.716	0.655	0.421	0.320

Note: 3.74% of the sample were dropped from the current regression analysis. See footnote of Table 3. The regression coefficients for past weight, roommate's past weight, past BMI, roommate's past BMI, past overweight dummy, roommate's past overweight dummy, past obesity dummy and roommate's past obesity dummy have been reported. *, ** and *** denote significance at 0.10, 0.05 and 0.01 levels, with clustered standard errors at the room-year level in parentheses.

Appendix Table 7: Regression results using own and roommate's height as additional controls

Variables of Interest	Current Weight		Current BMI		Current Overweight Dummy[1]		Current Obesity Dummy[1]		Current Overweight Dummy[2]		Current Obesity Dummy[2]	
Past Weight	0.874***	0.897***										
	(0.042)	(0.051)										
Roommate's Past Weight	**-0.117****	**-0.125****										
	(0.056)	**(0.057)**										
Past BMI			0.774***	0.841***								
			(0.044)	(0.052)								
Roommate's Past BMI			**-0.130***	**-0.130****								
			(0.065)	**(0.059)**								
Past Overweight Dummy[1]					0.658***	0.657***						
					(0.048)	(0.058)						
Roommate's Overweight Dummy[1]					-0.086	-0.091						
					(0.055)	(0.057)						
Past Obesity Dummy[1]							0.622***	0.619***				
							(0.101)	(0.109)				
Roommate's Obesity Dummy[1]							**-0.210***	**-0.210***				
							(0.110)	**(0.109)**				
Past Overweight Dummy[2]									0.699***	0.694***		
									(0.061)	(0.066)		
Roommate's Overweight Dummy[2]									**-0.088****	**-0.085***		
									(0.040)	**(0.044)**		
Past Obesity Dummy[2]											0.695***	0.695***
											(0.227)	(0.228)
Roommate's Obesity Dummy[2]											**-0.019****	-0.004
											(0.009)	(0.021)
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	214	214	214	214	214	214	214	214	214	214	214	214
R-squared	0.703	0.725	0.661	0.684	0.404	0.423	0.344	0.363	0.452	0.464	0.379	0.404

Note: Student's and roommate's past height have been used as an additional control in all the regressions. See footnote of Table 3. [1]Overweight and obesity dummies have been constructed according to the Asian standards, whereby an individual with BMI greater than or equal to 23 (*27.5*) is considered overweight (*obese*). If average past BMI of roommates is greater than or equal to 23, roommate's past overweight dummy is 1, zero otherwise. If average past BMI of roommates is greater than or equal to 27.5, roommate's past obesity dummy is 1, zero otherwise. [2] Alternatively, overweight and obesity dummies have been constructed according to the WHO's international standards, whereby an individual with BMI greater than or equal to 25 (*30*) is considered overweight (*obese*). The regression coefficients for past weight, roommate's past weight, past BMI, roommate's past BMI, past overweight dummy, roommate's past overweight dummy, past obesity dummy and roommate's past obesity dummy have been reported. *, ** and *** denote significance at 0.10, 0.05 and 0.01 levels, with clustered standard errors at the room-year level in parentheses. See footnote of Table 3.

Appendix Table 8: Robustness Check: Having at least one roommate obese and proportion of obese roommates

Variables of Interest	Current Overweight Dummy[1]	Current Obesity Dummy[1]	Current Overweight Dummy[2]	Current Obesity Dummy[2]	Current Overweight Dummy[1]	Current Obesity Dummy[1]	Current Overweight Dummy[2]	Current Obesity Dummy[2]
Past Overweight Dummy[1]	0.651***				0.650***			
	(0.057)				(0.057)			
At least 1 Roommate overweight[1]	-0.007							
	(0.053)							
Past Obesity Dummy[1]		0.630***				0.630***		
		(0.098)				(0.101)		
At least 1 Roommate obese[1]		**-0.106*** **						
		(0.032)						
Past Overweight Dummy[2]			0.699***				0.694***	
			(0.062)				(0.063)	
At least 1 Roommate overweight[2]			-0.066					
			(0.046)					
Past Obesity Dummy[2]				0.692***				0.705***
				(0.196)				(0.187)
At least 1 Roommate obese[2]				**-0.088***				
				(0.047)				
Proportion of Roommates Overweight[1]					-0.064			
					(0.077)			
Proportion of Roommates Obese[1]						**-0.213*** **		
						(0.069)		
Proportion of Roommates Overweight[2]							**-0.134** **	
							(0.067)	
Proportion of Roommates Obese[2]								**-0.276*** **
								(0.078)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	214	214	214	214	214	214	214	214
R-squared	0.414	0.371	0.463	0.420	0.416	0.368	0.466	0.427

Note: See footnote of Table 3. [1]Overweight and obesity dummies have been constructed according to the Asian standards, whereby an individual with BMI greater than or equal to 23 (*27.5*) is considered overweight (*obese*). [2] Alternatively, overweight and obesity dummies have been constructed according to the WHO's international standards, whereby an individual with BMI greater than or equal to 25 (*30*) is considered overweight (*obese*). *, ** and *** denote significance at 0.10, 0.05 and 0.01 levels, with clustered standard errors at the room-year level in parentheses. See footnote of Table 3.

Appendix Table 9: Robustness Check: Regression estimates with increase in BMI and decrease in BMI as dependent variables

	Direction of standardized BMI change (Ref: No change if lies between -0.5 & +0.5 SD)							
Variables of Interest	Going Down	Going Up	Going Down	Going Up	Going Down	Going Up	Going Down	Going Up
Past Weight	0.005	-0.001						
	(0.004)	(0.007)						
Roommate's Past Weight	**0.010****	-0.003						
	(0.004)	(0.009)						
Past BMI			0.029***	-0.013				
			(0.009)	(0.021)				
Roommate's Past BMI			**0.021***	-0.015				
			(0.012)	(0.026)				
Past Overweight Dummy[1]					0.236***	-0.090		
					(0.085)	(0.182)		
Roommate's Overweight Dummy[1]					0.120	-0.054		
					(0.078)	(0.156)		
Past Obesity Dummy[1]							0.302**	0.038
							(0.130)	(0.319)
Roommate's Obesity Dummy[1]							**0.361***	**-0.659*****
							(0.188)	**(0.155)**
Observations	160	161	160	161	160	161	160	161
R-squared	0.102	0.065	0.138	0.068	0.127	0.066	0.115	0.067

Note: Going down is a dummy variable which takes the value 1 if the standardised BMI is less than 0.50 SD, and 0 if there is no change in the standardised BMI (i.e., -0.50<= standardized BMI <=0.50). In the going down dummy, standardized BMI greater than 0.50 have been dropped. Similarly, going up is a dummy variable which takes the value 1 if the standardised BMI is greater than 0.50, and 0 if there is no change in the standardised BMI (i.e., -0.50<= standardized BMI <=0.50). In the going up dummy, standardized BMI less than 0.50 have been dropped. See footnote of Table 3. Overweight and obesity dummy have been constructed according to the Asian standards, whereby an individual with BMI greater than or equal to 23 (*27.5*) is considered overweight (*obese*). If average past BMI of *current* roommates is greater than or equal to 23, roommate's past overweight dummy is 1, zero otherwise. If average past BMI of current roommates is greater than or equal to 27.5, roommate's past obesity dummy is 1, zero otherwise. The regression coefficients for past weight, roommate's past weight, past BMI, roommate's past BMI, past overweight dummy, roommate's past overweight dummy, past obesity dummy and roommate's past obesity dummy have been reported. *, ** and *** denote significance at 0.10, 0.05 and 0.01 levels, with clustered standard errors at the room-year level in parentheses.

Appendix Table 10: Descriptive statistics of the other variables of interest

Other variables of Interest	Mean	Standard Deviation	Minimum	Maximum
Own Characteristics				
Past height (in centimeters)	166.82	8.70	104.14	187.96
Introvert dummy	1.61	0.49	1.00	2.00
Higher relative income	0.44	0.50	0.00	1.00
Life satisfaction on a scale of 0 to 10	6.89	1.65	2.00	10.00
Mental health (GHQ-12 score) on a scale of 0-36	8.48	4.37	0.00	24.00
Relative marks	1.00	0.13	0.54	1.27
Own lifestyle habits				
Eats out regularly	0.13	0.34	0.00	1.00
Eats fresh fruits and vegetables rarely	0.48	0.50	0.00	1.00
Participates in moderate or intense physical activity	0.57	0.49	0.00	1.00
Sleeps a lot on weekdays	0.27	0.44	0.00	1.00
Sleeps a lot on weekends	0.23	0.42	0.00	1.00
Smokes	0.18	0.38	0.00	1.00
Roommate's Characteristics				
Past height (in centimeters)	166.83	5.84	143.91	185.42
Proportionate of roommate's who are SC/ST/OBC	0.20	0.28	0.00	1.00
Proportionate of roommate's from rural area	0.46	0.37	0.00	1.00
Roommate's household income	2.46	1.61	0.15	8.98
Roommate's cumulative marks	68.82	8.69	29.39	88.11
Having at least one roommate overweight	0.63	0.48	0.00	1.00
Having at least one roommate obese	0.25	0.43	0.00	1.00
Proportion of roommates overweight	0.36	0.34	0.00	1.00
Proportion of roommates obese	0.10	0.20	0.00	1.00
Roommate's lifestyle habits				
Eats out regularly	0.06	0.24	0.00	1.00
Eats fresh fruits and vegetables rarely	0.64	0.48	0.00	1.00
Participates in moderate or intense physical activity	0.45	0.50	0.00	1.00
Sleeps a lot on weekdays	0.13	0.33	0.00	1.00
Sleeps a lot on weekends	0.13	0.34	0.00	1.00
Smokes	0.39	0.49	0.00	1.00
Blockmate's Characteristics				
Past Weight (in kg)	61.15	1.32	59.15	63.97
Past BMI (in kg/m^2)	21.98	0.37	21.27	23.03
Proportion of blockmates who are overweight	0.36	0.06	0.27	0.44
Proportion of blockmates who are obese	0.10	0.04	0.00	0.18

Note: Number of observations is 214. Introvert dummy is a binary variable which takes the value 1 if the student is introvert and 0 if he is extrovert. Higher relative income is a binary variable which takes the value 1 if monthly household income (per ten thousand) is greater than 2.4 (average monthly household income), 0 otherwise. Life satisfaction is the response to the question "*All things considered, how satisfied are you with your life? Pick a number between 0 and 10 to indicate how satisfied you are.*" Mental health is an index made with the help of the general health questionnaire (GHQ-12). Relative marks is marks of the student relative to the average of all the students. Own lifestyle habits consist of dummy variables for each of the following: whether the student himself eats out 6 to 7 times or more in a week, eats fresh fruits and vegetables less than once a week, participates in moderate or intense physical activity 3 or more than 3 times a week, smokes cigarettes, sleeps 8 or more than 8 hours on weekdays and sleeps 9 or more than 9 hours on weekends. Similarly, dummies for the roommate's lifestyle habits were constructed.

Appendix Table 11: Asymmetries on the basis of personality traits relative to the roommates

	Current Weight		Current BMI		Current Overweight Dummy		Current Obesity Dummy	
Variables of Interest	Introvert	Extrovert	Introvert	Extrovert	Introvert	Extrovert	Introvert	Extrovert
Past Weight	0.954***	0.906***						
	(0.075)	(0.064)						
Roommate's Weight	0.021	**-0.158****						
	(0.059)	**(0.063)**						
Past BMI			0.862***	0.771***				
			(0.058)	(0.065)				
Roommate's BMI			**0.162***	**-0.220*****				
			(0.083)	**(0.068)**				
Past Overweight Dummy					0.640***	0.639***		
					(0.125)	(0.071)		
Roommate's Overweight Dummy					0.028	-0.113		
					(0.136)	(0.069)		
Past Obesity Dummy							0.799***	0.556***
							(0.204)	(0.117)
Roommate's Obesity Dummy							-0.034	**-0.279*****
							(0.042)	**(0.087)**
Observations	69	145	69	145	69	145	69	145
R-squared	0.779	0.694	0.825	0.625	0.452	0.426	0.635	0.312
Adj. R-squared	0.745	0.674	0.799	0.600	0.368	0.388	0.580	0.267

Note: A student is considered to be extrovert if he is extrovert while his roommates on an average are relatively introvert. A student is considered to be an introvert, in the following two situations: (1) if he is introvert while is roommates are extrovert, (2) if he and his roommate both have similar nature. See footnote of Table 5. Overweight and obesity dummy have been constructed according to the Asian standards, whereby an individual with BMI greater than or equal to 23 (*27.5*) is considered overweight (*obese*). If average past BMI of *current* roommates is greater than or equal to 23, roommate's past overweight dummy is 1, zero otherwise. If average past BMI of current roommates is greater than or equal to 27.5, roommate's past obesity dummy is 1, zero otherwise. The regression coefficients for past weight, roommate's past weight, past BMI, roommate's past BMI, past overweight dummy, roommate's past overweight dummy, past obesity dummy and roommate's past obesity dummy have been reported. *, ** and *** denote significance at 0.10, 0.05 and 0.01 levels, with clustered standard errors at the room-year level in parentheses.

Appendix Table 12: Asymmetries on the basis of relative income relative to the roommates

Variables of Interest	Current Weight		Current BMI		Current Overweight dummy		Current Obese dummy	
	Low relative Income	High relative income	Low relative income	High relative income	Low relative income	High relative income	Low relative income	High relative income
Past Weight	0.850***	1.025***						
	(0.068)	(0.070)						
Roommate Weight	-0.090	**-0.178****						
	(0.075)	**(0.072)**						
Past BMI			0.726***	0.949***				
			(0.059)	(0.063)				
Roommate BMI			0.021	**-0.232*****				
			(0.094)	**(0.068)**				
Past Overweight dummy					0.579***	0.711***		
					(0.093)	(0.069)		
Roommate Overweight dummy					-0.039	**-0.190****		
					(0.094)	**(0.078)**		
Past Obese dummy							0.631***	0.668***
							(0.164)	(0.148)
Roommate Obese dummy							-0.031	**-0.275*****
							(0.032)	**(0.101)**
Observations	120	94	120	94	120	94	120	94
R-squared	0.676	0.783	0.643	0.762	0.309	0.587	0.349	0.408

Note: The relative income is the household income of the student relative to his roommates. A student is considered to have a low relative income if his household income is less than or equal to his roommate's household income. Moreover, a student is considered to have high relative income if his household income is greater than or equal to his roommates' household income. See footnote of Table 5. Overweight and obesity dummy have been constructed according to the Asian standards, whereby an individual with BMI greater than or equal to 23 (*27.5*) is considered overweight (*obese*). If average past BMI of *current* roommates is greater than or equal to 23, roommate's past overweight dummy is 1, zero otherwise. If average past BMI of current roommates is greater than or equal to 27.5, roommate's past obesity dummy is 1, zero otherwise. The regression coefficients for past weight, roommate's past weight, past BMI, roommate's past BMI, past overweight dummy, roommate's past overweight dummy, past obesity dummy and roommate's past obesity dummy have been reported. *, ** and *** denote significance at 0.10, 0.05 and 0.01 levels, with clustered standard errors at the room-year level in parentheses.

Appendix Table 13: Asymmetries on the basis of caste relative to the roommates

Variables of Interest	Current Weight		Current BMI		Current Overweight Dummy		Current Obesity Dummy	
	Relatively disadvantaged caste category	Relatively advantaged caste category	Relatively disadvantaged caste category	Relatively advantaged caste category	Relatively disadvantaged caste category	Relatively advantaged caste category	Relatively disadvantaged caste category	Relatively advantaged caste category
Past Weight	0.908***	0.992***						
	(0.056)	(0.168)						
Roommate's Weight	**-0.114****	-0.042						
	(0.050)	(0.129)						
Past BMI			0.807***	0.813***				
			(0.066)	(0.059)				
Roommate's BMI			**-0.117***	-0.094				
			(0.061)	(0.141)				
Past Overweight Dummy					0.648***	0.700***		
					(0.067)	(0.121)		
Roommate's Overweight Dummy					-0.092	-0.012		
					(0.061)	(0.178)		
Past Obesity dummy							0.595***	1.088***
							(0.117)	(0.074)
Roommate's Obesity Dummy							-0.269	-0.081
							(0.189)	(0.095)
Observations	172	42	172	42	172	42	172	42
R-squared	0.723	0.683	0.661	0.754	0.413	0.492	0.368	0.375

Note: A student belongs to a relatively disadvantaged caste if his caste is backward relative to his roommates, i.e., if he belongs to SC/ST/OBC and his roommates belong to general class. A student belongs to a relatively advantaged caste category in the following two situations: (1) if he belongs to general caste, while his roommates belongs to SC/ST/OBC category; (2) if his caste and his roommate's caste is same. See footnote of Table 5. Overweight and obesity dummy have been constructed according to the Asian standards, whereby an individual with BMI greater than or equal to 23 (*27.5*) is considered overweight (*obese*). If average past BMI of *current* roommates is greater than or equal to 23, roommate's past overweight dummy is 1, zero otherwise. If average past BMI of current roommates is greater than or equal to 27.5, roommate's past obesity dummy is 1, zero otherwise. The regression coefficients for past weight, roommate's past weight, past BMI, roommate's past BMI, past overweight dummy, roommate's past overweight dummy, past obesity dummy and roommate's past obesity dummy have been reported. *, ** and *** denote significance at 0.10, 0.05 and 0.01 levels, with clustered standard errors at the room-year level in parentheses.

Appendix Table 14: Asymmetries on the basis of region of residence relative to the roommates

Variables of Interest	Current Weight		Current BMI		Current Overweight Dummy		Current Obesity Dummy	
	Relatively Rural	Relatively Urban	Relatively Rural	Relatively Urban	Relatively Rural	Relatively Urban	Relatively Rural	Relatively Urban
Past Weight	0.913***	0.972***						
	(0.066)	(0.094)						
Roommate's Weight	**-0.150****	-0.079						
	(0.063)	(0.088)						
Past BMI			0.764***	0.879***				
			(0.066)	(0.082)				
Roommate's BMI			**-0.216*****	0.065				
			(0.068)	(0.071)				
Past Overweight Dummy					0.605***	0.802***		
					(0.078)	(0.076)		
Roommate's Overweight Dummy					**-0.164****	0.018		
					(0.068)	(0.108)		
Past Obesity Dummy							0.610***	0.662**
							(0.120)	(0.251)
Roommate's Obesity Dummy							**-0.266****	-0.003
							(0.102)	(0.032)
Observations	137	77	137	77	137	77	137	77
R-squared	0.720	0.714	0.644	0.749	0.424	0.447	0.340	0.473

Note: A student belongs to a relatively rural region of residence if he belongs to a rural background while his roommates on an average come from urban areas. A student belongs to a relatively urban region of residence in the following two situations: (1) if he comes from an urban area, while his roommates from rural area (2) if he and his roommate belong to the same region of residence, i.e., both are from wither rural area or urban area. See footnote of Table 5. Overweight and obesity dummy have been constructed according to the Asian standards, whereby an individual with BMI greater than or equal to 23 (*27.5*) is considered overweight (*obese*). If average past BMI of *current* roommates is greater than or equal to 23, roommate's past overweight dummy is 1, zero otherwise. If average past BMI of current roommates is greater than or equal to 27.5, roommate's past obesity dummy is 1, zero otherwise. The regression coefficients for past weight, roommate's past weight, past BMI, roommate's past BMI, past overweight dummy, roommate's past overweight dummy, past obesity dummy and roommate's past obesity dummy have been reported. *, ** and *** denote significance at 0.10, 0.05 and 0.01 levels, with clustered standard errors at the room-year level in parentheses.

	In sample		Not in sample		Difference	
Variables of Interest	Mean	Std. dev.	Mean	Std. dev.	Mean	*p*-value
Outcome Variables						
Current Weight	64.273	11.962	64.514	12.916	0.240	0.911
Current BMI	22.566	4.071	22.579	4.051	0.013	0.986
Current Overweight Dummy[1]	0.435	0.497	0.486	0.507	0.052	0.559
Current Obesity Dummy[1]	0.112	0.316	0.108	0.315	-0.004	0.943
Controls						
Age (in years)	19.327	0.859	18.432	0.689	**-0.895*** **	**0.000**
Rural residence dummy	0.475	0.500	0.378	0.492	-0.093	0.293
Limiting illness dummy	0.056	0.231	0.000	0.000	-0.056	0.141
Backward caste dummy	0.206	0.405	0.216	0.417	0.011	0.884
Household income	2.302	2.024	2.457	2.087	0.155	0.669
Other variables						
Cumulative marks	69.065	10.231	66.461	12.154	-2.604	0.171
Personality (Extrovert=1)	1.607	0.489	1.568	0.502	-0.040	0.649
Relative income dummy	0.444	0.498	0.432	0.502	-0.011	0.897
Mental health (GHQ-12) on a scale of 0-12	1.579	2.014	1.216	1.718	-0.363	0.302
Mental health (GHQ-12) on a scale of 0-36	8.489	4.370	8.027	3.648	-0.459	0.547

Appendix Table 15: Differences in in-sample and excluded observations

Note: Number of observations in the in-sample is 214, while 37 observations are not in the sample due to missing past anthropometry information. "Difference" is the difference in outcomes between the individuals included in the sample and individuals not included in the sample. The t-test is conducted to see whether there exists any statistical difference between the mean outcome of individuals in the sample and those not included in the sample. Relative income dummy is a binary variable which takes the value 1 if the household income is greater than or equal to the average monthly household income (approx. INR 23,017 pm or 230 pounds pm or US$ 384 pm) for the sample. *, ** and *** denote significance at .10, .05 and .01 levels.