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To cite this article: Bridget L. Forster & Peter R. Reuter (2022): Do college students' living arrangements affect their health behaviors and academic performance?, Journal of American College Health, DOI: 10.1080/07448481.2022.2066978

To link to this article: https://doi.org/10.1080/07448481.2022.2066978
Do college students’ living arrangements affect their health behaviors and academic performance?

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ABSTRACT

Objective: To assess how living arrangements influence lifestyle habits and behaviors that impact the health and academic achievement of students. Participants: 876 undergraduate students at a university in Florida. Methods: Students in all colleges were invited to participate in an anonymous survey. The survey was comprised of questions based on living arrangements, grade point average (GPA), anthropometric measures, as well as health behaviors. Data analysis was performed employing least squares regression and Wilcoxon and Kruskal-Wallis Rank Sums Test tests. Results: Different living arrangements were related to different health behaviors, but not one arrangement was associated with unhealthy or healthy habits only. Overall, there was no significant association between students’ living arrangement, body-mass index (body mass index), and self-reported GPA. Conclusion: While university students’ living arrangements are associated with differences in health behaviors and habits, these differences have no significant impact on students’ average BMI or GPA.

ARTICLE HISTORY
Received 18 January 2021
Revised 13 March 2022
Accepted 10 April 2022

KEYWORDS
body mass index; grade point average; health behaviors; living arrangements

Introduction

According to a 2019 report by the American College Health Association (ACHA), 38% of college students were living in university housing on campus, 40% of students lived in off-campus housing, and 16% lived at home. While many factors contribute to the decision of where to live, including geographic location, finances, culture, special interests, and friendships and relationships, each option comes with its own advantages and disadvantages. With parental guidance becoming, at least to some degree, less of a presence as students enter the freedom of a university setting, the lifestyle and behavioral choices students make can now be influenced by their environment and peers around them.

While the transition to college may give young people a new sense of independence, it has been well documented that college students tend to adopt unhealthy behaviors during this time. Health promoting behaviors are often complicated, while, at the same time, an increase in sugar and fat content in food choices, and unhealthy or risky habits, including alcohol, tobacco, and marijuana use, may be observed. These changes facilitate undesirable outcomes, such as unintentional weight gain, and influence academic performance measured as grade point average (GPA). Previous studies have documented that there is an association between living arrangements and the development of health-related behaviors that could ultimately impact both overall health and academic success. Some studies pointed out that students living off campus exhibit more freedom in the choices they can make and activities they can participate in without the supervision of parents or dorm monitors. Based on residency, differences in lifestyle choices have been noted, such as in physical activity, dietary patterns, sleep, alcohol consumption, and hours worked. Unhealthy behaviors and habits can over time lead to negative changes in anthropometric measures such as body weight and BMI (BMI). According to Yoon, Kim and Lee, students living on campus consume more calories and, therefore, tend to gain weight. Vella-Zarb and Elgar reported weight gains for freshmen, although the weight increase was less than the fifteen pounds freshmen are alleged to gain. Furthermore, it has been suggested that living arrangements may have an influence on academic success or failure as well. For example, academic performance showed a small but significant increase when classmates lived in the same dorm on campus. Students living on campus exhibited greater self-esteem and academic persistence. Based on data from the 2004 National Survey of Student Engagement, Pike, Kuhn, and Massa-McKinley also reported a negative impact of hours students worked per week on grades and that students residing on campus earned lower grades.

However, there is still a lack of studies that assess the impact living arrangements have on lifestyle behaviors and habits that ultimately impact students’ health and academic success. The purpose of this study was to add to the knowledge on the influence living arrangements have on selected health behaviors and habits of university students, and to further explore whether or not differences in these behaviors and habits lead to weight gain, i.e., increased BMI, and impact students’ academic achievement measured as GPA.
Methods

Data collection

The research protocol was approved by an ethical review board (Institutional Review Board (IRB)) prior to data collection. Data for this article were collected over a two-year period (Spring 2018 – Fall 2020). During that time, each semester students from all colleges at a regional state university in Florida were invited via email to participate in an anonymous online survey titled "Student Health Behavior and Academic Success." The response rate was approximately 6-10% per semester. The first page of the survey consisted of an approved online survey consent form, i.e., consent was obtained. Participation was voluntary and participants did not receive any compensation. The survey included questions regarding demographic information, such as gender, age, and ethnicity/race, current overall grade point average (GPA), eating and sleeping habits, and drugs and alcohol consumption (see Appendix 1). The self-response survey was described previously and used successfully for the same purpose.12

Data analyses

For the purpose of this article, we compared data for the following twelve behaviors and habits and for four different groups based on living arrangements (living at home with family; living on campus; living off campus with other students/roommates; living off campus on their own/alone): breakfast and fast food consumption, sleep (average hours per night and time to bed), working, watching or reading on a TV/computer/tablet, playing video or computer games, going out, alcohol consumption, marijuana use, vaping, physical activity, and strength training.

Self-reported GPA differed by biological sex, with female students reporting higher average GPAs than male students (3.44 ± 0.48 vs. 3.33 ± 0.49, mean ± standard deviation; Wilcoxon Rank Sums Test, DF = 1, Chi-square = 8.2629, p = 0.0040). Therefore, biological sex was used as a random effect in some analyses (clearly indicated, below).

Least Squares Regression fixed effects test were used (with gender as a random effect using the Restricted Maximum Likelihood method), as were non-parametric Wilcoxon and Kruskal-Wallis Rank Sums Test (with Steel-Dwass post-hoc tests as needed). Data were analyzed using JMP Statistical Software (version 15.2.1, SAS Institute Inc.).

Results

Study population

We received 1,024 responses overall from students in all colleges at our university. However, 148 responses had to be excluded because respondents did not provide an age, were younger than 18 or older than 30 (n = 119), or did not provide information on biological sex (n = 9) or living arrangements (n = 20). Therefore, the study population analyzed consisted of 876 respondents (Table 1). The demographic characteristics of the respondents reflect the undergraduate study body at our university fairly well other than the percentage of female and male respondents; the university has 52% female and 48% male students.23

<table>
<thead>
<tr>
<th>Biological sex</th>
<th>79.9% female students, 20.1% male students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race/ethnicity</td>
<td>59.5% Caucasian/White, 16.6% Hispanic, 5.1% African-American/Black, 1.0% East Asian, 17.9% more than one ethnicity/race or ethnicity/race other than listed, 0.8% no information</td>
</tr>
<tr>
<td>Age</td>
<td>19.8 ± 1.9 years; median 19 years, range 18-30 years</td>
</tr>
<tr>
<td>Student population</td>
<td>32.3% sophomore, 28.4% freshman, 24.1% junior, 14.0% senior, 0.8% non-degree/second-degree seeking student, 0.4% graduate student</td>
</tr>
</tbody>
</table>

Table 1. Study population profile (n = 876).

| Living arrangements of study respondents (n = 876). |
|----------------|-----------------|
| At home with family (26.0%) | 78.9% female; 21.1% male; age: 20.0 ± 2.0, median 19 |
| On campus (48.1%) | 77.9% female; 22.1% male; age: 19.1 ± 1.3, median 19 |
| Off campus with other students or roommates (19.2%) | 85.7% female; 14.3% male; age: 20.3 ± 1.6, median 20 |
| Off campus on their own/alone (6.7%) | 81.4% female; 18.6% male; age: 22.3 ± 3.2, median 21 |

Table 2. Living arrangements of study respondents (n = 876).

Living arrangements

Almost half of respondents lived on campus, while one-quarter lived at home with family. Of the remaining quarter, three-quarters lived off campus with other students/roommates and one-quarter off campus on their own/alone (Table 2). Students living off campus on their own had the highest average age with 22.3 years and the highest median age with 21 years. Students living on campus were the youngest group with an average age of 19.1 years. The highest percentage of females was reported for respondents living off campus with other students or roommates at 85.7%.

Health behaviors and habits

We analyzed survey data for twelve health behaviors and habits to find out whether behavior and habits were different depending on respondents’ living arrangements. Tables with the survey results for all behaviors and habits discussed below can be found in the supplemental data.

Breakfast consumption

On average, one third of students in each group ate breakfast on seven days of the week, while one in ten students of each group never had breakfast. Respondents living at home with family or off campus on their own were most likely to eat breakfast seven days a week (38.6% and 37.9%); conversely, respondents living on campus were least likely to eat breakfast every day of the week (29.1%).

Fast food consumption

Respondents in all four groups reported consuming fast food at a low rate. One-quarter of all respondents had not consumed any fast food over the previous seven days and
another six out of ten students had eaten fast food between one and three times only during the same period. Less than 3.5% of respondents in all groups consumed fast food seven times or more per week.

**Sleep**
The recommended amount of hours of sleep per night for our study population was eight. The majority of students living at home, on campus, or off campus with others indicated getting between seven and nine hours of sleep per night (57.0%, 52.5%, and 54.3%). Students living off campus alone had the highest percentage of participants who slept five hours or less per night at 28.8% compared with 18.0% for students living at home, 18.8% for students living on campus, and 17.3% for students living off campus with others.

Students living at home and those living off campus alone reported the highest percentages of respondents going to bed before midnight (57.4% and 56.0%). Students living on campus or off campus with others were more likely to go to bed after midnight (58.6% and 54.1%). One in eight students living on campus and one in ten students living off campus with others reported going to bed after 2 am on average.

**Working**
Almost 60% of students living on campus did not work at all and less than 3.5% worked 30 hours or more per week. Students living off campus on their own reported the highest percentage of students working 30 hours or more per week (29.3%) and the lowest percentage of students not working at all (20.7%). Students living at home or off campus with others reported very similar data: one-third of respondents from each group did not work at all and one-tenth worked 30 hours or more per week.

**Watching or reading on a TV/computer/tablet**
The responses were similar for all four groups; between 55% and 65% of respondents in each group reported watching/reading between one and three hours per day. Less than one-quarter of students living off campus on their own watched/read four or more hours per day as compared with 30% of students living at home, living on campus, or living off campus with others. The most common amount of screen time for students living at home as well as students living on campus was three hours at 21.5% and 22.9%, and two hours for students off campus with others and off campus alone at 26.8% and 30.5%.

**Playing video or computer games**
Students living off campus alone were least likely to play four hours or more per day (8.5%) and reported the highest percentage of respondents who did not play at all (32.2%). One in seven respondents living at home or on campus reported not playing at all and one in five respondents living at home or on campus played four hours or more per day.

One in five students living off campus with others also reported playing four hours or more per day.

**Going out**
Regardless of living arrangements, more than 90% of respondents in each group reported not going out more than two nights per week. Students living at home or off campus on their own were more likely to not go out at all (51.4% and 47.3%) than students living on campus (39.8%) or off campus with others (33.8%).

**Alcohol consumption**
Of the students who reported having consumed alcohol before (n = 695), students living at home were most likely to not have had a drink during the past 30 days (48.9%) and least likely to have drunk on ten days or more (3.4%). At the other end of the spectrum, only one in five students living off campus with others had been abstinent for 30 days and one in six acknowledged drinking on ten days or more over the same period. Among students living off campus on their own, one in six also had drunk on ten days or more during the previous 30 days and only slightly more than a quarter had refrained from consuming alcohol.

**Marijuana use**
Among the respondents who reported having used marijuana before (n = 487), 60% or more of students within each living arrangement had not used marijuana in the past seven days, with students living at home having the highest percentage (79.8%). Students living off campus with others or on their own reported the highest percentage of respondents who had used on six or seven days with more than 20% for each group. One in ten students living at home had used marijuana every day during the past week. Students living on campus reported the lowest percentage of respondents using marijuana six or seven days during the past seven days.

**Vaping**
The use of electronic vaping devices was quite popular among our study population with 37.3% admitting having vaped before. One-third of students living off campus alone had vaped every day during the past week, compared with less than a quarter of students living on campus with others, one in six students living on campus, and one in fourteen students living at home. Students living at home and on campus reported the highest rates of respondents who had not vaped during the past seven days with 60.6% and 56.7%, respectively.

**Physical activity**
An average of 18.5% of students reported that they had not been physically active at all over the past seven days. Those living off campus alone had the highest percentage of students that did not work out at all (22.4%). Only 20% of students living at home worked out more than four days a week, whereas one-third or more of students living on campus or on their own off campus worked out five days or more per week.
Strength training
For all four groups, 40% or more did not participate in strength training during the past seven days. The living arrangement with the highest percentage of respondents participating in strength training on 2-3 days per week was students living off campus with others at 30.2%. Less than 10% of students living on campus or off campus with others strength trained 6-7 days. Students living at home had the lowest percentage (4.1%) who engaged in strength training on 6-7 days per week, while those living off campus alone reported the highest percentage at 10.4%.

Living arrangements and grade point average (GPA) and BMI (BMI)
Survey respondents were asked to provide their current grade point average (continuous numerical scale: 0.00 – 4.00) as well as their body height and weight. One hundred of 876 students in the study population failed to provide one or more of these data points. Therefore, the remaining study sample size consisted of 776 students, of whom 47.4% lived on campus, 25.9% lived at home with family, 20.0% lived off campus with other students, and 6.7% lived off campus on their own. Within this study sample, 79.5% of students were female and 20.5% were male.

Living arrangements and GPA
There was no impact of living arrangements on self-reported GPA (Least Squares Regression, DF/DFDen = 1/771.5, F-Ratio = 1.6234, R² = 0.014, p = 0.1825, biological sex as a random effect). When looking at male students alone, there was also no impact of living arrangements on GPA (Kruskal-Wallis Rank Sums Test, DF = 3, Chi-square = 1.3543, p = 0.7163). For female students, there was an impact of living arrangements on GPA (Kruskal-Wallis Rank Sums Test, DF = 3, Chi-square = 4.6484, p = 0.01994; females: Chi-square = 6.6447, p = 0.0841).

The results of our study confirm previous reports that students’ health behavior and habits are different for different living arrangements. However, there is no one living arrangement that would be associated with healthy or unhealthy behaviors and habits only. In our study, each of the four groups of respondents exhibited healthy as well as unhealthy behaviors and habits. While we found differences for some health behaviors and habits, there were no big differences overall and, therefore, does not come as a surprise that there are no significant differences in the average BMI and self-reported GPA for our respondents.

Living arrangements
The percentages for the different living arrangements for our study respondents are similar to those reported in other studies. For instance, in a study by Turley and Wodtke, 3 54% of students lived on campus, 28% lived with family, 15% lived off campus without family, and 3% lived in other residences. However, in Brunt and Rhee’s study, 27 38% of participants lived on campus, 56% off campus, and 6% at home with parents.

Health behaviors and habits
Most published studies looked at healthy and unhealthy eating behaviors as well as alcohol and drug use for different living arrangements. Some of the behaviors we included,
such as going out or playing video games, have not been looked at in the context of living arrangements. Due to using only breakfast and fast food consumption as indicators for healthy and unhealthy eating behaviors, respectively, we were not able to confirm results from previous studies that described increased calorie intake by students living on campus.\textsuperscript{5, 8, 22} On the other hand, Gupta and Gupta\textsuperscript{21} found a better nutritional status for students living on campus. The rate of fast food consumption reported by Pelletier and Laska\textsuperscript{21} is in the same range as in our study.

It is not surprising that students living alone off campus are more likely to sleep less than six hours per night and to work 30 hours or more per week than the other groups. One can assume that these students need to earn money to support themselves and, possibly, to pay for college, leading to more of them having to work. Students living on campus, on the other hand, apparently have fewer financial worries and, thus, are far less likely to work at all. However, we have no information on the socio-economic situation of our study respondents to compare our data with studies showing that students of low-income families are more likely to live at home and work for school-related expenses, while students from families with higher incomes were least likely to work during the first year of college.\textsuperscript{28} Contrary to our results, Coates\textsuperscript{29} found that students living at home with parents were more likely to work than students living on campus or in off campus housing.

Sleep patterns depend on a number of factors beyond living arrangements. For example, students who work may have to get up early to go to work or to go to classes before work. They may also work late and, thus, go to bed later compared with students who do not work. Living with others at home, on campus, or off campus may also influence sleep hours and quality in either direction. Lau et al.\textsuperscript{20} found that campus residents showed longer sleep duration, sleep efficiency, and greater sleep quality.

It is surprising that there are hardly any studies into an association of time spend watching TV, engaging with social media, or playing computer/videos games and students’ living arrangements. The only study we are aware of included female university students only who lived at home.\textsuperscript{30} Yet, the study focused on the effect playing video games has on the relationship of players to their family and did not address a potential association with academic performance.

There are, however, a number of published articles on alcohol and drug use among college students that report findings similar to ours. As the legal drinking age is 21 in Florida and recreational marijuana is still illegal, it is not surprising to see that students living off campus with others or alone are more likely to consume both alcohol and marijuana more often than students living at home or on campus. Likewise, students living off campus had more drinking days per month than those living on campus or at home in a study by Roemer and Walsh.\textsuperscript{14} Correspondingly, Benz et al.\textsuperscript{15} found that students living off campus drank more and that students living with parents exhibited less risky drinking behavior than those living on campus. DiBello et al.\textsuperscript{4} also reported that students living off campus were 50% more likely to drink. In the same study, students living off campus were twice as likely to use marijuana. Gfroerer, Greenblatt and Wright\textsuperscript{31} recorded students not living with their parents to be more likely to drink alcohol and use marijuana compared with students living with their parents. Vaping as a habit is fairly new and there are no published studies looking at the frequency depending on students’ living arrangements.

While our study did not find significant differences in physical activity, including strength training, for our student groups, a study by Irwin\textsuperscript{32} reported that students living on campus were less physically active than their peers living off campus. A recent study reported that students living on campus made exercising a priority if they were engaged in organized sports; other students complained about being too busy and too tired to exercise.\textsuperscript{5} Students in a study by LaCaille et al.\textsuperscript{8} also used being busy as an excuse for not engaging in physical activities. Brevard and Ricketts\textsuperscript{33} reported lower physical activity and energy use for male students living on campus compared to those living off campus. However, the opposite was found for female students with those living on campus being more active. Yoon, Kim and Lee\textsuperscript{22} measured students’ physical activity by recording the number of steps during a day; students living on campus walked significantly more than students living off campus (13,500 step vs. 6,500 steps).

\textbf{Living arrangements and GPA}

Contrary to our results, a study looking at freshmen only revealed greater academic persistence, self-esteem, and self-belief among participants living on campus.\textsuperscript{23} In a study reported on by Parker,\textsuperscript{24} economics students performed better if they were living on campus with other economics students. Nelson et al.\textsuperscript{34} focused on the relationship between the distance from home to campus and GPA for commuter students; they found that as commuting distance increases, GPA decreases. In a study by Sikhwari et al.\textsuperscript{18} students living on campus marginally outperformed commuter students by achieving higher scores on final exams. Contrasting to that, Khurshid, Tanveer and Qasmi\textsuperscript{35} found that commuter students obtained higher mean scores on a study skills inventory as well as on academic achievement than resident students. Simpson and Burnett\textsuperscript{36} also found that commuter students earned higher grade point averages than residential students.

\textbf{Living arrangements and BMI}

Our results are similar to those reported by Breward and Ricketts,\textsuperscript{33} who also found that the BMI was similar for both sexes and those living on and off campus. Gupta and Gupta,\textsuperscript{20} however, reported that students living at home or off campus were more likely to be overweight or obese. Brunt and Rhee\textsuperscript{25} found that only male students living of campus were most likely to be overweight or obese. On the other hand, in Vella-Zarb and Elgar’s\textsuperscript{31} study, students living on campus gained more weight than those living off campus.
Study limitations

The four main limitations of our study were: 1) participant selection, 2) culture-specific factors, 3) reliance on self-reported health behaviors and habits, and 4) reliance on self-reported grade-point average. Inviting only students at one regional university in the Southeast of the United States limits the capacity to generalize results to all students in the United States or other countries. These limitations are even more enhanced by culture-specific factors, such as the legal drinking age or the prevalence of vaping. Respondents may have purposefully or unintentionally provided incorrect information about their habits and behaviors as well as their body weight and height and current GPA. They may not recall exactly how often they consumed fast food or provide an incorrect body weight because they were dressed when they stepped on a scale last time. Nonetheless, there is no reason to believe that the data provided by one group of respondents are more inaccurate than the data from other groups.

Conclusions

This cross-sectional study involving undergraduate students at university in the Southeastern United States confirmed that there are indeed differences in students’ health behaviors and habits for different living arrangements. Each of the four living arrangements studied (living at home with family; living on campus; living off campus with others/roommates; living off campus on their own/alone) is associated with healthy as well as unhealthy behaviors and habits. Students living at home display healthy lifestyle choices throughout; they have the highest proportions of students who do not consume alcohol, use marijuana or vape. Students living on campus report similar behaviors, although they are less likely to eat breakfast every day of the week and more likely to go to bed after midnight. Students living off campus with others generally also exhibit healthy behaviors, even though they are more inclined to consume alcohol and to use marijuana or vape seven days a week. Students living alone off campus report the highest rates of alcohol consumption, marijuana use, and vaping. They also are most likely to work 30 hours or more per week and to sleep less than six hours per night. Nonetheless, these differences in health behaviors and habits have no significant impact on students’ BMI and GPA.

Our findings underscore the importance of considering living arrangements when designing health promotion programs for college student populations. Counseling services are more readily available for students living on campus which encourages a greater distribution of health-related instruction. When designing health promotion programs, student affairs administrators and health professionals must abandon the often used one-size-fits-all approach and instead create programs and initiatives that target students based on their living arrangements as well as their health behaviors and habits. With the lack of time spent on campus for those who are commuting, more resources such as Web-based services including Telehealth, video communication, or audio-conferencing options are necessary in order to fulfill a greater health-promoting environment and to address the needs of all students regardless of their living arrangements.

Future research should look at how the socioeconomic situation of students and their families as well as factors such as being a first generation college student influence students’ choice of living arrangements as well as their health behaviors and habits. Also, it will be interesting to see how the changes and challenges brought on by the Covid-19 pandemic influence students’ health behavior and choice of living arrangements.

Conflict of interest disclosure

The authors have no conflicts of interest to report. The authors confirm that the research presented in this article met the ethical guidelines, including adherence to the legal requirements, of the United States and received approval from the IRB at our university.

Funding

No funding was used to support this research and/or the preparation of the manuscript.

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