WINDOWLESSNESS AND WELL-BEING IN OFF-CAMPUS STUDENT HOUSING AT THE UNIVERSITY OF TEXAS AT AUSTIN

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ABSTRACT

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In this thesis, I take a multifaceted approach to addressing the following research question: What effect does a lack of natural light in bedrooms in off-campus student housing at the University of Texas at Austin have on well-being? To address this question, I frame windowlessness as a mental and physiological epidemic and use a historical lens to analyze how cities and governments have adapted to fight past epidemics. I explore how scientists and architects have transformed the way we view illness and have reshaped the way we build our cities. I explore the history of Austin's West Campus neighborhood and the creation of the University Neighborhood Overlay (UNO). By analyzing these design guidelines, I demonstrate the human-focused design of the district. I explore the emergence of windowless bedrooms in the UNO, detail my methods and methodology, and explain my survey instrument, an original survey created for this study. I then analyze the survey data, present findings, and share student experiences.

The data analysis conclusively demonstrates ($p \leq 0.05$) that windowless bedrooms contribute to poor well-being and may contribute to mood disorders. I have found that predatory leasing practices and windows that face interior hallways further contribute to the epidemic of windowlessness. Students are likely to sign windowless leases to live with friends but quickly realize the impact that a lack of natural light has on their sleep patterns and mood.

Future studies should explore windowless bedrooms in other jurisdictions. Policy recommendations should prioritize the well-being of students and ensure that future constructions only lease windowed rooms. Existing windowless rooms should be leased with students made aware of the potential health detriments and, over time, removed completely from housing.

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Their love is boundless.

INTRODUCTION

This project began in the Fall of 2019 during my freshman year at Texas. I recall walking into the Moontower Apartments leasing office to sign a lease for my sophomore year apartment, a three-by-three in a brand-new building marketed as luxury student housing. My other two roommates had already signed. As the agent walked me through the lease, I immediately realized that something was off. “This bedroom is missing a window,” I blurted. Was this legal? How would living in a closet-equivalent affect my future? Would I receive owl-post from Hogwarts? The leasing agent assuaged my concerns, assured me that no window would not be an issue. After all, people enjoyed not being abruptly awoken by the sun. She suggested that I would spend most of my days outside the apartment, walking to class, mingling in coffee shops, or making use of the amenities: the trendy gym, the 18th floor yoga studio, or rooftop pool.

But thanks to COVID-19, 2020 would not be an ordinary year. Starting my mornings in darkness with no perception of time, stuck in my room for hours every day, virtual classes made me feel closed off from the world, claustrophobic. For a year, my days devolved into a three-step routine involving my desk, my bed, and the floor lamp that provided a semblance of the outside world. I began to understand the tremendous impact that the built environment could have on mental health. I realized that poor design could have long-term effects, especially on those who lack the means to access better quality accommodation. I now find it difficult to leave on fluorescent lights and never close my blinds. I revel in waking up with the sun.

Literature Review: Designing for Disease

In response to viruses and bacteria, the way we construct our homes and our cities has changed: London and Paris' sewage networks, the creation of Central Park, the Thames Embankment, are all responses to the threats that illnesses pose to urban populations.[1] What makes these cases curious, especially Central Park, is that these urban centers were retrofitted in the name of public well-being, underscoring the role that disease has played in changing urban fabric.

Often, cities are viewed as petri dishes for disease. If history is any indication, this assumption is not entirely misguided. Even recently, during the COVID-19 pandemic, early hotspots were in cities. Large metropolises like New York, with crowded subways and packed streets, became the epicenters of the pandemic.[2] Fareed Zakaria, political commentator and journalist, notes that for a virus to become a full-blown pandemic it must enter an urban setting. But this presents an interesting paradox. Modern cities afford inhabitants a higher quality of life, longer lifespans that their rural counterparts, lower rates of diabetes, heart disease, and suicide. People in modern cities are happier.[3] Zakaria notes that our modern perspectives of cities as hotspots of "pollution and disease come from an image of industrial cities of another era."[4] Until the twentieth century, death rates in cities surpassed those of rural areas.[5] Cities provided inadequate waste disposal for the volume and density of inhabitants. Trade, migration, and globalization facilitated the spread and important of animal-borne and human-spread diseases. Research indicates that urban populations almost everywhere experienced higher rates of

[1] Carr, "The Topography of Wellness."
[2] Zakaria, "Ten Lessons."
[3] "The Future Is Urban: Integrated Planning Policies Can Enable Healthy and Sustainable Cities - The Lancet Global Health."
[4] Zakaria, "Ten Lessons."
[5] Davenport, "Urbanization and Mortality in Britain, c. 1800–50."

communicable diseases that rural populations.[6] Especially among young children, this divide was most apparent. Zakaria notes that for children aged one to four, mortality was 94% higher in urban areas.[7]

Since the nineteenth century, housing and urban planning have been used to combat disease and congestion. The work of Louis Pasteur, Robert Koch, and Jonas Salk advanced germ theory, demonstrating that viruses, bacteria, and other pathogens invisible to the naked eye were responsible for the spread of illness. Prior to modern advances in sewage, air purification, and centralized plumbing, urban design played a tremendous role in the health of cities. From John Snow's study of cholera in Victorian London by mapping cholera cases and identifying a contaminated pump as a source to Georges-Eugène Hausmann's urban renewal program under Napoleon III to remove narrow medieval streets in favor of Paris' famed avenues, city planners and designers have understood that urban planning has an impact on wellness.[8] Advances in the way we design our cities has improved quality of life. In modern cities, density is no longer a death sentence. With advances in air purification, knowledge of germ theory, and masking, a study conducted at the London School of Economics found no evidence to suggest that population density correlates positively with COVID-19 cases and deaths when adjusted for time.[9] This is a significant shift over the cramped, crowded, disease-ridden cities of the industrial revolution.

[6] Zakaria, "Ten Lessons."
[7] Ibid.
[8] Tulchinsky, "John Snow, Cholera, the Broad Street Pump.
[9] Carozzi, "Urban Density and Covid-19," 2020.

Many of the advancements of the nineteenth and twentieth centuries saw the rise of beautification programs, a push for public spaces, open areas that could provide city-dwellers respite from the organized chaos of urban living.

Perhaps the biggest proponent of the open space movement was Frederick Law Olmsted, General Secretary of the United States Sanitary Commission, designer of New York's Central Park. In carving out a swath of the nation's largest city, Olmsted created a space that sought a "soothing and refreshing sanitary influence" for visitors and residents of the city.[10] While Olmsted designed the park prior to the introduction of germ theory, his understanding of public spaces, as able to provide "relief from ordinary cares" to serve as the "lungs of the city" shows that public health in the nineteenth century understood the importance of public spaces and access to greenery as essential to "securing the means of happiness."[11] While sunlight may not disinfect the air and foliage as Olmsted predicted, access to fresh air, natural light, and public spaces established a tradition of retrofitting dense, crowded, industrial-era cities with urban green spaces.

Nineteenth century New York City remains an ideal case study for demonstrating how policy and health-centered reform can improve the quality of life in cities. From 1800-1880 the population of the city doubled every sixteen years. To accommodate this exponential influx, single family homes were often divided into multiple living spaces. These spaces were crowded, often lacked natural light, and were inhabited by immigrants and blue-collar workers who lacked the capital to live elsewhere. The low-rise masonry homes on New York's Lower East Side

[10] Olmsted, "Trees in Streets and Parks."
[11] Olmsted, "Yosemite."

lacked interior ventilation and were often constructed using low-quality materials.[12] In July 1863 working class New Yorkers took to the streets to protest the Civil War Federal Draft. Considered one of the bloodiest riots in American history, hundreds were killed. But rioters were not only protesting conscription. Rioters were also blaming and murdering Black residents. Many were agitated by the intolerable living conditions that characterized immigrant neighborhoods.[13]

By 1867, the First Tenement House Act was passed, mandating fire escapes and a window for every room.[14] However, landlords attempted to navigate these regulations with interior-facing windows. The Second Tenement House Act of 1879 closed this loophole, mandating windows face a source of fresh air and light.[15] This law led to the creation of 'dumbbell' tenements, structures that bulged out toward the front and back so that when stacked in rows would create central air shafts into which windows could face. But landlords still attempted to provide the bare minimum and these air shafts designed to provide light and clean air became receptacles for waste and refuse. The 1901 New York State Tenement House Act of 1901 rectified this issue, mandating that air shafts be accessible and designed for garbage removal.[16] Similar reforms were instituted in Chicago and Mexico City. These laws established the importance of windows and ventilation. They were mandated and considered necessary for city life.

Articles, books, and research on the intersection between health, disease, and urban planning have demonstrated how pandemics have shifted the way we build our cities. Understanding how housing plays a role in injuries, mental health, and social mobility has been

[12] New York Public Library, "Tenements."
[13] Ibid.
[14] Ibid.
[15] Ibid.
[16] Ibid.

broadly studied. As Adhlaka and colleagues assert in *The Lancet*, the future is urban.[17] The article suggests that current planning exacerbates poor health and urban inequity. Rather than a crisis of infection and transmission, the article identifies the following factors as potential health risks: exposure to traffic, air and noise pollution, lack of social interaction, low levels of physical activity, and engaging in sedentary behaviors.[18]

The COVID-19 pandemic upended routines, exposed deficiencies in design, and underscored the importance of space. Recent research has shown that windows, natural light, and access to green space can have a tangible impact on mental well-being.[19] The walkability of local neighborhoods, the proximity of food, access to recreation, and the quality of life provided by a residence became central during the 2020 lockdown period. A study conducted by a university in Milan, one of the regions in Europe most heavily affected by the pandemic, found that living in apartments <60m^2 with poor views and poor ventilation were associated with an increased risk of depressive symptoms.[20] Walsh and colleagues analyze how the intersection of mental health care and architecture contribute to positive mental health outcomes for patient recovery.[21] Their work highlights the role that light plays on mental health and describe this as a significant design feature that affects mental health outcomes. Daylight and proximity to windows were associated with positive mental health outcomes. They compared the recovery of patients who stayed on the bright side of a hospital to those recovering in areas with less intense sunlight. The patients exposed to higher intensity sunlight experienced less perceived stress and marginally less pain.[22]

[17] Adlakha and John, "The Future Is Urban."
[18] Ibid,
[19] Sharifi and Khavarian-Garmsir, "The COVID-19 Pandemic."
[20] Amerio et al., "COVID-19 Lockdown."
[21] Joseph, "Impact of Light on Outcomes in Healthcare Settings."
[22] Ibid.

They also had 21% less pain medication costs.[23] This research presents a compelling correlation between windows and well-being. D'Alessandro and colleagues analyze the impact of COVID-19 on housing. COVID-19 exposed deficiencies in construction and showed that much housing is poorly designed.[24] But most importantly, studies suggest that simply having a window in a bedroom or apartment is not enough.

Researchers at Aarhus University in Denmark found that access to green space in childhood was linked with a lower risk of psychiatric disorders from adolescence to childhood. This groundbreaking study examined more than 900,000 individuals and discovered that children who were exposed to less green space during their upbringing had an increased risk of up to 55% for developing a psychiatric disorder, regardless of the influence of other established risk factors. This suggests the importance of prolonged exposure to public green space.[25] A 2020 study conducted on COVID-19 that provided recommendations for healthy living spaces found that not only is access to public green spaces essential, but also window views that look out onto green spaces can contribute to well-being.[26] The World Health Organization (WHO) recognizes healthy housing as encouraging a complete state of physical, mental, and social well-being.[27] Taken together, these studies present a compelling argument for the importance of windows with views of green space as an important contributing factor to well-being.

Natural light is essential for well-being and numerous studies have demonstrated that natural light is crucial for regulating physiological functions.[28] While this study does not take a

[23] Ibid.
[24] Appolloni, Corazza, and D'Alessandro, "The Pleasure of Walking."
[25] Ibid.
[26] Appolloni, Corazza, and D'Alessandro, "The Pleasure of Walking."
[27] World Health Organization, *WHO Housing and Health Guidelines*.
[28] Osibona, Solomon, and Fecht, "Lighting in the Home and Health."

physiological approach to natural light deprivation, it is important to note that natural light has been broadly studied as playing a role in the function of the nervous and endocrine systems—specifically in the secretion of melatonin.[29] Melatonin plays an essential role in regulating the body's circadian rhythm. The release of melatonin by the pineal gland follows a 24-hour cycle in response to the amount of light received. The hormone reaches its peak at night in the absence of light, promoting healthy sleep; the hormone is at its lowest during daylight, promoting alertness. Improper light exposure can negatively impact overall health.[30] A 2006 study from the World Journal of Biological Psychiatry suggests that circadian rhythm disfunction may underlie the pathophysiology of depression.[31]

In response, cities should consider the windowlessness-related well-being crisis as potent and timely as crises of centuries past. Like central plumbing and easy access to green space, access to natural light should not be a privilege afforded to a select few.

In exploring the importance of windows in dwellings, Austin's West Campus neighborhood is a natural experiment. A high-density, walkable neighborhood home to 27,000+ students, just across the street from the University of Texas at Austin (UT), West Campus has seen an enormous rise in high-density housing and windowless bedrooms.[32] The phenomenon is strikingly similar to the nineteenth century tenements of New York—if the City of Austin did anything to remedy the issue. The first section of this thesis explores West Campus, its history and examples of windowless rooms. The second section of this thesis involves a survey component to compare the well-being of students who live in windowless rooms to the well-

[29] Ibid.
[30] Ibid.
[31] Srinivasan et al., "Melatonin in Mood Disorders."
[32] Williams, Chad D. "Student Housing Cooperatives and the University Neighborhood Overlay in Austin, Texas."

being of students who live in windowed rooms. Finally, this thesis provides actionable policy recommendations to alleviate the epidemic of windowless rooms in Austin. Existing literature explores well-being on a macro scale: Public parks, the walkability of neighborhoods, an avoidance of car-based infrastructure. West Campus, a walkable, high-density neighborhood presents a unique opportunity to isolate windowless rooms as a variable that can impact well-being. This thesis fills the gap in existing literature, approaching well-being in cities at an individual level. It is the first known study of its kind to explore a lack of exposure to natural light in a controlled environment.

This study takes a deep dive into windowless off-campus housing in Austin. Using an IRB-exempt survey, student comments and interviews, a conversation with a developer, photos and floorplans from student housing, historic analysis, and primary sources, this work contributes a novel understanding of how natural light and windows play a significant role in well-being. This work explores the following hypothesis:

1. Students at the University of Texas at Austin who live in windowless rooms have poorer well-being than their peers who live in windowed rooms.

LAYING THE GROUNDWORK FOR DENSITY IN WEST CAMPUS

As its name may suggest, Austin's West Campus neighborhood—colloquially known simply as 'West Campus,'—is a neighborhood situated directly west of the University of Texas at Austin campus. Prior to the revision of zoning laws in 2004, student housing in the neighborhood primarily comprised single family homes, fraternity and sorority houses, and cooperative housing.[33] The 2004 ordinance outlines its goals to "promote high density redevelopment in the area generally west of the University of Texas campus, provide a mechanism for the creation of a densely populated but livable and pedestrian friendly environment, and protect the character of the predominantly single-family residential neighborhoods adjacent to this district".[34] The newly created University Neighborhood Overlay (UNO), a 231.68-acre area, sought to increase the density of West Campus to create a walkable, vibrant student community.

[33] Central Austin Combined Neighborhood Plan, 2004.
[34] Ordinance No. 040902-58, Austin City Code.

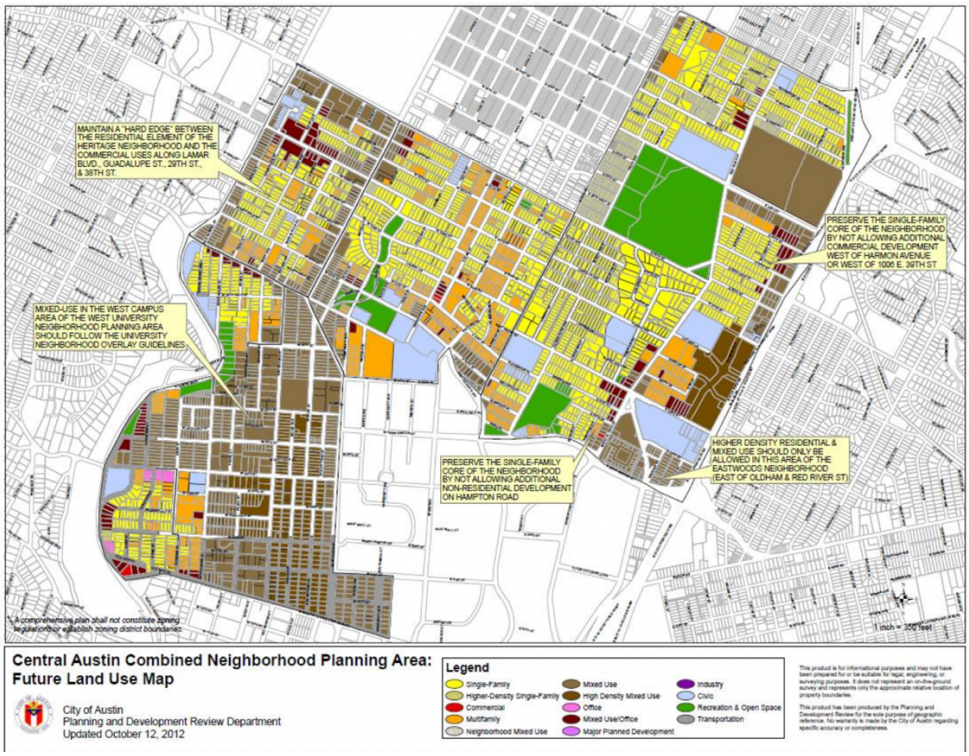

Figure 1. Neighborhood planning area, UNO is the area designated as 'mixed use in the West Campus area of the West University Neighborhood Planning Area. [35]

The primary goals of the UNO were to create a neighborhood that centralized the UT student population and to create a distinct district where developers could supply dense student housing in an area with high demand. While the zoning has been described as 'neoliberal' and 'laissez-faire,' centralizing student housing was largely effective.[36] Data from the 2000 to 2010 Census shows a decrease in college-aged students from surrounding neighborhoods and an increase in college aged students in UNO-zoned census tracts.

[35] Central Austin Combined Neighborhood Plan, 2004.
[36] Williams, Chad D. "Student Housing Cooperatives and the University Neighborhood Overlay in Austin, Texas."

The development of the UNO can be traced back to West Campus' original zoning as multifamily-4 (MF-4). This zoning is for moderate density housing[37] and was the standard for West Campus. In the 1990s, a developer identified an Austin Land Development Code loophole that allowed for the construction of multifamily-6 zoning (MF-6), the highest density construction designation, in a multifamily-4 zone. Student Housing Cooperative and UNO researcher Chad Williams identifies this developer's knowledge of the 1984 Land Development Code (LDC) as the catalyst for high-density student housing. Williams' identification asserts that the developer "massaged a provision in the 1984 LDC that had never been used. This provision allowed for MF-6 height despite the fact West Campus was only zoned to MF-4 at the time. This meant that instead of height limits of 60 feet, West Campus could now develop to 90 feet.

Subsequently, two projects were developed in West Campus, apparently for the first time since the 1984 LDC, at the MF-6 height."[38] The first of these projects, located at 1023 W. 24th Street, was the first time that the city had permitted an MF-6 structure. The Austin Monitor cites the developers desire to "maximize profit potential" by building a 36-unit apartment on the property.[39] Concerns arose from neighbors, most notably the Texas Federation of Women's Clubs (TFWC), located just across the street from the site.

[37] Multifamily Residence Moderate-High Density district is intended to accommodate multifamily and group residential use with a maximum density of 36 to 54 units per acre, depending on unit size and mix. This district is appropriate for moderate-high density housing in centrally located areas near supporting transportation and commercial facilities, in areas adjoining downtown Austin and major institutional or employment centers, and in other selected areas where moderate-high density multifamily use is desirable.
[38] Ibid.
[39] Austin Monitor, "Developers of Villas on Guadalupe."

Figure 2. The TFWC Mansion (left) and the Park Place Apartments (right).[40,41]

Fearing that the apartment would disrupt the single-family character of the neighborhood, the TWFC petitioned the construction and recommended the original MF-4 zoning, a designation that would only allow 15 units on the lot. The developer agreed to aesthetic features that neighbors found aesthetically appealing. Cladding the structure in brick, adding a metal roof, covered parking, and pedestrian-friendly amenities were enough for the TFWC to withdraw their petition. Chair Joy Davis commenting that "(the) design is compatible with TFWC's beautiful and historic headquarters building."[42] City councilman Wyatt Wynn was an outspoken supporter of high-density construction, stating that "these developments help us cut back on traffic and congestion, promote walking and bicycling, improve the quality of our environment, and bring us closer together as a community."[43] By establishing precedents for neighborhood character, respect for existing structures, pedestrian amenities, and enclosed parking, this project would lay the groundwork for the future of density in West Campus and the creation of the UNO.

[40] "Austin Wedding at The Mansion (TFWC) - LGBTQ Wedding Photographers."
[41] "Park Place Apartments, 1023 West 24th Street, Austin, TX - RentCafe."
[42] Ibid.
[43] Ibid.

The Villas on Guadalupe was the first example of student housing construction that now typifies modern off-campus housing in Austin. It was the first high-density large-scale student housing development billed as 'luxury' student housing. Boasting a resort-style pool, 24-hour gym, and a poolside projection screen, the building's amenities and proximity to campus attracted students to sign leases. Villas on Guadalupe was completed in 2002 and was immediately met with outrage from the North University Neighborhood Association, which claimed that the development of an MF-6[44] structure in a low-density neighborhood would inundate the region with similar complexes, destroying the character of the neighborhood. Villas on Guadalupe was constructed to house 500 students on a 2-acre lot with 150 units and 395 parking spaces. At the time of construction, the only two cases of MF-6 zoning existed within the city. Traffic, walkability, and an increase in property prices were topics of concern.[45]

The development would face a one-way street home to single-family residences, duplexes, and smaller residential dwellings. Concerns about the development's massing, size, and scale and its ability to 'fit' into the neighborhood mirrored the concerns of the TFWC during the construction of the first MF-6 zoned construction in West Campus, just two years prior. The structure was approved for SMART housing, implying that at least 10% of the units were deemed 'affordable' by the City of Austin at the time of construction. The Villas on Guadalupe was also the first known apartment building to lease windowless units to the UT Austin student demographic.

[44] Multifamily Highest Density district is intended for multifamily and group residential use. An MF-6 district designation may be applied to a use in a centrally located area near supporting transportation and commercial facilities, an area adjacent to the central business district or a major institutional or employment center, or an area for which the high-density multifamily use is desired.
[45] Austin Monitor, "Developers of Villas on Guadalupe."

While Villas on Guadalupe was not located in West Campus, the building's construction set a precedent for future construction. By demonstrating that students would lease windowless rooms, live in a building without guaranteed parking, and that developers could navigate zoning regulations by providing affordable units and aesthetic neighborhood appeal, the Villas on Guadalupe paved road to the creation of the University Neighborhood Overlay just two years later.

Laying the groundwork for density in West Campus involved significant private-public partnerships. From the early days of high-density construction, the tug-of-war between maintaining neighborhood character and encouraging students to live near campus is evident. Especially in the early 2000s an emphasis on aesthetic appeal and neighborhood fit emerges in West Campus, ideas that inform the creation of the UNO and continue to play a role in contemporary UNO dynamics.

Incentives for Density

Austin's Developer Density Incentives have also played a significant role in bringing density to West Campus. The UNO ordinance provides substantial site design bonuses, including reduced parking requirements, and specific land use allowances above the base zoning regulations in exchange for a percentage of the total dwelling units to be set aside as affordable housing.[46] These incentives go hand-in-hand with Austin's SMART housing program. [47] UNO ordinances have been revised several times. The original ordinance in 2004, a revision in 2014,

[46] Jones-Meyer, "Do Minimum Parking Requirements Matter?"
[47] SMART stands for Safe, Mixed-income, Accessible, Reasonably priced, Transit-oriented

and a 2019 update are the most notable. These revisions increased height requirements and altered density bonus requirements.

> "To be eligible for these bonuses, a project was required to be certified by the city as an affordable housing development and to set aside 10% of its units as affordable to households earning 80% median family income (MFI) and 10% of its units as affordable to households earning 60% MFI. In 2014, the affordability requirements were altered to target households earning 60% and 50% MFI and a greater height bonus was offered for projects that either paid a fee-in-lieu of onsite affordable housing or set aside an additional 10% of their total units as affordable to households earning 50% MFI. Finally, in 2019, the Overlay was further amended to allow an even greater height bonus, up to 125-feet over the maximum, and to eliminate all parking requirements for participating projects."[48]

A higher percentage of SMART units in a development corresponds to a greater number of developer incentives. Developers receive fast-track status on permits and project approval along with fee waivers based on the amount of SMART units included (Figure 1).

[48] Jones-Meyer, "Do Minimum Parking Requirements Matter?"

Policy	Incentive Policy Type	Applicability	Development Incentives & Waivers/Modifications	Affordability Set-Aside Requirements	Maximum Income Limit (as % of MFI)*		Affordability Period		Fee-in-Lieu Rate	Year Adopted	Most Recent Amendment	Original Ordinance/ Regulating Plan	Land Development Code Reference
					Owner	Rental	Owner	Rental					
Affordability Unlocked (AU)	Density Bonus	Citywide	Waiver of compatibility, duplex design, and site area, FAR, dwelling unit occupancy requirements, modified parking requirements, front & rear setback reduced by 50%, min lot size & width reduction, height increase	50% of total units**	80%	60%	99 years	40 years	None	2019		Ordinance No 20190509-027	§ 25-1-720
Downtown Density Bonus (DDB)	Density Bonus	Central Business Distict	Increased maximum height and floor-to-area ratio (FAR)	10% of residential bonus area	120%	80%	99 years	40 years	*Interim Fees:* $5 - Residential Rainey Street; $12 - Residential with CBD zoning other than Rainey Street; $10- Residential with zoning other than CBD other than Rainey Street ; $18 - Commerial with CBD zoning; $12 - Commercial with zoning other than CBD	2013		Ordinance No. 20130627-105	§ 25-2-586
East Riverside Corridor (ERC) Development Bonus	Density Bonus	East Riverside Corridor Regulating District	Increased maximum height, FAR, and modification to compatability standards	25% of bonus area	80%	60%	99 years	40 years	$1 per gross bonus square foot for buildings over 90 ft. (no in-lieu option under 90')	2013		Regulating Plan	§ 25-2-149
Micro-Unit Density Bonus	Density Bonus	Applies to multifamily use in Transit Oriented Development Districts or along Core Transit Corridors when units are 500 square feet or less	Waiver of minimum site area requirements and reduction in off-street parking requirements	10% of total units	80%	50%	99 years	40 years	None	2014		Ordinance No. 20141211-228	§ 25-2-780
North Burnet Gateway (NBG) Development Bonus	Density Bonus	North Burnet Gateway Regulating District	Increased maximum height and FAR	10% of bonus area	80%	60%	99 years	40 years	$8 per gross bonus square foot	2009		Regulating Plan	§ 25-2-148
Planned Unit Development (PUD) Density Bonus	Density Bonus	Planned Unit Developments where the proposed land use exceeds base entitlements	Increased maximum height, FAR, and building coverage	10% of bonus area (rental) and 5% of bonus area (ownership)	80%	60%	99 years	40 years	$8 per gross bonus square foot	2008	Ordinance No. 20131003-096	Ordinance No. 20080618-098	§ 25-2-Subchapter B Article 2.5
Rainey Street Density Bonus	Density Bonus	Rainey Street Subdistrict	Waiver of maximum height up to 8:1 FAR	5% of total residential area	80%	80%	none	none	None	2005	Ordinance No. 20140227-054	Ordinance No. 20050407-063	§ 25-2-739
S.M.A.R.T. Housing	Fee Waivers & Development Incentives	Citywide	Permit, inspection, and Capital Recovery fee waivers	At least 10% of total units	80%	80%	1 year	5 years	None	2007	Ordinance No. 20071129-100	Ordinance No. 20141106-124	§ 25-1 Article 15.2
S.M.A.R.T. Housing Greenfield Single-Family Density Bonus	Density Bonus	SF-2 & SF-3 zoning districts on lots 3 acres or greater	Site may be developed under SF-4A zoning district standards	10% of total units	80% and 100%	60%	1 year	5 years	None	2008		Ordinance No. 20080131-132	§ 25-2-566
S.M.A.R.T. Housing Greenfield Multi-Family Density Bonus	Density Bonus	Undeveloped lots with MF-2 through MF-5 zoning	Site may be developed under MF-6 zoning district standards	10% of total units	80% and 100%	60%	99 years	40 years	None	2008		Ordinance No. 20080131-132	§ 25-2-567
Transit Oriented Development (TOD) Development Bonus	Density Bonus	Plaza Saltillo, Lamar/Justin Lane, and MLK Transit Oriented Development Districts	Increased maximum height, FAR, and modification to compatability standards	At least 10% of total area	80%	50% and/or 60%	99 years	40 years	$13 per gross bonus square foot for Lamar/Justin Lane and Plaza Saltillo; $12 per gross bonus square foot for MLK	2009		TOD Regulating Plans	§ 25-2 Subchapter C Article 3.10
University Neighborhood Overlay (UNO) Density Bonus (Pre 2/24/14)	Density Bonus	University Neighborhood Overlay District, On or Before February 24, 2014	Increased maximum height, FAR, and modification to compatability and parking standards	At least 10% of total units	65% and/or 80%	65% and/or 80%	15 years 15 years	15 years 15 years	None $1 per net rentable square foot	2004	Ordinance No. 20140213-056	Ordinance No. 040902-58	§ 25-2 Subchapter C Article 3.09
University Neighborhood Overlay (UNO) Density Bonus (Post 2/24/14)	Density Bonus	University Neighborhood Overlay District, After February 24, 2014	Increased maximum height, FAR, and modification to compatability and parking standards	At least 10% of total area	50% and/or 60%	50% and/or 60%	40 years 40 years	40 years 40 years	$1 per net rentable square foot for residential use or $2 per net rentable square foot for hotel use	2014	Ordinance No. 20191114-067	Ordinance 20140213-056	§ 25-2 Subchapter C Article 3.09
Vertical Mixed Use 1 (VMU 1)	Density Bonus	Vertical Mixed Use and Mixed Use Combining Districts	Relaxed site area requirements, setbacks, and parking requirements, and waiver of FAR	10% of total units	80%	60%	99 years	40 years	None (Fee amount for commercial space above ground floor pending)	2010	Ordinance No. 20220609-080	Ordinance No. 20100408-049	§ 25-2-Subchapter E Article 4.3
Vertical Mixed Use 2 (VMU 2)	Density Bonus	Vertical Mixed Use and Mixed Use Combining Districts	VMU 1 bonuses plus increased maximum height	At least 10-12% of total units; location dependent	80%	50% or 60%	99 years	40 years	None (Fee amount for commercial space above ground floor pending)	2022	Ordinance No. 20220609-080	Ordinance No. 20100408-049	§ 25-2-Subchapter E Article 4.3

A builder provides:

10% S.M.A.R.T.™ Reasonably Priced Units
20% S.M.A.R.T.™ Reasonably Priced Units
30% S.M.A.R.T.™ Reasonably Priced Units
40% S.M.A.R.T.™ Reasonably Priced Units

The City of Austin provides:

25% Fee Waivers & Fast-Track Review
50% Fee Waivers & Fast-Track Review
75% Fee Waivers & Fast-Track Review
100% Fee Waivers & Fast-Track Review

Figure 3. Austin Developer Incentive Matrix (top); SMART Units and fee waivers by the City of Austin (bottom).[49]

The timing of SMART housing's introduction and the development of high-density housing near UT reflects the City's priorities leading up to the creation of the UNO, asserts Williams.[50] Given the City's desire to create affordable housing units and developers' desire to

[49] Developer Incentive Matrix, The City of Austin.
[50] Williams, Chad D. "Student Housing Cooperatives and the University Neighborhood Overlay in Austin, Texas."

create high-density housing, the City's willingness to facilitate development reflects a neoliberal, laissez faire approach to housing and development taking hold across the United States.[51]

Green Building One Star Rating System

UNO zoning mandates that all buildings constructed using UNO regulations and exemptions must achieve at least a one-star rating under the Austin Green Building program. According to the City of Austin, the Austin Green Building Program (AEGB) was the first rating system in the United States for evaluating the sustainability of buildings. According to the AEGB website, the program "cultivates innovation in building for the enrichment of the community's environmental, economic, and human well-being."[52] Receiving a star rating from AEGB requires receiving points for various measures and tallying these points on a scorecard. A one-star rating is the lowest AEGB rating and does not require the developer to meet any points requirements but simply meet the basic requirements for construction.[53]

AEGB COMMERCIAL RATING STAR LEVELS	
1 Star	Basic Requirements
2 Stars	35 - 44 points
3 Stars	45 - 54 points
4 Stars	55 - 74 points
5 Stars	75 points or more

Figure 4. Austin Energy Green Building rating star levels.[54]

[51] Anecdotal evidence from Professor Larry Speck at the University of Texas at Austin suggests that the majority of SMART housing units are windowless.
[52] Austin Energy Green Building, "Leadership in Sustainability."
[53] AEGB, "AEGB 2022 Commercial Guidebook."
[54] Ibid.

To achieve a basic requirements rating (BR), a developer must commit to the following:

1. Goal setting
2. Codes and Regulations
3. Bicycle Parking
4. Electric Vehicle Charging
5. Commissioning
6. Energy Performance
7. Potable Water Use Reduction
8. Interior Paints and Coatings
9. Material Quantities
10. Tenant and Residential Requirements

While this is the baseline for all AEGB rated buildings, developers can gain extra points by meeting other requirements. Some of these requirements include daylight, operable windows, indoor air quality, indoor air pollutant source control. The AEGB notes that providing access to high quality daylight,

> "reduces disruptions to occupants' circadian rhythms and improves productivity, mental health, and sleep. Project teams that evaluate light exposure and glare when designing envelope glazing and shading can increase daylight access within the building while minimizing uncomfortable brightness and contrast."
>
> "connects building occupants with the outdoors, reinforce circadian rhythms, and reduce the use of electrical lighting by introducing daylight into the space"
>
> "promotes occupants' comfort, well-being, and safety by offering natural ventilation and thermal control within occupied spaces"

> "establishes better indoor air quality in the building after construction and during occupancy to protect human health, productivity, and well-being."[55]

However, the most astonishing finding from the AEGB is that meeting the requirements for daylight, operable windows, indoor air quality, and pollutant source control contribute only one point toward rating star levels. Essentially, meeting the 'exemplary' window requirement by ensuring either that 1) 70% of all spaces with furniture are within 16 ft of windows with a visible light transmittance value (VLT) ≥40% 2) The window area with VLT ≥40% is at least 25% of the occupied area of the unit 3) Average sDA300,50% is achieved for > 75% of regularly occupied floor area.[56,57]

To contextualize the value of one point on the AEGB scale, ensuring that refrigerators have adaptive defrost controls also provides one point toward the AEGB rating scale.

> "To promote the adoption of demand-based defrost controls in cold cases to save energy, improve operation of cold cases and freezers, and extend equipment life by reducing unnecessary timed defrost cycles."[58]

When there is no benefit to developers to include windows, there is little incentive for a developer to include windows in a development. While the AEGB purports to understand the importance of natural light on well-being, in practice this is not the case. While the UNO prioritizes the human experience through walkability, benches, street trees, automobile reduction, neighborhood character, and a student focus, the epidemic of windowless rooms presents a serious challenge for well-being. The lack of incentives and mandates to ensure windows in

[55] AEGB, "AEGB 2022 Commercial Guidebook."
[56] Ibid.
[57] This indicator, sDA, is spatial daylight autonomy, which indicates a certain brightness (300) for a certain amount of time (50%).
[58] Ibid.

every leased bedroom creates a dilemma whereby UNO policy fails to achieve its purported student-focused goals. Analyzing the full impact of windowless rooms can provide a more complete view of the issue in the UNO. Examining student experiences in windowless rooms, how students are impacted by long-term residence in a windowless space, how a lack of natural light inhibits connection, community formation, and overall well-being can provide a promising baseline to provide recommendations to rectify this issue.

PLAYING UNO: THE UNIVERSITY NEIGHBORHOOD OVERLAY

In addition to defining an area for constructing high-density housing, the UNO established conditions and regulations to ensure that West Campus maintained a human-centered, neighborhood feel. Created in response to controversial MF-6 zoning cases, the UNO established an incentive-based overlay that encouraged density, emphasized aesthetics, walkability, a pedestrian focus, and mandated affordability. I hope to demonstrate the district's goals do not match the reality of the West Campus student experience. As stated in the ordinance that created the district, the goal was:

> "To promote high density redevelopment in the area generally west of the University of Texas campus, provide a mechanism for the creation of a densely populated but livable and pedestrian friendly environment, and protect the character of the predominantly single-family residential neighborhoods adjacent to the district."[59]

Protecting the character of surrounding neighborhoods was an important consideration during the creation of the UNO. In many ways, this paints the UNO as a 'sacrificial' neighborhood, an island of density, walkability, and community in a sea of low-density, single-family zoning.

[59] Ordinance No. 040902-58, Austin City Code.

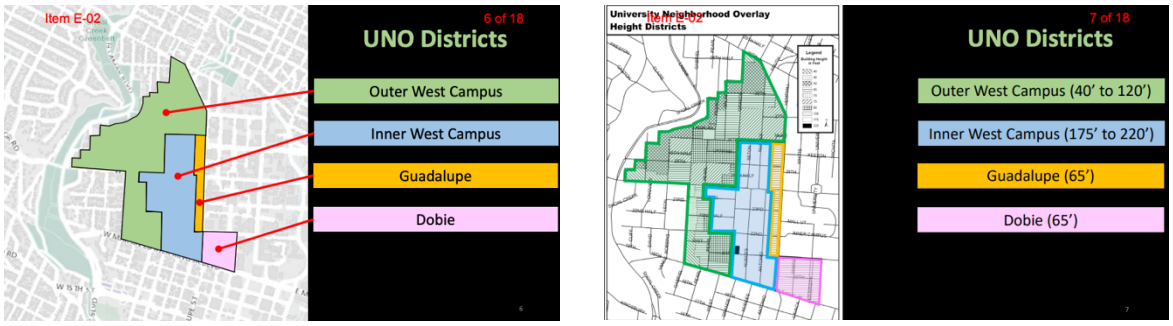

Figure 5. A map of the UNO, identifying the four districts, each distinguished by height maximums.[60]

The UNO is divided into distinct districts (Figure 5), each with distinct height maximums. Closer to the University Campus, there is an opportunity for higher density while farther from Campus, the height restrictions step back, creating a district that more naturally fades into the surrounding neighborhoods. UNO developer Chris Kritzman of Park7 Group, a New York City-based student-housing development firm identified Austin as an ideal market for high density housing. With a large student population, developer-friendly zoning laws, and opportunities for fast-track permit approval, Park7 identified Austin as the ideal market for development. "UT Austin is a large school, it's a growing school– very progressive market. Not just the people and culture and the codes, the development standards," said Kritzman. "It was a market we wanted to be in– specifically because of the UNO code changes."[61]

Building Character and Design Guidelines

While the UNO is a designated geographic area, all construction in this zone is not required to follow UNO ordinances. Developers may opt in to the UNO requirements which

[60] Planning Commission Briefing, "Overview of the University Neighborhood Overlay (UNO)."
[61] Kritzman, Chris, Personal Interview.

allows developers to construct larger, denser buildings. In 2004, Contra + Reed Architects developed *West Campus Design Guidelines for the University Neighborhood Overlay* as part of neighborhood plan sponsored by the City of Austin.[62] The goal of this document was "to create a long-range vision of an urban and diverse residential district in the area just west of the campus, while preserving the smaller scale residential character of other areas in the neighborhood plan."

The plan recognized the benefits of high-density neighborhoods. Most notable, it recognizes that density can reduce reliance on cars, reduce development pressures on areas north of the University campus, and reduce street parking. The plan hoped to reduce urban sprawl, pollution, and oil consumption, which Contra + Reed consider one of the greatest threats to the environment. From the *West Campus Design Guidelines,* it is evident that urban sprawl and car-based infrastructure was seen as a threat to long term population health. In addition to urban sprawl, car-based infrastructure has been linked to sedentary behavior, pollution, an increase in accident-related death rates, social isolation, obesity, and community disconnection.[63] Austin's attempt to create a walkable, pedestrian-friendly community is commendable. However, Austin's first large-scale density plan, the UNO placed an intense focus on the exterior character and walkability of the neighborhood with little consideration for the design and character of interior spaces.

In an effort to create a district that was dense, urban, and humane, the UNO requirements mandated street trees. Street trees not only create a feeling of greater connectedness to nature, they also create a shady, cool summer environment. Walkability considerations emphasized the creation of bike lanes and shade trees, and making Pease Park, which bounds the UNO to the

[62] Contra + Reed, "Design Guidelines."
[63] Okeke et al., "Cities for People."

West, walkable from the University.[64] Once again, these considerations emphasize the focus on exterior character but also play an immense role in improving quality of life. A 2021 article from the Environmental Systems Research Institute even links the rise of street trees in Austin to a positive chain reaction that can tackle health inequities on a large scale, "Planting more trees in an underserved area starts a positive chain reaction: more trees mean more canopy; more canopy means more shade; more shade means less heat; less heat means lower energy bills and more outdoor activity. Therefore, more trees result in improved health and quality of life."[65] By considering the negative impacts of walking outdoors in a Texas summer, city officials transformed human comfort into concrete legislation.

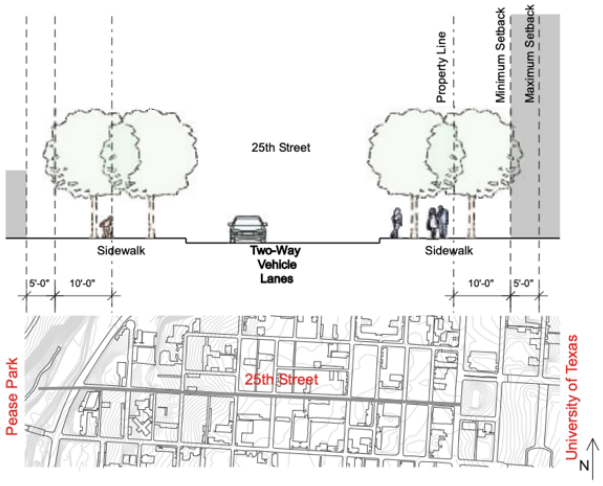

Figure 6. Prioritizing walkability in UNO planning.[66]

In addition to street trees, trash cans, benches, and bicycle racks encourage walkability (Figure 6). Most notably, the report states, "sidewalks should be considered more important a

[64] Contra + Reed, "Design Guidelines."
[65] ESRI, "How Austin's Map of Trees Helped City Leaders See and Tackle Social Inequities."
[66] Contra + Reed, "Design Guidelines."

public pathway as [sic] the roadway they line."[67] Prioritizing the movement of pedestrians over vehicles is a tremendous step in creating a high-density community that centers health and people over automobiles. In fact, commercial off-street parking is banned in the UNO along with the ban of parking spaces leased with rooms. In an effort to reduce costs for students, reduce traffic, noise pollution, much of the design guidelines focus on the experience of the pedestrian and UNO resident. Many of the design guidelines also accommodate for a future where "cars are less necessary."[68] Alluding to investments in public transit, design guidelines note that parking garages with sloped floors can create a sense of discomfort for residents. "The park-on ramps seem to flaunt their association with cars and suggest that in the visible areas of the building are not created for people - resulting in a sense of reduced safety and sense disconnect from the residents of the buildings."[69] Thus, the design guidelines suggest floor slabs that are not sloped and can be easily transformed into additional residential units or office space (Figure 7).

[67] Contra + Reed, "Design Guidelines."
[68] Ibid.
[69] Ibid.

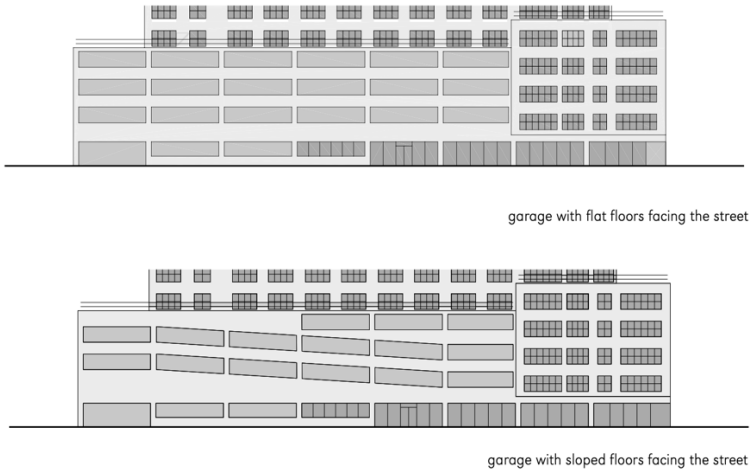

Figure 7. Comparing exterior views of parking garages to prioritize the pedestrian experience.[70]

Additionally, a clear understanding of how building scale and materials create a neighborhood character and culture that reinforces the notion that the UNO is built for people. Requiring a variety of materials equipped for Austin climate and ensuring that buildings are massed to meet a human scale can help to create a sense of place. The UNO zoning achieves this through carefully drafted design guidelines that reinforce the human character of the UNO. To dissuade the construction of monolithic buildings that appear uniform and featureless, design guidelines encourage a mix of materials: a combination of masonry, metal, glass, are recommended. A focus on longevity encourages high quality, durable materials that can age well and enhance the neighborhood's character.

[70] Contra + Reed, "Design Guidelines."

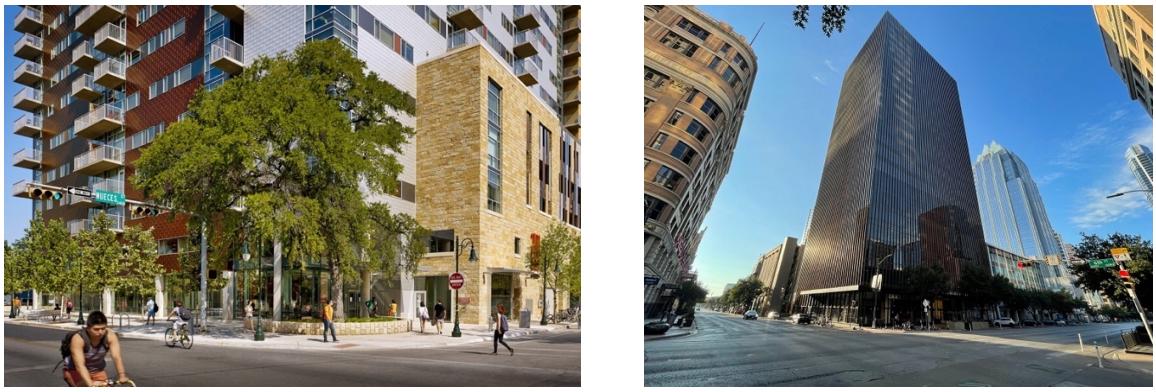

Figure 8. Comparing 2400 Nueces (left), a UT-owned, 18-story, UNO housing development to 515 Congress Ave. (right), an office building in Downtown Austin.[71, 72]

The office building (Figure 8) appears monolithic, lacks a variety of massing, and does not accommodate a human scale. However, 2400 Nueces (Figure 8), designed by Page, is faced with a variety of materials: limestone, glass, metal. The lack of monolithic massing by separating the façade both horizontally and vertically creates a more appealing structure. Especially at the street level, the massing of the building accommodates a human scale, signaling considerations taken for pedestrians and residents. There is a clear human focus in the UNO design guidelines. Streets designed for pedestrians not cars, exterior character that requires a variety of materials, massing that acknowledges human scale, and building a student-focused neighborhood enforce the idea that the UNO is a high-density community created for people and for well-being.

[71] "2400 Nueces."
[72] "515 Congress Ave Austin Tx 78701 – Austin Tenant Advisors."

Windowless in West Campus

However, the UNO design code does not mandate windows in leased bedrooms. Analysis of recent UNO high-rise construction and floorplan analysis found that windowless rooms are quite prevalent in off-campus housing (Table 1).

Table 1. Recent constructions in the UNO and the percentage of windowless bedrooms. [73]

Aparment	Address	Floors	Units	Bedrooms	Windowless Bedrooms	Total Percentage Windowless
Legacy on Rio	2614 Rio Grande St Austin, TX 78705	6	122	472	131	27.75%
Moontower	2204 San Antonio St. Austin, TX 78705	18	170	581	144	24.78%
Crest at Pearl	706 W Martin Luther King Blvd Austin, TX 78705	6	143	343	95	27.70%
Ion Apartment	2100 San Antonio St Austin, TX 78705	14	180	472	164	34.75%
Villas on Nueces	2207 Nueces St, Austin, TX 78705	5	101	241	36	14.94%
Villas on Rio	2111 Rio Grande St, Austin, TX 78705	18	282	1131	585	51.72%

Often small and cramped, windowless bedrooms lack natural light. These windowless units are often described by leasing agents as ‘tucked.’ Rarely is the term windowless used. Promotional materials often depict the units furnished. In the image below (Figure 9), taken from Moontower Apartments’ promotional materials, a curtain rod framing a mirror is visible. Plants attempt to mimic outdoor greenery while the mirror is likely a stand-in for a window.

[73] Data courtesy of Professor Juan Miró, School of Architecture, The University of Texas at Austin.

Figure 9. Promotional materials for a windowless bedroom at Moontower Apartments, 2204 San Antonio St. Austin, Texas 78705.[74]

The promotional photo appears to have a bright and diffuse light behind the camera with a color temperature that approximates daylight. The ceiling light fixture is not turned on and a light source is visible in the mirror, suggesting that light has been artificially added to make this room appear brightly lit.

Figure 10. Photos taken by students of windowless bedrooms at the request of Professor Juan Miró, School of Architecture, The University of Texas at Austin.

[74] "Photo Gallery | Moontower."

Dimly lit, with most of the space taken up by a desk and a bed, these rooms expose the darker side of density in the UNO (Figure 10).[75] However, students continue to sign these windowless leases. For this study I had the opportunity to interview a developer. In talking to develop Christopher Kritzman of Park 7 Group, a New York based firm developing a 30-story tower in West Campus in which every leased bedroom will have a window, many of these issues were discussed. Amenities remain a tremendous draw. What began as an apartment pool and a gym at Villas on Guadalupe has transformed into what Kritzman calls an "amenities arms race." Saunas, rooftop pools, golf simulators, resident-only coffee shops, and study rooms allow apartment buildings to stand out from their competition. "The amenities that a lot of developers put in buildings–they're bells and whistles–they're great on tours. Practicality? You're not going to use it at all," said Kritzman.

Figure 11. The 30th story rooftop pool at Waterloo Apartments. [76]

The amenity arms race has led to the development of apartment buildings that hardly resemble traditional college dorms. Curated lobbies with fireplaces, velvet upholstery, wood floors, high ceilings, and wainscoting present an evocation of a more upscale college experience.

[75] Miró, "The Dark Side of Density."
[76] "Photos & Tours | Yugo Austin Waterloo in Austin, TX | Student Housing."

Comparable rent prices across multiple apartment complexes have spurred a form of competition whereby apartment buildings' unit floorplans have largely remained unchanged since the early 2000s with windowless units as the norm. But gimmicky amenities, trendy finishes, and contemporary interior design allow developers to compete in a high-density market where the student population turns over every four years. Kritzman predicts that in the long term the UNO amenity bubble will 'burst' with students opting for spaces that prioritize well-being and student health. "For a whole host of factors– mental well-being, mental health. Personally? Would I want to live in a house without a window? It would be a deal killer," said Kritzman.

Profits and rent revenue are also a large consideration for developers. Including windowless bedrooms can remove 'dead space' from a floor plan and allow developers to include more rent-paying rooms in a unit.

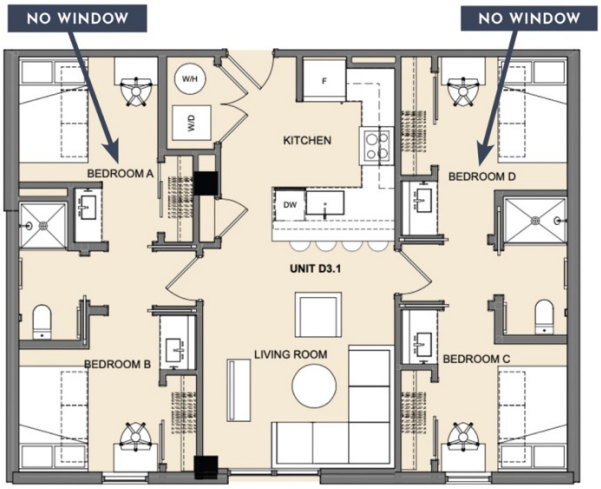

Figure 12. A floorplan for a 4-bedroom, 4-bathroom unit at Legacy on Rio, 2614 Rio Grande St. Austin, TX 78705.[77]

[77] "Apartment Floor Plans | Legacy on Rio."

In this unit, two of the leased bedrooms lack windows (Figure 12). These bedrooms share a wall with an interior hallway. Given the constraints of this exact unit it is challenging to reconfigure this space to include four bedrooms with windows. Rather than leave the space occupied by the two bedrooms fallow, developers lease this space at a lower rate than windowed rooms. Rather than discount the rate for windowless bedrooms, there is a premium for living in a bedroom with a window (Figure 13).

INSTALLMENT PAYMENTS	
Rent	$1,215.00
Standard Parking	$225.00
Green Fee	$35.00
a bedroom window	$50.00
to live on floor 26-29	$100.00
a downtown view	$15.00
TOTAL INSTALLMENT	**$1,640.00**

Figure 13. Monthly installment breakdown for a single bedroom in a four-bedroom unit at Waterloo Apartments, a 30-story tower in the UNO.[78]

From the installment payments (Figure 13) leasing a bedroom with a window adds $50 per month to the base rent. For students living on a high floor without a window, the floor premium still applies. Over the course of a lease with twelve installments, this totals $600 per year for a window. Paying extra to have a window is an absurd predicament. But sadly, this payment structure is standard practice across the UNO.

Even in bedrooms leased as containing windows, a view of the outdoors is not guaranteed. Windows in off-campus housing face interior hallways that are perpetually lit with artificial light or due to a lack of setbacks view the face of a neighboring building. Tenants of

[78] Personal lease agreement.

these rooms pay a window premium for a sheet of glass that provides none of the benefits of an opening with exposure to natural light. Students claim that leases do not guarantee a specific unit number within a building. Some are unaware that their apartment has no exterior-facing window until they move into the unit.

Figure 14. A bedroom leased as windowed with a window that faces into an interior hallway at Villas on 26th, 800 West 26th St., Austin, Texas 78705.[79]

The epidemic of windowless bedrooms has become so entrenched in building practices and development culture that it is the norm rather than the exception. In Austin, students pay extra to see the sun. Park7 has developed student housing in jurisdictions across the United States, identifying markets near large public universities with high enrollments. “Maybe it's an incentive to encourage development,” Kritzman said, speculating on the City’s reasoning for allowing windowless bedrooms. “Your numbers may not work if every bedroom has a window so maybe if we do this it helps your density; it helps offset costs, offset land costs, offset labor

[79] Hrishabh Bhosale, personal photo, April 27, 2023.

costs, construction costs. But yeah, I think to my memory of projects permitted Austin is the only one."[80]

[80] Chris Kritzman, personal interview, March 28, 2023.

WELL-BEING METHODOLOGY

An essential component of this thesis is testing the hypothesis that windowless rooms are detrimental to well-being. A validated, IRB-exempt survey instrument and student interviews provide an in-depth look at life in the UNO.

One of the challenges of exploring well-being is defining well-being. The phrase is used flippantly in our lexicon, with wellness and health often conflated. Health food, wellness retreats, self-care, burnout, feeling 'unwell' have lost their original meaning and have infiltrated popular culture. In a seminal work, researcher Rachel Dodge attempts to hone the definition of well-being.[81] Dodge compares well-being as a seesaw. On one side, are challenges: psychological, social, and physical. On the other are resources: psychological, social, and physical. At the center of this seesaw is well-being. Dodge asserts that stable well-being is when "individuals have the psychological, social, and physical resources they need to meet a particular psychological, social and/or physical challenge."[82] This situates well-being as dynamic rather than something that an individual possesses or lacks. Policy advisor and statistician Nic Marks compares well-being to a dynamic dance. "There's movement in that all the time and actually it's the functionality of that movement which actually is true levels of well-being."[83]

This seesaw framework views well-being as situated on the fulcrum between the psychological, social, and physical aspects of resources and challenges (Figure 15). This framework can be applied to windows in West Campus. I hypothesize that windows and natural light fall on the resource side of the seesaw, providing psychological, social, and physical

[81] Dodge et al., "The Challenge of Defining Wellbeing."
[82] Ibid.
[83] Ibid.

benefits. However, when deprived of natural light, a lack of a window falls on the challenges side of the seesaw, creating a psychological, social, and physical burden.

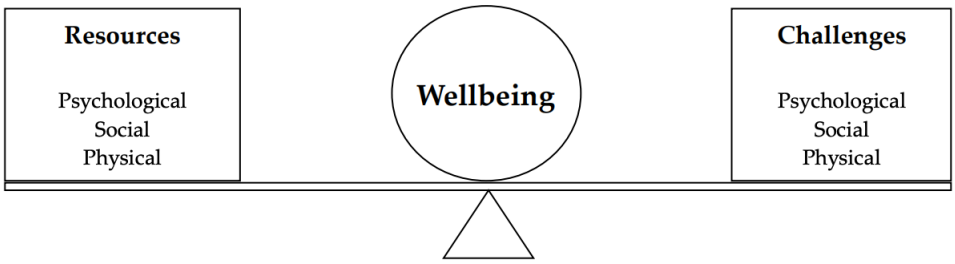

Figure 15. Well-being depicted as a seesaw, balancing resources, and challenges.[84]

Well-being is a subjective measure. Unlike the spread of diseases in New York's cramped nineteenth century tenement, mental well-being is not virulent. Unlike a COVID swab or a flu test, a person experiencing an imbalance of challenges and resources cannot test positive for poor well-being. Thus, in considering an appropriate survey instrument three requirements were considered essential to maximize the sample size, encourage participants to complete the survey to the best of their abilities, and ensure effective data analysis. Limited length, ease of access, and using an existing, validated survey ensured the production of reliable accurate results.

I considered two primary surveys: the twenty-four question BBC Subjective Well-being scale and the twelve-item Scale of Positive and Negative Experience (SPANE). Both are validated measures that assess subjective feelings of well-being on a five-point Likert scale.[85] The BBC scale measures the psychological, physical, and social dimensions of well-being.[86] The

[84] Dodge et al., "The Challenge of Defining Wellbeing."
[85] Pontin et al., "A UK Validation of a General Measure of Subjective Well-Being."
[86] Ibid.

SPANE presents twelve adjectives, six to assess positive feelings and six to assess negative feelings.

I ultimately selected the BBC Well-being scale as the primary survey instrument due to its ability to present a more complete view of a respondent's well-being. The five points on the Likert scale were 'not at all' (1); 'a little' (2); 'moderately' (3); 'very much' (4); and 'extremely' (5). I scored all items—except question four—from one to five, with five reflecting greater well-being. Question four, which asked about anxiety and depression, was reversed scored.[87] The five-point Likert scale BBC Well-being survey was validated in 2013 using a sample size of 23,341 respondents.[88] The validation found that the twenty-four questions had good internal consistency and demonstrated significant correlation with measures of concurrent validity.[89] The study concluded the BBC Well-being scale to be a "a reliable and valid measure for the online assessment of subjective well-being in the general population with good psychometric properties."[90] This external validation lent credibility to the survey instrument's effectiveness and its usefulness in this study as an ideal survey instrument.[91]

Each of the 24 questions in the BBC well-being scale fits into one of the three categories that constitute well-being: psychological well-being, physical well-being, and social well-being.[92] The questions associated with each of the three categories and the questions are presented below (Figure 16):

[87] Ibid.
[88] Ibid.
[89] Ibid.
[90] Ibid.
[91] Kinderman et al., "The Development and Validation of a General Measure of Well-Being."
[92] Ibid.

Psychological: 4,5,6,7,8,9,10,11,12,13,14,15 (yellow)

Physical: 1,2,3,21,22,23,24 (blue)

Social (Relationships): 16,17,18,19,20 (green)

The BBC Well-being scale

This questionnaire attempts to measure how happy you feel generally in most parts of your life. Select the response that best describes your experience.

	Not at all	*A little*	*Moderately*	*Very much*	*Extremely*
1. Are you happy with your physical health					
2. Are you happy with the quality of your sleep					
3. Are you happy with your ability to perform daily living activities					
4. Do you feel depressed or anxious*					
5. Do you feel able to enjoy life					
6. Do you feel you have a purpose in life					
7. Do you feel optimistic about the future					
8. Do you feel in control of your life					
9. Do you feel happy with yourself as a person					
10. Are you happy with your looks and appearance					
11. Do you feel able to live your life the way you want					
12. Are you confident in your own opinions and beliefs					
13. Do you feel able to do the things you choose to do					
14. Do you feel able to grow and develop as a person					
15. Are you happy with yourself and your achievements					
16. Are you happy with your personal and family life					
17. Are you happy with your friendships and personal relationships					
18. Are you comfortable about way you relate connect with others					
19. Are you happy with your sex life					
20. Are you able to ask someone for help with a problem					
21. Are you happy that you have enough money to meet your needs					
22.Are you happy with your opportunity for exercise/leisure					
23. Are you happy with access to health services					
24. Are you happy with your ability to work					

Figure 16. The BBC Well-being scale.[93]

The demographic variables used in my study were: age, graduation year, grade point average, total time to receive degree, whether the respondent was a first-generation college

[93] Kinderman et al., "The Development and Validation of a General Measure of Well-Being."

student, whether the respondent currently leased a bedroom in West Campus, whether the respondent had ever leased a windowless bedroom. The survey also included a component where students could voluntarily provide contact information to be interviewed about their off-campus living experiences along with comments about their experiences in off-campus housing.

I created the survey through UT Qualtrics and distributed through the mailing list of the School of Architecture at the University of Texas at Austin to students— graduate and undergraduate— and included in a School of Architecture newsletter, distributed to all students, faculty, and staff. The survey was also distributed to students in the College of Natural Sciences and the Department of History. Successful completion of the survey required participants to consent, indicate that they were currently enrolled as students at UT, and were over 18 years of age. The survey immediately terminated if any of these criteria were not met. The survey was distributed to 730 people on the mailing list including undergraduate and graduate students in the School of Architecture, approximately 500 students in the College of Natural Sciences, and approximately 800 students in the Department of History.[94]

This survey is not longitudinal, nor does it attempt to explain the long-term impacts of living in windowless spaces. Rather, this survey compares the experiences of students currently living in windowless rooms to the experiences of students currently living in rooms with windows. I only included the data of respondents who completed 100% of the survey—as indicated by Qualtrics—in the data analysis. The survey was released to the public on March 20, 2023 and closed on April 2, 2023. During this two-week period, the survey received 162 responses, 144 of which were 100% complete.

[94] Distribution involved reaching out to faculty and staff with access to study lists. A standard solicitation message was accompanied with a final deadline for completing the survey along with the UT Qualtrics link.

Leases in the UNO typically begin on the first day of August and terminate at the end of July. However, students who do not remain in Austin over the summer typically move out of their apartments at the end of the school year, which ends the first week of May 2023. Students typically sublet over the summer or continue to pay rent for their room even though it is unoccupied. Many apartment buildings have restrictive sublet clauses that require students to inform management of their intent to sublet and pay a fee.

Data Analysis

The well-being related hypothesis that students at UT who live in windowless rooms have poorer well-being than their peers who live in windowed rooms was tested using a p-value approach with a two-tailed test and a significance value of 0.05. I exported raw survey data from Qualtrics as a Microsoft Excel file and coded the data by assigning numerical values to the Likert Scale criteria.

Table 2. Scoring the BBC Well-being index by assigning numerical values to Likert scale values—question 4 is reverse scored.[95]

	Not at all	*A little*	*Moderately*	*Very much*	*Extremely*
Item 4	*5*	*4*	*3*	*2*	*1*
All other items	*1*	*2*	*3*	*4*	*5*

	Q10_1	Q10_2	Q10_3	Q10_4	Q10_5	Q10_6	Q10_7	Q10_8	Q10_9	Q10_10
	The BBC Wel	The BBC Wel	The BBC Wel	The BBC Wel	The BBC Wel	The BBC Wel	The BBC Wel	The BBC Well-b	The BBC Wel	The BBC Wel
	4	4	4	4	5	4	5	4	4	3
	4	4	5	4	4	4	4	4	3	3
	5	3	3	4	5	5	5	4	5	4
	4	4	4	4	4	4	4	4	4	4
	4	3	3	4	4	4	4	4	4	4
	3	2	4	2	3	4	3	4	3	3
	3	3	4	4	4	4	4	3	4	2
	3	3	3	4	4	3	4	3	3	2
	4	5	4	4	4	5	5	3	4	3
	4	4	4	3	4	4	5	4	4	3
	3	2	3	4	3	4	4	4	4	3
	3	5	3	2	2	2	3	2	1	3
	3	3	4	4	4	5	4	3	4	3
	3	4	5	4	5	4	3	3	4	4
	4	3	4	3	4	4	3	3	3	3
	4	3	4	4	4	5	5	3	4	3
	2	1	2	3	3	2	2	2	1	1
	5	4	5	5	5	5	5	5	5	4
	4	4	4	4	4	4	4	3	4	4
	2	2	2	2	2	4	3	4	3	1
	4	2	4	4	3	3	4	3	3	3
	2	3	4	3	4	5	4	5	4	3
	4	4	4	4	5	4	4	3	5	4
	4	4	4	4	5	5	4	5	5	4
	3	5	4	2	4	4	5	3	5	4
	3	4	4	3	5	4	4	4	4	4
	4	3	4	4	4	4	4	4	5	4
	3	3	4	4	5	5	5	5	5	5
	2	2	2	4	2	2	2	3	2	2
	5	5	5	5	5	5	5	5	5	5
	2	3	4	1	4	4	4	3	4	4
	3	2	3	2	3	3	3	3	3	2
	3	3	4	4	4	4	4	4	4	4
	3	3	3	3	3	3	3	2	3	3
	3	3	3	4	4	3	3	2	2	2
	4	3	4	3	4	4	4	3	3	3
	3	2	4	3	4	4	4	4	3	3
	4	4	4	3	4	4	2	4	4	4
	3	3	3	3	3	4	3	4	3	3
	2	4	4	3	4	3	3	2	2	3
	4	4	4	3	4	4	4	4	4	3
	2	4	3	2	3	4	4	2	3	2
	3	4	2	3		5	4	3	3	4
	4	3	4	3	3	2	2	2	2	3
	4	2	3	4	5	5	5	3	4	4
	4	3	4	1	4	5	5	4	4	4
	3	3	3	4	3	4	4	3	3	3
	4	2	5	2	4	4	4	1	3	4
	1	2	1	1	2	1	1	1	2	4
	4	4	4	5	5	5	5	4	5	4
	3	3	3	4	4	4	3	4	4	3
	2	2	3	4	4	3	3	4	4	4
	3	3	4	4	4	3	3	4	3	4
	3	4	3	1	4	3	3	4	3	2
	4	3	5	5	5	4	4	4	5	5
	3	1	1	2	2	3	2	1	1	3
	3	2	2	2	3	3	3	4	2	3
	2	2	3	1	4	4	4	3	4	2
	3	4	4	4	5	4	4	4	4	3
	2	1	2	3	2	2	2	2	2	2
	3	5	3	2	3	4	4	3	3	3
	3	1	3	4	5	5	4	4	3	2
	4	4	4	4	4	4	4	3	3	4
	4	4	4	4	4	4	4	3	3	4
	4	3	4	5	4	5	5	4	4	4
	2	3	4	3	4		4	2	2	2
	2	2	4	5	4	4	4	4	4	2
	3	3	4	5	4	3	4	5	4	5
	2	3	2	2	2	3	4	2	2	4
	3	3	5	4	3	2	3	1	4	4
	2	3	4	4	4	3	3	4	2	3
	4	3	3	4	5	4	5	3	5	5
	4	4	5	3	4	4	4	4	5	5
	2	3	4	3	3	4	3	4	3	2
	3	3	3	4	3	2	3	2	2	2
	3	3	3	4	3	3	4	4	3	4
	4	4	3	2	4	3	3	4	4	3
AVERAGE	3.220779	3.12987	3.558442	3.350649	3.802632	3.763158	3.727273	3.33766234	3.454545	3.285714
STD. DEV.	0.852602	0.96451	0.895802	1.060862	0.864403	0.921859	0.897898	0.99486034	1.045611	0.943916

Figure 17. Sample coded data visualization for windowed rooms, questions 1-10.

[95] Kinderman et al., "The Development and Validation of a General Measure of Well-Being."

Given that different sections of the BBC Well-being Index correlate to different facets of well-being, I analyzed each of the 24 questions on the scale individually: for each of these questions the population mean, and the sample mean were compared to determine statistical significance. I determined statistical significance using a p-value: a way of determining the degree to which the experimental data varies from the population. In this case, the 'population' was residents of windowed rooms while the experimental group was residents of windowless rooms. I sorted the aggregate data and found that n=29 respondents indicated that they currently reside in windowless rooms and that n=76 respondents indicated they currently reside in rooms with windows. I calculated a t-score for each of the 24 questions on the BBC scale (for example, see Figure 18) to determine how significantly the mean of the population differs from the experimental group.

$$t = \frac{\bar{x} - \mu}{\frac{S}{\sqrt{n}}}$$

Figure 18. T-score formula used to calculate t values for a p-test.

The t-score is used to determine how significantly the means of two data sets differ (Figure 18). In this formula, the numerator takes the difference between the population and the experimental group while the denominator divides the standard deviation of the experimental group by the square root of the number of data points in the experimental group. I matched each of the 24 questions from respondents in windowless rooms to the 24 questions from respondents in rooms with windows and performed a t-test to compare the two data sets. Using Microsoft Excel's TDIST function, using a two-tail test, and calculating degrees of freedom from the experimental data set, p-values were obtained. I considered a p-value of ≤ 0.05 significant and allowed the rejection of the null hypothesis. For responses where the p-value was ≤ 0.05, I considered those

facets of well-being to be impacted by residing in a windowless room. Analysis on the data found responses to all questions except 16,19,20, and 21 statistically significant (Table 3). This indicated a statistically significant difference between the well-being of students who reside in windowless rooms and students who reside in windowed bedrooms.

Table 3. BBC Well-being Index Survey Results[96, 97]

Question	Measure	WDOW AVG (n=76)	WLESS AVG (n=29)	Delta	P-Value
1	Physical Health	3.221	2.367	0.854	0.00003118
2	Sleep	3.130	2.621	0.509	0.03889000
3	Daily Activities	3.558	2.600	0.958	0.00000641
4	Depressed	3.351	2.621	0.730	0.00295900
5	Enjoy Life	3.803	3.200	0.603	0.00000641
6	Purpose in Life	3.763	3.069	0.694	0.00487200
7	Optimistic Future	3.727	2.967	0.761	0.00144500
8	Control of Life	3.338	2.586	0.751	0.00236700
9	Happy with Self	3.455	2.667	0.788	0.00020430
10	Happy with Looks	3.286	2.655	0.631	0.00602100
11	Live way you want	3.494	2.733	0.760	0.00054150
12	Confident beliefs	4.065	3.345	0.720	0.00122500
13	Do things want	3.740	3.200	0.540	0.01532000
14	Grow and develop	4.143	3.448	0.695	0.00048700
15	Achievements	3.805	3.233	0.572	0.00483600
16	Personal Life	3.714	3.429	0.286	0.16120000
17	Personal Relationships	3.714	3.267	0.448	0.04397000
18	Connect Others	3.610	2.897	0.714	0.00284900
19	Sex life	3.260	2.897	0.363	0.18750000
20	Ask help	3.506	3.172	0.334	0.07312000
21	Enough money	3.429	3.067	0.362	0.12430000
22	Opp. for leisure	3.364	2.793	0.571	0.00665200
23	Access to health	3.408	2.867	0.541	0.01354000
24	Ability to work	3.688	3.100	0.588	0.01236000

[96] P-value and delta values highlighted red if less than or equal to 0.05.
[97] Psychological: highlighted orange. Physical: highlighted blue. Social: highlighted green.

In this case study, the delta between the mean value of the population and experimental sample was between 0.286-0.958. In addition to scoring questions individually, total scores were calculated for each respondent's survey by adding a respondents coded Likert responses. For both groups, population and experimental, all survey totals were averaged. For the population, I calculated a score of 83.57 with a standard deviation of 13.70; for the experimental group, I calculated a score of 72.67 with a standard deviation of 10.90. A delta of greater than 10 points and a t-score calculation yielded a p-value of 0.003, less than the 0.05 threshold for significance.

Given that the survey uses a validated three-factor predictive model that assigns each question on the survey to a facet of well-being, questions were also analyzed by assigning them to their respective factors. Factor 1 (psychological well-being) was analyzed by combining questions 4-15, Factor 2 (Physical health and well-being) was analyzed by combining 1,2,3,21,23,24, and Factor 3 (Social and relationship well-being) was analyzed by combining questions 16-20.

Results and Interpretations

Let's say that you are a researcher who wants to study the impact of living in a windowless bedroom for an entire academic year. You go to your university Institutional Review Board and submit an application for a study. You propose randomly assigning students between rooms with windows and rooms without windows. You suggest that the students live in the space for one year and then administer a survey to evaluate mental health. What would the IRB say? Likely that your study is unethical, places students under unnecessary mental duress, that it in no way minimizes harm. What would the consent forms look like? Pages of paperwork in which the student accepts the potential risks of the study, that they understand that there may be long term

consequences for their well-being. But in Austin, in West Campus, all it takes is a lease. This is the first study of its kind to analyze the impact on living in a windowless bedroom over an academic school year.[98] Given the duration of student-housing leases, students indicating they lease a windowless bedroom would have leased that bedroom for eight months.

Data analysis shows that students who live in windowless rooms are more likely to report being depressed, more likely to report poor sleep, have poor physical health, less interest in daily activities, less likely to be happy with themselves, less confident in their abilities, less happy with their looks, their self, less likely to feel that they can grow and develop as a person, less satisfied with personal relationships, and less satisfied with their access to health services and ability to work when compared to their peers who live in windowed rooms. Since well-being is defined as a subjective measure and given the statistical significance ($p \leq 0.05$) of the survey data, it is evident that windows have a measurable impact on well-being. Across all 24 questions, students in windowless rooms reported lower mean Likert scale values than their peers in windowed rooms. While some proponents of windowless bedrooms claim that windowless rooms are necessary for density and may be appealing to light-sensitive individuals, this study demonstrates that the cost is poor well-being. Mayor of New York, Eric Adams has been a vocal proponent of windowless bedrooms as a solution to alleviate the housing crisis. “Why can’t we do a real examination of the rules that state every bedroom must have a window?” Adams asked. “You don’t need no window where you’re sleeping, it should be dark!”[99] While Adams may be a

[98] Prior studies that have focused on the effects of natural light on well-being typically require rigorous approval processes and have small n-values. To my knowledge, there is no existing study that analyzes the effects of living in a windowless bedroom over the course of an entire school year. Given that there is no other known jurisdiction with high-density student housing and windowless bedrooms in proximity to a large public university, it is unlikely that this research would have already been conducted. Professor Miró in the School of Architecture has investigated the issue of windowless bedrooms but has primarily analyzed the legality of these spaces and the prevalence of these spaces. His work has not directly investigated the impacts on student well-being.

[99] Murphy, “Eric Adams Event Renews Discussion of Windowless Bedrooms.”

proponent of a return to the tenement housing of the early 19th century, his pro-density comments fail to consider the physiological and well-being impacts of windowless spaces. This study lends credence to previous literature-based work on the proposed well-being impacts of natural light disturbances. While windowless bedrooms may benefit developers hoping to maximize space within a given floor plate,[100] there is a real cost borne by tenants.[101]

Corroborating the findings of this survey with existing literature, the detriments to psychological well-being can be related to the role that natural light plays in regulating circadian rhythms, melatonin secretion, and the pathophysiology of depression. The psychological impacts are likely a downstream effect of a lack of natural light. The more direct effects of irregular natural light exposure are evident in the questions that relate to physical health. Poor sleep, poor physical health, less satisfaction with performing daily activities is also supported by literature on mood disorders and seasonal affective disorder.[102] Sleep irregularities and circadian rhythm imbalances can also explain more difficulty with personal relationships and connection with others. Many of the responses that indicate poor well-being align with the textbook indicators of a mood disorder. This analysis of the data is also supported by responses to question 4 which indicates that students in windowless rooms are more likely to be depressed. The results of this survey present a compelling case against windowless bedrooms.

Irregular natural light → Irregular melatonin secretion → Circadian rhythm imbalance → Mood disorders[103]

[100] The entire floor of a building.
[101] Of the 29 respondents who reported having leased a windowless bedroom, nearly 30% (n=8) re-signed at least one additional lease. None of the students who re-signed windowless bedrooms provided their contact information for a follow-up interview.
[102] Srinivasan et al., "Melatonin in Mood Disorders."
[103] A mechanism for the role that natural lights plays on mood disorders.

The survey allowed students to provide comments on their experiences in off-campus housing. The responses from students who live in both windowed and windowless bedrooms provide a more complete picture of live in off-campus housing.

Below are a few responses from students who reside in **windowless** rooms:[104]

> "A windowless bedroom in combination with seasonal depression greatly affected my mental health and schoolwork/grades."

> "I have a room that faces the hallway which is inside the building. The light is always on outside so it feels like day 24/7. Most students cover the window so it's blackout inside. This causes issues with oversleeping, poor sleep, and circadian rhythm problems. It's been a challenge for me to adjust and definitely affects my sleep."

> "I try very hard to not be affected by my windowless room. I only go in there to sleep and I spent every other moment in the living room (has windows)"

> "Living in a windowless room was so depressing for me because I love natural daylight and feel energized by it when I wake up in the morning. It always felt like night in my bedroom no matter what time of day it was and I think it made it harder to get up in the morning, and easier to sleep through the morning/wake up late. I think it should be illegal."

> "The year without windows was one of the worst years of my entire life and I mean that in the least dramatic sense."

[104] Windowlessness and Well-being in Off-Campus Housing, Student Responses.

These are contrasted by respondents who resides in a **windowed** room:[105]

> "I live in a room that is actually mostly windows and my access to light is so wonderful and definitely fuels my positive behavior."

> "To clarify, my room has a window, but it's about four feet from a solid wall; I'm considering it windowless because it's always very dark, and I can never tell the weather. Overall, the convenience of off campus housing is great, but it's really depressing living in a room with little sunlight. I feel confined in my room, but I'm also naturally a homebody. I stay in it a lot, but I think it takes a toll on my motivation. I often don't want to work here even with the privacy of my own bedroom. "

Not only do these comments support the data, but they also show that students understand the impact that light and views of nature can have on well-being. Not only is a window in a bedroom important, the view that the window provides is equally significant.

Interviews

In interviewing students about their experiences in off-campus housing, one of the primary themes was poor sleep. Students expressed that it did not take long to fully understand the gravity of a windowless rooms. "The first couple weeks my sleep schedule took a huge hit because I respond to the sun like most people do naturally and not having that I didn't have any sort of cue to wake up to; I would wake up and feel like I was in a cave," reported a student.

[105] Windowlessness and Well-being in Off-Campus Housing, Student Responses.

“Even if I was well rested it wouldn't feel like it because I would wake up in pitch black—that was really hard.”[106]

Interruptions to the circadian rhythm were common and students reported that these interruptions caused them to miss classes and feel less inclined to complete classwork in their bedrooms. “I always have been really good about getting up for class, going to class, having motivation,” reported a student. “I slept through a couple classes and had to buy one of those alarm clocks that's like a fake sunrise.”

Interviewing students provided background on why students sign windowless leases. In some cases, students are unaware that their bedroom is windowless until they move in. This is due to the ambiguity of the specific unit in lease agreements. Model units typically feature floor plans in which every unit has windows.

“I remember I looked at a model room. The model room had all windows, said a student.”

Often, students sign leases for multi-bedroom apartments with a group of friends. To stay together, students reported being willing to sacrifice a window. There is no centralized database where students can compare rent prices or floor plans and many students who live in on-campus housing as freshman find themselves lost when it comes to living off-campus.

“It was all of our first time living outside of some place that wasn't a dorm. Our primary thing was sticking together as roommates,” said a student.

For students moving off-campus after living in on-campus housing, many of the amenities that UNO apartments offer can appear enticing and help students look past the potential harm caused by a windowless bedroom. Apartments advertising an “up-scale,” or

[106] Personal Interview, April 17, 2023.

“luxury” experience boast amenities that attract tenants. However, these amenities often go unused.

“Ignore the bells and whistles that places advertise a lot of it is replicable and not very special,” a student reported. “A lot of these places that advertise a luxurious experience are quickly and cheaply built apartments. It's pseudo-luxury.”

When asked if students would re-sign a windowless bedroom, all students interviewed were vehemently opposed.

“Oh, hell no, absolutely not,” remarked a student. “Don't get stuck in a windowless bedroom; it has a very tangible effect on your mood when you go to bed when you wake up. I would not ever live in a windowless room again.”

LIMITATIONS OF THE STUDY

While the study yielded statistically significant results, there are ways this study could have been improved.

As a student with little background in psychology and architecture, my knowledge is limited to information I have gathered from courses at the University of Texas at Austin, research I have conducted at MD Anderson Cancer Center, and self-study. While the analyses in this study may not compare to a more experienced research team, it is my hope that this study sparks conversations around windowless bedrooms and how they are detrimental to well-being. Students handling the stress of being away from home in a new city, handling academic and social stress should not be subject to the added stress of negotiating a windowless space.

A more comprehensive survey with full IRB approval would allow for more advanced information on demographics, race, ethnicity, student income, and academic information. A more streamlined study was chosen for feasibility and to protect the anonymity of students. A greater n-value would also allow for more advanced statistical analyses. While the study included questions on a student's status as a first-generation college student or their GPA, the small sample size made it challenging to glean significant data.

Conducting this study over a longer period with respondents asked to repeat the instrument at a regular time interval would show more directly how windowless bedrooms can impact well-being.

The survey was distributed to a large cross-section of students at the University, but most respondents were likely in the School of Architecture (SOA) given that the SOA comprised the largest percentage of the distribution. Students of architecture maybe familiar with the issue of windowless bedrooms and this may have skewed survey results.

The survey also only compared the experiences of students currently living in windowless bedrooms to the experiences of students currently living in windowed bedrooms. Gaining a more longitudinal perspective of student experiences could yield stronger results and allow researchers to explore whether lack of access to natural light has long term impacts.

Involving faculty from the school of sociology to reduce bias present in the data would also improve the methodology.

I believe that the methodology of this study is replicable and could be conducted again. With greater outreach through the University and incentives for students to complete the survey, this survey could be replicated in other jurisdictions where windowless bedrooms might exist.[107] Comparing results from different areas could better inform long-term decision making and hopefully end the practice of windowless bedrooms.

Conclusions and Future Recommendations

Students who live in windowless bedrooms report significantly poorer well-being than their peers who lease bedrooms with windows. Across the board for measures of well-being, they fare poorer in every single category measured. While students suffer, developers are locked in an amenities arms race, drawing new tenants with promises of absurd amenities that encourage students to sign leases and care less about their windowless bedroom. Rather than focus on student well-being, developers are maximizing revenue and density. Windowless bedrooms have become the norm with developers charging students premiums for windows. And sometimes, these windows face interior hallways, without any access to natural light.

[107] Anecdotal evidence suggests that windowless bedrooms may be gaining prominence in Houston.

Cities adapt. From the creation of sewage networks in American cities to the creation of wide avenues in Paris to stem the spread of disease, when officials identify a situation and plan for the future, change is possible. Rather than a virulent epidemic that can be tracked using epidemiological data, captured in a lab, and traced back to a source, the newest epidemic facing cities is a crisis of well-being.

The lockdown of 2020 and COVID-19 distancing measures exposed deficiencies in the way we design our cities. In American cities, which are car reliant, characterized by urban sprawl, and lack public resources, residents took to the streets. Not to protest but to walk, to mingle with neighbors. The return of al fresco dining, renewed interest in the outdoors, demonstrated that natural light, fresh air, walkability, are at the core of well-being.

Austin, a city that—for decades—lacked any major industry was a town for students and those looking for a lifestyle shift. Lady Bird Lake, ample hike and bike trails, a culture that placed a premium on the human experience made Austin a microcosm of cool. With the rise of high-density student housing in Austin's West Campus Neighborhood began an experiment in density. Rather than embrace urban sprawl and car-focused design, Austin zoned for density, for walkability. The new laws, code book, and design guidelines celebrated the importance of the human experience; perhaps being connected to peers, community, pedestrian-friendly streets, and street trees could create a new urban fabric.

This new district, the University Neighborhood Overlay (UNO), drew developers from across the country, developers seeking to take a bite of the market. This was expected. But along with the fast-paced development came windowless bedrooms. Students began signing 12-installment leases for bedrooms that lacked natural light.

This is a problem that impacts only the UNO. It is the only known zoning in the country that allows for windowless bedrooms on such a massive scale. Rectifying this issue in existing buildings by gutting floors and redesigning to ensure access to natural light would prove challenging and costly. But this is a realistic solution that could improve well-being for generations of students. Reworking floor plates to carve out cavities for natural light or reworking floor plans to maximize light in bedrooms would ensure that existing buildings do not get away with leasing windowless bedrooms simply because their construction predates this study.

Should students with suicidal ideation and diagnosed mental illness be allowed to sign windowless bedrooms? Future leases of windowless bedrooms should prioritize the experience and well-being of tenants. Until all leased bedrooms in the UNO are windowed, students should be required to complete a mental health evaluation to ensure they can endure the conditions in a windowless bedroom for an entire lease term.

A solution to the problem must mandate that all future leased bedrooms have windows that receive natural light and open to allow fresh air. Developer incentives should correspond directly to the amount of spatial daylight autonomy at the time of construction. This would ensure that windows do not face indoor hallways or interior shafts. For existing windowless bedrooms, students should be required to sign paperwork in which the possible well-being detriments are acknowledged. Students should have to consent to living in a windowless bedroom with paperwork that mimics the rigor of participating in a year-long research study, being informed of the potential negative consequences of residing in a windowless bedroom.

If the City of Austin wanted to ban windowless bedrooms, they could do it in a single afternoon at a Council meeting. Establishing habitability standards require all bedrooms leased

as units to have windows with access to adequate natural light would prevent this practice from persisting and prevent landlords from leasing existing spaces that do not comply. Ensuring that developers are only leasing bedrooms labelled as bedrooms on permits and floorplans approved by the city would close loopholes.

Given the existence of current and future examples of apartment buildings in the UNO where 100% of bedrooms have windows, it is possible to build structures where every room has a window and where developers can turn a profit.

The University of Texas at Austin's power as a force for change should also not be understated. Given that these UNO buildings are primarily inhabited by UT Austin students, if the University does care about well-being, they should be encouraged to assist in changing this practice. The University's motto of "what starts here changes the world" should be a guiding principle for driving this change. In the spirit of the University's core values of discovery, truth, and responsibility, spreading knowledge about this issue and responsibly ensuring that this practice does not spread to other jurisdictions is the University's duty.[108]

Future studies should dive deeper into the physiological implication of windowless bedrooms. Measuring cortisol, observing the longitudinal impacts of windowless bedrooms, collecting non-anonymized data to study patterns in family income, and productivity could provide a more complete view of how natural light plays a role in the human experience. A deeper analysis of these demographic factors could determine if the University is complicit in a well-being inequity being perpetrated on students. The UNO remains a jurisdiction in which extensive research is possible on natural light and windowless spaces. With a controlled

[108] "Mission & Values | The University of Texas at Austin."

population age, geographic location, and relatively similar daily patterns, the UNO is an ideal environment for future research.

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Biography

Born in the City of Brotherly Love and raised in Houston, Roosh Bhosale moved to Austin in 2019 to study History and Plan II Honors at the University of Texas at Austin. He was one of fifteen students in the 2023 cohort of the Forty Acres Scholars Program: The University of Texas' premier, full-ride scholarship. His passion for understanding how events of the past have shaped the way we build our cities, practice medicine, and approach inequity led him to pursue a pre-med track. He had the opportunity to research diabetes in East Austin, lead an organization devoted to pursuing medicine with an interdisciplinary focus, and explore the importance of human-centered design in urban planning and healthcare delivery. A member of the Tejas Club and Texas 4000 for Cancer, Roosh will cycle from Austin, Texas to Anchorage, Alaska in the Summer of 2023 to spread hope, knowledge, and charity in the fight against cancer. He will graduate from the University of Texas at Austin as a Dean's Distinguished Graduate and matriculate to McGovern Medical School in Fall 2023.