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Similarity in meal plan use among first-year roommates

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Abstract

Objective—To examine if first-year roommates made similar meal plan decisions.

Methods—Residence information for 1186 first-year students (N=593 roommate pairs) and 559 floormates was obtained for the 2015–2016 academic year. Linear generalized estimating equations (GEEs) were used to examine if the number of meals students used over the semester was higher if their roommate used their meal plan more frequently. A logistic GEE examined joint meal plan usage between students and roommates for each month of the semester. To determine if residence, rather than roommate, explained the results, a simulation was conducted by randomly assigning the floormates to a same-sex roommate.

Results—The number of meals students used in spring was higher if the students' roommate had used more meals in spring, even after controlling for the number of meals students used in fall (Female: $\beta=0.07$, 99% CI=0.00, 0.13; Male: $\beta=0.10$, 99% CI=0.02, 0.18). Students were more likely to use a meal with their roommate if they were on the same meal plan (Female: OR=1.61, 99% CI=1.27, 2.04; Male: OR=1.57, 99% CI=1.09, 2.25), and less likely after the first month of being roommates (Female: OR=0.57–0.25; Male: OR=0.50–0.22; $p<0.001$). The simulation analysis indicated these findings were not due to shared residence.

Discussion—Students' meal plan choices were associated with their roommates' meal plan choices. Roommates' joint meal plan usage was highest at the start of the year. Strategic roommate pairings may result in students using their meal plan more. Further research should determine the extent of roommate influence on students' diet.

Keywords

College students; freshmen; university; meal plans; dining halls; roommates

INTRODUCTION

First-year students in the United States (US) typically live in on-campus residence halls, share a room with at least one other student, and are required to purchase a university meal plan (College Counselor Services; Farran Powell, 2018). Meal plans generally provide a set number of entries to a dining hall and cash-equivalence for purchasing food items from on-campus food outlets. Dining halls tend to provide more healthful food options than other outlets (Horacek, et al., 2013). Prior research indicates that students do not fully use their meal plans (van Woerden, et al., 2019). Encouraging higher dining hall use may improve students' diets and save students money.

Studies suggest that randomly assigned roommates influence students' behaviors and outcomes. First-year university students' randomly assigned roommates have been associated with weight gain, alcohol intake, racial prejudice, and GPA (Duncan, Boisjoly, Kremer, Levy, & Eccles, 2005; Sacerdote, 2001; Van Laar, Levin, Sinclair, & Sidanius, 2005; van Woerden, Hruschka, Brewis, Schaefer, & Bruening; Zimmerman, 2003). Different explanations for roommate influence have been suggested, such as certain behaviors being 'contagious' (Duncan, et al., 2005) and convergence on unmeasured behaviors (van Woerden, et al.). Zimmerman (2003) and Van Laar et al. (2005) both suggest that the close proximity of roommates may result in convergence among roommate behaviors, potentially through the tendency towards group uniformity (Zimmerman, 2003) or contact theory (Van Laar, et al., 2005).

Given that roommates live together for an entire academic year we examine the extent of roommate influence on students' meal plan. Students' roommates may influence how many meals students use, as well as the time and location where meals are used. Studies suggest that students spend more time with their roommate than any other friend (Stinebrickner & Stinebrickner, 2006). Students may also prefer to use the dining hall with a friend or roommate more than by themselves.

Roommates who are similar may have higher joint meal plan use. Studies suggest that friends tend to be racially/ethnically similar to each other (Bruening, et al., 2018; De La Haye, Robins, Mohr, & Wilson, 2011). Roommates who are demographically similar may be more likely to befriend each other (or to have been friends prior), and as such more likely to purchase the same plan or use meals together. Roommates may also influence the number of meals used; students may increase (or decrease) the number of meals they use to mirror the number of meals their roommate uses. Moreover, roommates who purchase the same meal plan may have higher joint decision making, and be especially likely to use their meal plan at the same time and location as each other.

One difficulty with roommate analyses is the confounding effect of environment. If students in the same environment (e.g., same residence floor; floormates) typically use their meal plan together, joint meal plan use among roommates *and* floormates would occur. Analyses that examine both roommates and floormates can help discern whether environmental factors are likely responsible for findings among roommates, or not. Simulation analysis, where students are randomly paired with floormates, are one means to make this distinction.

If similarities among roommates are also found among floormates, this suggests that the similarities among roommates are due to environmental factors.

Meal plans are intended to be students' main sources of dietary intake. If roommates influence students' meal plan use, novel ways to encourage dining hall use, and potentially higher dietary quality, may be more effective if targeted to roommates, rather than individuals. While deliberate student assignments may result in an increase in desirable behaviors, unintended outcomes remain a very real possibility (Carrell, Sacerdote, & West, 2011).

The primary purpose of this study was to examine if roommates made similar meal plan decisions. We hypothesized that: (1) students would use more of their meals over the semester if their roommate used a higher number of meals, (2) roommates' meal plan joint usage would be highest at the start of the academic year, and for students who were similar to their roommate. We also sought to describe which meal plans students purchased, and the number of meals students used, in order to put the examination of roommates into context.

METHODS

Study Sample

This manuscript is a secondary analysis of first-year students' meal plan decisions. Information on students' meal plan purchases, frequency of meal plan use, and roommate, for the 2015–2016 cohort of first-year students attending a large, southwestern university was obtained from university records. Inclusion criteria for students were: 1) complete demographic information, 2) known and standard meal plan, 3) aged between 17 and 20 years old, 4) resided in the same location throughout the entire academic year, and 5) typical number of meals used (see description below). A total of 1942 students (71.5% of the students provided by the university) had complete demographic information, a known and standard meal plan, and stayed in the same room for both semesters. A total of 26 students over 20 years old, and 5 students less than 17 years old, were excluded resulting in a sample size of 1911. An additional 37 students with a very high number of meals used and 129 students who rarely used their meal plan were excluded. The remaining 1745 students resulted in an analytical sample of 559 students whose roommate did not meet the inclusion criteria, and 1186 students whose roommate met the inclusion criteria. Students consented to their university records being used for research purposes as part of the universities' privacy statement (Arizona State University, 2008a). This research was approved by the Arizona State University Institutional Review Board.

Measures

Roommates and Floormates.—University records provided the residence halls, floors, and rooms that students officially resided in during the academic year. At this university, the residence hall rooms had space for two people. A students' roommate was defined as someone who resided in the same residence hall, floor, and room, as the student for the entire academic year. Students who met the inclusion criteria, but whose roommate did not, were classified as floormates. Floormates were randomly assigned to a same-sex student

from the roommate analysis who resided in the same residence hall and the same (or nearby) floor.

Meal plan.—At this university, first-year students' meal plans are linked to their student ID card; students swipe their student ID to purchase a meal. The date, time, location, and meal plan type used for students' meal plan purchases were obtained from university records. There were four standard meal plan types (8 meals/week, 180 meals/semester, 14 meals/week, unlimited meals) available to students. Students were required to purchase a meal plan when applying to live in a residence hall (prior to starting the semester), but were able to change their meal plan during their first week. Students could change their meal plan between the first and second semester, as long as the change was requested before the end of the first week of the second semester. Students' meal plan was defined as the meal plan used after the third week of semester. Meal plan use was defined as meals students purchased for themselves (i.e. excluding meals purchased for guests). Students who changed their meal plan after the third week of semester, or who used non-standard meal plans (e.g. veteran meal plans) were excluded. Students who did not use their meal plan during at least one of the first four months of either semester were classified as having atypical, low, number of meals used. Students who used their meal plan more than 289 (mean + 3SD) times in either semester were categorized as having atypical, high, number of meals used. Students with atypical (low or high) number of meals used were excluded from the main analyses. The days students' used their meals were categorized as weekday/weekend. Based on the distribution of responses, meal plan purchases were categorized as occurring in the morning (before 10 AM), at midday (10 AM to 1 PM), in the afternoon (1 PM to 4 PM), and in the evening (after 4 PM).

Meal plan joint usage.—Meal plan joint usage was classified as meal plan use at the same location and within one minute.

Demographics.—Students' date of birth, sex, race/ethnicity, and Pell Grant status (federal aid for low income students) were provided by the university. Students' sex was reported as female/male. Students' race/ethnicity was classified as American Indian/Alaska Native; Asian; Black/African American; Hispanic/Latino; International; Native Hawaiian/Pacific Islander; Two or more races; Unspecified. Due to low counts, American Indian/Alaska Native, Asian and Native Hawaiian/Pacific Islander were classified as 'other' race/ethnicity. Pell Grant status was reported as Pell Grant recipient vs not.

Statistical Analysis

Descriptives—To better understand how students' number of meals used was associated with meal plan and demographics, the differences between the 1911 students with low, typical, and high frequency of meal plan use was examined using chi-square tests (only for students with low and typical frequency of meal plan use due to low counts). Chi-square and ANOVA tests, as appropriate, were conducted to determine if the demographics of the 1186 students included in main analyses were associated with meal plan purchased.

The percentage of roommates sharing the same race/ethnicity and Pell Grant status was examined to evaluate the assumption of random roommate assignment. To account for the distribution of demographics varying by residence hall, and roommates being the same sex, analyses were at the residence hall level and stratified by sex. Firstly, the number of students of each demographic (race/ethnicity and Pell Grant status) living in the residence halls was determined, and the number of roommates sharing the same demographic calculated. Secondly, using the observed distribution of demographics for each residence hall, roommates were randomly assigned to each other for 1000 permutations. The actual percentage of roommates with the same race/ethnicity and Pell Grant status was compared to the percentage distribution from the random permutations.

Number of meals used—A linear generalized estimating equation (GEE) was used to examine if the number of meals students used was predicted by the number of meals the students' roommate used during the semester. The model included terms for semester, students' meal plan, race/ethnicity, Pell Grant status, age, and residence hall, and roommates having the same meal plan, race/ethnicity, or Pell Grant status. A clustering effect by student to account for clustering of meal plan usage within students for the Fall and Spring semesters was also included in the model. By controlling for roommates having the same meal plan, race/ethnicity, and Pell Grant status the model partially controls for roommates who may have been more similar than expected (i.e., selected roommate rather than randomly assigned). Analyses were stratified by sex to account for males tending to purchase more expensive meal plans and using their meal plan more.

To determine if students had higher number of meals used over the semester if their roommate had higher number of meals used, even after controlling for the students' prior number of meals used, an additional linear GEE was run. The students' number of meals used in the Spring semester was predicted by the number of meals the students' roommate used in the Spring semester. Controls for the number of meals the student used in the Fall semester, as well as students' meal plan in Spring, race/ethnicity, Pell Grant status, age, and residence hall, and roommates having the same meal plan in Spring, race/ethnicity, or Pell Grant status were included. A clustering effect by residence hall room was included in the model to account for both the student and the roommate being included in the model. Analyses were stratified by sex.

We anticipate that a small number of students, around 20%, had roommates who were not randomly assigned. To assess whether non-random matching on key variables (e.g. meal plan, sex, race/ethnicity, and Pell grant status) might account for relationships greater similarity in roommate's meal plan use, we conducted twelve additional GEEs predicting the number of meals used in Spring, stratified by sex and by roommates with the same meal plan, the same race/ethnicity, the same Pell Grant status, a different meal plan, a different race/ethnicity, and a different Pell Grant status. Due to small sample sizes, we only included the following covariates from the full model for the stratified analyses - number of meals used in Fall, the number of meals the students' roommate used in Spring, residence hall, and meal plan. A clustering effect by residence hall room was also included in the model.

Meal plan joint usage—ANOVA tests were used to determine if the percentage of converged meals between students and their roommates differed by students' meal plan. Logistic GEEs, stratified by sex, were used to examine the extent of meal plan joint usage. Terms for residence hall, Pell Grant status, race/ethnicity, meal plan, age, and roommates having the same meal plan, the same race/ethnicity, and the same Pell Grant status, were included in the model to determine if certain students were more likely to use a meal together. To determine the extent of joint meal plan usage over time, terms for month, day of week, and time of day were included in the model. To account for repeated measures by students, a clustering effect by student was included.

Floormate simulation analysis—The same analyses, but using floormates rather than roommates, was conducted to help determine if results may have been due to shared residence, rather than roommate, effects. Analyses were conducted for 250 different floormate randomizations. The distribution of the model parameters of interest from these simulations were used to determine the confidence intervals and level of significance. Statistical significance was determined at $p < 0.01$ due to the large sample size and number of tests. All analyses were conducted using the statistical software R (version 3.6.1). The GEEs were run using the R geepack package (version 1.2–1).

RESULTS

Descriptives

A summary of the 1911 students with low, typical, and high frequency of meal plan use are shown in Table 1. Students with low number of meals used tended to purchase the cheapest meal plan (43% Fall, 57% Spring). Students with high number of meals used tended to be male (95%) and to purchase the unlimited meal plan (97%, 100%; Fall, Spring). The average number of meals used per semester was 109 ($sd=60$). Some students rarely used their meal plan: 2.2% of females and 1.2% of males used less than five meals over the entire Spring semester.

Bivariate analyses indicated that of the 1186 students with a roommate, students who purchased the cheaper meal plans tended to be female, Hispanic/Latino or International, and Pell Grant recipients (Table 2). Students tended to purchase the second most expensive meal plan (14 meals/week; $418/1186=35\%$) in the Fall semester, and the cheapest meal plan (8 meals/week; $438/1186=37\%$) in the Spring semester. Of the 1186 students with a roommate, 66 students (6%) changed their meal plan after the start of Fall, and 108 (9%) changed their meal plan after the start of Spring.

Roommates were significantly more likely than floormates to be the same race/ethnicity (45% vs 32%; $p < 0.001$), to have the same Pell Grant status (62% vs 57%; $p < 0.001$), and to be on the same meal plan in Fall (37% vs 28%; $p < 0.001$) and Spring (37% vs 31%; $p < 0.001$). As shown in Table 3, after controlling for residence hall and sex, the percentage of female roommates with the same race/ethnicity remained higher than expected for four of the six residence halls; for males one of the six residence halls had a higher percentage of roommates having the same race/ethnicity than expected, and one residence hall had *fewer* roommates of the same race/ethnicity than expected. One of the female residence halls, and

two of the male residence halls, had a higher percentage of roommates sharing the same Pell Grant status than expected.

Number of meals used—For females, students whose roommate was on the same meal plan used an additional eight meals per semester on average ($\beta=7.71$, 99% CI=2.57, 12.86; Table 4); this association was positive, but not significant, for males having the same meal plan as their roommate and number of meals used ($\beta=4.02$, 99% CI=-5.29, 13.33). There was no association between number of meals used and roommates being the same race/ethnicity (Female: $\beta=-2.32$, 99% CI=-8.31, 3.67; Male: $\beta=-5.90$, 99% CI=-16.70, 4.90) or having the same Pell Grant status (Female: $\beta=-0.74$, 99% CI=-6.81, 5.33; Male: $\beta=7.45$, 99% CI=-3.82, 18.72). As expected, students on the cheapest meal plans used fewer meals than students on the more expensive meal plans (Female: $\beta=-76.28$, 99% CI=-88.94, -63.61; Male: $\beta=-79.49$, 99% CI=-93.07, -65.91). For every meal a student's roommate used, students were predicted to use around an additional 0.2 meals over the semester (Female: $\beta=0.23$, 99% CI=0.16, 0.31; Male: $\beta=0.18$, 99% CI=0.09, 0.28). To illustrate, if a student's roommate used 150, rather than 50 meals over the semester, the student would be anticipated to use around an additional 20 meals over the semester – more than one additional meal per week. The number of meals students used in the Spring semester remained significantly associated with the number of meals their roommate used in the Spring semester (Female: $\beta=0.07$, 99% CI=0.00, 0.13; Male: $\beta=0.10$, 99% CI=0.02, 0.18; Table 5), even after accounting for the number of meals the student used in the Fall semester.

When analyses were conducted within smaller strata defined by roommate similarities on key variables (e.g., meal plan, race/ethnicity, and Pell grant status) effect sizes were uniformly positive and generally within the 95% confidence intervals for the original effects. Despite the substantial reduction in sample size, the association between the number of meals students and their roommate used in the Spring semester remained significant for female roommates on the same meal plan ($\beta=0.15$, 99% CI=0.03, 0.28), female roommates of the same race/ethnicity ($\beta=0.14$, 99% CI=0.05, 0.23), male roommates on a different meal plan ($\beta=0.11$, 99% CI=0.01, 0.21), and male roommates with the same Pell Grant status ($\beta=0.10$, 99% CI=0.01, 0.19; Supplementary Table 1).

Meal plan joint usage—The proportion of meals students used at the same time and location as their roommate was 21% in Fall and 14% in Spring. Figure 1 shows the proportion of meals students used with their roommate for each month. Joint meal plan usage was more likely if both the student and roommate were on the same meal plan (Female: OR=1.61, 99% CI=1.27, 2.04; Male: OR=1.57, 99% CI=1.09, 2.25; Table 6). Joint meal plan usage among females was more likely if the student and the roommate were the same race/ethnicity (OR=1.76, 99% CI=1.33, 2.32), and less likely if the student was Black/African American (OR=0.44, 99% CI=0.28, 0.70). Students were most likely to use a meal with their roommate in August (the start of the academic year). Joint meal plan usage between roommates decreased as the year progressed. Compared to August, students used less meals with their roommate in September (Female: OR=0.57, 99% CI=0.52, 0.63; Male: OR=0.50, 99% CI=0.44, 0.57), with the least number of meals used with a roommate occurring in April (the end of the academic year; Female: OR=0.25, 99% CI=0.21, 0.31;

Male: OR=0.22, 99% CI=0.17, 0.29). Students were more likely to use a meal with their roommate during weekends than weekdays (Female: OR=1.17, 99% CI=1.08, 1.26; male: OR=1.28, 99% CI=1.16, 1.41), and after morning (Female: OR=1.24–1.53, $p < 0.001$; Male: OR=1.31–1.88, $p < 0.003$)

Floormate simulation analysis—When floormates, rather than roommates, were examined, there was no association between the number of meals students and their floormates used (Female: $\beta=0.01$, 99% CI=-0.08, 0.10; Male: $\beta=0.01$, 99% CI=-0.09, 0.10; Table 7). The extent of joint meal plan use among floormates was 1.22% in Fall and 0.93% in Spring. Apart from male floormates having higher joint meal plan use at midday (OR=1.75, 99% CI=1.05, 2.92) and in the evening (OR=1.89, 99% CI=1.15, 3.11) than in the morning, no association between floormates and joint meal plan use was found (Table 8).

DISCUSSION

This study examined if roommates used their meal plans a similar extent, and at the same time and location as each other. Understanding this roommate similarity is required before interventions designed to alter meal plan decisions via roommate influence are tested. This study indicates that roommates influence the number of meals used from meal plans, and that the extent of joint meal plan use between roommates decreases after the start of the academic year. The two mechanisms likely leading to similarities in meal plan decisions among roommates are influence and selection. Additional research examining the roommate assignment process, showing how students' friendship groups form, and who students eat with over time, even after their first year, may suggest at-risk student populations to target for interventions later in the year and throughout students' time in college.

Students were more likely to purchase the cheapest, and less likely to purchase the most expensive, meal plan in the Spring semester. This may suggest students used the dining hall less than they (or their parents) had anticipated in the Fall semester. The default meal plan at this university provided 14 meals/week, and is advertised as “super popular” and the “most selected plan for first year residents” (Arizona State University, 2018b). A combination of default settings, advertising, and intentions to ensure a smooth transition to university may have contributed to a misalignment between the number of meal plan meals available to students and students' meal plan use. Given the popularity of the cheapest meal plan (8 meals/week) in the Spring semester, we question if a meal plan providing 8 meals per week is sufficient for students' meal plan needs. Additionally, given the number of students who did not use their meal plan for an entire month (7% of students), and the percentage of students who didn't use their meal plan for an entire month who purchased the cheapest meal plan (43% Fall, 57% Spring), we question the ethics of requiring students to purchase a meal plan. However, it is unclear where students obtained the rest of their meals. University students tend to have diets that do not meet dietary guidelines (Brown, Dresen, & Eggett, 2005; Kolodinsky, Harvey-Berino, Berlin, Johnson, & Reynolds, 2007), and healthful options are typically more readily available in dining halls than other food outlets in the campus food environment (Horacek, et al., 2013). Understanding why students are not using the dining hall(s) may suggest changes that improve students' dietary intake. The reasons for students opting to purchase smaller meal plans in the Spring semester should be researched

further. Additionally, the reasons for the Fall meal plan purchases should also be examined. Given that Pell Grant recipients (i.e. lower-income students) were more likely to purchase the cheapest meal plan in Fall we anticipate that one of the main reasons behind meal plan purchase decisions is cost.

Weight gain is common for first-year students, and is potentially associated with meal plan use. Kapinos et al. found that female (but not male) students whose residence was connected to a dining hall gained more weight than students whose residence was not connected to a dining hall (Kapinos & Yakusheva, 2011). Systematic reviews suggest that first-year students gain weight during their entire first year of college (Fedewa, Das, Evans, & Dishman, 2014; Vella-Zarb & Elgar, 2009), and some studies suggest that more weight is gained in Fall than in Spring (Lloyd-Richardson, Bailey, Fava, Wing, & Network, 2009; van Woerden, et al., 2018). How students' higher number of meals used in Fall is associated with students weight gain in Fall is unknown. Prior studies suggest that friends and roommates influence weight gain (Bruening, et al., 2018; van Woerden, et al., 2018). This study suggests that one mechanism for this weight gain may be meal plan use; students used more meals over the semester if their roommate also did so. Further research should examine if dining hall use is associated with weight gain, and if students are choosing meal plans that provide less dining hall meals in Spring due to weight concerns.

Students were more likely to use a meal with their roommate if they were the same race/ethnicity; the reason why was unclear. One study indicated that White students reported more satisfaction and involvement with their roommate when assigned a roommate that was the same race (Shook & Fazio, 2008). The findings from this study may further suggest that friendships among roommates of different race/ethnicities are less developed than friendships between roommates of the same race/ethnicity. Another study showed that roommates who requested to room with friends were more racially/ethnically homogenous than roommates who were randomly assigned (Van Laar, et al., 2005). Further research should examine the underlying causes of the association between roommates' relationship and race/ethnicity before any conclusion on shared meal plan use by roommates shared race/ethnicity is made.

Students were less likely to use a meal plan with their roommate on weekdays, in the morning, and after the first month. Potentially, roommates spend more time together later in the day, and during weekends rather than weekdays. The lower number of meals used with a roommate later in the year may indicate that first-year roommates become more independent of each other as the year progresses. One study indicated that in the first year of college, students spend more time with their roommate than any other student, but that less than 40% of students list their roommate as a 'best friend' (Stinebrickner & Stinebrickner, 2006). After the first month, students may be forging different friendship groups, and be less co-dependent on their roommates. As such, interventions targeted to first-year roommates living in residence halls may be more effective at the very start of the academic year.

The percentage of roommates with the same race/ethnicity and Pell Grant status was higher than expected for some residence halls which indicates that some roommates were likely not randomly assigned. While the pre-existing relationship between roommates in this study was

unknown a prior study using a subset of the students used in this study suggested that around 80% of roommates were randomly assigned; of 75 roommate pairs examined there were only 16 roommate pairs where at least one of the students reported meeting their roommate prior to coming to campus (van Woerden, et al.). Interestingly, the percentage of roommates sharing the same Pell Grant status was generally within the expected range for most residence halls, while the percentage of roommates sharing the same race/ethnicity was higher for several residence halls. Some students may have known their roommate in person prior to starting college, while others may have requested to be roommates after meeting online (see <https://asu.uloop.com/roommates/> and <https://www.roomsurf.com/> for example websites). Students who met online may have been able to determine potential roommates' race/ethnicity more easily than wealth status, resulting in more roommates having a higher than expected number of matches on race/ethnicity than Pell Grant status. Alternatively, students may have preferred a roommate with the same race/ethnicity than a student with the same wealth status.

While we expect some roommates were not randomly assigned, the results from this study are still of relevance. Even if some of the similarities between the number of meals students and their roommates used and the extent of joint meal plan use were due to roommate selection (rather than roommate influence), the findings indicate that roommates use their meal plan to a more similar extent than non-roommates. Notably, when we stratified the analyses by roommate demographic similarities, the effect size for roommate influence remained positive in all of the models, even those that were demographically dissimilar. Demographically dissimilar roommate pairs could not have selected their roommate based on shared demographics, which suggests that the results obtained cannot solely be attributed to roommate selection based on pre-existing similarities related to race, Pell Grant status, or meal plan. The lack of meal plan similarities between students and their same-sex floormates suggest the similarities we observed among roommates are not due to environmental factors. Interventions aimed to alter meal plan use may be more effective if targeted at roommates than individual students. Future research should examine effect modification among randomly selected roommates and prior selected roommates.

Strengths and Limitations

The strengths of this study include the large sample size, objective measures of meal plan use for an entire academic year, university-derived information for student demographics and living location, and the simulation analysis which allows potential environment effects to be examined. Additionally, objective measures of shared meal use over time among a newly-acquainted population were examined. The main limitation, as discussed above, is the lack of clarity around which roommates were randomly assigned to each other. It is difficult to distinguish roommate selection from roommate influence in this study. Other limitations include not knowing how much time roommates spent together; indeed, students may have unofficially resided somewhere other than their dorm room. Students' schedules were also unknown; some students may have been off-campus for periods of time (e.g., field trips, sickness) such that it was not possible for their roommate to use a meal with them. Additionally, it was unclear if students shared their student ID/meal plan card with others.

These findings are from a single cohort of students at one university and results may be different in other years, and at other institutions.

Conclusion

The findings of this study suggests that many students do not use their meal plan to the full extent, and that students tend to purchase the cheapest meal plan option – particularly in the Spring semester. The volume of students' meal plan usage was associated with their roommate's meal plan usage, as was the timing and location of the meals used. The simulation analyses using floormates found no association between students' and floormates' meal plan use. As such, while it is unclear if the similarities between roommates were due to selection or influence effects, the findings are unlikely to be due to environmental effects. Roommates were more likely to use a meal together if they were the same race/ethnicity, however the reason for this finding was unclear. Future research should examine who students use their meals with later in the academic year, predictors of friendship and shared activities between roommates, and how students decide between choosing a roommate (that they may not know well) and being randomly assigned a roommate.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

REFERENCES

- Arizona State University. Privacy Statements. <https://www.asu.edu/privacy/> Accessed August 15 2018.
- Arizona State University. Traditional Meal Plans. <https://sundevidining.asu.edu/meal-plans/traditional-meal-plans> Accessed September 15 2018.
- Brown LB, Dresen RK, & Eggett DL (2005). College students can benefit by participating in a prepaid meal plan. *Journal of the American Dietetic Association*, 105, 445–448. [PubMed: 15746834]
- Bruening M, van Woerden I, Schaefer DR, Hruschka D, Brewis A, Whisner CM, Dunton G, Todd M, Ohri-Vachaspati P, & Laska M. (2018). Friendship as a social mechanism influencing body mass index (BMI) among college students. *PLoS one*, 13, e0208894.
- Carrell SE, Sacerdote BI, & West JE (2011). From natural variation to optimal policy? The Lucas critique meets peer effects. In: National Bureau of Economic Research.
- College Counselor Services. Do College Students Have to Purchase Meal Plans? <http://www.collegecounselorservices.com/faq/do-college-students-have-to-purchase-meal-plans/>
- De La Haye K, Robins G, Mohr P, & Wilson C. (2011). How physical activity shapes, and is shaped by, adolescent friendships. *Social science & medicine*, 73, 719–728. [PubMed: 21802807]
- Duncan GJ, Boisjoly J, Kremer M, Levy DM, & Eccles J. (2005). Peer effects in drug use and sex among college students. *Journal of abnormal child psychology*, 33, 375–385. [PubMed: 15957564]
- Powell Farran. (2018). What to Know About the Cost of Paying for Meals in College. <https://www.usnews.com/education/best-colleges/paying-for-college/articles/2018-05-23/what-to-know-about-the-cost-of-paying-for-meals-in-college>. In U.S. News.
- Fedewa MV, Das BM, Evans EM, & Dishman RK (2014). Change in weight and adiposity in college students: a systematic review and meta-analysis. *American journal of preventive medicine*, 47, 641–652. [PubMed: 25241201]
- Horacek TM, Erdman MB, Byrd-Bredbenner C, Carey G, Colby SM, Greene GW, Guo W, Kattelman KK, Olfert M, & Walsh J. (2013). Assessment of the dining environment on and near the campuses of fifteen post-secondary institutions. *Public health nutrition*, 16, 1186–1196. [PubMed: 23174458]

- Kapinos KA, & Yakusheva O. (2011). Environmental influences on young adult weight gain: evidence from a natural experiment. *Journal of Adolescent Health*, 48, 52–58. [PubMed: 21185524]
- Kolodinsky J, Harvey-Berino JR, Berlin L, Johnson RK, & Reynolds TW (2007). Knowledge of current dietary guidelines and food choice by college students: better eaters have higher knowledge of dietary guidance. *Journal of the American Dietetic Association*, 107, 1409–1413. [PubMed: 17659910]
- Lloyd-Richardson EE, Bailey S, Fava JL, Wing R, & Network TER (2009). A prospective study of weight gain during the college freshman and sophomore years. *Preventive medicine*, 48, 256–261. [PubMed: 19146870]
- Sacerdote B. (2001). Peer effects with random assignment: Results for Dartmouth roommates. *The Quarterly journal of economics*, 116, 681–704.
- Shook NJ, & Fazio RH (2008). Interracial roommate relationships: An experimental field test of the contact hypothesis. *Psychological Science*, 19, 717–723. [PubMed: 18727788]
- Stinebrickner R, & Stinebrickner TR (2006). What can be learned about peer effects using college roommates? Evidence from new survey data and students from disadvantaged backgrounds. *Journal of public Economics*, 90, 1435–1454.
- Van Laar C, Levin S, Sinclair S, & Sidanius J. (2005). The effect of university roommate contact on ethnic attitudes and behavior. *Journal of Experimental Social Psychology*, 41, 329–345.
- van Woerden I, Hruschka D, Brewis A, Schaefer D, & Bruening M. Roommates' body size influences weight gain over time. Under review.
- van Woerden I, Hruschka D, Vega-López S, Schaefer DR, Adams M, & Bruening M. (2019). Food Insecure College Students and Objective Measurements of Their Unused Meal Plans. *Nutrients*, 11, 904.
- Vella-Zarb RA, & Elgar FJ (2009). The 'freshman 5': a meta-analysis of weight gain in the freshman year of college. *Journal of American College Health*, 58, 161–166. [PubMed: 19892653]
- Zimmerman DJ (2003). Peer effects in academic outcomes: Evidence from a natural experiment. *The Review of Economics and statistics*, 85, 9–23.

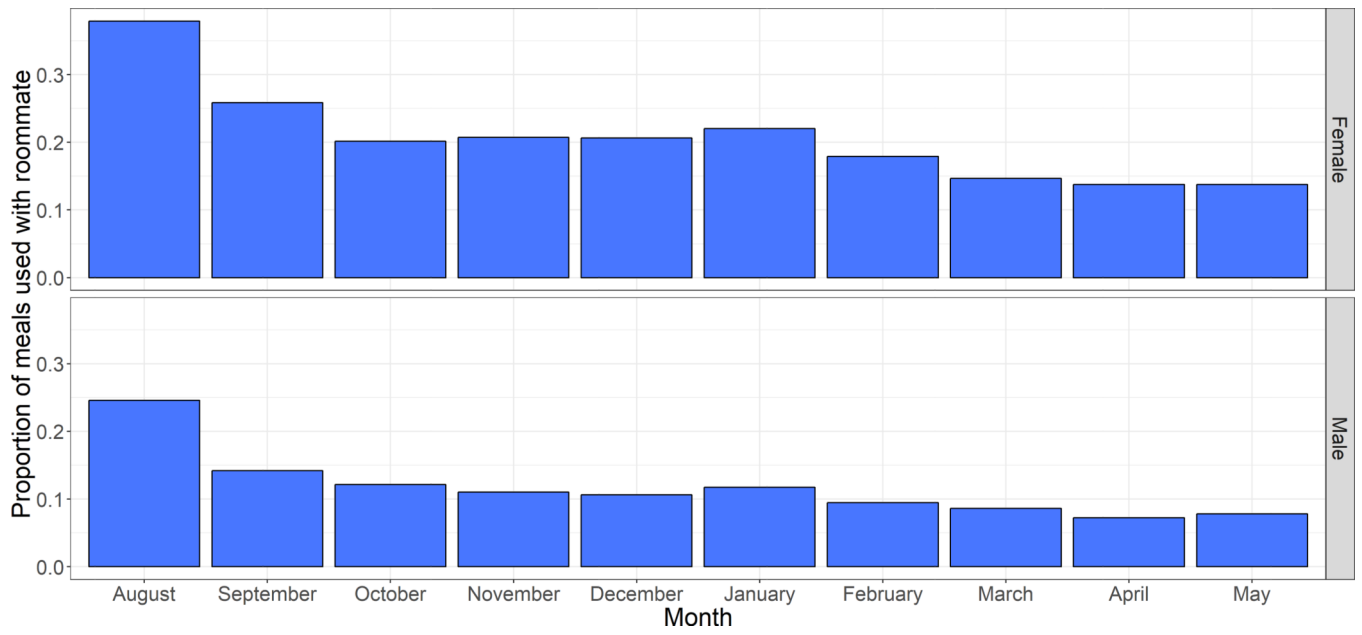


Figure 1: Proportion of meals used at same time (within one minute) and location as roommate, by sex and month (n=1186 students; 266,243 data points)

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Table 1:

Extent students aged 17–20 years with complete demographics, known and standard meal plan, and one residence (n=1911) used their meal plan by key demographics.

Meal plan use	Low ^C	Typical	High ^D
n	129	1745	37
Sex, n (%)			
Female	81 (62.8)	1090 (62.5)	2 (5.4)
Male	48 (37.2)	655 (37.5)	35 (94.6)
Race/Ethnicity, n (%)			
White	57 (44.2)	875 (50.1)	23 (62.2)
Black/African American	13 (10.1)	141 (8.1)	1 (2.7)
Hispanic/Latino	32 (24.8)	380 (21.8)	8 (21.6)
International	8 (6.2)	110 (6.3)	1 (2.7)
Two or more races	10 (7.8)	116 (6.6)	1 (2.7)
Other	9 (7.0)	123 (7.0)	3 (8.1)
Pell grant recipient, n (%)			
No	81 (62.8)	1186 (68.0)	26 (70.3)
Yes	48 (37.2)	559 (32.0)	11 (29.7)
Age (mean (sd))	18.4 (0.4)	18.4 (0.4)	18.5 (0.4)
Fall Meal plan, n (%)^A			
8 meals/week	56 (43.4)	473 (27.1)	0 (0.0)
180 meals/semester ^E	23 (17.8)	345 (19.8)	0 (0.0)
14 meals/week	31 (24.0)	604 (34.6)	1 (2.7)
Unlimited meals	19 (14.7)	323 (18.5)	36 (97.3)
Spring Meal plan, n (%)^B			
8 meals/week	73 (56.6)	658 (37.7)	0 (0.0)
180 meals/semester ^E	16 (12.4)	364 (20.9)	0 (0.0)
14 meals/week	26 (20.2)	503 (28.8)	0 (0.0)
Unlimited meals	14 (10.9)	220 (12.6)	37 (100.0)

^A A significant difference between students with low and typical meal plan use by meal plan was found in Fall (p=0.001)

^B A significant difference between students with low and typical meal plan use by meal plan was found in Spring (p<0.001)

^C Students were classified as having low meal plan use if they did not use their meal plan for an entire month.

^D Students were classified as having high meal plan use if they used their meal plan more than 289 (mean + 3 SD) times in either semester.

^E 180 meals/semester equates to approximately 11 meals per week with consistent use

Table 2: Key demographics for the 1186 students (593 roommates) by meal plan type and academic semester.

meal plan	Total	Fall 2015					Spring 2016					P value
		8 meals/ week	180 meals/ semester ^A	14 meals/ week	Unlimited meals	P value	8 meals/ week	180 meals/ semester ^A	14 meals/ week	Unlimited meals		
Sex (%)	1186	318	227	418	223		438	245	351	152		
Female	752 (63.4)	232 (73.0)	167 (73.6)	259 (62.0)	94 (42.2)	<0.001	327 (74.7)	176 (71.8)	200 (57.0)	49 (32.2)	<0.001	
Male	434 (36.6)	86 (27.0)	60 (26.4)	159 (38.0)	129 (57.8)		111 (25.3)	69 (28.2)	151 (43.0)	103 (67.8)		
Race/Ethnicity (%)												
White	603 (50.8)	124 (39.0)	116 (51.1)	243 (58.1)	120 (53.8)	<0.001	181 (41.3)	126 (51.4)	211 (60.1)	85 (55.9)	<0.001	
Black/African American	92 (7.8)	22 (6.9)	15 (6.6)	39 (9.3)	16 (7.2)		28 (6.4)	20 (8.2)	35 (10.0)	9 (5.9)		
Hispanic/Latino	265 (22.3)	96 (30.2)	47 (20.7)	83 (19.9)	39 (17.5)		124 (28.3)	49 (20.0)	64 (18.2)	28 (18.4)		
International	69 (5.8)	34 (10.7)	14 (6.2)	11 (2.6)	10 (4.5)		47 (10.7)	10 (4.1)	7 (2.0)	5 (3.3)		
Two or more races	78 (6.6)	16 (5.0)	20 (8.8)	22 (5.3)	20 (9.0)		26 (5.9)	18 (7.3)	21 (6.0)	13 (8.6)		
Other	79 (6.7)	26 (8.2)	15 (6.6)	20 (4.8)	18 (8.1)		32 (7.3)	22 (9.0)	13 (3.7)	12 (7.9)		
Pell Grant recipient (%)												
No	819 (69.1)	195 (61.3)	159 (70.0)	304 (72.7)	161 (72.2)	0.005	280 (63.9)	168 (68.6)	254 (72.4)	117 (77.0)	0.009	
Yes	367 (30.9)	123 (38.7)	68 (30.0)	114 (27.3)	62 (27.8)		158 (36.1)	77 (31.4)	97 (27.6)	35 (23.0)		
Age (mean (sd))	18.39 (0.40)	18.40 (0.43)	18.37 (0.39)	18.38 (0.39)	18.44 (0.41)	0.224	18.40 (0.42)	18.38 (0.37)	18.36 (0.40)	18.46 (0.42)	0.108	
Dorm (%)												
A	494 (41.7)	134 (42.1)	102 (44.9)	179 (42.8)	79 (35.4)	0.001	185 (42.2)	107 (43.7)	144 (41.0)	58 (38.2)	0.002	
B	62 (5.2)	14 (4.4)	10 (4.4)	18 (4.3)	20 (9.0)		24 (5.5)	10 (4.1)	17 (4.8)	11 (7.2)		
C	356 (30.0)	84 (26.4)	63 (27.8)	139 (33.3)	70 (31.4)		111 (25.3)	79 (32.2)	120 (34.2)	46 (30.3)		
D	52 (4.4)	27 (8.5)	8 (3.5)	13 (3.1)	4 (1.8)		33 (7.5)	4 (1.6)	11 (3.1)	4 (2.6)		
E	130 (11.0)	40 (12.6)	23 (10.1)	35 (8.4)	32 (14.3)		60 (13.7)	22 (9.0)	29 (8.3)	19 (12.5)		
F	92 (7.8)	19 (6.0)	21 (9.3)	34 (8.1)	18 (8.1)		25 (5.7)	23 (9.4)	30 (8.5)	14 (9.2)		
% meals at same time and location as roommate	0.18 (0.20)	0.24 (0.25)	0.21 (0.21)	0.20 (0.21)	0.18 (0.19)	0.028	0.16 (0.22)	0.13 (0.17)	0.13 (0.19)	0.11 (0.16)	0.095	

^A180 meals/semester equates to approximately 11 meals per week with consistent use

Table 3:

Percentage of roommates with the same race/ethnicity and Pell Grant status and expected sociodemographic distribution based on roommates sociodemographic.

	Females			Males		
	<u>Actual</u>	<u>Permutation</u>		<u>Actual</u>	<u>Permutation</u>	
Race/ethnicity						
Residence Hall	% same	Median % same	99% CI	% same	Median % same	95% CI
A	51	38	(31, 46)	46	40	(29, 53)
B	33	28	(11, 56)	23	15	(0, 46)
C	48	36	(27, 46)	49	31	(20, 43)
D	41	24	(0, 47)	22	22	(0, 67)
E	45	21	(6, 39)	34	25	(9, 41)
F	46	25	(7, 43)	22	39	(22, 61)
Pell Grant						
Residence Hall	% same	Median % same	99% CI	% same	Median % same	99% CI
A	62	49	(43, 58)	71	49	(38, 62)
B	39	48	(19, 76)	69	44	(22, 78)
C	58	50	(39, 60)	69	50	(37, 61)
D	65	45	(27, 82)	56	43	(14, 86)
E	58	48	(29, 71)	59	49	(33, 69)
F	57	47	(27, 73)	67	50	(25, 75)

Table 4:

Number meals used by first-year students, adjusted for roommate meal plan use (Females: n=752 students, 1504 data points; Males: 434=students, 868 data points).

	Female			Male		
	β	99% CI	P value	β	99% CI	P value
Race/ethnicity						
White						
Black/African American	4.96	(-7.10, 17.03)	0.289	-16.03	(-34.09, 2.04)	0.022
Hispanic/Latino	-4.29	(-11.73, 3.15)	0.137	-8.10	(-21.82, 5.62)	0.129
International	15.40	(2.21, 28.58)	0.003	1.95	(-13.84, 17.73)	0.751
Two or more races	3.81	(-7.71, 15.34)	0.394	-6.16	(-31.94, 19.63)	0.539
Other	-4.63	(-18.18, 8.91)	0.378	4.17	(-9.83, 18.17)	0.443
Same race/ethnicity	-2.32	(-8.31, 3.67)	0.318	-5.90	(-16.70, 4.90)	0.160
Pell grant recipient						
No						
Yes	3.81	(-2.73, 10.35)	0.133	4.41	(-7.40, 16.22)	0.336
Same Pell grant status	-0.74	(-6.81, 5.33)	0.755	7.45	(-3.82, 18.72)	0.089
Age	-0.79	(-7.62, 6.04)	0.765	-6.12	(-17.72, 5.47)	0.174
Residence Hall						
A						
B	-13.87	(-28.78, 1.03)	0.017	2.52	(-18.34, 23.37)	0.756
C	-15.50	(-22.97, -8.04)	<0.001	-13.93	(-26.30, -1.57)	0.004
D	-20.25	(-31.82, -8.67)	<0.001	-24.11	(-41.56, -6.67)	<0.001
E	-18.80	(-29.72, -7.88)	<0.001	-14.32	(-29.75, 1.10)	0.017
F	-24.28	(-36.84, -11.72)	<0.001	-18.15	(-35.27, -1.04)	0.006
Semester						
Fall 2015						
Spring 2016	-0.89	(-3.66, 1.87)	0.405	-3.94	(-8.22, 0.34)	0.018
Student meal plan						
Unlimited meals						
8 meals/week	-76.28	(-88.94, -63.61)	<0.001	-79.49	(-93.07, -65.91)	<0.001
180 meals/semester ^A	-49.08	(-61.89, -36.28)	<0.001	-48.22	(-64.27, -32.17)	<0.001
14 meals/week	-41.05	(-54.03, -28.08)	<0.001	-35.93	(-50.06, -21.80)	<0.001
Same meal plan	7.71	(2.57, 12.86)	<0.001	4.02	(-5.29, 13.33)	0.266
Number meals roommate used	0.23	(0.16, 0.31)	<0.001	0.18	(0.09, 0.28)	<0.001

^A180 meals/semester equates to approximately 11 meals per week with consistent use

Number meals used in the Spring semester by first-year students, adjusted for fall semester use and roommate use in the spring semester (Females: n=752 students, 1504 data points; Males: 434=students, 868 data points).

Table 5:

	Female n=752			Male n=434		
	β	99% CI	P value	β	99% CI	P value
Race/ethnicity						
White	(ref)					
Black/African American	5.87	(-3.70, 15.44)	0.114	-1.87	(-18.35, 14.60)	0.770
Hispanic/Latino	-1.98	(-8.39, 4.42)	0.425	4.45	(-6.72, 15.62)	0.305
International	2.40	(-10.46, 15.26)	0.631	-18.11	(-34.43, -1.79)	0.004
Two or more races	5.19	(-6.57, 16.96)	0.256	-12.08	(-34.40, 10.24)	0.163
Other	1.67	(-8.38, 11.72)	0.669	-6.14	(-24.63, 12.36)	0.393
Same race/ethnicity	0.02	(-5.12, 5.16)	0.992	1.89	(-6.97, 10.76)	0.582
Pell grant recipient						
No	(ref)					
Yes	2.54	(-3.24, 8.32)	0.257	0.00	(-11.53, 11.53)	1.000
Same Pell grant status	2.20	(-3.02, 7.43)	0.278	2.64	(-7.08, 12.35)	0.484
Age	0.33	(-5.83, 6.49)	0.890	-3.25	(-12.72, 6.22)	0.376
Residence Hall						
A	(ref)					
B	-11.58	(-26.09, 2.93)	0.040	3.72	(-14.19, 21.64)	0.592
C	-5.96	(-11.90, -0.03)	0.010	-7.20	(-17.55, 3.16)	0.073
D	-11.21	(-21.26, -1.15)	0.004	-0.17	(-18.18, 17.84)	0.981
E	-2.83	(-12.27, 6.61)	0.440	6.10	(-6.89, 19.09)	0.227
F	-5.42	(-15.55, 4.71)	0.168	-4.28	(-25.19, 16.63)	0.598
Student meal plan (Spring)						
Unlimited meals	(ref)					
8 meals/week	-29.31	(-46.22, -12.41)	<0.001	-16.67	(-33.77, 0.43)	0.012
180 meals/semester ^A	-12.73	(-29.21, 3.76)	0.047	-9.84	(-27.43, 7.74)	0.149
14 meals/week	-17.42	(-33.76, -1.08)	0.006	-1.74	(-14.48, 11.00)	0.725
Same meal plan	4.62	(-0.45, 9.69)	0.019	2.50	(-6.06, 11.06)	0.453

	Female n=752			Male n=434		
	β	99% CI	P value	β	99% CI	P value
Student Number meals used (Fall)	0.63	(0.55, 0.71)	<0.001	0.68	(0.55, 0.80)	<0.001
Roommate Number meals used (Spring)	0.07	(0.00, 0.13)	0.006	0.10	(0.02, 0.18)	0.001

^A 180 meals/semester equates to approximately 11 meals per week with consistent use

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Table 6:

Logistic regression predicting which meals students would use within 1 minute and at the same location as their roommate (Females: n=752 students, 153,370 data points; Males: 434=students, 112,873 data points).

	Female			Male		
	OR	99% CI	P value	OR	99% CI	P value
Race/ethnicity						
White	(ref)					
Black/African American	0.44	(0.28, 0.70)	<0.001	0.83	(0.48, 1.46)	0.408
Hispanic/Latino	0.76	(0.54, 1.09)	0.051	1.27	(0.75, 2.13)	0.239
International	0.78	(0.46, 1.32)	0.228	0.66	(0.33, 1.31)	0.121
Two or more races	1.13	(0.66, 1.92)	0.564	0.92	(0.39, 2.19)	0.806
Other	1.27	(0.75, 2.16)	0.243	1.46	(0.65, 3.29)	0.225
Same race/ethnicity	1.76	(1.33, 2.32)	<0.001	1.41	(0.96, 2.06)	0.020
Pell grant recipient						
No	(ref)					
Yes	0.96	(0.72, 1.28)	0.722	0.96	(0.62, 1.47)	0.799
Same Pell grant status	1.08	(0.82, 1.42)	0.496	1.14	(0.77, 1.67)	0.398
Age	0.89	(0.65, 1.22)	0.339	1.15	(0.72, 1.81)	0.446
Residence Hall						
A	(ref)					
B	1.11	(0.59, 2.11)	0.663	1.51	(0.83, 2.73)	0.075
C	1.02	(0.77, 1.36)	0.824	1.16	(0.78, 1.74)	0.333
D	1.06	(0.59, 1.90)	0.807	2.13	(0.76, 5.97)	0.058
E	0.99	(0.61, 1.61)	0.965	1.41	(0.79, 2.54)	0.126
F	0.69	(0.40, 1.18)	0.073	0.54	(0.24, 1.19)	0.045
Student meal plan						
Unlimited meals	(ref)					
8 meals/week	0.90	(0.60, 1.35)	0.494	1.64	(0.96, 2.80)	0.018
180 meals/semester ^A	0.87	(0.58, 1.31)	0.394	1.12	(0.62, 2.03)	0.615
14 meals/week	0.87	(0.60, 1.28)	0.366	0.96	(0.65, 1.41)	0.775
Same meal plan	1.61	(1.27, 2.04)	<0.001	1.57	(1.09, 2.25)	0.001
Month						
August	(ref)					
September	0.57	(0.52, 0.63)	<0.001	0.50	(0.44, 0.57)	<0.001
October	0.41	(0.36, 0.46)	<0.001	0.41	(0.35, 0.49)	<0.001
November	0.42	(0.37, 0.48)	<0.001	0.36	(0.30, 0.43)	<0.001
December	0.43	(0.37, 0.5)	<0.001	0.35	(0.28, 0.44)	<0.001
January	0.46	(0.39, 0.53)	<0.001	0.38	(0.31, 0.47)	<0.001
February	0.36	(0.30, 0.42)	<0.001	0.30	(0.24, 0.38)	<0.001
March	0.28	(0.23, 0.33)	<0.001	0.27	(0.22, 0.34)	<0.001
April	0.25	(0.21, 0.31)	<0.001	0.22	(0.17, 0.29)	<0.001

	Female			Male		
	OR	99% CI	P value	OR	99% CI	P value
May	0.26	(0.20, 0.33)	< 0.001	0.25	(0.18, 0.35)	< 0.001
Day of week						
Weekday	(ref)					
Weekend	1.17	(1.08, 1.26)	< 0.001	1.28	(1.16, 1.41)	< 0.001
Time of Day						
Morning (before 10 AM)	(ref)					
Midday (10 AM to 1 PM)	1.33	(1.15, 1.55)	< 0.001	1.31	(1.04, 1.64)	0.003
Afternoon (1 PM to 4 PM)	1.24	(1.06, 1.47)	0.001	1.44	(1.15, 1.81)	< 0.001
Evening (after 4 PM)	1.53	(1.32, 1.78)	< 0.001	1.88	(1.49, 2.37)	< 0.001

^A 180 meals/semester equates to approximately 11 meals per week with consistent use

Table 7:

Number meals used by first-year students, adjusted for floormate meal plan use (Females: n=676 students, 1352 data points; Males: 442=students, 884 data points).

	Female			Male		
	β	99% CI	P value	β	99% CI	P value
Race/ethnicity						
White						
Black/African American	8.64	(3.06, 14.22)	<0.001	-5.90	(-14.7, 2.9)	0.084
Hispanic/Latino	-7.95	(-12.43, -3.46)	<0.001	-5.65	(-12.16, 0.87)	0.026
International	9.18	(2.28, 16.08)	0.001	-4.02	(-10.35, 2.32)	0.102
Two or more races	-2.53	(-9.19, 4.12)	0.327	-3.49	(-14.61, 7.62)	0.418
Other	-2.29	(-8.11, 3.54)	0.312	12.18	(5.99, 18.37)	<0.001
Same race/ethnicity	0.01	(-7.5, 7.51)	0.999	4.61	(-5.99, 15.21)	0.262
Pell grant recipient						
No						
Yes	1.92	(-1.95, 5.79)	0.202	-5.30	(-11.6, 1.01)	0.030
Same Pell grant status	1.09	(-5.23, 7.41)	0.658	-3.21	(-12.76, 6.34)	0.387
Age	3.60	(-0.09, 7.28)	0.012	-1.70	(-6.08, 2.68)	0.316
Residence Hall						
A						
B	-13.26	(-18.79, -7.72)	<0.001	1.26	(-5.93, 8.44)	0.653
C	-22.94	(-27.91, -17.97)	<0.001	-19.54	(-25.86, -13.22)	<0.001
D	-31.89	(-38.5, -25.27)	<0.001	-31.62	(-39.36, -23.87)	<0.001
E	-23.94	(-28.53, -19.35)	<0.001	-18.42	(-25.47, -11.37)	<0.001
F	-28.44	(-35.76, -21.13)	<0.001	-16.55	(-24.39, -8.71)	<0.001
Semester						
Fall 2015						
Spring 2016	-2.61	(-4.26, -0.97)	<0.001	-6.88	(-9.03, -4.72)	<0.001
Student meal plan						
Unlimited meals						
8 meals/week	-72.91	(-80.1, -65.72)	<0.001	-80.15	(-86.11, -74.19)	<0.001
180 meals/semester ^A	-44.54	(-52.09, -36.99)	<0.001	-47.93	(-54.27, -41.6)	<0.001
14 meals/week	-38.19	(-45.56, -30.82)	<0.001	-34.88	(-40.96, -28.81)	<0.001
Same meal plan	0.35	(-5.81, 6.50)	0.885	-0.59	(-10.86, 9.68)	0.883
Number meals floormate used	0.01	(-0.08, 0.10)	0.726	0.01	(-0.09, 0.10)	0.880

^A180 meals/semester equates to approximately 11 meals per week with consistent use

Table 8:

Logistic regression predicting which meals students would use within 1 minute and at the same location as their floormate (Females: n=676 students^A; Males: 442=students^A).

	Female			Male		
	OR	99% CI	P value	OR	99% CI	P value
Race/ethnicity						
White						
Black/African American	0.81	(0.22, 3.02)	0.686	1.39	(0.43, 4.48)	0.471
Hispanic/Latino	0.86	(0.29, 2.53)	0.719	1.25	(0.50, 3.12)	0.535
International	0.60	(0.15, 2.34)	0.336	2.28	(0.36, 14.49)	0.252
Two or more races	1.09	(0.28, 4.30)	0.869	1.53	(0.37, 6.27)	0.437
Other	1.48	(0.29, 7.61)	0.534	1.01	(0.27, 3.75)	0.988
Same race/ethnicity	1.67	(0.51, 5.45)	0.265	1.84	(0.62, 5.50)	0.150
Pell grant recipient						
No						
Yes	0.93	(0.44, 1.98)	0.816	0.92	(0.52, 1.62)	0.698
Same Pell grant status	0.98	(0.35, 2.79)	0.964	1.16	(0.47, 2.89)	0.666
Age	0.94	(0.41, 2.19)	0.856	0.93	(0.42, 2.06)	0.811
Residence Hall						
A						
B	2.44	(0.46, 13.02)	0.169	1.70	(0.49, 5.94)	0.276
C	1.07	(0.29, 3.99)	0.895	0.80	(0.20, 3.21)	0.684
D	1.20	(0.13, 10.87)	0.831	0.75	(0.08, 7.24)	0.742
E	1.34	(0.24, 7.51)	0.661	0.62	(0.10, 3.83)	0.497
F	0.61	(0.05, 7.16)	0.605	0.57	(0.05, 5.95)	0.539
Student meal plan						
Unlimited meals						
8 meals/week	0.90	(0.25, 3.32)	0.843	0.81	(0.28, 2.37)	0.620
180 meals/semester ^B	1.16	(0.34, 3.96)	0.758	0.84	(0.25, 2.83)	0.716
14 meals/week	1.00	(0.31, 3.24)	0.993	1.13	(0.42, 3.02)	0.745
Same meal plan	1.20	(0.39, 3.65)	0.677	1.43	(0.49, 4.17)	0.386
Month						
August						
September	0.75	(0.45, 1.26)	0.155	0.94	(0.58, 1.52)	0.733
October	0.65	(0.36, 1.17)	0.060	0.74	(0.39, 1.41)	0.233
November	0.74	(0.39, 1.38)	0.212	0.76	(0.40, 1.44)	0.264
December	0.55	(0.24, 1.26)	0.063	0.67	(0.29, 1.54)	0.219
January	0.74	(0.34, 1.63)	0.324	0.74	(0.37, 1.46)	0.249
February	0.69	(0.33, 1.44)	0.191	0.74	(0.38, 1.44)	0.242
March	0.50	(0.21, 1.19)	0.039	0.49	(0.22, 1.11)	0.025
April	0.45	(0.19, 1.06)	0.016	0.48	(0.21, 1.06)	0.017

	Female			Male		
	OR	99% CI	P value	OR	99% CI	P value
May	0.34	(0.00, 205.42)	0.666	0.39	(0.10, 1.57)	0.083
Day of week						
Weekday						
Weekend	0.92	(0.62, 1.37)	0.585	1.04	(0.76, 1.42)	0.768
Time of Day						
Morning (before 10 AM)						
Midday (10 AM to 1 PM)	1.37	(0.68, 2.77)	0.250	1.75	(1.05, 2.92)	0.005
Afternoon (1 PM to 4 PM)	0.93	(0.41, 2.07)	0.806	1.48	(0.87, 2.50)	0.055
Evening (after 4 PM)	1.37	(0.67, 2.79)	0.251	1.89	(1.15, 3.11)	0.001

^AThe number of data points varied for each of the 250 iterations, depending on the floormate pairings. The average number of data points per iteration for females was 130,268 (SD=986) the average number of data points per iteration for males was 111,503 (SD=841)

^B180 meals/semester equates to approximately 11 meals per week with consistent use