The Effects of On-Campus Housing Requirements on Student Outcomes

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Abstract

Due to increased focus on student well-being and heightened competition in higher education, universities have adopted on-campus housing requirements for incoming undergraduate students. These requirements mandate that students live on campus for a certain number of years during their university tenure. While research on the effects of on-campus housing has been mixed, recent causal methods have identified some positive effects for minority students. Using OLS models, this paper estimates the effects of on-campus housing requirement lengths on students. While on-campus housing requirements are correlated with student outcomes, the effects become negligible when university fixed-effects are included in the model. This implies that other aspects of universities' auxiliary and student services expenditures may be more impactful for student outcomes.

1 Introduction

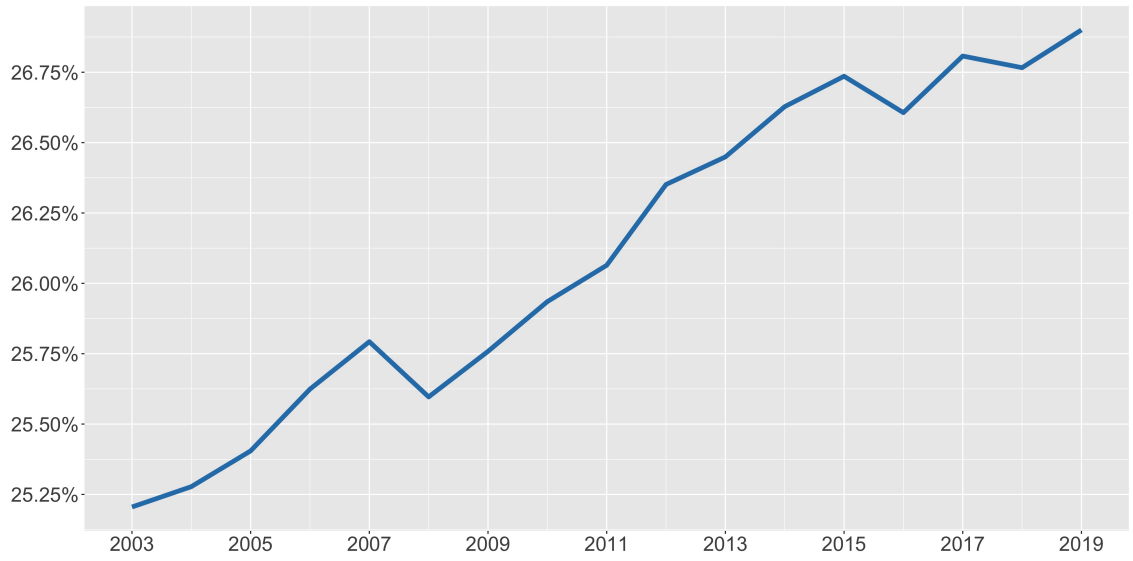
In an effort to both improve students' qualities of life and to compete for students more effectively, many universities have utilized on-campus housing requirements as a way of providing increased support for students. These efforts often aim to increase students' qualities of life through dedicated resources and through an improved sense of community on campus. By requiring that students live in residence halls or dorms, universities can ensure that students have greater connections to the university and can more directly provide support to struggling students.

Particularly in the last two decades, the need to address students' qualities of life has increased exponentially. University students have reported increasing rates of mental illness, and these rates seem to be rising at a rate faster than that of the general population (Hefner and Eisenberg (2009)). In addition, amidst growing costs of university tuition, universities are expected to provide more services to satisfy students and their parents alike (Jacob et al. (2018)).

This rising interest in student well-being is illustrated through universities' spending habits as well. Figure 1 depicts the average percentage of universities' total expenditures dedicated to auxiliary and student services expenditures. While student spending decreased following the Great Recession, universities are increasingly prioritizing students over other types of expenditures.

While some researchers have found positive effects on student outcomes from living on-campus, students frequently criticize universities for these policies. On-campus housing requirements are viewed as restrictive,

Figure 1: Universities' Student and Auxiliary Expenditures Average Share of Total Expenditures



Source: IPEDS financial data for academic years 2003-2004 through 2019-2020. Student and auxiliary services expenditures share of total university expenditures averaged with equal weighting between universities. Sample comprises 1,876 public and private institutions.

and some programs have been accused of being more expensive than off-campus alternatives. In the face of growing tuition costs, many students and parents question the efficacy of these policies.

Using variation in on-campus housing requirement lengths, this paper estimates the effect of living on campus for an additional year on student retention and graduation rates. Furthermore, I also use survey data to determine the effect of living on-campus when SAT scores and family incomes are taken into account. Taken together, these findings imply that on-campus housing policies are less important than other university and student-level characteristics for predicting student outcomes.

2 Literature Review

Since the mid-20$^{\text{th}}$ century, researchers and universities have progressively increased their focus on improving the quality of students' experiences. Patton et al. (2016) describes how student development theory as well as increasing social upheaval in the 1960s led researchers to study how students developed their identities. In a seminal paper on this topic, Sanford (1967) articulated the role of universities in developing students' senses of social responsibility. In his view, college-aged students were not generally well-developed in terms of social responsibility, and universities needed to provide a cohesive environment to help students develop this quality.

Following these researchers, other theorists expanded the theory of identity development to better

understand the heterogeneous development trajectories of different social groups. For example, Josselson (1987) further developed Sanford (1967)'s in her research on females' identity development. The approach to study individual social groups' identities was later echoed in research regarding related to race, (Cross (1991), Jackson III (2001), Ritchey (2014)), ethnicity (Choney et al. (1995), Ancis et al. (1996)), and sexual orientation (Worthington et al. (2002)).

As researchers began to focus on students' identity development, universities followed suit. This was both because of an altruistic interest in developing students holistically and as a result of increasing competition in higher education. In two highly influential pieces, Tinto (1975) and Astin (1977) hypothesized that that student integration with university life would lead improved student outcomes. Furthermore these researchers posited that improved social integration would reflect positively on the university and increase universities' abilities to be competitive in a new national market for higher education. This interest signalled a change from the "ivory tower" perception of universities in the United States towards a socially engaged environment.

In addition to an altruistic investment in student development, Hoxby (1997) details how universities began to compete more aggressively for students as early as the 1940s. She argues that as a result of decreasing costs of travel and communication, higher education transformed from a "series of local autarkies" into a nationally integrated market. Under this new system, universities simultaneously increased their prices as well as their quality as they endeavored to attract more students.

While Hoxby argues that increased competition represented a net positive for students due to increased quality at institutions, many others have criticized the cutthroat, business-like market structure of higher education. Kirp (2005) takes the position that universities have totally converted to businesses instead of institutions of learning. In his view, the development of competition among universities coincided with a decrease in interest in teaching students. More recently, reporters and researchers alike have observed that universities increasingly emphasize extravagant student services over academics. Through photojournalism, Stephey (2008) demonstrates that the perception of on-campus housing developed from a dingy dorm in the 1970s to a luxury resort in the 2000s. Similarly, P. Brown (2011) and Wotapka (2012) describe the opulence of many residence halls today, and Newlon (2014) goes so far as to describe the competition to develop amenities in universities as an "arms race." These images paint universities as profit-maximizing businesses whose purposes are to attract and amuse students.

In addition to these anecdotal reports, researchers have also identified a rising importance of student and auxiliary services on college campuses. Jacob et al. (2018) find that investment in student and auxiliary

services attracts more student applications. This finding quantifies the value of ballooning amenities and demonstrates that universities can compete more effectively when they invest in these services. Similarly, Alter and Reback (2014) find that other dimensions of students' perceptions such as campus attractiveness and student happiness are drivers of applications as well. This dovetails with Jacob et al. (2018)'s finding in that intangible campus characteristics can also influence students' qualities of life.

More generally, other researchers have identified positive causal relationships between auxiliary spending and student outcomes. Webber and Ehrenberg (2010) and Webber (2012) both find that spending on auxiliary services improves student achievement. These effects also appear to be more salient for Pell Grant recipients and students with lower standardized test scores.

Given the developing altruistic and competitive interests in student and auxiliary services in the U.S., researchers have considered many different means by which students can take advantage of these investments. Students may be affected by different channels of spending including through student groups, dining halls, and university sports. Significant focus has also been placed on university housing as an environment in which students can realize the benefits of student services spending. In addition to arguing for students' social involvement, Tinto (1975) and Astin (1977) both emphasized the importance of residence halls for students. In particular, Astin asserted that students living on-campus were more likely to persist and aspire to graduate than non-residents. Furthermore, these students were more likely to engage in extracurricular and social activities leading to increased satisfaction with their university experiences.

Building on these frameworks for student satisfaction, many researchers in the 1970s and 1980s subsequently found positive correlations between on-campus residence and student outcomes. In 1983, Pascarella and Chapman (1983) tested Tinto (1975)'s theoretical model using survey data. This model predicted that student satisfaction would be determined by both academic and social integration, and this study largely confirmed this hypothesis. Furthermore, the authors found that the strength of the effects of on-campus housing varied between 2- and 4- year institutions. Similarly, Thompson et al. (1993) provided additional support for Tinto's model as their research indicated students living on-campus had higher GPAs than students living off-campus. The authors of this study also suggested that support groups in addition to on-campus housing might improve students' social and academic integration in the university.

In contrast to these findings, Bliming (1989) and Bliming (1999) found that living on-campus did not have a strong effect on student achievement. In these studies, the author used a meta-analysis approach in which he compared many studies that had analyzed on-campus housing. Nevertheless, he concluded that when models controlled for previous academic performance, the effect of residence halls on student GPAs

decreased significantly. Notably, Ware and Miller (1997) countered this finding with their own literature review and found that despite inconsistencies in the research, residence halls could be an important element of students' success. This result added to the mixed nature of the impact of on-campus housing on students.

While Bliming found no evidence that on-campus housing was related to student achievement, other researchers have argued that this finding was only due to an ineffective implementation of student housing. For example, Kenyon (1997) argues that university-community relations are essential to create a regenerative university housing environment. In her view, physical, social, and economic concerns are intertwined with low-quality student housing. Similarly, Macintyre (2003) also finds that new student housing developments must contribute to the social integration of students in order to be regenerative assets for the community. This echoes Kenyon and indicates that higher quality housing can contribute to student well-being.[1]

Aside from the model of student housing in the community, other researchers have considered whether intangible aspects of on-campus housing can affect students. J. Brown et al. (2019) find that students living in a "socializing architecture" had higher GPAs than students in other residences. In this study, the authors classified corridor style housing as "socializing" due to the increased likelihood that students would see and interact with each other versus in apartment style housing. Additionally, Cheng and Chan (2020) find that residential hall activities were the most effective aspect of university housing in terms of providing students with a holistic education. These findings imply that there may be specific aspects of residential life that are particularly beneficial for students.

More recently, additional quantitative research has found mixed evidence for the effects of on-campus housing on student outcomes. Using a logistic regression model and a robust set of covariates, Bozick (2007) finds that students are more likely to persist in higher education if they live on campus. Separately, Kuh et al. (2016) also uses a logistic approach and finds that commuter students had higher GPAs than those who lived on campus. This research implies that living on campus is positively correlated with student retention and GPAs. Furthermore, Schudde (2011) utilizes longitudinal data from the Educational Longitudinal Study with a propensity-score matching approach and she finds that campus residency does have a positive effect on college student retention. This alternative approach provides increased confidence that the correlation of on-campus housing and student outcomes is not spurious.

Notably, several researchers in different African countries have also addressed the question of whether on-campus housing impacts students. In Ghana, Addai (2015) uses survey data with a probit model

[1] A separate but related literature also investigates the effect of quality of facilities on student well-being. See Price et al. (2003) for a discussion of this literature.

approach and finds weak results consistent with a positive relationship between on-campus housing and achievement. Conversely, Zotorvie (2017) finds no relationship between student accommodation and student performance in Ghana using correlational statistics. In Nigeria, Owolabi (2015) also finds a weak positive relationship between on-campus housing and student achievement. This research as well as others' indicates that while on-campus housing is less common outside of the U.S., the question of how to improve student outcomes through resources seems to remains salient.

In addition to these studies, other researchers have used new causal methods to analyze the relationship between on-campus housing and student outcomes. de Araujo and Murray (2010) use an instrumental variable model and identify a positive relationship between whether a students lives in a dorm and their cumulative GPA. The authors of this paper note that the factors that influence a student's choice of whether to live on campus may be correlated with their performance, but their model still suggests that living on-campus increases student achievement. In contrast, Millea et al. (2018) finds that academic preparedness, scholarships, and class sizes are stronger predictors of student success than whether a student lived in a residence hall. Reynolds (2020) expands on this finding using an instrumental variable model. In this study, the author uses students' distances from home to determine the causal effect of living on-campus. They find that on-campus housing has no effect on retention and only limited positive effects on GPAs. That being said, the author also finds that positive effects on GPAs were concentrated among the lowest-ability students, so residence halls seem to affect some students positively.

Turley and Wodtke (2010) add to this debate by analyzing heterogeneous effects of on-campus housing on different groups of students. The authors of this paper find that that the type of first-year residence does not have a strong impact on most students except for Black students. Black students living on campus were shown to have significantly higher GPAs than similar students at the same institution. Webber and Ehrenberg (2010) echo the argument that student services spending may have differential effects on students. These authors posit that Pell Grant recipients as well as students with low test scores may benefit more than other students from student services spending. In an effort to make universities more equitable, on-campus housing and university housing requirements could make large differences for these students.[2]

While these researchers have investigated the efficacy of on-campus housing both in aggregate and on different groups, relatively few studies have considered the effects of on-campus housing requirements. In addition to offering on-campus housing opportunities, many universities have implemented on-campus

[2]For a more detailed review of how to improve student outcomes for minority students, see Swail et al. (2003) and Chetty et al. (2017).

residency requirements for students. These policies require that students live in a dorm or residence hall for a certain number of academic years. In the last decade, many universities have also begun to increase their on-campus housing requirements (Muller (2017), Pena (2018)). Universities typically justify these increases by citing a mix of research and their own internal studies of student performance (Stoetzer (2015)).[3]

While these policies can positive affect students in some cases, it is unclear whether on-campus housing universally has positive effects on students. Furthermore, these policies could be more expensive for students, particularly if the surrounding area supports inexpensive off-campus housing. As a result, universities need to consider the trade offs of these policies carefully before requiring students to live on-campus for longer periods of time.

3 Methodology

Given that relatively little academic research has studied the effects of on-campus housing requirements, I will estimate an OLS models to determine whether these policies are positively correlated with students' retention and graduation rates. Previous research such as de Araujo and Murray (2010) and Reynolds (2020) has utilized exogenous variation among students to predict whether they will live on campus. In contrast, this study uses random variation among universities to determine whether those institutions with longer requirements also have higher graduation rates.

In addition to estimating the effect of the length of on-campus housing requirements, these models will also control for the effects of other types of university expenditures that could impact students. These will control for auxiliary expenditures, student services expenditures, and instruction expenditures as defined in the IPEDS data dictionary. Under these definitions, auxiliary expenditures represent "expenses associated with essentially self-supporting operations of the institution that exist to furnish a service to students, faculty, or staff." Examples of these expenses include residence halls, food services, and student health services. Student services expenditures represent "expenses associated with admissions, registrar activities, and activities whose primary purpose is to contribute to students' emotional and physical well-being and to their intellectual, cultural, and social development outside the context of the formal instructional program." These include student activities, intramural athletics, and student organizations. Instruction expenditures represent "expenses associated with the colleges, schools, departments, and other instructional divisions of the institution." Examples of these expenditures include academic, vocational, and preparatory instruction.

[3]Universities have been known cite academic research such as Mayhew et al. (2016). While citing findings is always important, it seems strange to provide citations in official statements without acknowledging the mixed results from the rest of the literature.

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In each of the regression models, I use the natural log of the rolling 4-year expenditures for each graduating cohort. Using student services expenditures as an example, this is to say that the graduating cohort in 2012 will receive student services expenditures in each year beginning in academic year 2008-2009 through academic year 2011-2012. This measure is intended to capture all of the benefits that a cohort received from student services expenditures during their tenure at the university. Notably, I also implement the natural log of rolling 4-year expenditures with retention rate regressions. As retention rates are measured after students' first-years, I hypothesize that students may receive the effects of additional spending on student services from previous years.

Finally, these models also account for general characteristics of universities including their bed-enrollment ratios, total undergraduate enrollments, and average monthly rents of 2-bedroom apartments in the zip codes of the universities. The bed-enrollment ratio is defined as the number of beds the university has available on-campus divided by the number of undergraduates.[4] This variable controls for the possibility that students might be less likely to stay on campus or to be impacted by these services if on-campus housing is limited.[5] Universities' bed-enrollment ratios could also be correlated with on-campus housing requirements as additional beds are required in order to institute such a policy. Additionally, controlling for the average rent of a 2-bedroom apartment in a university's zip code represents a rough proxy for the cost of living off-campus. Universities with very high off-campus living costs might be less likely to see students move off-campus, and this could also be correlated with on-campus living requirements.[6]

With these variables in mind, I will estimate an OLS model of the following form:

$$Y_{it} = \beta_0 + \beta_1 HouseReq_{it} + \beta_2 AuxExp_{it} + \beta_3 StudentExp_{it} + \beta_4 InstExp_{it} + \boldsymbol{X}_{it} + \delta_i + \gamma_t + \varepsilon_{it} \qquad (1)$$

For each university i and academic year t, Y represents either the natural log of the graduation rate or the natural log of the retention rate, $HousingReq$ represents the number of years of on-campus housing required for students, $AuxExp$ represents auxiliary expenditures, $StudentExp$ represents student services expenditures, $InstExp$ represents instruction expenditures, $\boldsymbol{X}$ is a vector of university characteristics during academic year t, δ is a vector of university fixed-effects, and γ is a vector of year fixed-effects.

[4] It is possible that this measure could be biased if a university had a large amount of dedicated graduate student housing.

[5] This is particularly an issue at large universities with minimal housing requirements. Relatively few students at these universities have the option to remain on campus after their required tenure.

[6] This is a rough proxy. Universities such as Stanford have extremely high off-campus living costs and the majority of undergraduate students choose to live on-campus. In this case, the proxy would work very well. In contrast, the University of Southern California has a relatively low off-campus living cost, but most students choose to live on-campus there due to safety concerns. This proxy likely wouldn't work as well in this case.

In addition to this model, I will also implement a second model with student-level data from the Beginning Postsecondary Students (BPS) survey. While the estimates from the models above will provide aggregate effects, many studies have found that student-level characteristics are stronger determinants of outcomes than on-campus housing status. To determine the effect of on-campus housing on outcomes controlling for student-level characteristics, I will estimate the effect of living on-campus on students' GPAs using the following model:

$$GPA_i = \beta_0 + \beta_1 Housing_i + \beta_2 Dist_i + \beta_3 SAT_i + \beta_4 DepInc_i + \varepsilon_i \tag{2}$$

For each student i, GPA represents their cumulative grade point average, $Housing$ represents a binary indicator for whether a student lived on campus in 2014, $Dist$ represents the distance that the student lived from their home in miles in 2011-2012, SAT represents the student's composite SAT score, and $DepInc$ represents the student's parents' income in 2011-2012.

Notably, these estimates rely on anonymized data from the BPS survey, so I can't include on-campus housing requirements, university-level fixed-effects, or student-level fixed-effects. Furthermore, the sample sizes for these regressions are masked to preserve anonymity, so there is a high level of uncertainty regarding how these estimates are generated.

4 Data

In order to estimate these models, datasets were collected from several different sources. Graduation rates, retention rates, expenditure data, bed-enrollment ratios, and counts of total undergraduates were collected from the Integrated Postsecondary Education Data System (IPEDS). These data are available at the university-level for academic years 2003-2004 through 2019-2020. Universities' on-campus housing requirements were collected from individual universities' websites. These requirements are frequently listed in housing FAQ pages and notes for incoming students. A list of sources of these requirements by university is available by request. Finally, the local average rent of 2-bedroom apartments near each university was collected from the U.S. Housing and Urban Development (HUD) website using Fair Market Rents (FMR) data for 2-bedroom apartments. These data are published annually as early as the 2005 fiscal year.

Notably, graduation rates in the United States are typically computed on a six-year rolling basis. While these statistics could be computed over a shorter time frame, many students either take additional semesters to complete their degrees. This may be in an effort to work or save money prior to resuming studies. As a result, regressions involving graduation rates only have data available as recently as the

Table 1: IPEDS On-Campus Housing Summary Table

	Public Schools				
Variable	**N**	**Mean**	**St. Dev.**	**Min**	**Max**
Retention Rate	700	0.91	0.06	0.40	0.98
Graduation Rate	700	0.80	0.09	0.28	0.95
Housing Requirement	700	0.44	0.51	0	2
Auxiliary Expenditures ($)	700	184,936,248	132,746,228	0	922,505,363
Student Services Expenditures ($)	700	52,914,797	38,942,068	0	253,749,677
Instruction Expenditures ($)	700	461,557,083	315,452,191	0	2,504,008,515
Total Undergraduates	700	23,654.04	9,199.66	841	46,820
Bed-Enrollment Ratio	700	0.38	0.15	0.11	0.79
Local 2BR Rent	700	928.54	314.44	435	2,290
	Private Schools				
Variable	**N**	**Mean**	**St. Dev.**	**Min**	**Max**
Retention Rate	1,017	0.93	0.04	0.65	1
Graduation Rate	1,017	0.87	0.07	0.60	0.98
Housing Requirement	1,017	1.44	0.92	0	4
Auxiliary Expenditures ($)	1,017	109,282,621	122,770,060.00	0	1,205,872,000
Student Services Expenditures ($)	1,017	65,550,197	56,765,210.00	0	377,321,254
Instruction Expenditures ($)	1,017	452,338,406	458,874,071.00	33,597,814	2,933,539,000
Total Undergraduates	1,017	8,782.26	6,565.24	864	41,359
Bed-Enrollment Ratio	1,017	0.66	0.26	0.16	1.80
Local 2BR Rent	1,017	1,113.40	412.83	435	2,680

Source: Retention rates, graduation rates, expenditures data, total undergraduates, and bed-enrollment ratios collected from IPEDS data. Housing requirement data collected from university websites. Local 2BR rental cost collected from HUD Fair Market Rent data. Descriptive statistics for 102 universities between 2003-2019.

2014-2015 cohort. In contrast, retention rates are computed each year for the previous year's incoming cohort, so these are available through the 2019-2020 academic year.

Given the significant variation between universities in the United States, this study is restricted to the top 100 research universities as ranked by the 2021 U.S. World News College Rankings.[7] While these universities still spend differentially on students and offer various levels of regional amenities, they comprise a cohort of moderately to highly competitive institutions. Furthermore, each of these universities espouses a commitment to student well-being as well as a competitive academic environment. Summary statistics for these universities are provided in Table 1.

In the top panel of Table 1, statistics are provided for the public institutions in this sample. For 42 unique public universities, there are 700 university-academic year pairs. The average retention rate for these schools is 91%, and the average six-year graduation rate is 80%. These universities spent over $52

[7]Due to ties in rankings, this comprises 102 universities in total.

million per year on average between 2003-2019 on student services. This equates to approximately $2,237 per undergraduate student.

In the lower panel of Table 1, statistics are provided for the private institutions in this sample. Private universities spend more on average on student services despite far few students. For these 60 universities, there are 1,017 unique university-academic year pairs In the sample period, private schools spent approximately $65 million per year on student services and had approximately 8,782 students per institution. This equates to approximately $7,464 per undergraduate student. In addition, private schools have higher retention and six-year graduation rates, more beds as a ratio of total undergraduate enrollment, and are located in more expensive zip codes using the average 2-bedroom rental cost compared with public universities.

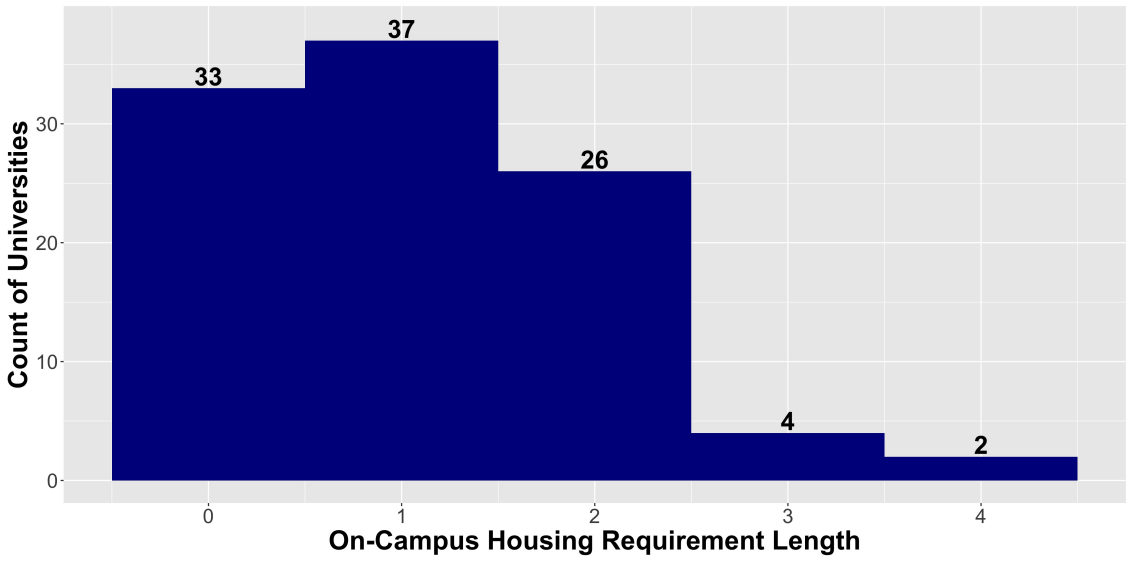
Notably, some universities opt to spend as little as $0 on auxiliary services, student services, or instruction. For most institutions, this is unlikely. After reviewing the data, these observations appear to describe expenditures that are either captured in a different type of expense such as "academic services" or mis-coded. In order to keep as many university-academic pairs as possible, I opt to keep these observations if they have sufficient housing requirement data and either retention or graduation rate data. Furthermore, I only rely on auxiliary, student services, and instruction expenditure variables in this study, although exploring the effects of additional types of expenditures on student outcomes would be an interesting area for future research.

In addition to these descriptive statistics, public and private universities in the U.S. have differential on-campus housing requirements. Figure 2 illustrates the relative frequencies with which public and private universities require years of on-campus housing. In the 102 universities in this sample, the most common requirement length is one year. Following this, no requirement and two-years required are the next most common lengths. Universities do change their requirements occasionally, and 12 universities change their requirement lengths during my sample period.

Notably, there are several different types of on-campus housing. These include dormitories, residence halls, and Greek houses. For the purposes of this paper, I will treat each of these types of housing as the same, although these types of housing can provide different services and amenities to students depending on the university.

Regarding the BPS survey data, this sample is limited to students who lived on-campus in 2011-2012. Therefore, the estimates of the regression reflect the differential effect of housing for students who decided to stay on-campus and those who decided to move off. Due to privacy concerns, the raw dataset for this survey is masked to preserve the anonymity of the participants. As a result, I am unable to produce summary

Figure 2: Histogram of 2017 Sample Universities' On-Campus Housing Requirements



Source: Author's calculations from university websites. Individual university source web pages available by request.

statistics for the sample. In addition, the number of observations reported in the results section has been "coarsened." This implies that these counts are only estimates of the actual numbers of observations in each regression.

5 Results

Using these data, the results of Equation 1 for retention rates are provided in Table 2. The regression in column (1) of this table demonstrates that longer on-campus housing requirements are correlated with higher retention rates in this sample of universities. This remains significant when controls for university spending are added in column (2), however, once university-level characteristics are added in column (3), this variable is no longer significant. Furthermore, the coefficient on the housing requirement length decreases even further in significance once university-level fixed-effects are included in column (4) and when year fixed-effects are included in column (5). This could imply that characteristics specific to universities themselves may be more indicative of student outcomes than spending or housing policies.

Given that the effects of on-campus housing requirements disappear when university-level characteristics are included, this signals that other qualities of the university are stronger predictors of student retention. Notably, auxiliary spending and private status remain significant in these regressions once university and year fixed-effects are included in column (5). As auxiliary expenditures relate to residence halls and dining services, it is possible that these could identify the effect of the quality of on-campus housing on

Table 2: Results of Equation 1. Dependent Variable: Log Retention Rate

	(1)	(2)	(3)	(4)	(5)
Housing Requirement	0.0101***	0.0103***	0.00204	-0.00234	0.00222
	(0.00173)	(0.00193)	(0.00159)	(0.00461)	(0.00427)
Log Rolling Aux. Spending		-0.00179	0.0213***	0.0186***	0.0146**
		(0.00494)	(0.00640)	(0.00622)	(0.00606)
Log Rolling Student Spending		0.0129***	0.0123***	0.00573	0.00545
		(0.00303)	(0.00243)	(0.00367)	(0.00515)
Log Rolling Inst. Spending		0.0230***	0.0141***	-0.00109	-0.00792
		(0.00274)	(0.00335)	(0.00761)	(0.00845)
Private			0.00602	−0.0431*	0.0705**
			(0.00931)	(0.0220)	(0.0282)
Bed-Enrollment Ratio			0.0246***	0.0101	0.0117
			(0.00845)	(0.0112)	(0.0113)
Log Total Undergraduates			−0.0238***	0.0202	0.0239
			(0.00551)	(0.0189)	(0.0188)
Log Local 2BR Cost			−0.00981***	-0.00685	-0.000296
			(0.00373)	(0.00604)	(0.00503)
Constant	−0.0912***	−0.779***	−0.758***	−0.724***	−0.574*
	(0.00280)	(0.0998)	(0.104)	(0.128)	(0.314)
University FE	No	No	No	Yes	Yes
Year FE	No	No	No	No	Yes
Observations	1,717	1,391	1,090	1,090	1,090
R^2	0.022	0.242	0.336	0.867	0.876

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Data collected from university websites, IPEDS, and HUD. Expenditures variables represent the natural log of four-year rolling sums of expenditures. All regressions use robust standard errors. For fixed effects regressions, R^2 represents the fit for the OLS regression for consistency rather than the within or between R^2.

student retention. This metric could also include other tangible characteristics such as university athletic equipment as well as intangible characteristics such as services related to campus climate. Disaggregating these auxiliary expenditures to better understand the effects of specific aspects of campus amenities will represent an interesting area for future research.

The estimates of Equation 1 provide similar results when using graduation rates as the outcome of interest as well. In column (1) of Table 3, longer housing requirements appear to be associated with higher graduation rates. Additionally, the coefficient related to on-campus housing length remains significant even when other university-level characteristics are included in columns (2) and (3). Nevertheless, the coefficient on the requirement length variable becomes insignificant once university-level and year fixed-effects are included in columns (4) and (5).

As with retention rates, graduation rates in this subset of universities are most strongly influenced

Table 3: Results of Equation (1). Dependent Variable: Log Graduation Rate

	(1)	(2)	(3)	(4)	(5)
Housing Requirement	0.0355***	0.0337***	0.0172***	0.0107	0.0100
	(0.00350)	(0.00335)	(0.00275)	(0.00732)	(0.00835)
Log Rolling Aux. Spending		−0.0276***	0.0327***	0.0476***	0.0404***
		(0.00748)	(0.0102)	(0.00909)	(0.00960)
Log Rolling Student Spending		0.0427***	0.0436***	0.0141	0.00751
		(0.00609)	(0.00529)	(0.0105)	(0.0103)
Log Rolling Inst. Spending		0.0472***	0.0267***	0.0118	-0.00843
		(0.00579)	(0.00598)	(0.0151)	(0.0173)
Private			-0.0144	-0.0307	-0.00101
			(0.0118)	(0.0351)	(0.0413)
Bed-Enrollment Ratio			0.0182	0.0207	0.0212
			(0.0154)	(0.0221)	(0.0225)
Log Total Undergraduates			−0.0829***	0.0464	0.0388
			(0.00861)	(0.0319)	(0.0330)
Log Local 2BR Cost			0.00681	0.0104*	0.00697
			(0.00777)	(0.00619)	(0.00749)
Constant	−0.218***	−1.451***	−1.483***	−2.269***	−1.485***
	(0.00558)	(0.134)	(0.136)	(0.256)	(0.485)
University FE	No	No	No	Yes	Yes
Year FE	No	No	No	No	Yes
Observations	1,207	886	714	714	714
R^2	0.076	0.303	0.515	0.951	0.951

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Data collected from university websites, IPEDS, and HUD. Expenditures variables represent the natural log of four-year rolling sums of expenditures. All regressions use robust standard errors. For fixed effects regressions, R^2 represents the fit for the OLS regression for consistency rather than the within or between R^2.

by auxiliary services spending. The effect is higher on graduation rates than on retention rates, and this could imply that students continue to gain satisfaction from university resources even after they move off campus. This correlation could also be the result of tangible or intangible aspects of the university, and additional research is needed to disaggregate the effect of auxiliary spending on student outcomes.[8]

Aside from these aggregated regressions, I also estimate the effect of living on campus for a longer period of time using BPS data. Table 4 shows the standardized results of these regressions using student-level data. Consistent with the basic estimates of Equation 1, these models indicate that continuing to live on-campus after freshman year is correlated with increased grade point averages. This is evident in both columns (1) and (2). Nevertheless, these effects disappear when other student-level characteristics

[8]To emphasize the point that further disaggregated research is necessary, it is possible that universities could categorize the same spending differently. See Ehrenberg (2012) for a discussion of auxiliary, student services, and instruction expenditures for a robust discussion of which types of services these classifications could comprise.

Table 4: Results of Equation (2). Dependent Variable: GPA

	(1)	(2)	(3)	(4)
On Campus	0.0316**	0.0307**	0.0211	0.0189
	(0.0125)	(0.0124)	(0.0135)	(0.0139)
Distance from Home		0.0172	0.0034	−0.0006
		(0.0114)	(0.0118)	(0.0116)
Composite SAT Score			0.1218***	0.1088***
			(0.0138)	(0.0148)
Parents' Income				0.0460***
				(0.0119)
Observations	3,900*	3,900*	3,800*	3,700*
R^2	0.0041	0.0052	0.0603	0.0646

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Regressions computed using BPS PowerStats online tool. "On Campus" is an indicator for whether a student lived on campus in 2013-2014. Distance from home provides the distance the student's home is from their university in 2011-2012. Composite SAT score represents students' composite SAT scores, and Parents' Income refers to students' parents' income in 2011-2012. Observations have been coarsened to maintain anonymity in these results. Additionally, the sample is limited to students who lived on campus in academic year 2011-2012.

are taken into account. Specifically, students' composite SAT scores in column (3) and students' parents' incomes in column (4) are much stronger predictors of students' GPAs than whether they continued to live on campus.

Considering these results along with those in Tables 2 and 3, additional years of living on campus are unlikely to positively affect student retention rates, graduation rates, or GPAs. That being said, this study is limited by a small sample size, a lack of granularity regarding expenditures, and by limited student-level data. With a larger sample size and greater variation among universities' housing requirements, this approach might identify an effect of on-campus housing on students. Furthermore, other university qualities such as auxiliary services do seem to be correlated with student outcomes, and further research should be conducted to better understand what types of auxiliary expenditures are driving these results.

6 Conclusion

As a result of increasing concern for student well-being and competition in higher education, universities have explored numerous methods to improve students' qualities of life. Among these, on-campus housing represents a key area of focus, and many universities have implemented on-campus housing requirements in an effort to improve student outcomes.

This paper estimates the effects of on-campus housing requirements on retention rates, graduation rates,

and GPAs. While on-campus housing requirements are correlated with student retention and graduation rates, the effects disappear in fixed-effect models. Nevertheless, auxiliary services appear to be positively correlated with graduation rates in these models, and this implies that other aspects of university services for students are correlated with improved students outcomes. In addition, using data from the BPS survey, this paper also finds that additional years of living on-campus have no effect on students' GPAs.

These results imply that universities should focus more on auxiliary services when working to increase student outcomes. Furthermore, improving university resources for students may be more effective than requiring additional years of on-campus housing.

References

Addai, Isaac (2015). "The Predicaments of Non-Residential Students in Ghanaian Institutions of Higher Education: A Micro-Level Empirical Evidence". In: *Journal of Education and Practice* 6(1). DOI: 10.7176/JEP.

Alter, Molly and Randall Reback (Sept. 2014). "True for Your School? How Changing Reputations Alter Demand for Selective U.S. Colleges". In: *Educational Evaluation and Policy Analysis* 36(3), pp. 346–370. DOI: 10.3102/0162373713517934.

Ancis, Julie, Sandra Choney, and William Sedlacek (Jan. 1996). "University Student Attitudes Towards American Indians". In: *Journal of Multicultural Counseling and Development* 24, pp. 26–36. DOI: 10.1002/j.2161-1912.1996.tb00286.x.

Astin, Alexander (1977). *Four Critical Years: Effects of College on Beliefs, Attitudes, and Knowledge*. First. Jossey-Bass, Inc.: San Francisco. ISBN: 0-87589-346-5.

Bliming, Gregory (1989). "A Meta-Analysis of the Influence of College Residence Halls on Academic Performance". In: *Journal of College Student Development* 30(4), pp. 298–308.

Bliming, Gregory (Sept. 1999). "A Meta-Analysis of the Influence of College Residence Halls on Academic Performance". In: *Journal of College Student Development* 40(5), pp. 551–561.

Bozick, Robert (July 2007). "Making It Through the First Year of College: The Roll of Students' Economic Resources, Employment, and Living Arrangements". In: *Sociology of Education* 80, pp. 261–285. DOI: 10.1177/003804070708000304.

Brown, Joshua, Fred Volk, and Elisabeth Spratto (2019). "The Hidden Structure: The Influence of Residence Hall Design on Academic Outcomes". In: *Journal of Student Affairs Research and Practice* 56(3), pp. 267–283. DOI: 10.1080/19496591.2019.1611590.

Brown, Patricia (Nov. 2011). "Animal McMansion: Students Trade Dorm for Suburban Luxury". In: *CNBC*.

Cheng, Michelle and Cecilia Chan (2020). "Do University Residential Experiences Contribute to Holistic Education?" In: *Journal of Higher Education Policy and Management* 42(1), pp. 31–48. DOI: 10.1080/1360080X.2019.1659211.

Chetty, Raj et al. (July 2017). "Mobility Report Cards: The Role of Colleges in Intergenerational Mobility". In: *NBER Working Paper*. Working Paper Series(23618). DOI: 10.3386/w23618.

Choney, Sandra, Elise Berryhill-Paapke, and Rockey Robbins (1995). "The Acculturation of American Indians". In: *Handbook of Multicultural Counseling*. Sage Publications, Inc.: Thousand Oaks, California, pp. 73–93. ISBN: 0-8039-5506-5.

Cross, William (1991). *Shades of Black: Diversity in African-American Identity*. Temple University Press: Philadelphia. ISBN: 0-87722-759-4.

de Araujo, Pedro and James Murray (Mar. 2010). "Estimating the Effects of Dormitory Living on Student Performance". In: *Economics Bulletin* 30(1). DOI: 10.2139/ssrn.1555892.

Ehrenberg, Ronald (2012). "American Higher Education in Transition". In: *Journal of Economic Perspectives* 26(1), pp. 193–216. DOI: 10.1257/jep.26.1.193.

File Documentation Public Institutions - GASB 34/35: Fiscal Year 2020 (n.d.).

Hefner, Jennifer and Daniel Eisenberg (2009). "Social Support and Mental Health Among College Students". In: *American Journal of Orthopsychiatry* 79(4), pp. 491–499. DOI: 10.1037/a001691.

Hoxby, Caroline (Dec. 1997). "How the Changing Market Structure of U.S. Higher Education Explains College Tuition". In: *NBER Working Paper No. w6323*.

Jackson III, Bailey (2001). "Black Identity Development: Further Analysis and Elaboration". In: *New Perspectives on Racial Identity Development*. New York University Press: New York, pp. 9–31. ISBN: 0-8147-9342-8.

Jacob, Brian, Brian McCall, and Kevin Strange (Feb. 2018). "College as Country Club: Do Colleges Cater to Students' Preferences for Consumption?" In: *Journal of Labor Economics* 36(2), pp. 309–348. DOI: 10.1086/694654.

Josselson, Ruthellen (1987). *Finding Herself: Pathways to Identity Development in Women*. Jossey-Bass, Inc.: San Francisco. ISBN: 1-55542-049-4.

Kenyon, Elizabeth (June 1997). "Seasonal Sub-Communities: The Impact of Student Households on Residential Communities". In: *The British Journal of Sociology* 48(2), pp. 286–201. DOI: 10.2307/591753.

Kirp, D.L. (2005). "This Little Student Went to Market". In: *Declining By Degrees*. Palgrave MacMillan: New York. ISBN: 978-1-4039-7316-0.

Kuh, George et al. (Oct. 2016). "Unmasking the Effects of Student Engagement on First-Year College Grades and Persistence". In: *The Journal of Higher Education* 79(5), pp. 540–563. DOI: 10.1080/00221546.2008.11772116.

Macintyre, Clement (Nov. 2003). "New Models of Student Housing and Their Impact on Local Communities". In: *Journal of Higher Education Policy and Management* 25(2). DOI: 10.1080/1360080032000122598.

Mayhew, Matthew et al. (Sept. 2016). *How College Affects Students: 21st Century Evidence That Higher Education Works*. First. John Wiley & Sons. ISBN: 978-1-118-46268-3.

Millea, Meghan et al. (2018). "What Matters in College Student Success? Determinants of College Retention and Graduation Rates". In: *Education* 138(4), pp. 309–322.

Muller, Jordan (2017). "How Syracuse University's Potential 3-Year Housing Requirement Compares to Schools Nationally". In: *The Daily Orange*.

Newlon, Cara (July 2014). "The College Amenities Arms Race". In: *Forbes*.

Owolabi, Babatunde Oluwaseyi (Mar. 2015). "The Effects of Students' Housing on Academic Performance at the University of Ibadan in Nigeria". In: *International Journal of Scientific & Engineering Research* 6(3).

Pascarella, Ernest and David Chapman (1983). "A Multiinstitutional, Path Analytic Validation of Tinto's Model of College Withdrawal". In: *American Educational Research Journal* 20(1), pp. 87–102. DOI: 10.3102/00028312020001087.

Patton, Lori et al. (Feb. 2016). *Student Development in College: Theory, Research, and Practice*. Third. John Wiley & Sons. ISBN: 978-1-118-82181-7.

Pena, Alma (Aug. 2018). *University Living Requirements Affect Off-Campus Student Housing*.

Price, If et al. (2003). "The Impact of Facilities on Student Choices of University". In: *Facilities* 21(10), pp. 212–222. DOI: 10.1108/02632770310493580.

Reynolds, C. Lockwood (July 2020). "Estimating the Causal Effects of Dormitory Residence During College on Student Outcomes". In: *Journal of Human Capital* 14(2), pp. 249–289. DOI: 10.1086/709534.

Ritchey, Keyiona (2014). "Black Identity Development". In: *The Vermont Connection* 35(12).

Sanford, Nevitt (Jan. 1967). *Where Colleges Fail: A Study of the Student as a Person*. Jossey-Bass, Inc.: San Francisco.

Schudde, Lauren (2011). "The Causal Effect of Campus Residency on College Student Retention". In: *The Review of Higher Education* 34(4), pp. 581–610. DOI: 10.1353/rhe.2011.0023..

Stephey, M.J. (2008). "The Evolution of the College Dorm". In: *TIME Magazine*.

Stoetzer, Ethan (July 2015). "Lehigh University Recomments 3-Year on-Campus Housing Mandate". In: *USA Today*.

Swail, Watson Scott, Kenneth Redd, and Laura Perna (2003). *Retaining Minority Students in Higher Education*. Tech. rep. 2; Vol-30. Washington, D.C.: Association for the Study of Higher Education.

Thompson, Jane, Virginia Samiratedu, and John Rafter (1993). "The Effects of On-Campus Residence on First-Time College Students". In: *NASPA Journal* 31(1), pp. 41–47. DOI: 10.1080/00220973.1993.11072336.

Tinto, Vincent (1975). "Dropout from Higher Education: A Theoretical Synthesis of Recent Research". In: *Review of Educational Research* 45(1), pp. 89–125. DOI: 10.3102/00346543045001089.

Turley, Ruth and Geoffrey Wodtke (2010). "College Residence and Academic Performance: Who Benefits from Living on Campus?" In: *Urban Education* 45(4), pp. 506–532. DOI: 10.1177/0042085910372351.

Ware, Thompson and Michael Miller (1997). "Current Research Trends in Residential Life". Information Analyses.

Webber, Douglas (2012). "Expenditures and Postsecondary Graduation: An Investigation Using Individual-Level Data from the State of Ohio". In: *Economics of Education Review* 31, pp. 615–618. DOI: 10.1016/j.econedurev.2012.02.003.

Webber, Douglas and Ronald Ehrenberg (2010). "Do Expenditures Other than Instructional Expenditures Affect Graduation and Persistence Rates in American Higher Education?" In: *Economics of Education Review* 29, pp. 947–958. DOI: 10.1016/j.econedurev.2010.04.006.

Worthington, Roger et al. (July 2002). "Heterosexual Identity Development: A Multidimensional Model of Individual and Social Identity". In: *The Counseling Psychologist* 30(4), pp. 496–531. DOI: 10.1177/00100002030004002.

Wotapka, Dawn (Dec. 2012). "Resort Living Comes to Campus". In: *Wall Street Journal*.

Zotorvie, Stehpen Tetteh (May 2017). "Students' Accommodation and Academic Performance: The Case of Ho Technical University, Ghana". In: *European Scientific Journal* 13(13). DOI: 10.19044/esj.2017.v13n13p290.