SUICIDE IN THE BARRACKS:
ARCHITECTURE AND SOCIAL CONNECTION IN MILITARY HOUSING

by

SEAN-MICHAEL TONE KELLY

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Student: Sean-Michael Tone Kelly

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This dissertation has been accepted and approved in partial fulfillment of the requirements for the Doctor of Architecture degree in the Department of Architecture by:

Mark Gillem	Chair
Howard Davis	Core Member
John Rowell	Core Member
Robert Ribe	Institutional Representative

and

Kate Mondloch	Interim Vice Provost and Dean of the Graduate School

Original approval signatures are on file with the University of Oregon Graduate

School. Degree awarded June 2020.

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DISSERTATION ABSTRACT

Sean-Michael Tone Kelly

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Title: Suicide in the Barracks: Architecture and Social Connection in Military Housing

Military barracks serve the same function today as they did in the first century—housing an Army's soldiers. Their form has stayed less consistent than their function, however. Since 1973—and the end of the Draft—the Army needs to convince soldiers to volunteer and re-enlist. Barracks design became part of that enticement, shifting to a philosophy centered on individual satisfaction at the expense of community. Barracks designers moved from shared rooms to private rooms, made those private rooms larger, and deleted communal social gathering space to re-apportion square footage to the individual.

In 1999, a second influential event shaped barracks design—terrorism. To guard against the backpack bomb, prescriptive antiterrorism requirements all but forced designers to create clear zones around the barracks, void of social amenities. In addition, the standards saw exterior doors as a blast hazard and effectively eliminated outdoor balcony-access designs.

Throughout this dissertation, I focus exclusively on these two design drivers: the military's aim to improve retention through design and to ensure security through surveillance. I argue that both shifts resulted in negative consequences for soldier social health, and that social health influences individual retention, physical well-being, and suicide. Using environment-behavior theory as a foundation, I claim that architecture's influence occurs through the social experience of place. I analyze social, emotional, and physical health survey data, along with official Army re-enlistment and suicide records to test these claims.

The data show serious cracks in the current design strategy. Newer barracks actually perform worse from a social performance perspective. Residents of the newest barracks are statistically less likely to benefit from social trust, belonging, and support. And as their social health declines, so too does their emotional and physical health. They are more depressed, more angry, more bothered by poor sleep, have lower self-esteem, and have fewer ways to effectively deal with stress. The social ills of designing for terrorism and individual retention also extend into soldier outcomes. Service members assigned to newer, post-antiterrorism barracks (those built after 2004) are less likely to re-enlist and have a nearly 3-fold increase in the probability of committing suicide.

CURRICULUM VITAE

NAME OF AUTHOR: Sean-Michael Tone Kelly

GRADUATE AND UNDERGRADUATE SCHOOLS ATTENDED:

University of Oregon, Eugene
University of Kansas, Lawrence
Marylhurst University, Marylhurst
University of Kansas, Lawrence

DEGREES AWARDED

Doctor of Philosophy, Architecture, 2020, University of Oregon
Master of Architecture, 2013, University of Kansas
Master of Business Administration, 2010, Marylhurst University
Bachelor of Architecture, 2008, University of Kansas

PROFESSIONAL EXPERIENCE:

Civil engineer officer, United States Air Force, 2008-present

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I need to thank the military for the academic opportunity, the funding, and the latitude to take my research in any direction I wanted, regardless of what I uncovered. I also need to thank Cristina Delgado-Howard and the hundreds of others in the US Army—both those in and out of uniform—for graciously fielding my questions, sitting down for interviews, and opening their data archives.

At the University of Oregon, I need to thank my committee. They narrowed my focus, refined my ideas, and challenged my assertions. I am especially indebted to my advisor and chair, Mark Gillem for his belief and guidance.

Above all, I need to thank my family for their support and encouragement—especially my loving, patient, and understanding wife. Without her, this project would have failed.

Any errors are mine and mine alone.

The conclusions and opinions expressed in this dissertation are my own. They do not reflect the official position of the US government, the Department of Defense, or the US Air Force. All materials for this study are from unclassified, publicly available sources. Pseudonyms have been used for all people who I personally interviewed.

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INTRODUCTION

August 7th, 2008.
Forward Operating Base Rustamiyah, 12 miles southeast of Baghdad, Iraq.

It was hot. Uncomfortably hot. 113 degrees, to be exact.[1] It was the kind of day that felt like you were staring down the barrel of a hairdryer, all while punches of sand landed left and right hooks across your jaw. Wearing full "battle rattle"—soldier slang for combat gear, to include a helmet, rifle, ammunition, and a 35-pound bullet-proof vest—Specialist Joseph Sanders was pulling guard duty. Six on, six off. That is, he and his roommate Specialist Albert Godding spent six hours at a time atop a guard tower, rifles fixed upon what might be lurking beyond the base's perimeter. Every six hours, they climbed to the top. Every six hours, they came back down. Today was different, though. The walls in Joseph Sanders' world were closing in, and he couldn't see a way out. Last week, seven thousand miles away, his wife filed for a divorce. It crushed him. He felt stuck and alone.

Back in his barracks room during his six hours of reprieve, Sanders reached for his Army-issued M4 Carbine rifle and pulled it off the rack. In one smooth, choreographed motion, he loaded a 5.56 millimeter round into the chamber and flicked his safety lever to semi-automatic. Feeling the cold steel of the rifle's barrel under his chin, Sanders closed his eyes, exhaled, and pulled the trigger.[2]

"Click."

Nothing happened.

Specialist Sanders quickly opened his eyes. More reliable than the Vietnam-era M16,[3] the M4 Carbine is a modern-day killing machine. Firing at over a half-mile per second, it can accurately take down an enemy target more than five football fields away.[4] From point-blank range, Joseph Sanders wouldn't have a chance. He should be dead. His M4 should have fired. It didn't.

As Sanders retells it, "When nothing happened, I immediately went into soldier mode and broke down my rifle really fast to find out why it didn't fire. I pulled it apart, and I found that my firing pin was not there. Godding walks in the door after all of this happened, and I look at him, and I said, 'Godding, where's my firing pin?'"[5]

Joseph Sanders may have felt stuck, but he certainly wasn't alone. He had Specialist Albert

Godding—his friend, roommate, and the second half of their room's guitar-playing duo. Since the news of his pending divorce, Godding noticed a change in Sanders' behavior. 'Happy Joe' was no longer happy. He stopped playing his guitar and avoided conversation. Worried, Godding intervened. He secretly removed the firing pin from Sanders' M4 rifle the day before.[6]

Suicide in the Ranks

Suicide is a tragedy that hits all ranks, all ages, and all occupational specialties within the US military. And it is becoming ever more prevalent. The US Army suicide rate is steadily climbing, each year jostling closely above or below a disturbingly upward trend line (Figure I.1). In 2012, it reached the highest rate in nearly 90 years. You have to go back to 1938 to match the present-day levels—a time when incident reporting and data quality was admittedly suspect.[7]

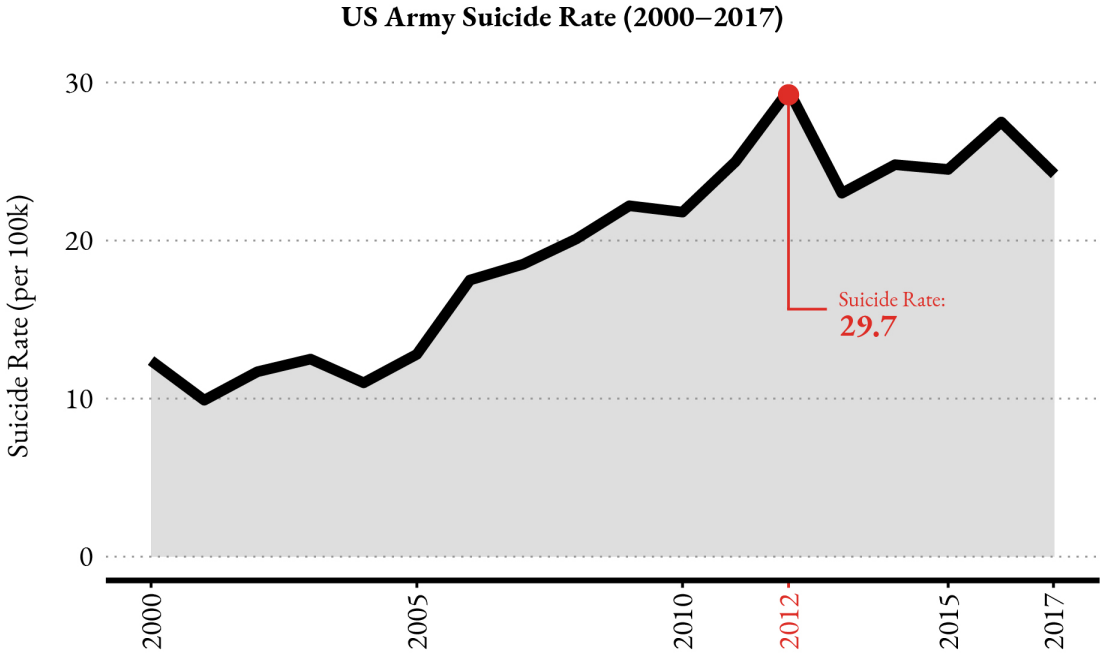


Figure I.1. US Army suicide rate from 2000-2017. Data from Smith, Jeffrey A. et al., 2019. Graphic created by the author.

Unfortunately, statistics can hide the truth. They can tell a false narrative—purposely or accidentally. For example, the suicide rate in 2012 for the US general population, ages 17 to 59 (i.e., military age), was 16.49 per 100,000.[8] The Army rate was 29.7, an 80% increase. A headline could claim that soldiers are killing themselves at nearly double the rate of their civilian peers—and those numbers would support a compelling argument. But that is not entirely accurate. The Army suicide rate is undeniably increasing. Figure I.1 makes that clear. There has been a nearly three-fold increase from 2001 to 2017. That is a problem. The Department of Defense is—and should be—ringing alarm bells. But comparing rates to civilian populations requires a precise level of data manipulation oftentimes missing in the analysis. The military is overwhelmingly young (63.2% of the force is

under the age of 29) and overwhelmingly male (83% as of November 2019).[9] As military epidemiologists point out, when one controls for age and gender, the military suicide rate is roughly equivalent to the general population.[10] The problem with this statement, although statistically accurate, is that it also hides some truth. Suicide is not an equal opportunity killer. Not all segments of the military population struggle with suicide to the same degree. Lumping the entire military into a single rate used for comparison obscures complexity. It ignores the fact that young, unmarried enlisted soldiers—those required to live in military barracks—are disproportionately hit. Their rates of suicide and suicide attempts are not roughly equivalent.

Digging into the suicide statistics as a function of housing type reveals a different story. For every year on record, it is barracks residents who have inequitably suffered from the grips of suicide. In some years, up to 236% more than their fellow soldiers not living in the barracks (Figure I.2).

Disproportionate Rates of Suicides and Suicide Attempts by Barracks Residents

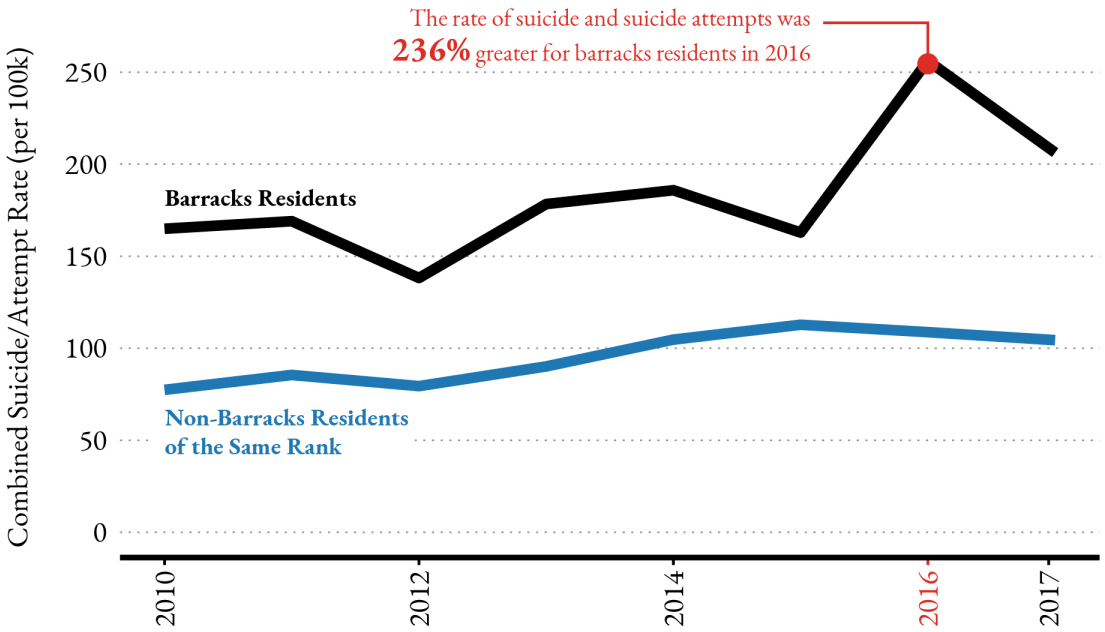


Figure I.2. Disproportionate rates of suicide and suicide attempts made by US Army barracks residents. Data from DoDSER Reports (2010-2017). Graphic created by the author.

I am not a psychologist nor an epidemiologist. And I do not pretend to be. I am not interested in determining what causes a soldier to decide to take their own life. There are already many talented, dedicated, and more qualified researchers doing just that. Instead, I am an architect and a planner. My interest is in the built environment—the physical places and spaces where these tragedies occur. Disproportionately, that place is all too often the military barracks. This dissertation focuses on those buildings.

Of initial semantic importance is to define the term barracks. Known by a host of different

names across the various military branches—including dormitories, quarters, unaccompanied housing, and barracks—my specific focus is on the buildings which permanently house junior enlisted members without dependents (i.e., without children or spouses of their own) during their first years of military service. For the Army, these junior enlisted members constitute all Privates through Sergeants without dependents. The Roman Army called their soldier housing buildings barracks in the first century A.D.,[11] and the US Army continues to do so to this day. As such, I use the term "barracks" for consistency.

The Boys in the Barracks[i]

Back to the barracks room of Sanders and Godding: Let's go back in time before August 7th, 2008. Let's consider a possible alternative ending—as all too often, these stories result in tragedy.

Sanders and Godding still live in the barracks. They still live together in the same room, but they keep to themselves. The common area between their private bedrooms is small, uncomfortably arranged, and affords limited activity. The overall complex's site plan makes it unlikely that either of them bumps into their fellow neighbors, let alone each other, during the course of the day. The room windows look outward, across an empty field, incapable of seeing when others come and go. There is a small community lounge, with an old, slanted pool table and a temperamental television, but it is located in a separate building. It is not on their daily path, and even if it were, it is encased by four walls and a door. You cannot see or hear who, if anyone, is in the lounge from the outside. The two roommates are still the same people. They are still friendly and caring, but they often default to retiring to their individual bedrooms when off-duty to watch movies, play video games, or meander through the webs of the internet.

Specialist Sanders' wife still files for divorce. It still crushes him. This time though, as Joseph Sanders retreats and avoids conversation, Albert Godding doesn't notice. They didn't form a bond over laughter and guitar sessions. They don't feel attached to one another as good friends do. The firing pin wasn't removed. The weapon properly functions as it was meticulously engineered to do. And it was pools of blood, not tears, that Specialist Godding walks into as he returned to the barracks on August 7th, 2008.

Of course, this alternate ending is entirely hypothetical—fictionalized to illustrate the underlying questions that I pose in this dissertation. The design of the built environment played no role in the crushing blow of Sanders' pending divorce. It played no role in his struggle, contemplation, or eventual decision to attempt suicide. But, did it play a small part in its prevention?

Specialist Godding intervened—removing the firing pin—because he noticed a change in Joe's

[i] Reference to a book by the same name; Ingraham and Manning (1984).

behavior. And he noticed because the two soldiers, the two roommates, built a social bond through casual and consistent interaction. Without that bond, this fictional ending seems increasingly possible.

Thus, I ask two primary questions. First, how does design—the architecture and planning of military barracks—affect resident interaction and social cohesion? And second, how do different levels of cohesion correlate to rates of re-enlistment, health outcomes, and the incidents of suicide for barracks residents?

Theoretical Foundation

The basis of these two questions sits atop three foundational environment-behavior theories: affordances theory, behavioral settings theory, and pattern language theory. I explore these theories to their full-depth in Part Two, "Patterns of Interaction," but it's worth briefly mentioning them here. Environment-behavior theories build upon the idea that human behavior is embedded in space. You cannot separate how people behave or interact with one another from the environments in which those behaviors or interactions take place.

Each theory has a slightly different take on this relationship, however. As a crude analogy, these three theories are like the menu at your favorite restaurant. The environment is the menu; the behaviors are the dishes. For affordances theory, the menu (the environment) *affords* certain dishes (behaviors). Pasta, salad, and steak are all potential options. Pizza is not. The environment does not afford that behavior. These affordances provide opportunities that allow, not force, behavior.

Behavior settings theory is the same restaurant. But instead, this theory now says that the environment has some coercive power over the afforded behaviors. For this theory, the menu is now printed on red paper, playing to subconscious associations between the color red and red meat (although I should note that I completely fabricated this association to illustrate the example). All behaviors are still possible—just like affordance theory—but with the new menu color, the environment has now changed the likelihood of each behavioral outcome. It has moved from a *possibilistic* approach to a *probabilistic* approach with the addition of odds. Borrowing from the field of behavioral economics, one could say that behavior settings can "nudge" people towards certain actions.[12]

Lastly, is pattern language theory. The restaurant is still the same, but they take more care in the craft of the menu. They pay particular attention to its design, capitalizing on prior observations between physical menu characteristics and customer ordering behavior. Using this knowledge, they now highlight the steak with a red border, listing it as the "chef's favorite." Here, the environment (the menu) is intentionally using design to imply and influence a specific desired outcome.

With a foundation in environment-behavior studies, this dissertation takes a probabilistic approach, not an environmentally deterministic one. The design of military barracks does not cause behavior; it allows—or affords—it. Specific physical patterns might correlate to certain social actions, but neither acts causally. The red paper or highlighted border or the chef's claim do not force your dinner selection. It only changes the odds of what you choose. The environment-behavior interaction is complex. It is not a deterministic two-variable relationship where changing one automatically leads to a change in the other.

The environment can act coercively, however. It can signal. It can encourage. And it can increase the *probability* that specific social patterns will emerge. It is these design patterns—those that correlate to increased social behavior or increase the probability of interaction—that I aim to reveal.

Criticizing Premise not Purpose

In Part One, "Building the Barracks," I look at these buildings as an architectural typology, trying to understand how they evolved into the spatial configurations they are in today. I explore the history of their form, the shifting military design philosophies over time, and the drivers of change—from antiterrorism to retention.

The military has a national security interest in retaining service members. On March 4th, 2020, the Army's chief of staff, General James McConville, said, "We [the Army] are in a war for talent."[13] But that fight didn't start in 2020. Preparations began in 1971, with the full-blown war kicking off in 1973 when the military ended the draft and went to the all-volunteer force. The DoD has battled for the last 47 years, competing for personnel. Along with new tanks and planes, they've developed new weapons to attract the nation's youth. Increased pay, education benefits, and clever marketing campaigns advertise not only what potential recruits can do for the Army, but what the Army can do for them. And part of what the Army did for them is make military service more enticing by increasing "quality of life" for the service member—to include changing the physical places where soldiers live.

In the effort to create better barracks, military designers have singularly focused on personal satisfaction as a means of achieving this "quality of life," and as the avenue to increase their retention bottom-lines. They have focused almost exclusively on the individual soldier. They shifted from shared rooms to private rooms, made those private rooms larger, and deleted social gathering space to re-apportion square footage to the individual. The problem with these actions is not in their merit—soldiers deserve high-quality housing for the sacrifices they make—but rather in their fundamental premise. The inherent claim that the military is making is that personal satisfaction, as gained through greater square footage and the privacy of individual rooms at the expense of communal

space, improves life quality, and increases re-enlistment likelihood. Unfortunately, the military has never validated these claims. When validated, the claims fall apart. Indeed, larger private rooms increase soldier satisfaction. That part is true. But the benefits stop there. There are also a host of negative externalities. The quest for individual satisfaction, as applied by barracks designers, encourages physical and social isolation, negatively correlates to loneliness and health, and has no effect on re-enlistment outcomes. In essence, if the Army wanted to improve soldier quality of life and retention—a worthwhile and necessary goal—designing for individual satisfaction is not the answer. Instead, they should look to the story of Sanders and Godding, and aim for increasing the probability of resident social interaction and cohesion. As sociability blossoms, so does health, retention, and incidentally, satisfaction too.

Socializing the Barracks

In Part Two, "Patterns of Interaction," I explore this dissertation's first central question: how design affects resident interaction and social cohesion. I dive deeper into the environment-behavior theories as a point of departure to understand and explore whether variations in physical patterns correlate to differences in resident sociability. Military barracks provide a particularly useful means to answer this question. For starters, the population of residents is uniquely homogenous in age, income, profession, and gender. Secondly, the environments are tightly controlled. Each service has its own design standard, which must conform to strict Congressional regulations. These regulations narrowly define each individual soldier's authorization for physical space. Barracks design variations are thus limited to a finite set of variables such as spatial layout, orientation, and functional adjacencies. Maybe most significantly, however, is that unlike nearly all other types of permanent housing—inside or outside of the military—there is no self-selection bias. All junior enlisted soldiers without dependents must live in the barracks. They do not have a choice to live in a different housing type or style, and they have no input into which barracks building or room they are assigned. As a researcher, this level of homogeneity and regulation is tremendously valuable. The gold standard for correlational research is the randomized clinical trial, where subjects are exposed to two different interventions while holding all other variables constant. It allows for a rigorous analysis of differences to investigate the effect of the intervention. While the military barracks would never hold up to the standard of a randomized trial, they may be as close as any ethical researcher can get when studying the permanent housing of people.

Lastly, in Part Three, "The Consequences of (dis)Connection," I take the first question one step further, investigating how different levels of cohesion correlate to rates of re-enlistment, health outcomes, and the incidents of suicide. In parts two and three, I travel to Schofield Barracks in Hawaii, Fort Bragg in North Carolina, and Joint-Base Lewis-McChord in Washington, using those three installations as case studies. I venture inside their barracks. I meet their residents. I talk to the

architects and planners who had a hand in their design. And I explore Army data to learn just how much design matters to the social experience of place.

Positionality

This research, and my ability to seamlessly venture in and out of military installations, in and out of military barracks, to access military records, and to garner the time of military leaders and designers, is in large part a function of my position. Like Sanders, Godding, and the many others in this story, I wear the nation's uniform. I am an active-duty military officer. I submit this dissertation as the culmination of a formal assignment in academia. And just as you cannot separate behavior from its environment, you cannot separate perspective from experience. I come to this dissertation as both an architect and a military member, experienced in both worlds. I see the designers who work tirelessly to create the best places possible for our junior enlisted soldiers. I see how much they care. But I also see design forces that encourage the creation of physically and socially isolating places. I see barracks buildings where I wouldn't want to live. I see room for improvement. And I see an opportunity to further the general knowledge of how design influences social interaction and health. I hope this research advances that conversation.

PART ONE:
BUILDING THE BARRACKS

"Barracks design standards have been evolving—significantly since we've gone away from the Draft—and this evolution has not always been good. We've created problems for ourselves. We've isolated soldiers, and isolation is a soldier's worst enemy."

- John Napalto
Military Master Planner

CHAPTER I:
QUARTERS FOR THE ARMY

Summer of 2016 in Rome, Italy.

Behind roped-off barriers across the city of Rome, orange-vested archaeologists carefully brush thousands of years of dirt and sediment off ancient artifacts. As they are delicately unearthing new discoveries from the empires of Nero, Hadrian, and Julius Caesar, hordes of tourists swarm to see, feel, and experience Rome's captivating history. They sit on the travertine limestone seats of the Colosseum, imagining the blood-lust spectacles of first-century gladiator battles, and stroll through the Roman Forum, picturing the buzz of commercial, intellectual, and judicial activity that once was. But Rome is also a modern European capital with traffic, shopping districts, and 2.87 million permanent residents.[1] Perhaps in no other city on Earth can you seamlessly step back and forth across such a sharp dichotomous divide between modernity and antiquity. Occasionally, like in 2016, those two worlds collide.

Nine years earlier, in 2007, construction workers broke ground on what would soon become the third, and desperately needed, addition to Rome's subway lines. Compared to most other large European cities, Rome falls woefully short on mass transit. Its two metro lines cover only 25.82 miles—less than 20 percent of similarly-sized Paris' system.[2] Line C would help close that gap. By 2016, construction crews had reached the shadows of the Colosseum, one step closer to connecting the central city to the eastern suburbs. Thirty feet below the chaos of whizzing Vespas and honking buses, progress came to a screeching halt when modern excavation equipment uncovered a buried architectural complex from one of Rome's earliest armies. Unbeknownst to archaeologists, historians, or subway transportation planners, the route of Line C was lying directly on top of a two-thousand-year-old military barracks.[3]

Barracks as an architectural building type are ancient. The ones exposed by Rome's subway construction crews date back to the second century AD, and armies across the world are still actively building them today.

The question for US Army barracks is how the design and planning of these buildings have changed. How did the Army get to its most recently published "2/1 Market Style" standard design in

2012? And what are the forces which spurred those transformations along the way?

We will pick up this story 4,500 miles away and 1,800 years after Hadrian's Roman Army occupied the barracks that now sit alongside subway Line C. We turn our focus away from the barracks that housed Roman Legionnaires, and towards the buildings that US Army soldiers call home today.

A lot has changed in 1,800 years. As we fast-forward through history and pick back up soon after John Hancock famously inscribed his signature on the Declaration of Independence, it is important to recognize that our new nation, and their newly formed Army, did not invent the barracks. The history of barracks design does not start with early colonial Army posts. Instead, the Army imported their form and function—with roots dating back to the ancient barracks just recently re-discovered.

Isolationist Beginnings

Hadrian's second-century barracks are cultural artifacts. They tell a story—a story about geopolitical empire, construction practices, and the everyday life of the Roman soldier. In the same way, US Army barracks buildings are cultural artifacts. They also tell a story—one that provides insight into the political, economic, and social conditions of the time.[4]

For the United States, the need for military housing began shortly after the American Revolution and the signing of the US Constitution. The third amendment, passed by the Congress on September 25th, 1789, states that "No soldier shall, in time of peace be quartered in any house, without the consent of the Owner, nor in time of war, but in a manner to be prescribed by law."[5] The Army could no longer force civilians to provide shelter for its soldiers. They needed a different solution. And thus, the Army—like other armies long before it—entered the housing business.

The 1789 amendment did not launch the Army into a fury of construction, however. They built very few permanent barracks before the Civil War.[6] They were still small and split between eastern coastal defense and western frontier expansion. On the coast, the US followed the European system, building impressive stone and masonry fortifications based on rigorous geometrical precision. As military scholar David Rhyne writes:

> Fortification had become an exact mathematical science during America's formative years. Few people felt that it could be improved upon. Louis XIV's France was the center of the world's scientific community in the seventeenth century, and her chief military engineer was the recognized expert on fortification. It was only natural that Americans copied the best of European technology in order to defend their newly won freedom.[7]

These impressively mathematical coastal fortifications did not come with equally impressive accommodations for its men. Soldiers lived in dark, damp, ill-ventilated, and moldy[8] casemates—the vaulted spaces in the fortress wall which housed and fired the cannons. With soldiers sleeping in the

walls, the Army did not need to build separate barracks buildings.

On the western frontier, the rationale for not constructing permanent barracks was quite the opposite of the coastal east. The frontier army needed places to house its troops; they just didn't need permanent ones. Unlike the coastline, the frontier was not a fixed boundary. It was continually moving westward, and the Army moved right along with it. The Army established and then abandoned frontier posts at a rapid pace, sometimes within only days. The opening and closing of forts happened with such regularity that the DoD has no complete record of their names, locations, or designs.[9] Those with records were small, isolated, and hastily constructed.

It makes no sense for the Army to construct purpose-built, permanent housing if they are about to pick up and leave. And it is equally foolish to build new if you already have enough adequate sleeping space for your soldiers. In the era of coastal casemates and a moving frontier, the Army found themselves without a need for permanent barracks. The Army had long-term plans for a few of its inland garrisons, however. It was at these sites—usually passed-by former frontier locations now operating as western re-supply (like Fort Leavenworth in Kansas of Jefferson Barracks in Saint Louis) or the former northeastern strongholds of the War of 1812 (like Carlisle Barracks in Pennsylvania or Plattsburgh Barracks in New York)—where the Army invested in permanent construction, barracks included. The "Old Stone Barracks" in Plattsburgh, built in 1838, typifies the early permanent barracks of the US Army.

Old Stone Barracks | Plattsburgh, NY
Built in 1838

Figure 1.1. 1838 Old Stone Barracks in Plattsburgh, NY. Images from the Library of Congress Prints and Photographs Division, Washington, DC. Reproduction numbers Historic American Engineer Record (HAER) NY-326-31 (left) and HAER NY-326-32 (right).

During the first half of the nineteenth century, lavatories were still in separate buildings a short walk away. It was not until 1860 when the Army-published a design entitled "Soldiers Quarters for One Company," that washing rooms and a lavatory moved inside of the barracks.[10]

These early barracks held prominent positions in the post's master plan. In nearly all cases, the barracks sat across from officer housing, framing and enclosing the garrison's central parade grounds.

As architectural historian Kathryn Kuranda writes:

> This location allowed easy access to training activities held on the parade ground and to duty stations. Because of their prominent location, barracks were important elements in the installation plan and often were impressive buildings that defined the architectural character of the installation as a whole.[11]

Fort D.A. Russell in Wyoming—first planned in 1867—is a good illustration of this arrangement.

Fort D.A. Russell, WY | Central Parade Grounds
Planned in 1867

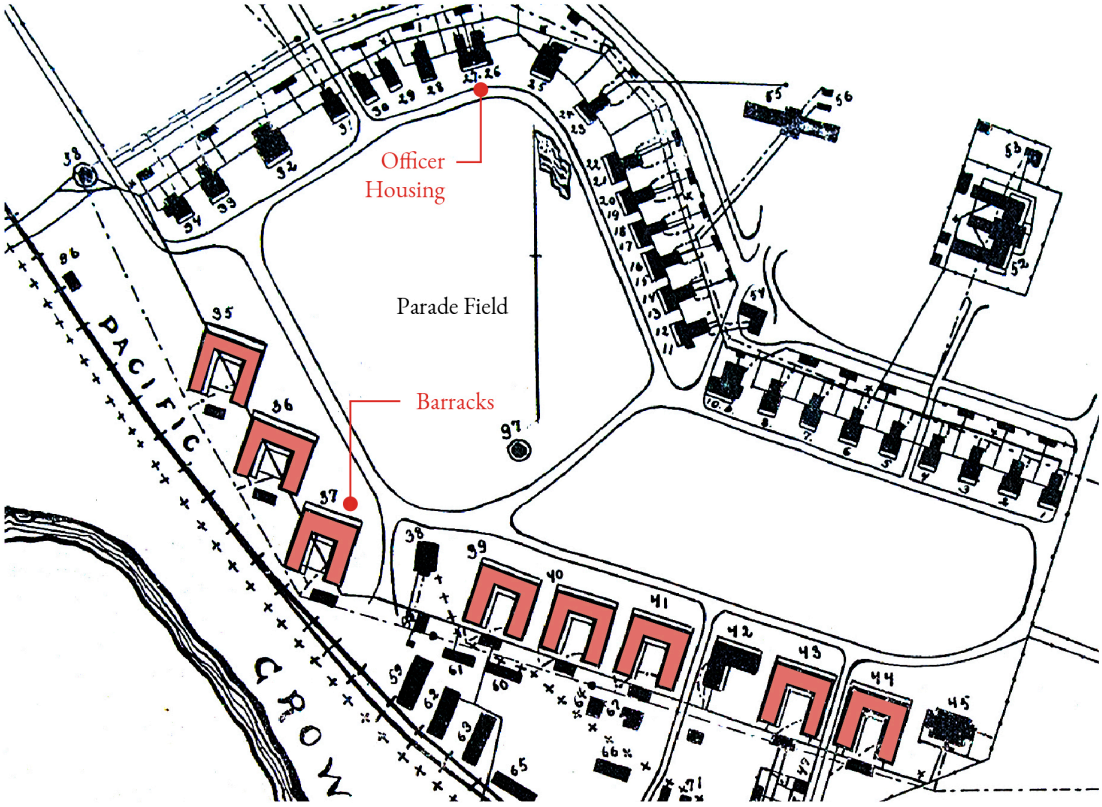


Figure 1.2. 1898 Plan of Fort D.A. Russell. Showing the layout of the garrison, with enlisted barracks and officer housing framing the central parade grounds. Plan courtesy of the US Air Force. Graphic created by the author.

The barracks at D.A. Russell are also a good example of how designers modified the "Old Stone Barracks" model. Taking the long, linear forms and bending them around their midpoint allowed planners to compress the overall parade ground footprint while still providing prominent frontage to each barracks.

Around 1870, three events converged to shape the future of Army barracks. First, the use of modern artillery during the Civil War proved the obsolescence of stone and masonry coastal fortifications. They were no match for gunpowder, rifled cannons, or high-lobbed mortars. Second,

the need for a frontier army was slowly fading. In 1890, the Bureau of the Census officially claimed there was no longer a distinct frontier. Short on funds, and heavy on desertions—the Army turned the page on small frontier outposts and started to economize, consolidating to fewer, but larger garrisons. And third, the Surgeon General released a scathing report on the living conditions of casemate housing and ramshackle temporary barracks. In his report, he writes:

> It has been said that we have the best-fed and the worst-housed Army in the world, and the statement seems more nearly correct than such generalizations usually are. The ultimate cause of the defect is, of course, ignorance, the immediate cause being a desire for economy, praiseworthy in itself, but producing results which are the reverse of its object; for savings in boards and bricks, at the expense of the health and life of the soldier, cannot be considered a commendable thrift.[12]

These three forces ushered in a new era of centralized design standardization that continues to this day. Quartermaster General M.C. Meigs issued the first set of widely-distributed barracks standards in 1872.[13][ii] The standard design set included all buildings typically found on an Army installation—from barracks to administration to industrial facilities.

Meigs Barracks | Fort Sam Houston, TX
Built in 1905

Figure 1.3. 1905 Cavalry Barracks at Fort Sam Houston in Texas. Images from the Library of Congress Prints and Photographs Division, Washington, DC. Reproduction numbers HABS TEX,15-SANT,39L-2 (left) and HABS TEX,15-SANT,39L-1 (right).

The new barracks standard was far from revolutionary. If anything, the 1872 plan merely codified the design practices of permanent barracks already in place. The Quartermaster design varies very little from the Old Stone Barracks built thirty-four years earlier. Just like the earlier plan, the standard calls for a long, linear building with communal spaces on the first floor and open-bay sleeping areas for junior enlisted soldiers above. The design continues to illustrate the concerted Army effort of housing and feeding a singular unit—the company—together in the same structure.

[ii] The Army's first design standard in 1860 was narrowly circulated and hardly used.

Notably different in the 1872 design is the inclusion of a second veranda, now running along both sides of the barracks.

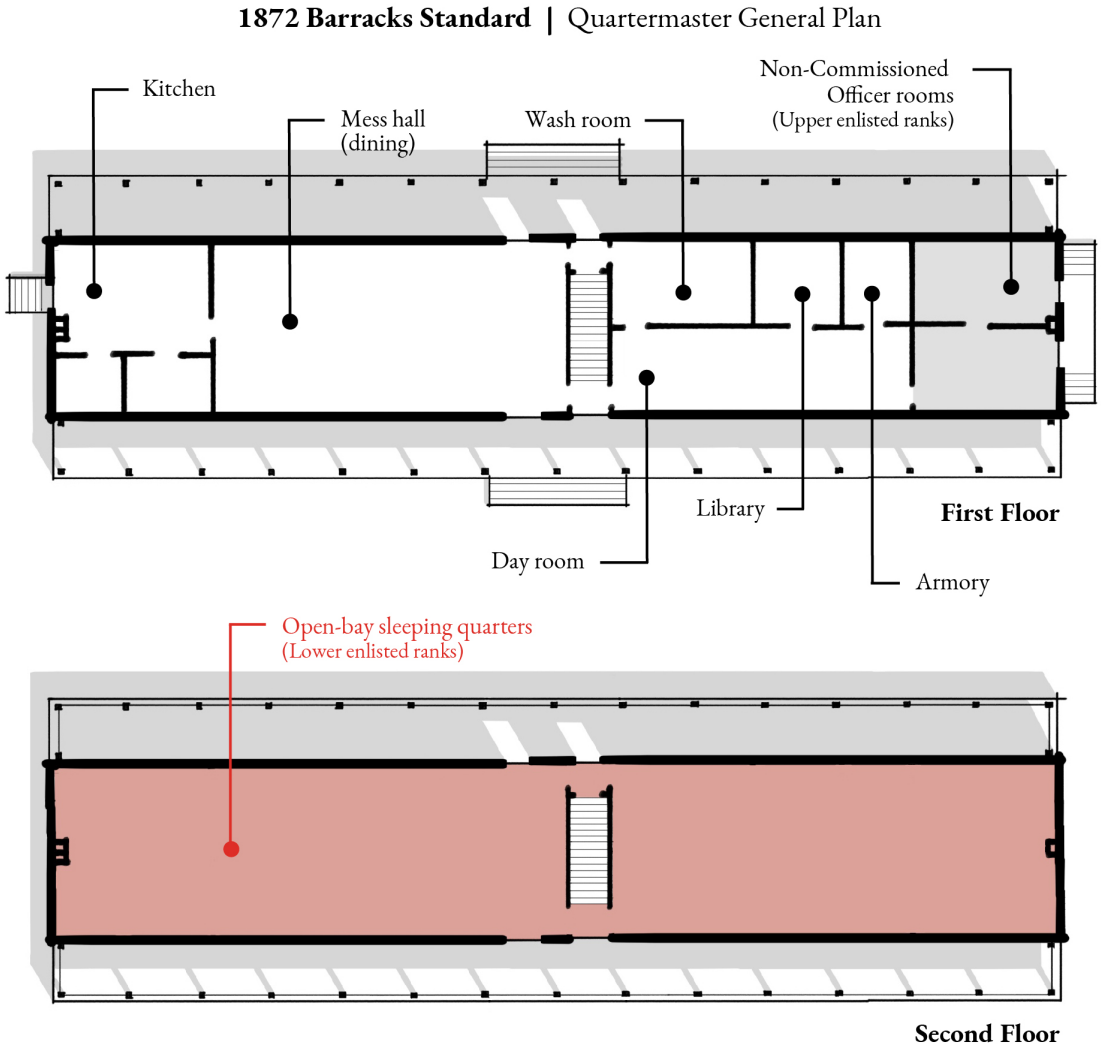


Figure 1.4. 1872 Quartermaster General plan for barracks. War Department, *Annual Report of the Quartermaster-General.* Washington, D.C.: Government Printing Office, 1872. Graphic created by the author.

While not a drastic design departure, the 1872 Quartermaster plan is significant for two reasons. First, it launched the Army into an era of ever-increasing design standardization, issuing plan sets directly to the field from central Washington, DC offices. As a means of control—both in terms of a barrack's cost and its architecture—design was now something that the Army standardized from afar. Second, the 1872 standard design is the first to respond to a soldier's social conditions through architecture directly. As Office of the Quartermaster General (OQMG) Historian Erna Risch writes:

> Believing that it was true economy to make the soldier comfortable since that improved his health, efficiency, and morale and prevented desertion, Meigs wished to offer better barrack accommodations than in the past, to make quarters, reading rooms, and mess rooms "more

attractive than the sutler's shop and the groggery.[14]

In 1872, General Meigs—and the Army—looked to a barrack's design to address problems of morale, health, and retention. This dissertation, one hundred and forty-eight years later, investigates those same questions.

Mobilizing for the World Wars

David Rhyne wrote that "If ever there was a single, cataclysmic event that put a permanent imprint on the design, construction, location, and size of the modern Army post, that event was the entrance of the United States into World War I."[15] It was a time of rapid Army expansion, constructing thirty-two new garrisons to support the war.[16] These posts certainly left their mark. All future development would build upon the design foundation established during this time, with their structural bones still very much visible today. But at the building-level of barracks, these mobilization camps—and the forts many soon became—didn't leave much of a permanent impact. This was not for reasons of quantity, nor reasons of location. Barracks were the most ubiquitous element of the new camps, endlessly stamped in a rigid grid splayed out on either side of a long, linear parade ground. Most of the modern barracks that I explore throughout this dissertation sit on the same sites where those WWI soldiers once slept. Instead, the reason they left little impact is because the Army purposely designed them that way. They were temporary and hastily constructed. And they needed to be.

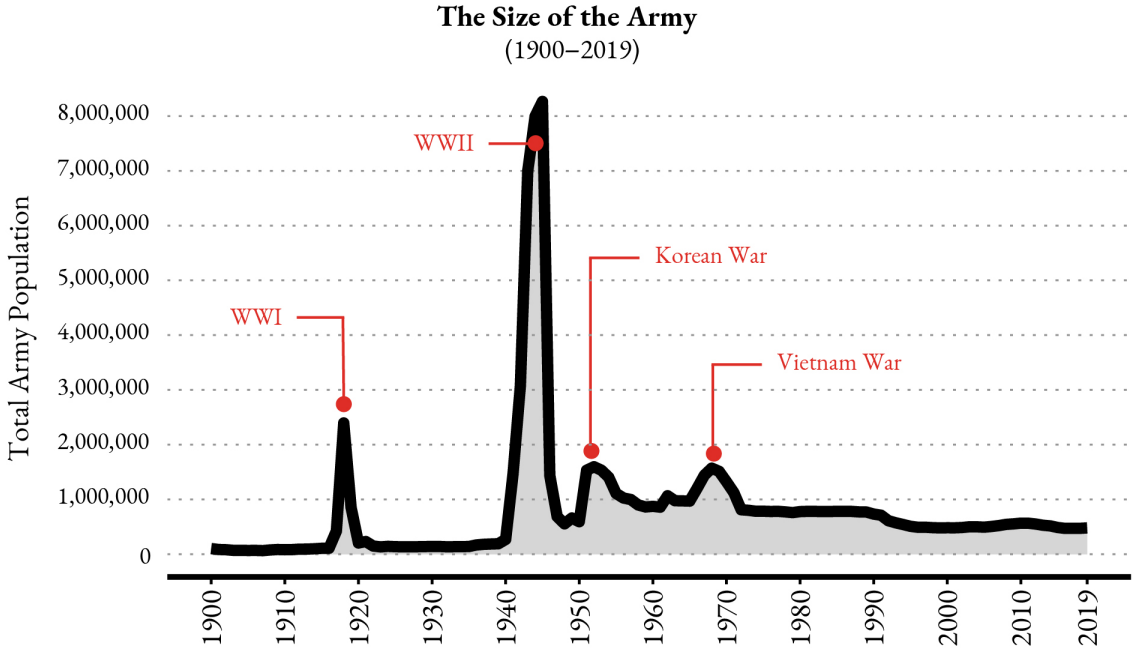


Figure 1.5. The size of the Army over time. Source: Defense Manpower Data Center (DMDC).

Military housing is primarily a function of demand, and directly related to the Army's population. Before WWI, the Army had enough housing for 50,000 men. They would need to house another 1,736,000 more by wars end.[17] To put that into perspective, the Army needed to build barracks for an influx of people larger than the current populations of Phoenix, Philadelphia, San Antonio, San Diego, or Dallas. And I could go on. There are only four cities in the United States today that are larger than the 1.7 million new soldiers who entered the Army for WWI.[18]

To mobilize for such a force, expediency was the main criteria:

> [Army mobilization camps] were built in response to a temporary crisis. In order to meet that crisis, the posts had to be built rapidly, and the industrial capacity of the nation allowed their successful completion. They were mass production Army posts, and they looked the part.[19]

The Army standardized and mass-produced post construction. So standardized that the Quartermaster General issued a "Manual of the Construction Division of the Army," spelling out exact layouts and building plans for every facility a mobilization camp would need. The barracks, titled "Series 600," were simple untreated wood structures, purposely left unpainted with all of the interior structure exposed for speed and thrift.[20] They came in either one or two-story options, with multiple size variations. The single-story plan had three interior walls enclosing three small rooms on one end—an office, storeroom, and senior noncommissioned officer (NCO) quarters. Designers left the remainder of the space as one large open sleeping bay. The two-story type (pictured) borrowed patterns from the Meigs barracks, adding a mess and kitchen to the ground floor.[21]

1917 Mobilization Barracks | 600-series

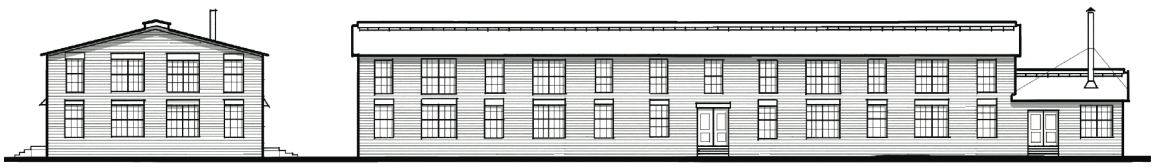


Figure 1.6. 1917 Quartermaster General 600-series design for mobilization barracks. Graphic created by the author.

Looking at the "Size of the Army" (Figure 1.5) through the Vietnam War, one trend stands out. As sharply as the Army grows in the months and years before a major international conflict, they downsize at an equally drastic pace when the war ends. After WWI, the 1.7 million new soldiers took off the uniform almost as quickly as they learned to wear it. And the exodus of people took the Army's congressional appropriations with them as they left. The flow of money from Congress was nearly shut off entirely after the war. To stay operational, the Secretary of War John Weeks moved to divest excess properties, placed many camps in "caretaker" status, and imposed a strict $500 limit to expenditures on "any building or military post or grounds" without his direct approval.[22] The lack

of money and manpower led to the steep decay of the temporary barracks. As described by Fine and Remington in their history of military construction during the world wars:

> The Inspector General pointed out that temporary wartime structures were "becoming unfit and unsafe for occupancy." Early in 1924, when an officer publicly stated that posts in the Second Corps Area were "rotting away" and told how soldiers at Governers Island fished for driftwood to repair flooring, the story made the front page of the *New York Times*. In his annual report for 1924 Secretary Weeks disclosed that 40,000 men were living under "unsuitable" conditions. Leading periodicals took up the theme, featuring articles with such titles as "Our Homeless Army" and "Army Housing: A National Disgrace."[23]

Like the response to the 1870 Surgeon General's report that helped launch the Meigs design, the answer to the decaying WWI barracks would become a reoccurring theme: deteriorating living conditions to the point of public outcry, followed by direct central investment.

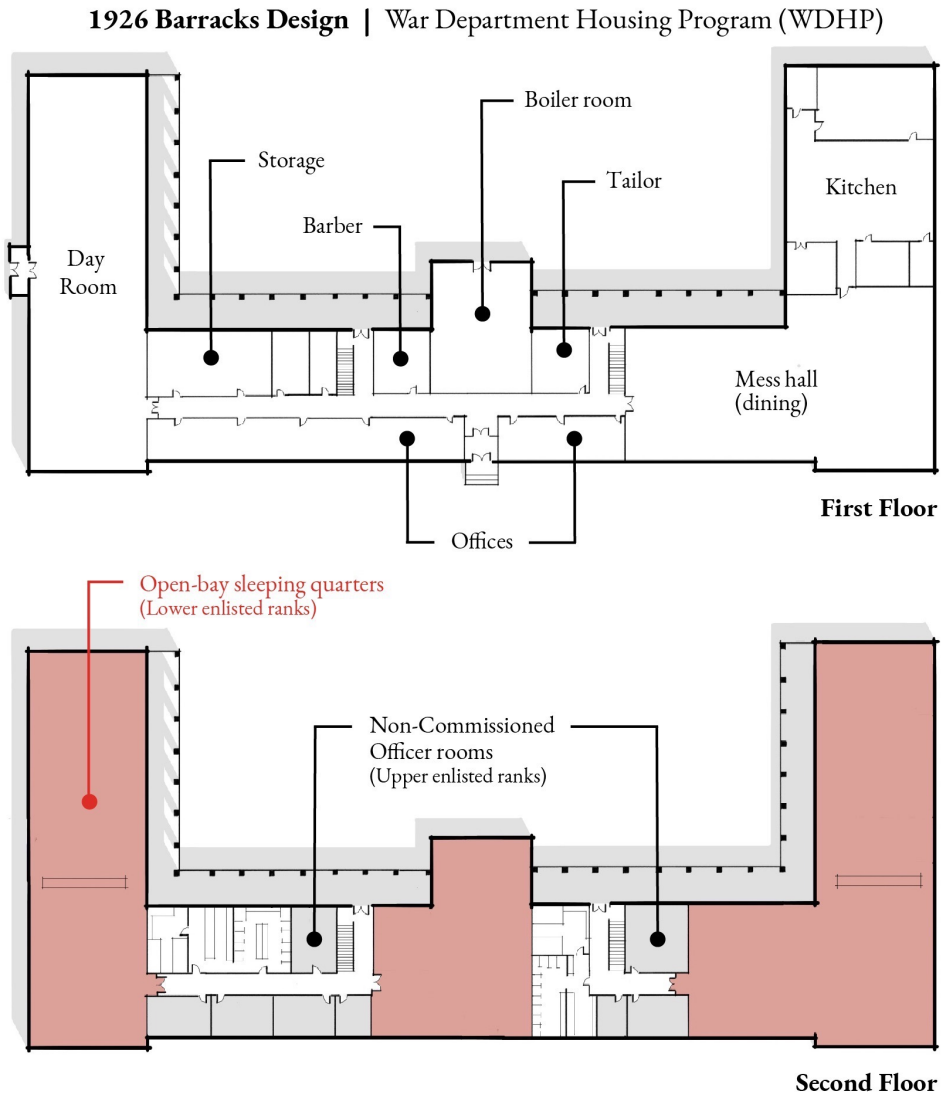


Figure 1.7. 1926 War Department Housing Program design for barracks. Based on Fort Jay, NY barracks. Graphic created by the author.

In 1926, this came under the moniker of the "War Department Housing Program" or WDHP. Funded by the sale of excess military property, the WDHP aimed to rebuild the barracks with permanent construction. Instead of using in-house military architects within the Quartermaster's office, this time, the Army reached out to civilian design professionals to create the new barracks—a shift that scholar Anna Darice Miller argues helped move the Army closer and closer to mainstream society.[24]

The 1926 WDHP design is reminiscent of the barracks at Fort D.A. Russell in Wyoming from decades earlier. They are typically two- or three-story, narrow-wing buildings that makes a "C" or "U" shape in plan. Designers reserved the public, social, and dining spaces for the ground floor with sleeping bays above. The most visible difference between the 1926 and 1872 Meigs designs is the move to relocate the verandas to the building's rear, a change that starts a continual emphasis on increasing soldier privacy.

1926 Barracks Design | Fort Jay, NY

Figure 1.8. War Department Housing Program barracks at Fort Jay, NY. Designed by the architectural firm McKim, Mead, and White in 1928 (using 1926 standard). Images from the Library of Congress Prints and Photographs Division, Washington, DC. Reproduction numbers HABS NY,31-GOVI,9--1 (left) and HABS NY,31-GOVI,9--2 (right).

A second trend that appeared with the 1926 WDHP barracks—the Army's first initiative to construct permanent housing in the twentieth century—was the shift to larger barracks buildings, supporting the move under economic pretense. As Kuranda writes:

> A barracks housing 2,000 to 3,000 men cost approximately $800 per man, while a barracks housing one company of 125 men cost $1,500 per occupant. Construction costs reflected the greater efficiency in the use of space in larger barracks. Areas of cost and space saving in large barracks were the dining facilities and service areas. Smaller barracks contained a separate kitchen serving a smaller number of residents; the large barracks incorporated dining space for large numbers in a cafeteria plan... Combining these areas in large barracks also saved space and maximized construction dollars.[25]

The design continues the planning and architectural patterns of the 1872 Meigs standard, only shifting ever so slightly towards increased privacy.

The post-WWI War Department Housing Program lasted for over a decade, coming to a close only when the Army needed to mobilize for WWII.[26] Just like in WWI, the Army again turned to mass-produced temporary wood barracks. The Series 600 plans were updated and reissued as "Series 700" in 1938.[27]

1938 Mobilization Barracks | 700-series

Figure 1.9. Quartermaster General 700-series standard design for mobilization barracks. Images from the Library of Congress Prints and Photographs Division, Washington, DC. Reproduction numbers HABS CAL,38-SANFRA,205--11 (left) and HABS CAL,38-SANFRA,205--10 (right).

In the 1938 700 series, Army planners only provided one option—a two-story linear structure with access on the ends. Compared to the 600 series of 1917, designers made quite a few changes. They removed the mess and kitchen and added more modern features. The 700 series barracks had interior electric lighting, outlets, indoor plumbing, and forced-air heating.[28] The Army also made a conscious effort to improve longevity, adding concrete foundations, exterior paint, and wooden awnings over the windows to prevent premature decay.[29]

1941 Mobilization Barracks | 800-series

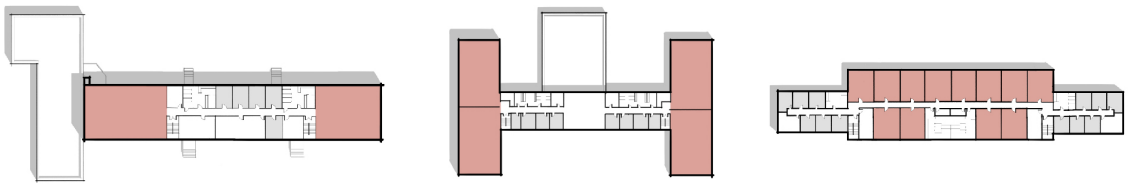
Figure 1.10. Quartermaster General 800-series standard design for mobilization barracks. Images from the Library of Congress Prints and Photographs Division, Washington, DC. Reproduction numbers HABS WIS,41-SPAR.V,1-A--6 (left) and HABS WIS,41-SPAR.V,1-A--4 (right).

In 1941, the Army looked to economize, issuing a new standard they titled the "800 series." As Delgado-Howard writes, the design changes of the 800 series, "reduced the quantity of nails, lumber, and shingles per structure while adding ten feet to the bay and height to the ceiling. The added height made it possible to return to the double bunk."[30] With a little added height, the Army could double the number of soldiers they housed in each building. This tug-of-war between efficiency and quality of life is a consistent push-and-pull that barracks designers continue to wrestle with today.

Cold War Barracks

On September 2nd, 1945, onboard the USS Missouri, Japan formally signed an unconditional surrender. World War II was officially over. With that, the United States followed its traditional post-war playbook: rapid troop downsizing and halting nearly all new construction activities. The Army of 8.2 million people—its largest population ever—shrunk by 92 percent in the two years after the war. But the cuts didn't last long. Less than five years later, by 1950, the Army was already building back up for the Korean War. In the one year from 1950 to 1951, they would again triple in size, topping 1.6 million soldiers.[31] After the steepest and longest drop in history, the rollercoaster Army was back on the rise. And the rising Army needed a place to sleep, eventually issuing three different standards over the next decade.

Cold War Barracks Standards



1951
Hammerhead

1955
H-Style

1960
Rolling Pin

Figure 1.11. Preview of Cold War barracks standards. Sleeping spaces are highlighted in red. Graphic created by the author.

In 1950, the Army successfully argued on Capitol Hill that the decaying temporary barracks of WWII were unsuitable and a bad investment. The following exchange between Major General William Shuler, Director of Installations for the Army, and Representative John Riley of South Carolina is insightful. It demonstrates two things: one, the Army's rationale for new permanent construction, and two, the level which the Army must publicly defend its positions to squeeze money from Congress. We pick up this testimony with General Shuler identifying the construction projects requested in the next fiscal year's budget:

> **General Shuler:** The next station, Mr. Chairman, is Fort Leonard Wood, which is one of the new permanent stations. We have no permanent barracks there. We are asking for 5 new permanent barracks.

Representative Riley: Did you not have some mobilization-type barracks there?

General Shuler: Yes, sir. We have enough barracks there to house all the troops there, but these are permanent barracks, to get these troops on a permanent station out of these World War II wooden type barracks which we consider now are completely unsuitable for troops to be in, and get them into permanent barracks.

Representative Riley: What is the condition of the barracks?

General Shuler: The barracks there are in bad condition, sir.

Representative Riley: They have not been maintained?

General Shuler: They have been maintained, sir, to a degree, but cannot say they have been maintained more or less than any other station. In general, sir, throughout the Army, the World War II mobilization-type buildings, having been built in World War II with green lumber and in a hurry, for a maximum expected life of 3 to 5 years at most, are completely outdated now. The lumber is warped, the insulation is bad, the building is drafty. There are two big squad rooms with heating systems that are not good. So the whole thing, we feel, is way below the standard that we would like to put our soldiers in, where we possibly can, sir… So rather than build the mobilization-type building, which will rapidly deteriorate, we feel it is more economical in the long run to put up a more permanent type of construction.[32]

Congress eventually agreed. Starting in 1950, Congress authorized and funded 83,000 new permanent barracks spaces for the Army (to include the five buildings argued here for Fort Leonard Wood in Missouri). To save time and money, the Army Corps of Engineers—who now took over all design and construction responsibilities from the Quartermaster General—produced a new set of standard plans for Army-wide use.

In many ways, the permanent barracks of the 1950s harkened back to the design ideas of the 1926 War Department Housing Program. Architects strived to regain company cohesion through consolidation. The primary goal was to accommodate all unit functions under a single roof—sleeping, eating, administration, and supply all back together again.[33] Thirty-five-person open-bay squad rooms continued to house soldiers' bunks, and the ground floor still held all public functions. When McKim, Mead, and White designed their new barracks at Fort Jay, this sleeping arrangement was left to the architects—although undoubtedly inspired by the 1872 Meigs barracks. In 1950, the Army moved to codify it, mandating in Directive No. 4270.4 that:

> Sleeping facilities will be provided in squad rooms. Partial partitions may be utilized together with lockers to provide cubicles for greater privacy within the squad rooms. Toilet facilities, including lavatories, will be grouped for optimum economy.[34]

The standard design became even more standardized.

Comparing their floor plans, the design of the 1926 WDHP barracks and those developed during the 1950s Korean War build-up were not much different. The primary design shift with the new barracks—apart from architectural style—was in master planning. Starting with the 1950s standards,

the Army officially moved away from the historical practice of siting barracks prominently along the central parade field. Barracks complexes, grouped and arranged according to military hierarchy, became isolated islands, no longer strongly tied to the main post.[35]

The first barracks standard designed around the Army's newly published criteria was the not-so-subtly named, "Hammerhead" barracks, issued in 1951.

1951 "Hammerhead" Barracks Design Standard
(1951-1957)

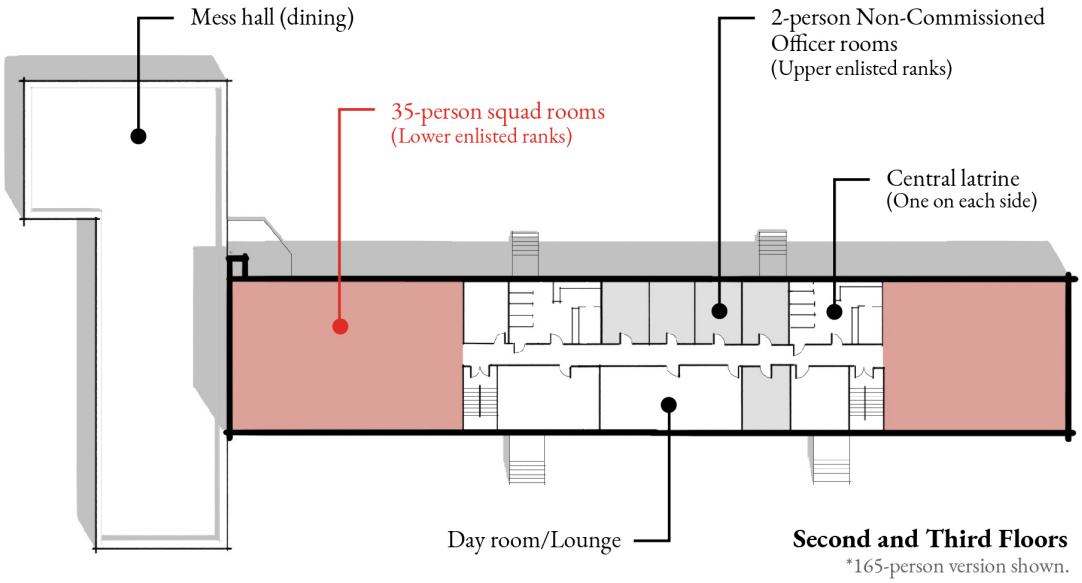


Figure 1.12. 1951 "Hammerhead" barracks design standard. The Army widely-implemented this design from 1951 through 1971. Graphic created by the author.

To accommodate different company sizes, designers created three variations: 105, 165, and 225-soldier capacities, respectively.[36] The head of the hammer housed the mess, kitchen, and supply. The handle contained everything else. The first floor (not pictured) featured administrative offices, a mailroom, a large lounge and foyer, a latrine, and senior enlisted sleeping quarters. The second and third floors are identical to each other. Squad bays sat on each end of the handle, separated in the middle by latrines, a day room, and non-commissioned officer rooms.[37] The design was modern and utilitarian—clustered in groups of four and ten. Each four-building group made up a battalion, and each ten-building group comprised a regiment.[38]

Figure 1.13 below, from Joint Base Lewis-McChord in Washington, illustrates how a resident walking through the complex would have seen the hammerheads.

1951 Hammerhead Barracks
Joint Base Lewis-McChord, WA

Figure 1.13. "Hammerhead" barracks design at Joint Base Lewis-McChord. Images taken by the author.

To Congress, Brigadier General Hardin, the Army's Assistant Chief of Engineers for military construction, described the design of the barracks as:

> A very simple, modernistic type of building, consisting of a reinforced-concrete frame and the walls, both interior and exterior, are made up of concrete block or cinder block. It might be termed a "warehouse structure." It is devoid completely of embellishments. It is a very durable structure. We think that it is very satisfactory.[39]

Simple, warehouse, unembellished, satisfactory. Not exactly high architectural praise. And a far cry from the WDHP barracks which critics described as beautiful, spectacular, magnificent, and striking.[40] Budgets were tight, and demonstrating fiscal responsibility through architectural simplicity played well on Capitol Hill. But Army planners were also limited to a strict $1,700 per soldier statutory limit. They could not build a barracks that exceeded that threshold. The Hammerhead design met the Army's functional and financial need—at least, for a couple of years.

By 1954, construction costs were rising, and the Army could no longer afford these "satisfactory warehouses" under the Congressional cap.[41] It was time to go back to the drawing board. As a result, designers looked for efficiencies. They thought if they could house two companies in a single building, they could save considerably by not having to duplicate mess and kitchen facilities. The new two-company design was dubbed the "H" style, again in reference to its footprint when viewed from above. Like its predecessor, H-style barracks were utilitarian in construction materials and appearance.

The H-style barracks were an attempt to improve economic performance without sacrificing function. The "H" shape allowed planners to keep the most desired attribute of the hammerhead barracks—company cohesion. The center cross-piece connected, but separated, the two units. Each company had its own opposing end of the "H," with shared spaces in between, maintaining both consolidation and physical segregation.

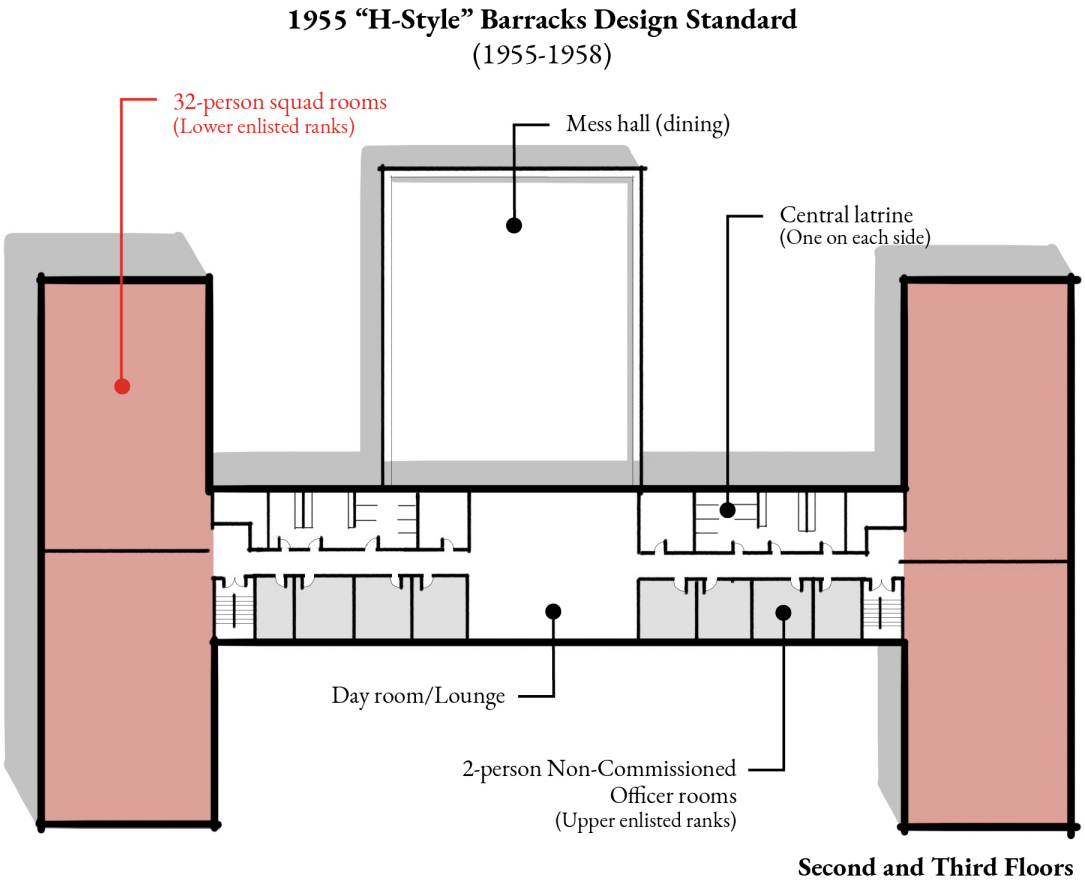


Figure 1.14. "H-Style" barracks design standard. Compared to the earlier "Hammerheads" or later "Rolling Pins," this barracks design was less common. Graphic created by the author.

The two designs were different architectural solutions to the same standards; the H-style was not an overhaul in Army design philosophy. Not surprisingly, they are similar in many ways. Their construction materials, building widths, room sizes, and shared sleeping spaces are nearly identical—almost as if the two designers were working with the same kit of parts. Designers also sited them both with the same focus towards regimental integrity. Instead of the four and ten Hammerhead clusters, the two-company H-styles were in groups of two and five.

The two designs are not the same, however, and their differences extend beyond the number of companies that they house. Functionally, they have very different floor plans. Instead of using non-commissioned officer quarters, latrines, and social lounges to separate squads, the H-style used those same functions to separate companies. Planners also redefined the spatial footprint, moving from long and thin to squat and boxy. The rotated sleeping bays keep the light-filled, narrow wing proportions, but compress the building's overall length, allowing the entire regimental complex to define a smaller central quad. Additionally, by placing the communal spaces in the center of the "H," designers not only ensured that those spaces were integral to the barracks, but centrally connected to

the everyday life of the soldiers. Figure 1.14 shows an image of H-style barracks at Joint Base Lewis-McChord in Washington.

1955 H-Style Barracks
Joint Base Lewis-McChord, WA

Figure 1.15. "H-style" barracks design at Joint Base Lewis-McChord. Images taken by the author.

Just a year after the switch from Hammerheads to the H-style, the Army was already looking to make changes. Cost was the culprit once again. Despite an upward adjustment to the statutory limit, moving the per soldier cap from $1,700 to $1,850, the bleak barracks and their impact on soldier quality of life concerned Army leadership. Kuranda writes:

> By the mid-1950s, quality of life factors were introduced in housing enlisted personnel to maintain viable and effective armed forces. Enlisted men voiced dissatisfaction over existing housing standards. Commanders became concerned over lower than expected re-enlistment rates attributed, in part, to housing conditions. In 1955 and 1956, Army commanders, concerned with the austere housing achievable under the Congressional price ceilings, agreed to eliminate the priority of company integrity in barracks design in favor of features considered essential to improve morale.[42]

In Army-speak, sacrificing company integrity means that the Army is now willing to entertain barracks which no longer consolidate all company-level activities under a single roof. The Air Force had already stripped all non-sleeping functions out of their barracks years earlier, giving them less to build under the same cost limitation. This allowed them to spend more per person. To stay competitive, the Army quickly followed suit. In their 1958 budget, the Army proposed a new standard design—its third of the decade. The new design removed the mess, administration, and storage from the barracks. Financially, it was a shell game. The Army (along with its sister services) separated functions to increase its spending without breaking the rules. The 1958 Congressional budget makes no attempt to disguise the economic parlor trick:

Per man Barracks	$1,850
Mess	450
Administration and storage	250

Total ..... $2,550[43]

By compromising company integrity, the Army gained a 38% increase in their possible per soldier costs. They moved from spending $1,850 per soldier to $2,550, a $700 increase. With the extra funds, the next era of Army barracks was born. H-styles were out, and "Rolling Pins" were in.

The Rolling Pin design was a significant shift to the typology of permanent barracks. Multi-use function was gone, and large open squad bays disappeared. Mess halls, administration, supply, and sleeping quarters all became separate buildings. Instead of segregating facilities by company, designers now separated buildings according to their function. With the freed-up funds from eliminating non-sleeping spaces in the barracks, designers aimed at improving soldier privacy and softening the "satisfactory warehouse" aesthetic. The Army wrapped the facade in brick, placed canopies over the windows, added suspended ceilings in the corridors, latrines, and social spaces, built plaster walls on the interior, installed tile flooring in the lobby, and included mechanical ventilation throughout.[44] More significantly to the future of barracks design, the Army also made its first deliberate effort to enhance quality through privacy. The 35-person squad bays became 8-person rooms with built-in closets.[45]

1960 "Rolling Pin" Barracks Design Standard
(1960-1971)

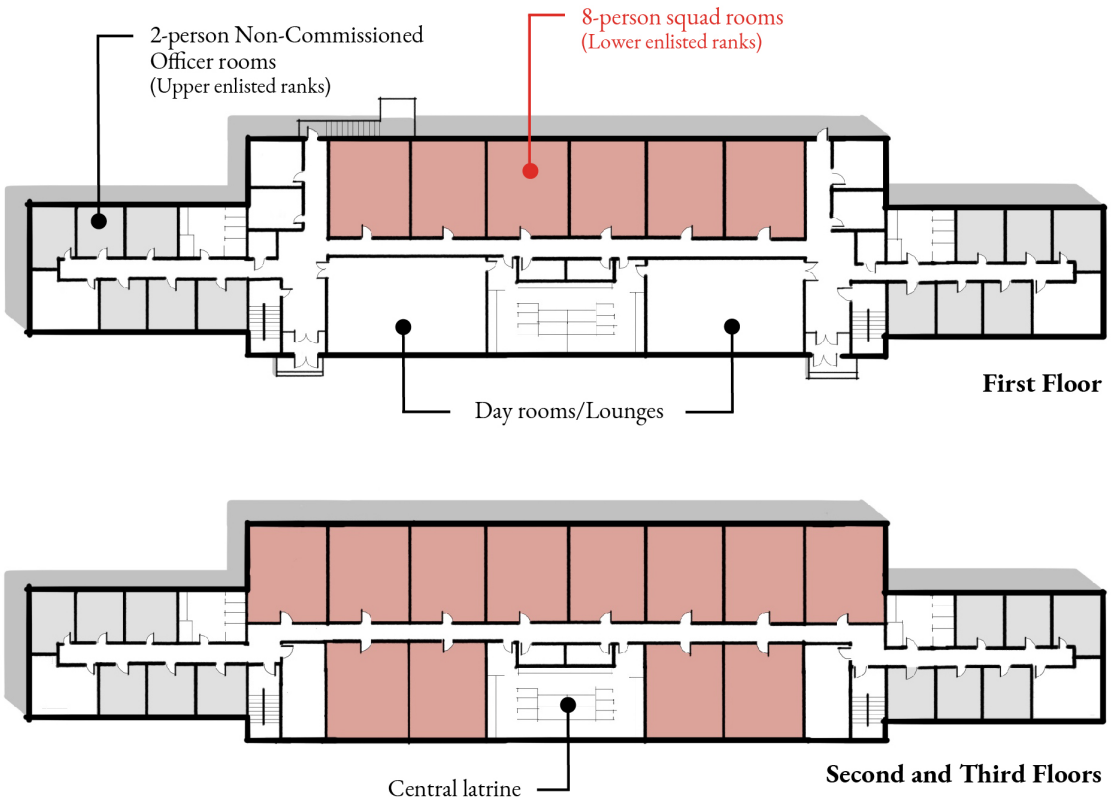


Figure 1.16. "Rolling Pin" barracks design standard, implemented from 1960 until 1971. The rolling pin design marked the Army's transition to concerted design efforts towards greater individual privacy. Graphic created by the author.

Like the Hammerheads and H-styles, the Army seemed content to continue its practice of naming its barracks using a Rorschach test. The main footprint—the rolling pin portion of the rolling pin—housed the junior enlisted soldiers, while the non-commissioned officers (NCOs) slept in the handles. The first floor had six eight-person squad rooms, a central latrine for the enlisted soldiers, laundry, and day rooms/social lounges. It also has two wings of six two-person NCO rooms along with their separate latrines. On the second and third floors, more eight-person enlisted rooms replaced the day rooms. In total, the design holds two companies, or 326 soldiers.

1960 Rolling Pin Barracks

Fort Bragg, NC

Figure 1.17. "Rolling Pin" barracks design at Fort Bragg, NC. Images courtesy of Fort Bragg.

By 1960, Rolling Pins were the dominant barracks type going up across all American Army bases. Like the H-style, planners clustered them in groups of five, only now adding a few additional buildings to the regimental campus to account for the newly-severed administrative, supply, and mess functions.

Proximity in master planning was still the goal, however. In their history of Cold War military housing, Kuranda et al. write:

> The site plan enabled men living in the farthest barracks to walk no more than one-half mile round trip to the support facilities. Vehicular parking at these facilities, with the exclusion of the chapel, was provided only for administrative personnel.

The Chairman of the House Armed Services Committee, Representative Clarence Cannon of Missouri, voiced his support of the new barracks complex plan:

> I want to compliment the approach of the Army and how well it reports this whole thing, of chapels, hospitals, post exchanges, gymnasiums. These people have to live there from 2 to 6 years. And it has an effect on re-enlistments or on reducing those leaving the services, and builds up re-enlistments.[46]

The Chairman's comments foreshadow what's to come. As the US tried to leave the Vietnam War

behind and move into their next phase as an All-Volunteer Force, the Army looked harder and harder at the connection between barracks design and soldier quality of life and re-enlistment.

Transitioning to the All-Volunteer Force

By the mid-1960s, there was an elevated concern within the Army about housing quality. Residents were not happy, and commanders listened. In 1964, the Deputy Secretary of Defense established a task force. The question: do barracks affect job performance or long-term career intentions?[47] The task force sought to find out what soldiers didn't like about their current barracks, how colleges and universities were designing student dormitories, and how much the barracks were impacting a soldier's decision to either stay in the service or trade-in their fatigues for the civilian world. The ultimate goal, explored further in chapter three, was to ensure the Army remained viable. The draft was not going to last forever, and the Army needed to recruit and retain. They saw barracks as part of that equation, and they re-designed their standards nearly every decade since.

Evolving Barracks Standards After the All-Volunteer Force (AFV)

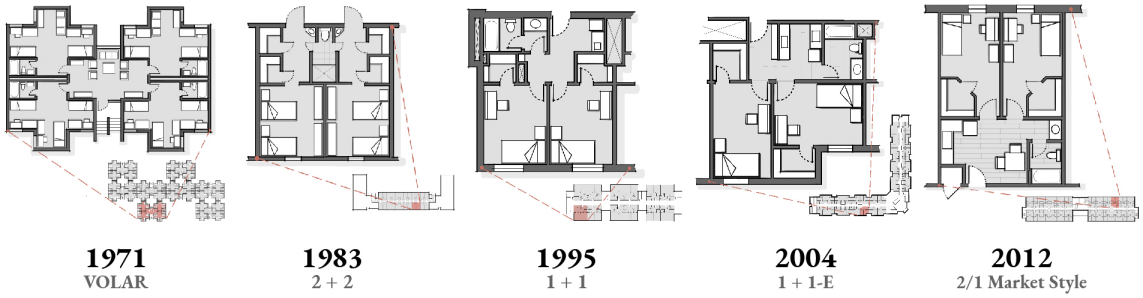


Figure 1.18. Preview of barracks standards after the All-Volunteer Force. Graphic created by the author.

After two years, 14,500 soldier surveys, and visits to every base in the United States, the 1964 task force published their findings. The connection between improving housing quality and soldier re-enlistment seemed clear. Two-thirds of the commanders believed new barracks standards would increase retention rates by ten percent.[48] And an analysis of the 14,500 surveys agreed:

> "When housing was ranked with other factors influencing retention, it appeared as one of the most important reasons for leaving the service, and one of the least important reasons for remaining."[49]

Barracks drove them out and didn't keep them in. Soldiers heavily criticized the lack of privacy. It was their number one complaint. To address it, the task force recommended increasing per-person space allotments and decreasing the number of soldiers per room. The "Rolling Pin" barracks cut sleeping rooms from thirty-two people to eight, and the new task force wanted to cut that in half again—three or four soldiers to a room, maximum.

Unfortunately, the Congressional appetite for such a change was not quite ready. It would take a

second task force in 1971, and the official end of the draft before Congress approved the new standards and their accompanying rise in the statutory limit. $1,850 became $3,200 per soldier.[50] With overhauled standards and a significant increase in the financial cap, the Army held a national design competition to solicit a new barracks standard. Two winning schemes emerged, both sharing many similarities. On Capitol Hill, General Cooper, the Director of Installations for the Army, described the changes and their background rationale:

> Our surveys have shown that the primary sources of dissatisfaction with barracks life are related to poor barracks design and the lack of comfort amenities. Specifically, the lack of privacy, in both sleeping areas and latrines; security of personal items; poor furnishings; and, inadequate storage space are areas most often criticized… The Army's new barracks design was developed to eliminate the noted shortcomings. The new design represents a revolutionary change from the traditional open bay living environment with community latrines to the 1, 2, or 3 man room with private bath concept.[51]

The two new designs—both falling under the name "VOLAR" barracks in reference to concurrent transition to the volunteer Army—are the most significant change to the typology and morphology of military barracks to date.

The VOLAR barracks were a significant departure from history. In the 1950s, with Hammerheads and H-styles, the Army saw consolidation as the answer. Designers consolidated functions by company—eating, sleeping, working, and recreation in one building. Two decades later, it was the reverse—extreme decentralization. Instead of one building for 326 soldiers, each VOLAR module slept 36, an 89% reduction. Instead of one lounge for each 70-soldier floor (or one per 128-soldier floor in the case of the H-style), lounges were broken up and apportioned with each 12-soldier module. Instead of one central latrine, each three-person room had its own bathroom. In the new all-volunteer Army, decentralization reigned supreme.

The design of the VOLAR barracks was a unique modular solution. Designers could duplicate each three-person room four times to create a 12-person suite, stack each suite three floors high to create a 36-person module, and mirror each module across a small courtyard to make a 72-person cluster. Planners then combined multiple 72-person clusters to create a barracks campus—usually twenty-one times for a 1,600-soldier brigade. The VOLAR design was a kit of parts, allowing scalable growth for Army planners.

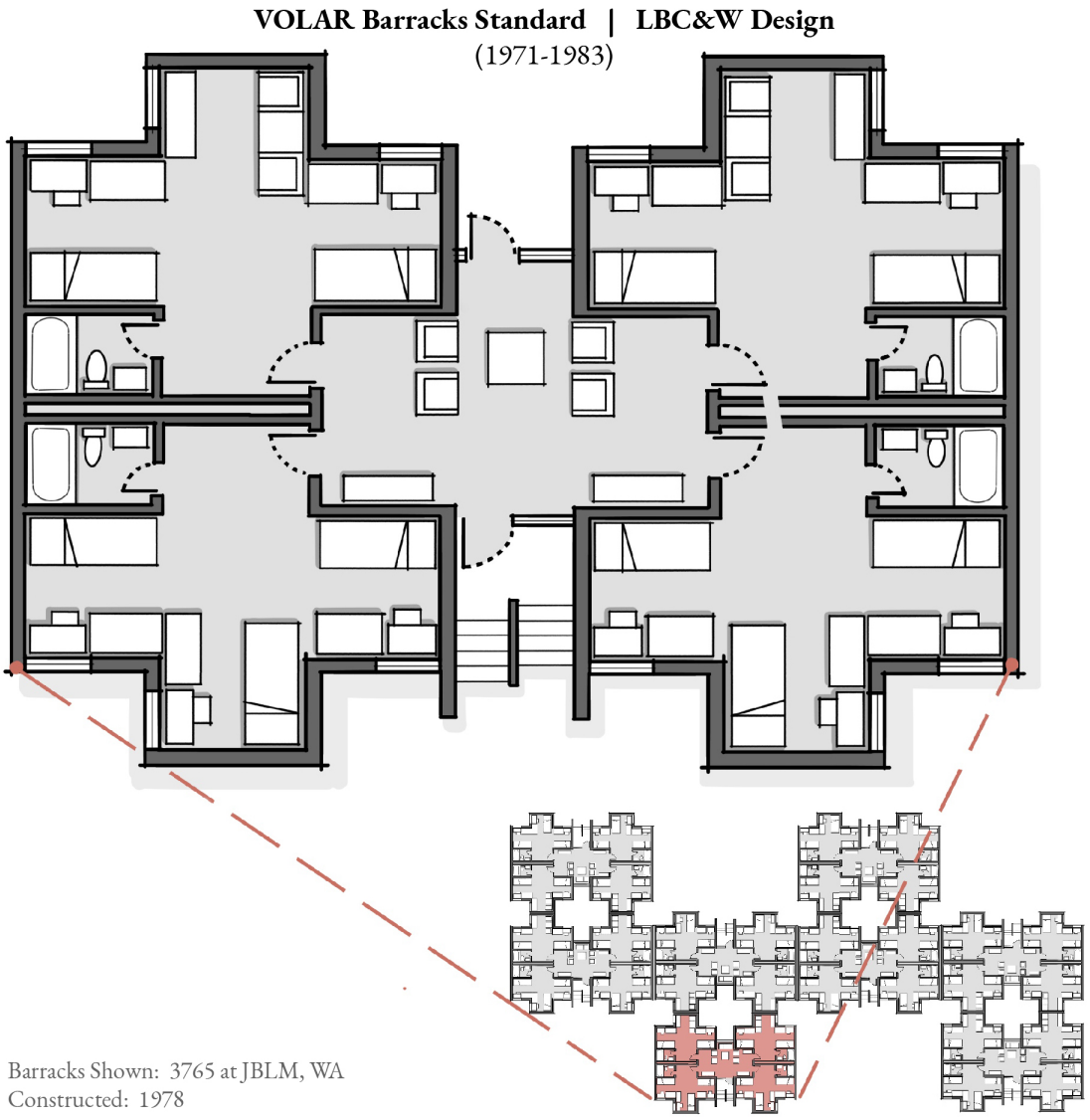


Figure 1.19. VOLAR barracks. The Army widely-implemented this standard design from 1971 through 1983. The reference barracks for this image comes from building 3765 at Joint Base Lewis-McChord in Washington, constructed in 1978. Graphic created by the author.

The floor plan was also efficient. Each of the four three-bed, one-bath rooms opened up onto a central lounge which connected the entire suite to the exterior stair. Because you entered the lounge directly from the stair, the LBC&W design had no internal circulation. There were no hallways and, thus, no unassigned space. Figure 1.18 shows an image of the VOLAR barracks from Joint Base Lewis-McChord in Washington.

VOLAR Barracks
Joint Base Lewis-McChord, WA

Figure 1.20. VOLAR barracks at Joint Base Lewis-McChord. Images taken by the author.

The VOLAR barracks didn't look like barracks—and that was the whole idea. The return to an all-volunteer military for the first time since before World War II, along with the Army's fear of declining retention, led to a complete re-imagining of the barracks.[52] The austere modernism of the 1950s became human-scaled and human-centric in the 1970s. Mr. James Allred, Chief of the Architectural Section within the Army's Office of Engineers, described the shifting design aesthetic while discussing the new barracks to the House of Representative's Armed Forces Committee in 1974:

> These architectural renderings show the general appearance of the building... Good human scale is maintained throughout. The big institutional or "anthill" aspect is gone. It is more of an apartment or townhouse complex atmosphere, a little more soft in terms of scale and responsive to let's say human environment.[53]

The VOLAR barracks enjoyed a twelve-year run. Starting in 1971, the Army constructed these distinctive barracks all across the country. But following a temporary freeze on major military construction by President Ford in 1977 and a Government Accountability Office (GAO) report criticizing the lack of uniformity across the services[54], the Army began to re-evaluate.

At the beginning of the 1980s, the Army was housing soldiers in a wide variety of barracks. Some were living in the new VOLAR designs—the air-conditioned, 270 square foot, 3-person suites with private bathrooms. While others lived on bunk beds in the thirty-year-old Korean War-era barracks—the unconditioned, 35-person squad bays with central gang-style latrines. The House Appropriations Committee criticized the disparity:

> The committee found "there needs to be a more carefully controlled central process for assuring that unaccompanied personnel are housed in modern housing that meets both health and safety standards."[55]

The committee directed the Department of Defense to submit a plan for improvement. As a

result, the Congressional Army Housing Committee conducted a study. They identified four key recommended improvements: controlling access to buildings, relocating company administrative and supply buildings closer to the barracks, moving to four-person rooms, and simplifying the design.[56] Clearly, the study was not exclusively concerned with health and safety. With the call for a simplified design, they were also trying to minimize cost.

The Department of Defense agreed with the 1981 Congressional study. In 1982, they issued a new barracks standard—officially named the "two-plus-two" or "2+2." The standard addressed all of the complaints voiced by the study. It controlled access, returned to the planning practice of closely-sited company administrative and supply functions, provisioned four-person modules, and simplified the VOLAR design. The plan created two, two-person sleeping rooms with a shared bathroom for the four soldiers—thus, two people to a room, two rooms to a module, or "two plus two." The modules opened up to a central, double-loaded corridor with a single point of entry on each end. In the name of controlling security and access, this design shift effectively killed the "apartment" or "townhouse" aesthetic Mr. Allred championed eight years earlier.

The result of the 2+2 standard was the quadrangle barracks, a flexible design that allowed planners to expand in multiple directions, or replicate building footprints across the site. They were not as adaptable as the infinitely modular VOLAR design, but much more scalable than the 1950's-era H-styles. Depending on the needs of the unit, the quadrangle barracks could form an "I," "L," or "C" shape, with or without connected administrative and supply functions.[57] A central, consolidated mess hall served the barracks complex, and the typical master plan sited multiple barracks buildings around a central quadrangle—hence, the origin of the name.

Much like the Rolling Pin barracks, the first floor housed the public spaces, to include a lobby, day room, laundry room, and storage. Above, flanking a central enclosed double-loaded corridor, are the room modules.

The 2+2 standard evolved from an Army and Congressional desire to move beyond the existing Cold War open-bay barracks. But they also evolved as a means of regaining control. In a discussion about the VOLAR design on Capitol Hill, General Cooper said, "Some of the sergeant majors now say they much prefer the open bays because they can keep their eyes on all of the troops."[58] The quadrangle barracks bridged back to an earlier era. It provided the Foucaultian panoptic control from the end of the hallway and building entrance, but maintained privacy at the level of the room.

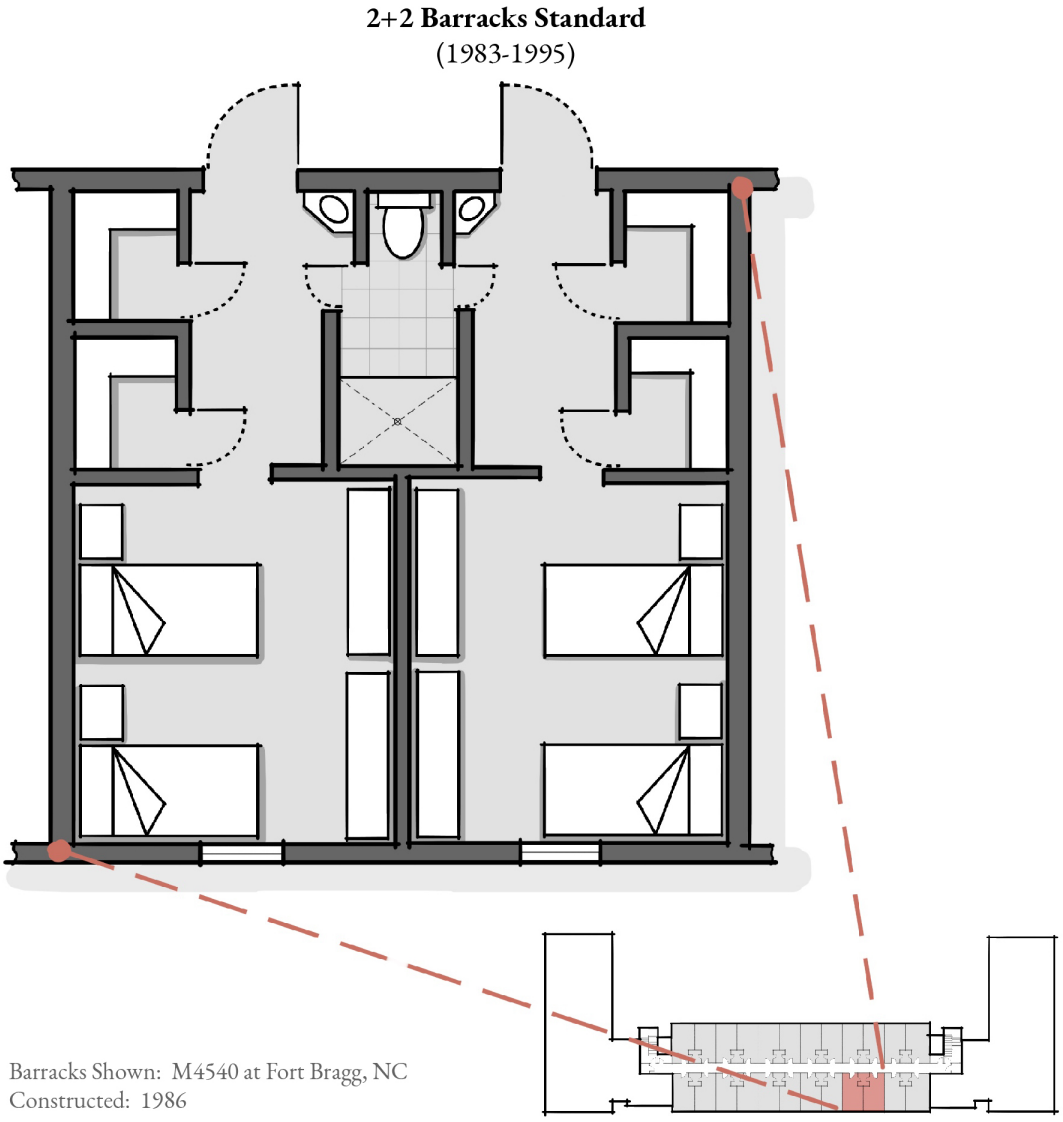


Figure 1.21. "Two-plus-two" barracks standard, issued by the Army from 1983 through 1995. The reference barracks for this image comes from building M4540 at Fort Bragg in North Carolina, constructed in 1986. Graphic created by the author.

"2+2" Quadrangle Barracks
Fort Bragg, NC

Figure 1.22. "Two-plus-two" quadrangle barracks standard at Fort Bragg, NC. Images courtesy of Fort Bragg.

By the mid-1990s, the level of individual privacy in the 2+2 standard was no longer enough. A 1992 tri-service survey found, amongst other things, that barracks residents disliked the comfort and privacy of the current standard.[59] Eighty-four percent of barracks residents would prefer to move off-base and out of the barracks. Twenty-four percent said private bedrooms would keep them in the service—second only to calls for policy revisions to loosen restrictions in the barracks.[60] Residents wanted equity. Married enlisted personnel of the same rank lived in multi-room houses and could come and go without oversight, while "single enlisted members live on base in barracks, usually sharing a room with one, two or three others; sometimes a communal bathroom serves everyone living on a hall or floor."[61]

Again scared of declining retention, the military believed that design changes would improve recruitment, retention, and morale.[62] Their strategy was to address the residents' biggest complaint: privacy. In November of 1995, the Secretary of Defense published a memorandum titled "Design and Construction of Unaccompanied Enlisted Personnel Housing," establishing a new barracks standard.[63] The new design, named "1+1," essentially halved the old 2+2 barracks model. Instead of two people sharing a room, it became one. Instead of four soldiers sharing a bathroom, it became two. In addition to giving soldiers their own private bedroom, the standard module also increased the personal space authorization from 90 square feet to 118 square feet, added large closets, and provided small, limited kitchenettes. As Delgado-Howard writes, "It also moved away from concerns related to cost savings and unit cohesion, which have always been integral to the barracks design philosophy."[64]

The estimated per soldier cost of the new "1+1" standard was nearly double that of the previous design; $63,000 as opposed to $38,000. To fully implement 1+1 barracks across all Army installations, it would cost an additional $4.4 billion compared to the older 2+2's.[65] For an Army historically concerned by cutting costs, either through consolidating companies under a single roof as in the H-styles or simplifying the design of the VOLARs, welcoming the 1+1 price tag is a significant change. Justification came back to retention. In a 1995 report to the House and Senate Appropriations Committees, the Department of Defense justified the new design, claiming that "savings in recruiting, training, and productivity will offset the quality-of-life investment."[66] We will revisit this claim in the coming chapters.

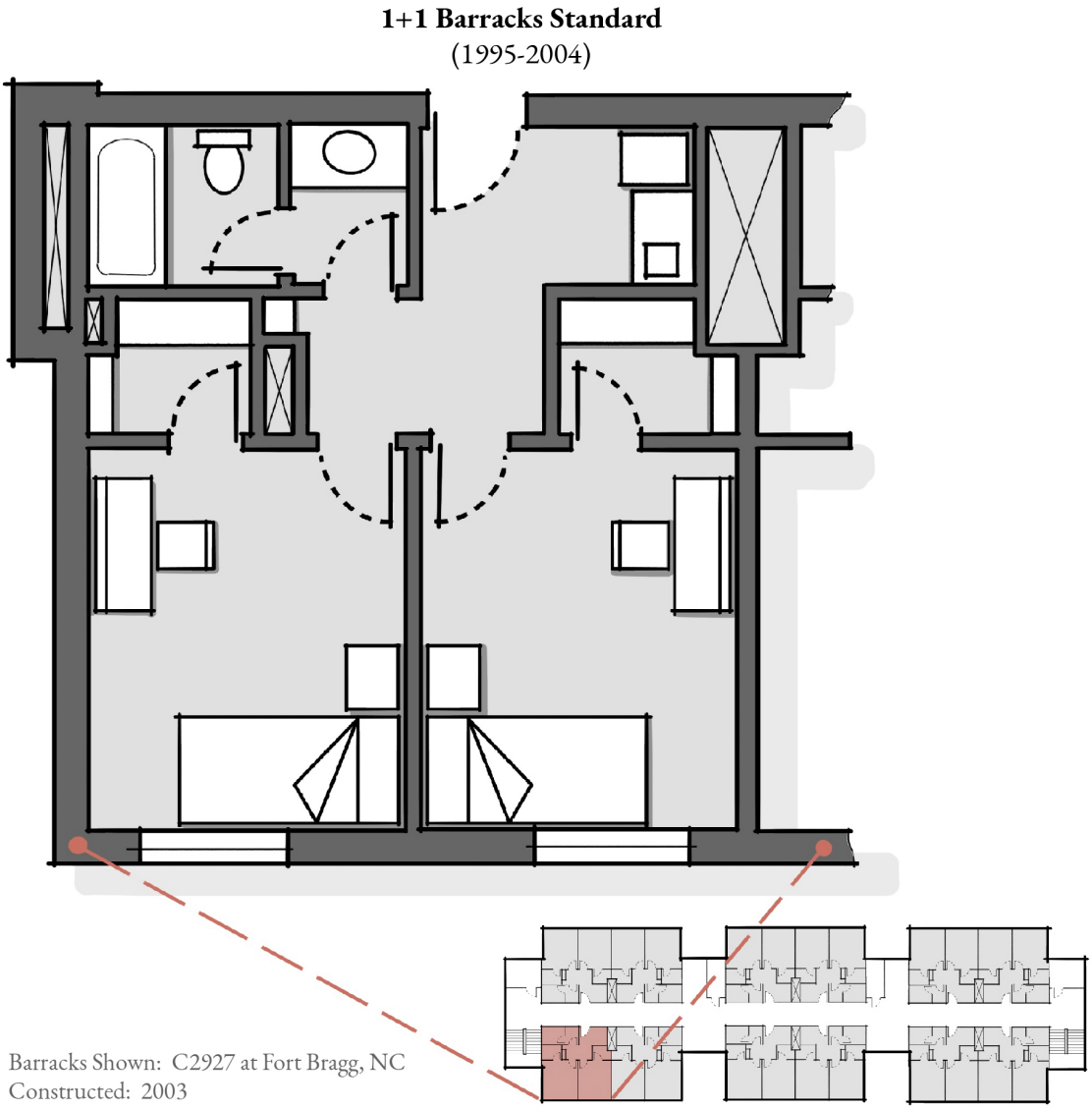


Figure 1.23. "One-plus-one" barracks standard, issued by the Army from 1995 through 2004. The reference barracks for this image comes from building C2927 at Fort Bragg in North Carolina, constructed in 2003. Graphic created by the author.

Designers site-adapted the 1+1 standard into many different forms. The version in Figure 1.23 at Fort Bragg had rooms opening onto a central open-air corridor, with each four-module block separated from one another by a small outdoor landing. An image of this barracks is shown in Figure 1.24. The other most popular variety was the balcony access type. Instead of a central corridor, soldier's access their rooms from an outdoor balcony that lined the building's exterior. In this design, each room opened directly to the outside, each resident having their own "front door." (see Figure 1.25).

"1 + 1" Barracks
Fort Bragg, NC

Figure 1.24. "One-plus-One" barracks at Fort Bragg. Images taken by the author.

"1 + 1" Barracks - Exterior Balcony Access
Joint Base Lewis-McChord, WA

Figure 1.25. "One-plus-One" barracks with exterior balconies. Images taken by the author.

The 1995 1+1 standard lasted only four years before the Army gave it another look. In 1999, the Army Corps of Engineers conducted a housing review. Barracks were too restrictive and unnecessarily expense, they said. The problem, according to the Corps, was that the Army required a level of construction that went beyond what contractors built in mass just outside of the military fence line. Bringing the two closer in-line, "using residential construction practices, similar to the practices used to build apartment buildings, could achieve considerable cost reductions without adversely impacting barracks' durability or maintainability."[67] Or so was the claim. The idea was that providing the contractor freedom—through design-build contracts or allowing residential construction techniques—would lead to the same quality, at a lower price.

The review called for more than just revising allowable construction techniques; it also added more amenities. The new changes, called "1+1 Enhanced" or "1+1E" barracks, increased the

maximum room size, deleted the module limit, and added more extensive cooking facilities into the kitchenette. Instead of a microwave and a small refrigerator, the new rooms came equipped with an oven and a two-burner stove.[68] The changes led to bigger rooms in bigger barracks. Expanded kitchens equal more space, and by deleting the module limit, Army regulations no longer capped how many rooms they could build in a barracks. The interesting part about all of this growth is that the overall gross square footage per soldier remained the same. The Army could not build a barracks larger than 366 square feet per soldier (or 388 square feet per soldier for barracks over three stories), the same as before. Prior to the 1995 standard, each new design iteration came with a Congressionally-authorized increase in allowable per soldier space. Since 1995, that number—366 square feet—has not changed. Thus, to expand in one area, designers had to shrink in others. For the 1+1E barracks, that growth came at the expense of communal space. In issuing their revised criteria, the Army wrote that "a separate soldier community building is no longer authorized. Accordingly, communal functions should be integrated into the barracks buildings, and minimized to free up more personal space."[69] Starting with the Rolling Pin barracks in 1960, each successive revision became increasingly individualized. The 1+1E model continued that trend.

The Army published the new 1+1E standard in 2003. Along with the deleted communal spaces, the new design also had to comply with antiterrorism measures. Barracks design was not only to aid command and control, but now used to guard against terrorism. Military engineers saw doors and windows as a blast hazard. To protect life and limb, the Army eliminated exterior balconies and barred windows or doors from opening to the exterior.[70] An image of the 1+1E barracks—"E" for enhanced personal space, enhanced kitchens, and enhanced security—is shown in Figure 1.26 and 1.27.

"1 + 1 Enhanced" Barracks

Fort Bragg, NC

Figure 1.26. "One-plus-One, Enhanced" barracks at Fort Bragg. Images taken by the author.

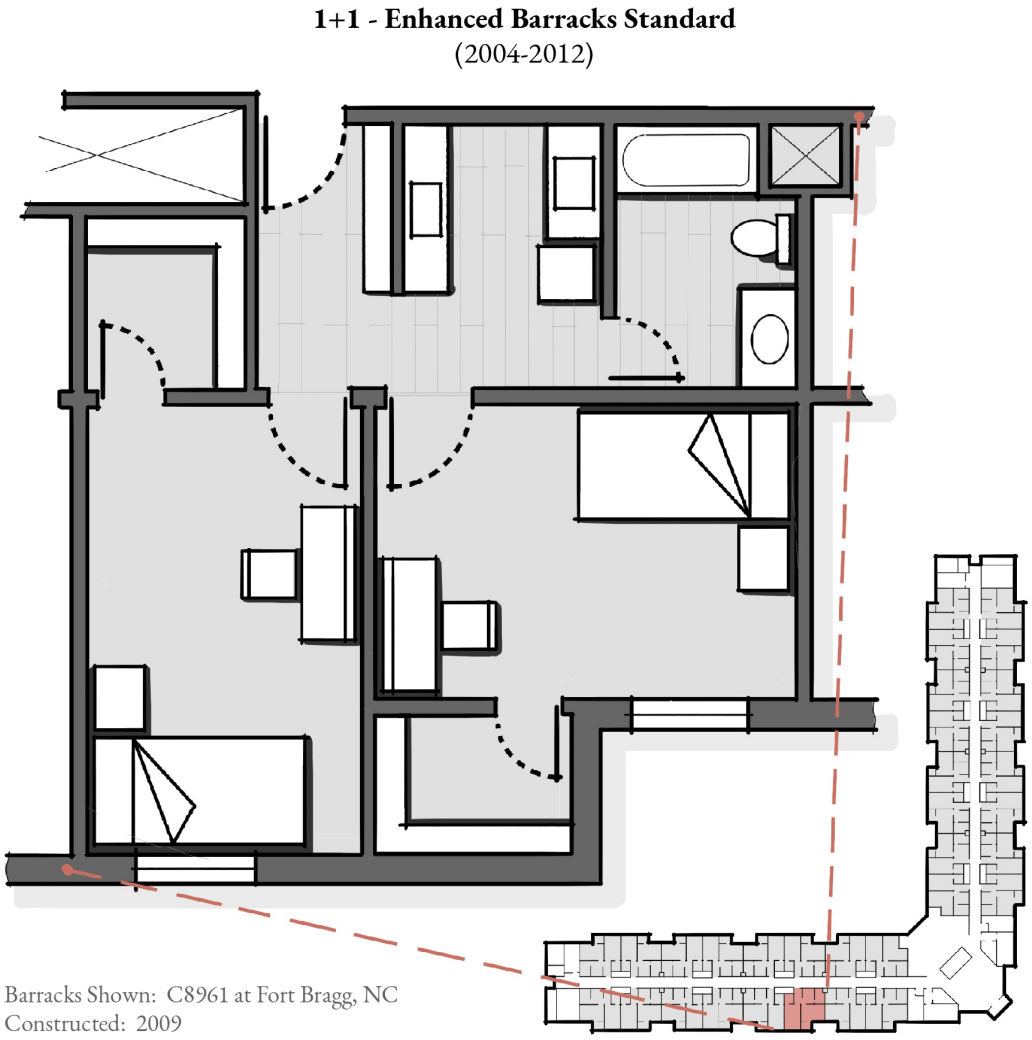


Figure 1.27. "One-plus-one, Enhanced" barracks standard, issued by the Army from 2004 through 2012. The reference barracks for this image comes from building C8961 at Fort Bragg in North Carolina, constructed in 2009. Graphic created by the author.

Moving to a Market Style

In the latest design change, the Army issued the "2/1 Market Style" barracks standard in 2012. Following the historic trends, the Market Style barracks apportioned more space to the individual and added more in-suite amenities—this time, a full-sized refrigerator.

2/1 "Market Style" Barracks Standard
(2012-Present)

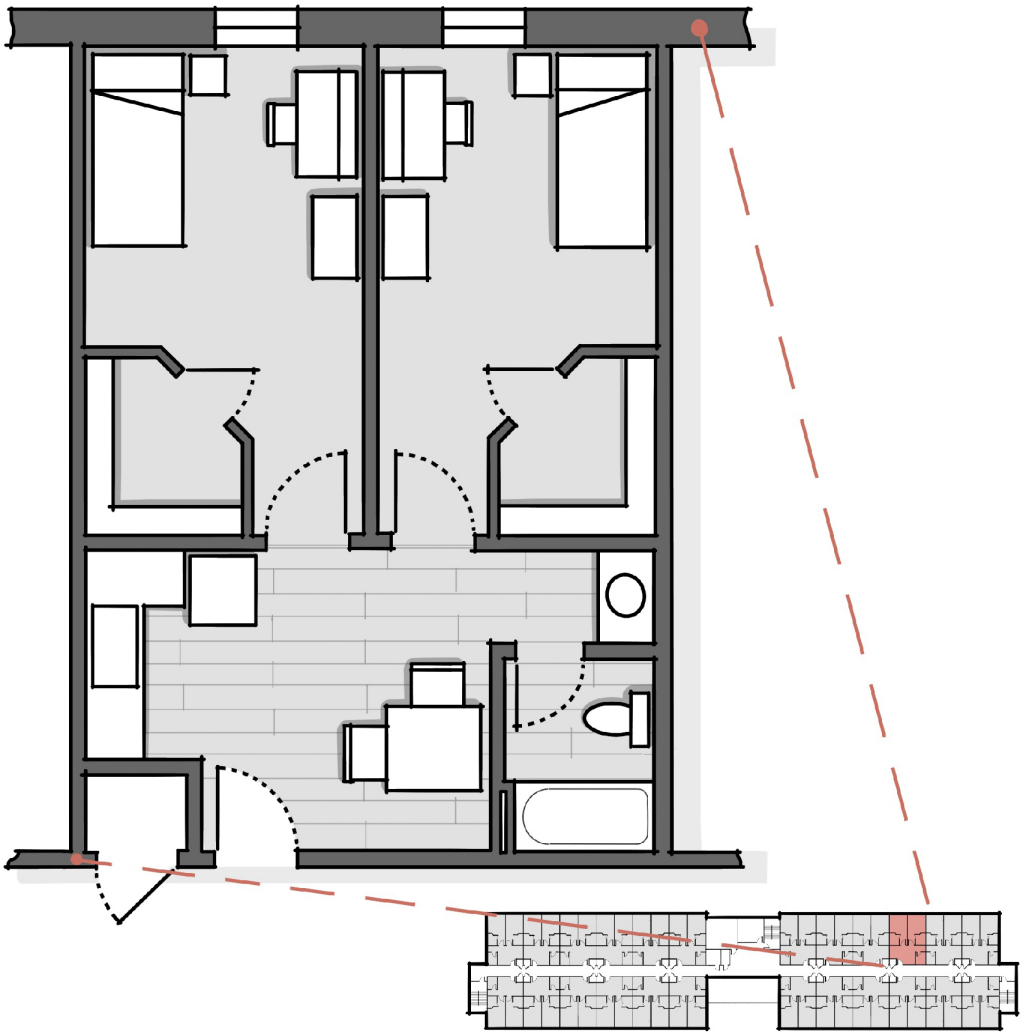


Figure 1.28. "2/1, Market Style" barracks standard, issued by the Army in 2012. This is the current barracks standard for the Army. The reference for this image comes from the barracks standard issued by the US Army Corps of Engineers. Graphic created by the author.

The design is an ever-so-slight modification to the previous standard. 1+1 room modules still branch off from a central, interior double-loaded corridor. The only apparent changes—apart from larger individual sleeping rooms and a full-sized refrigerator—is the elimination of an "L" shaped option and a square footage increase to what is labeled as the "Living Room" in the floorplan. At best, the space—or "room"—adjacent to the front door where the table sits, is a dining room, not a living room.

Labels aside, the new Army design represents the latest iteration in a long and storied history of military barracks architecture. Roman commuters riding the metro's new Line C will see the long, linear barracks where Hadrian's second-century army slept. Likewise, visitors to a modern Army post

will soon see the long, linear structures of the 2/1 Market Style standard from their moving car windows. Both are barracks, both house soldiers, and both are long and linear. But the similarities stop there.

In the next two chapters we explore the external and internal forces that shaped the barracks of the post-All-Volunteer Force. Chapter two, "Fear: Life After Khobar," tackles the external forces of prescriptive antiterrorism policy. The policy is external for two reasons: one, it originated outside of the design community, and two, it launched a series of barracks design changes external to the building envelope. Conceptually, the military has always used barracks as a means of maintaining command and control over a unit,[71] consistently sacrificing privacy or control for the sake of the other. But after a car bomb killed nineteen Air Force members in 1996, security and control became paramount, and barracks reflected these growing fears.

In chapter three, "The Quest for Quality of Life," I examine the internal forces—design changes inside of the buildings themselves and changes from within the military design community. In the struggle to house and maintain an army, the US military altered, updated, and sometimes wholly re-imagined the design of barracks. From the Civil War to the Cold War, barracks emphasized company consolidation, with public spaces below and open-bay sleeping above. After the Vietnam War and the end of the Draft, the need to retain a fighting force set the Army off on an architectural quest, searching for the elusive "quality of life." The new volunteer soldiers demanded a living situation closer to their civilian peers. In the name of recruitment and retention, the military moved their design paradigm from consolidation and cohesion to individualism and isolation. Satisfaction was the target, and increased privacy and greater amenities were the answer.

CHAPTER II:
FEAR: LIFE AFTER KHOBAR

At 9:45 p.m. on the night of June 25th, 1996, all was quiet in Dhahran, Saudi Arabia. Five minutes later, everything would change. That night, military personnel assigned to building 131, an eight-story housing unit located on the far perimeter of the Khobar Towers complex, had just begun the process of packing up after a 90-day deployment in support of Operation Southern Watch.[1] Above them, stationed on the rooftop, were two military policemen (MPs) positioned to take watch. While Saudi Arabia had long been considered one of the safest locations for US service-members in the Middle East, security was heightened, and armed MPs were on patrol after a car bomb killed five Americans seven months earlier in the nearby capitol city of Riyadh.[2]

At 9:50 p.m., Sergeant Guerrero, the military police supervisor that night, arrived at building 131 to check-in on his two sentries positioned on the roof.[3] While up talking to his men, all three noticed something unusual. A white Chevrolet Caprice entered the parking lot adjacent to building 131, pulled around to face the lot's entrance, and then flashed its headlights. A second vehicle soon followed. This time the vehicle was a large Mercedes-Benz gasoline or sewage-style tanker truck. The truck pulled into the lot, stopped, and then backed up into the parking space directly next to the jersey barriers and chainlink fence that separated the public lot from building 131. The truck was just 35 meters away from the building. As the truck parked, two men jumped out, sprinted to the white Caprice, and sped off into the night. Sergeant Guerrero and his two MPs immediately knew what was about to happen—the truck was a ticking time-bomb.

The three MPs sprung into action. As Jamieson writes,

> The three security policemen raised the alarm the same way that Roman sentries would have: yelling and pounding on doors. They found most people still awake, sitting in the day rooms of their suites, watching television or engaging in conversations. The [MPs] moved rapidly from one apartment to the next, spreading the word. Wagar [one of the rooftop MPs] recalled: "I was yelling, 'Get the hell out of the building.'"[4]

The blast, estimated at 5,000 pounds of explosives by investigators after the attack, ripped the face off building 131, shattering windows across the compound. Nineteen military and one local Saudi lay dead amongst the rubble. Over 500 more were injured. As Lieutenant Colonel Branigan

writes, "The blast was heard as far as 20 miles away, but it reverberated most loudly in the American press and the halls of the Pentagon."[5] To Lieutenant Colonel Branigan's list, I would only add the chambers of the US Capitol Building four miles across the Potomac River from the Pentagon—the heart of American politics and home to both the House and Senate.

Political Aftermath and the Birth of Policy

Even though the devastating terrorist attack in June 1996 was not the first to target Americans, the political aftermath of the Khobar Towers bombing was unlike those before it. According to current US Air Force doctrine,

> While the bombing of the Marine barracks in Lebanon in October 1983 marked the beginning of terrorist attacks by violent Islamic extremists upon the US military, it was not until their attack upon Khobar Towers in 1996 that protecting the force against a terrorist enemy rose to a more prominent role in military operations.[6]

A brief history of attacks against US personnel provides context to the increasing terrorist activity at the time:[7]

- **October 1983:** A truck drove past unarmed guards, exploding under a US Marine barracks in Beirut, killing 241.
- **February 1993:** In the underground parking garage of the World Trade Center, a truck explodes, killing six and injuring more than 1,000 others.
- **April 1995:** A truck explodes next to the Murrah Building in Oklahoma City, killing 168.
- **November 1995:** A car explodes at the Office of the Program Manager of the Saudi Arabian National Guard (OPM-SANG) in Riyadh, killing five and wounding 34.
- **June 1996:** The truck parked outside of Khobar Towers explodes, killing 19 airmen.

As scholars have written, it is the terrorist tactics—vehicles laden with explosives—which provide the common thread for all of these attacks above.[8] Not only does this common thread illuminate why the policy response to separate vehicles from buildings would soon follow, but the increasing frequency of attacks also provides insight into the political climate which enabled the Khobar Towers bombing to become a watershed moment, forever shaping the design and planning of military barracks. Terrorists were carrying out attacks against the world's greatest superpower with increasing fervor, and America could no longer tolerate casualties against the men and women it tasked with carrying out its international agenda. The public had questions, the politicians needed answers, and the Department of Defense demanded solutions.

As opposed to the Riyadh bombing, which held the headline in The New York Times for merely a day, the Khobar Towers bombing occupied the front page of multiple national news outlets and stayed there.[9] President Clinton held a press conference at the White House the very same day the news of the bombing broke, promising to launch an FBI investigation in a matter of hours.[10] Three

days later, Secretary of Defense William Perry asked recently retired General Wayne Downing to head up a task force to find out exactly what went wrong.[11] At the same time the FBI and the DoD were both conducting separate investigations, Congress had questions of their own. The political climate was tense. An article from *The Washington Post* on July 2nd, 1996, wrote:

> Eager for answers, two Senate committees—on intelligence and armed services—have announced hearings into the circumstances surrounding the Dhahran bombing. The chairman of the intelligence committee, Sen. Arlen Specter (R-Pa.), said over the weekend that the Defense Department needs a "shake-up" and that he may push for Perry's resignation depending on the testimony his panel hears… House Speaker Newt Gingrich (R-Ga.) joined Specter in suggesting Perry might have to resign and compared the truck bombing to the 1993 military mission in Somalia that ended after 18 American soldiers were killed in a firefight, the Associated Press reported... If congressional investigations show that the requests to extend the security perimeter "were as badly mismanaged as Somalia was... then I frankly think some people will have to resign," Gingrich said in Durham, NC.[12]

When General Downing finished his report, it only added fuel to the fire already burning. *The New York Times* published an incriminating editorial on September 18th, 1996, claiming:

> The inattention to security is astonishing. The Downing report shows that all the exculpatory Pentagon talk of unanticipated threats and unexpectedly powerful bombs is folderol. The problem was negligence. After the Beirut bombing and the unflinching investigation that followed it, plus last year's terrorist attack on American military offices in Riyadh, the Saudi capitol, there is no plausible excuse for inadequate security.
>
> Those responsible for the feeble security measures at the Khobar complex must be held accountable, including the senior civilian officials and generals who considered terrorism a secondary threat… It should not have taken another truck bombing to get the attention of the Pentagon.[13]

Using the media as a proxy for national public opinion, the clippings from *The Washington Post* after the attack and *The New York Times* after the Downing Report illustrate the intense public outcry for change. The transcripts from the congressional hearings tell the same story. Like the public, politicians were looking for answers and demanding action. In his opening statement before the Committee on Armed Services, Committee Chairman, Senator Strom Thurmond, proclaimed:

> I have reviewed the findings and recommendations included in the Downing report. Frankly, to say I have grave concerns with what General Downing discovered in his investigation would be an understatement.
>
> Mr. Secretary [Perry], … I would like to know what policy guidance was issued by … the military services to their troops in the region with regard to enhancing post protection to guard against another attack of this nature.[14]

A full reading of the congressional hearing testimony by Senator Thurmond's colleagues in the Senate shows they, too, shared his same frustrations and desire for change.[15] The legislative branch no longer desired to sit idle while the executive branch decided how to address the growing terrorist concern. Political lawmakers stepped in, and Senator Thurmond's last statement made it clear they

wanted results.

On August 30th, 1996, General Downing and his task force published their findings. The report outlines 26 different recommendations, each aimed at preventing a tragedy like Khobar Towers from ever repeating itself. The report's very first finding is particularly relevant to the subject of this dissertation. Here, the task force found that there were no formal force protection standards for military buildings, and as such, "commanders are left to a subjective determination of what is safe or unsafe."[16] The implicit claim made by Downing is that the subjective determinations by commanders have obviously been wrong. Downing's task force was not alone in that belief. In yet another investigation commissioned by Congress, a 1997 report by the Government Accounting Office (GAO), writes:

> A lack of prescriptive, measurable standards leaves commanders without an objective basis for determining whether their antiterrorism measures are sufficient. Moreover, DoD lacks assurance that the antiterrorism programs implemented by local commanders meet a consistent minimum standard for all overseas personnel.[17]

Inspired by fear—both the fear of another attack and the political fear of inaction—Secretary Perry and the Department of Defense fully embraced Downing's recommendations, to include issuing prescriptive building standards. In his statement to the Senate Armed Services Committee just weeks after publication of the Downing Report, Secretary Perry said:

> General Downing's report confirms my belief that we must make a fundamental change in our mindset, and we are responding to this report with an additional set of actions beyond the ones that I had already taken. First of all, I am issuing a DoD-wide force protection standard.[18]

Before the Khobar Towers bombing, force protection standards were 'advisory' and neither directive nor prescriptive, under the pretense that prescriptive rules would limit the flexibility needed to combat the unique and varying threat conditions at each military site.[19] After Khobar, however, the military decided that they could no longer risk subjective decisions based on varying local conditions. The Department of Defense issued mandatory, prescriptive force protection standards to all military branches after the bombing. Fearful that "the next target could be anywhere in the region, or anywhere in the world,"[20] the Department of Defense believed that "a world in which terrorist groups are numerous and diverse, geographic location is no longer an accurate indicator of a facility's vulnerability to the threat of terrorism."[21] Thus, it was not just Saudi Arabia, the Middle East, or overseas locations that received the new standards. Instead, these applied to every installation—and every barracks—worldwide, including those planted in the middle of the United States.

Policy Foundations

Before diving head-first into the specific prescriptive measures or their impact on barracks, it is

helpful to understand how the standards evolved. Noteworthy in this evolution story is the organization charged with drafting the initial iteration of the rules—the US Army Corps of Engineers Protective Design Center, stood-up in 1986. One of the center's first, and longest-tenured, employees is Mr. Phil Delainey, a structural engineer. He still works there. Sitting down with Mr. Delainey in his small Omaha, Nebraska, office, he reflected on the center's beginnings, describing the early days like a WWII veteran telling war-stories. He had shelves stacked six feet tall behind his desk, filled with technical manuals and textbooks. Reaching to the top shelf, he pulled down an old, nondescript blue three-ring binder and opened it. "This is where it all began," he told me as he quickly leafed through the pages. "This was the first document we ever wrote." He handed it to me. The pages had the distinct feeling that only comes with age. They were dog-eared and floppy, not crisp and rigid like those coming fresh off the printer. It was Military Handbook 1013/1, *Design Guidelines for Physical Security of Fixed Land-Based Facilities*, dated 1987.

The Army established the center in January of 1986 in response to the Beirut attack, where a suicide car-bomber tragically killed 241 Marines inside of their barracks.[22] After the attack, the Army decided that they needed an office to specialize in the engineering aspects of antiterrorism and security.[23] The Omaha District of the US Army Corps of Engineers became the new center's home. And given the educational background of the new center's employees—primarily structural engineers, according to Mr. Delainey—the initial guidance documents were understandably engineering-focused. No planners or architects were involved in the writing at all.[24] Not the initial "guidance," nor the eventual prescriptive "standards." The center viewed force protection as a quantitative science from the very beginning. If buildings were going to withstand terrorism, load calculations and blast analysis were the answer. And Military Handbook 1013/1—the blue three-ring binder that Mr. Delainey handed me—had 108 pages of answers; tables, charts, and checklists.[25]

Eleven years after the Beirut attack and eight years after the 1987 handbook, the center jointly released its "first comprehensive approach to dealing with antiterrorism"[26] with the Air Force, a four-volume manual titled, *Security Engineering* in 1994. At the same time, the Navy was publishing its own separate guidance. The different services had different offices issuing different guidance, all on the same topic with the same goal. After years of these separate but parallel efforts, the Department of Defense decided to merge and unify the two in 1997. As Mr. Delainey tells it,

> We decided enough is enough, rather than the Navy working on their documents and us working on one for the Air Force and the Army, let's just merge efforts. So we met at Jekyll Island, Georgia, in the very conference room where they formulated the Federal Reserve system. It was a very historic conference room, and that just happened to be where we met. We didn't know that when we went, but Jekyll Island was famous for that event—and for us, it was our Jekyll Island.[27]

Representatives from the Army, the Air Force, and the Navy were all there. What these service representatives didn't know was that this collective effort to unify policy would soon become something different. Coincidentally, the meeting at Jekyll Island occurred right after the Khobar Towers tragedy, and the DoD was at the center of multiple commissioned reports all proposing recommendations. Debates on Capitol Hill became increasingly impatient for corrective action. During one Congressional meeting, a Marine 2-star general was pointedly asked by the Committee Chairman, "*what are you doing to protect my facilities against a terrorist attack?"* Under pressure and remembering the Jekyll Island meeting, the general responded, "*I have a Lieutenant Colonel who is at Jekyll Island, Georgia even as we speak, Sir, and they're going to have standards out in 60 days.*"[28] Only the team in Georgia—thinking their job was to merge guidance—didn't know. As Mr. Delainey remembers it,

> We were sitting there trying to figure out how to merge all of our criteria when we got derailed. We set that aside because we were told we're going to have standards written in 60 days… And that's what you get in 60 days. We had to rely heavily on documentation we already had.[29]

As he spoke that last sentence, Mr. Delainey picked up a document from his desk for me to see. Adjusting the binder clip at the top, he said, "*Our 60-day standards.*" I looked closer at the document's title. It read *DoD Anti-terrorism/Force Protection Construction Standards.* Built from existing engineering documents that centered on target hardening and access control, the military's prescriptive standards were born.

The Changing Barracks

The military first published the interim standards in 1999. Yes, 1999. But if the writers of policy met in 1997, and they had 60 days, how come the standards came out in 1999? Well, the reason might be best explained by a popular saying for those in uniform: hurry up and wait. In this case, Mr. Delainey and his team hurried to draft policy, and then waited as it made it through the various levels of the Department of Defense.

Once the DoD published the standards, they were no longer advisory—all new barracks must now comply. Three years later, in 2002, the DoD removed the interim tag and re-published the "60-day" criteria as the *DoD Minimum Antiterrorism Standards for Buildings.* Incidentally, the new standards became mandatory for all barracks starting in 2004, the same year that the Army issued the revised "1+1 Enhanced" design. While the 1+1-E design added expanded kitchens and increased the square footage of room modules, the antiterrorism standards are responsible for a host of additional new changes to the barracks. Most notably, they changed the surrounding urban form, project siting, exterior fenestration, and integrated outdoor social space.

According to the policy's writers, the philosophy behind antiterrorism design is to build "a baseline level of resistance to terrorist attack through engineering solutions."[30] They claim the best

way to accomplish this is to "maximize standoff distance, to construct superstructures to avoid progressive collapse, and to reduce flying debris hazards."[31] While progressive collapse requirements had an impact on cost and structural design, it had little effect on the day-to-day resident experience. The other two strategies—standoff and reducing flying debris—did. Thus, I present to you my three arguments of this chapter:

1. Standoff policy led designers to create a morphology of bigger blocks and dispersed buildings. These bigger blocks decrease walkability, and walkability is a catalyst to generating social connections.
2. Unobstructed space provisions led designers to strip out most differentiated outdoor social spaces from barracks complexes. Removing these spaces separated barracks from their sites, and decreased opportunities for casual social interaction.
3. The fear of flying hazardous debris forced designers away from the exterior, balcony-access barracks model and into the double-loaded corridor design. The double-loaded corridor increases the physical and psychological distance from private to public space, makes that transition more cumbersome, and discourages routine interaction.

Standoff

Given that it was cars and trucks packed with explosives which were the predominant terrorist threat of the time, the simplest solution was to separate vehicles from buildings. The engineers deduced that they could minimize the damage if bombs only exploded further away. This push had a name: standoff distance. The standards tell designers to "maximize standoff distance," and that, "the primary design strategy is to keep terrorists as far away from inhabited DoD buildings as possible."[32]

Standoff distance is precisely what you might expect—the mandatory separation between cars and buildings. Figure 2.1 comes from the *Planner's Handbook*, published by the Air Force in 2006 to guide military planners in developing their installations. Using the barracks area of Hurlburt Field in Florida as an illustrative example, the graphic shows how to determine which barracks violate the new standoff policy. It is quite simple. To meet the standoff requirements, designers must set all buildings back from any roadways or parking lots a specified distance. In 2002, twenty-five meters, or eighty-two feet, was the universally applied minimum standoff distance. It works the same way in the Army. To determine the required standoff, planners draw an eighty-two-foot cordon around all roads and parking lots. No occupied part of an occupied building can intersect this buffer. If the building in question is behind the cordon—thus, further than eighty-two feet from the closest road or parking lot—it is compliant. It is safe. If it crosses, it's not.

The policy was later revised to dictate distance based on the building's structural design, but eighty-two feet remained roughly the value for all modern military barracks.

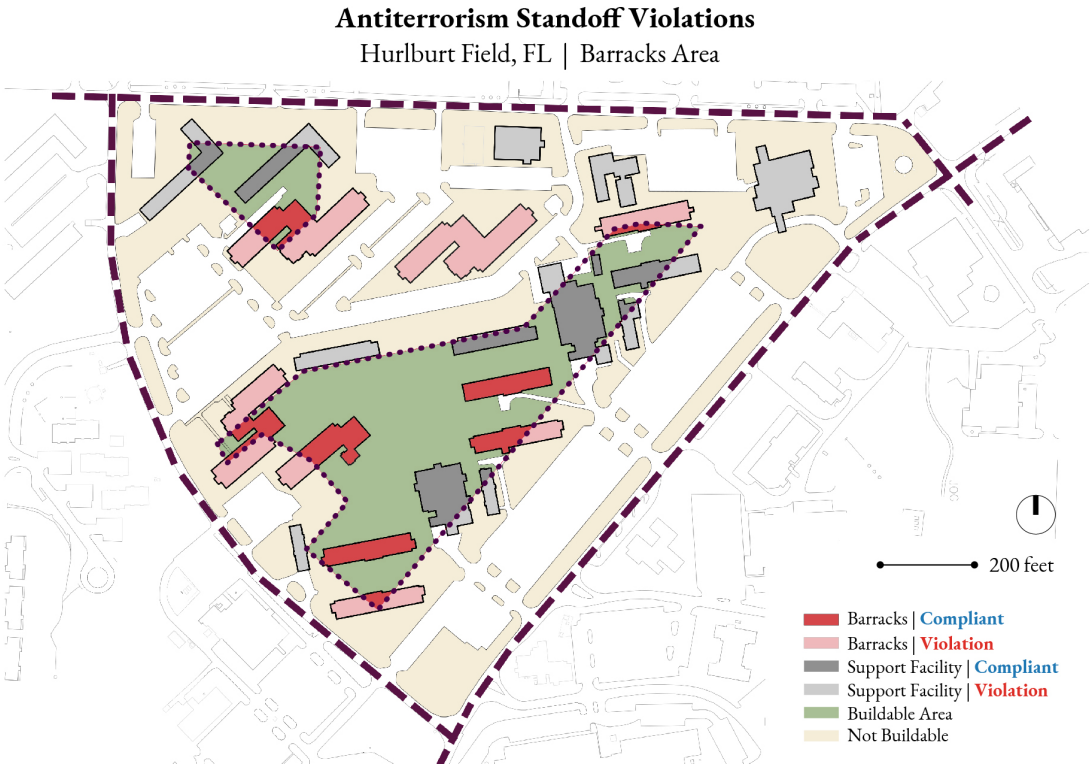


Figure 2.1. Determining antiterrorism standoff violations at Hurlburt Field, FL barracks area. Source: US Air Force, *Planners Handbook,* 2006. Graphic created by the author.

When you apply an eighty-two-foot standoff buffer to all roads and parking lots in Figure 2.1, only the darker-shaded green areas are in compliance and can contain buildings. All of the tan areas —which comprise most of the site—are no longer developable. The land-use effects are drastic.

To work around the handcuffing land-use impacts of standoff, planners advocated for an entirely new morphology—a morphology of fewer streets, larger blocks, and greater building setbacks.

Sprawling for Safety

Michael Southworth, a professor at the University of California-Berkeley and author of multiple books on post-industrial planning, wrote that "the quest for efficiency killed the walkable city."[33] The argument is popular amongst contemporary planning theorists. It goes something like this: the invention of the personal automobile, coupled with the rise of Modernism, dispersed one's daily activities and led to the creation of dedicated high-speed roadways to connect these new single-use functions. The claim is that Modernism and personal transportation fractured the small-scale, mixed-use pedestrian network of pre-industrial cities.[34]

For the post-Khobar military installation dealing with the new era of antiterrorism standoff, Southworth's words—and claim—needs only a slight tweak. Instead of blaming modernism or cars, I posit that it was the quest for safety that killed the walkable base.

Why does walkability matter in a dissertation about social connection in military barracks? Well, let me preview the first of my three arguments in this chapter: standoff policy led military designers to create bigger blocks and dispersed buildings. Bigger block sizes decrease walkability, and unwalkable neighborhoods (or barracks complexes) are less socially connected, and less socially cohesive.

Antiterrorism and Block Size

The stated philosophy of the Department of Defense antiterrorism policy is to minimize mass casualties. The standards claim that "the easiest and most cost-effective way to achieve this is to incorporate sufficient standoff distance to buildings."[35] The philosophy is clear. To save lives (and money), bases must spread out.[36] This sprawl for safety destroyed the fine-grained transportation network on military bases. Designers set buildings further back, and blocks got bigger.

Growing block sizes didn't happen by accident. Antiterrorism policy explicitly tells designers to create them. In the *DoD Security Engineering Facilities Planning Manual* (the companion to the *DoD Minimum Antiterrorism Standards for Buildings*), the criteria mandate that planners keep vehicles away from buildings "through measures such as road routings, road closures, and road restrictions."[37] It goes on to be more prescriptive. The manual tells planners to:

- Route roads away from buildings to which vehicle bomb threats may apply, and
- Limit road access near buildings to which vehicle bomb threats may apply through road removal, road closures, and road restrictions. Figure 5-5 illustrates road closures to establish standoff distance to a building.[38]

Once again, the directive to designers is clear. They are to re-route, remove, and close all roads within a building's required standoff zone. The goal is fewer roads, and thus, fewer standoff buffers to control.

To reinforce the written criteria, the manual provides a graphic illustration of its prescriptions. I've traced the aforementioned Figure 5-5 below (See Figure 2.2). The illustration shows how eliminating roads shatters the gridded, small-block connectivity of the base. In both writing and illustration, policy tells designers to close or eliminate roads in the name of security—and they listened.

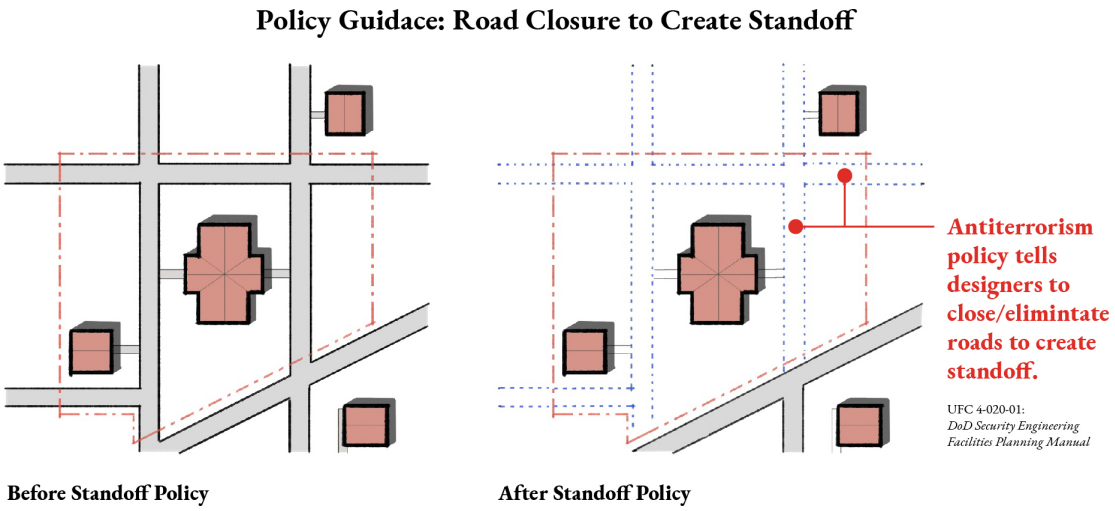


Figure 2.2. Road closure to create standoff. From UFC 4-020-01, DoD Security Engineering Facilities Planning Manual, Figure 5-5, "Road Closure to Create Standoff." Re-drawn by author.

Two examples demonstrate how designers applied this road-minimizing policy to real installations. The first comes from Joint Base Lewis-McChord (JBLM) just outside of Tacoma, WA. It is a site I will continue to visit often throughout this dissertation. In this case, it shows how designers modified an existing base, removing roads to create bigger blocks. The second example comes from across the globe, at US Army Garrison (USAG) Humphreys in South Korea. Compared to JBLM, USAG Humphreys is a story about building new barracks—and new roads—on a clean site. Like JBLM, it demonstrates that military planners are devout followers of policy—generating a new military base morphology of massive blocks and few roads.

Joint Base Lewis-McChord: Modifying the Historic

Joint Base Lewis-McChord (formerly the separate sites of Fort Lewis and McChord Air Force Base) first opened in 1917 as Camp Lewis, an Army training site for WWI.[39] Like most of the camps built in that era, the layout of North Fort (a section of the base located across Interstate 5 from the main cantonment) was a model of Army planning standards—a tightly-regulated grid surrounding a central parade grounds.

Functionally, North Fort contains a diverse mix of uses to include housing, administrative, recreational, and warehouse facilities. More importantly, it has also experienced a dramatic transformation in the past twenty-five years. Starting in 1996, the Army began a multi-decade demolition effort to replace the original wood buildings with new permanent ones—many serving the same use. Also in 1996, 7,300 miles away, a truck bomb exploded in front of the Khobar Towers complex, leading to debate, reports, and, eventually, new policy.

Three years into the North Fort redevelopment efforts, the Department of Defense issued its

1999 interim standards. Redevelopment persisted, integrating the new antiterrorism guidance and completely transformed North Fort with pre and post-antiterrorism design and planning.

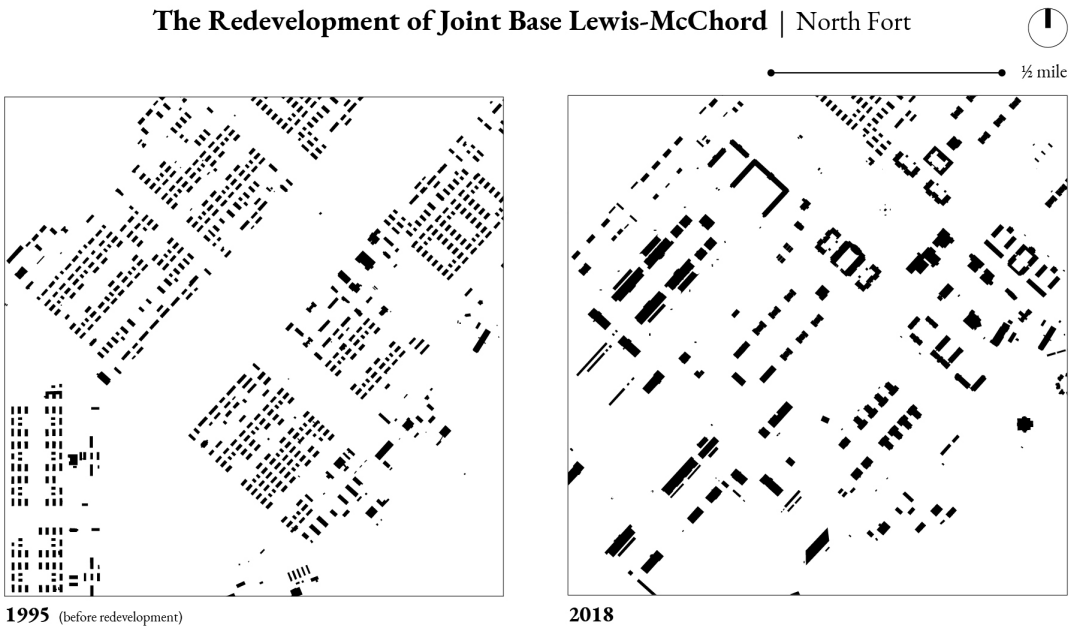


Figure 2.3. The redevelopment of North Fort (1995-1998), Joint Base Lewis-McChord, WA. GIS data courtesy of the JBLM Department of Public Works. Graphic created by the author.

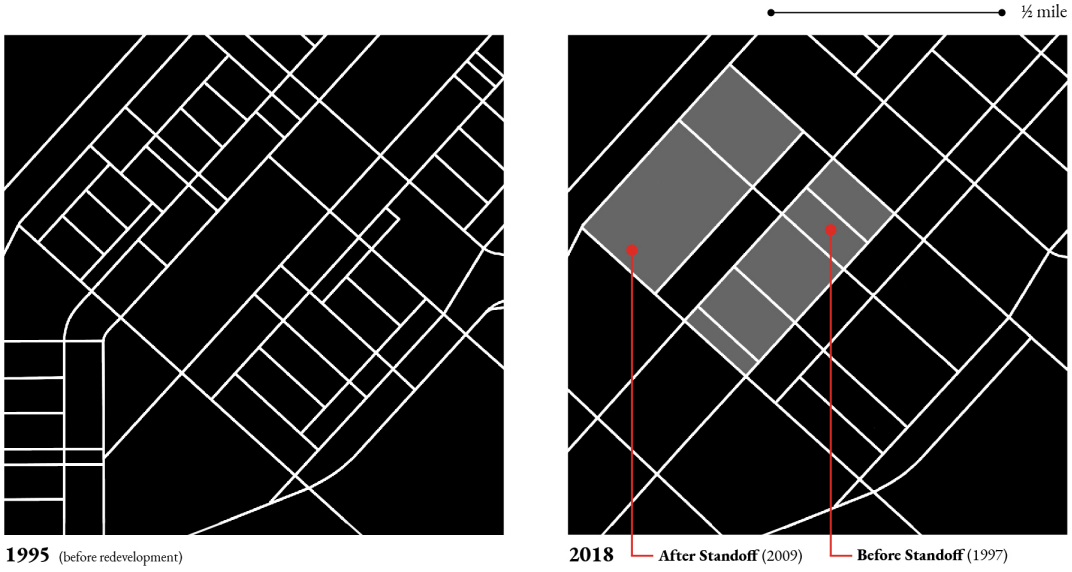


Figure 2.4. Standoff and the redevelopment of North Fort (2008-2018), Joint Base Lewis-McChord, WA. GIS data courtesy of the JBLM Department of Public Works. Graphic created by the author.

The side-by-side figure-ground images of Figure 2.3 provide a shocking visual contrast. Other than the northeastern axial alignment, you would be hard-pressed to guess that both images are from the same place. The 1995 image shows the nearly untouched original WWII-era plan. Designers

used small buildings sited close together to define space. The blank-white central parade ground jumps off the page as if it were colored and labeled. The same site, twenty-three years later, looks completely different. Nearly every single building that existed in 1995 is gone. Newer, larger, and more dispersed buildings now sit in their place. As the older, smaller buildings came down, newer, larger ones went up.

The side-by-side street networks (Figure 2.4) are less dramatic, but equally revealing. In 1995, North Fort contained small buildings and small blocks. In 2018, post-standoff planners designed larger buildings on larger blocks. Especially revealing are the two highlighted areas in the 2018 street network diagram. The two highlights show pre and post-standoff development. Each of the similarly-sized areas contains a single brigade and their accompanying buildings—primarily barracks and administrative facilities. In 1997, two-years before Mr. Delainey and his team published the interim standards, designers housed the brigade across five different blocks. In 2009, designers reduced that number to just two. To comply with antiterrorism and its road-minimizing policy mandates, post-standoff planners designed new blocks that are nearly three times (293 percent) larger on average than those constructed in 1997.

At Joint Base Lewis-McChord, planners had the opportunity and resources to redevelop two square miles on North Fort. Standoff policy forced the designer's hand; the solution was widely-spaced buildings, bigger blocks, and fewer roads.

As we turn now to South Korea, we will see that even with a blank slate, designers sprawl for safety. Courtesy of standoff, Le Corbusier's "towers in the park" appear on the military base.

US Army Garrison Humphreys: Starting From Scratch

US Army Garrison Humphreys might be the singular best example of antiterrorism planning. No other installation has designed more buildings or developed more land under the standards than Humphreys. Before WWII, when Korea was under Japanese colonial rule, Humphreys was home to the Japanese military. After WWII, the United States claimed control of the base, first naming it "K-6" (Korean airfield No. 6) before later renaming it Camp Humphreys.[40] The small, bare-bones outpost of Camp Humphreys would radically transform after 2004. That year—the same year that all DoD construction projects needed to fully comply with the minimum antiterrorism standards—the governments of South Korea and the United States signed the Yongsan Relocation Plan (YRP) and the Land Partnership Plan (LPP). These two plans would move US service-members from Seoul 45 miles south to USAG Humphreys (as part of the YRP) as well as any US forces stationed north of the Han River (as part of the LPP). To support the consolidation, USAG Humphreys expanded. The footprint of the old outpost grew three-fold, and the US military built over 650 buildings across a new land area that is equivalent in size to central Washington, DC.[41] The $10.7 billion relocation program—one of the largest in Department of Defense history—is expected to house nearly 45,000

troops, contractors, and family members by 2022.[42] It is also the largest military installation designed, planned, and built under the era of antiterrorism guidance.

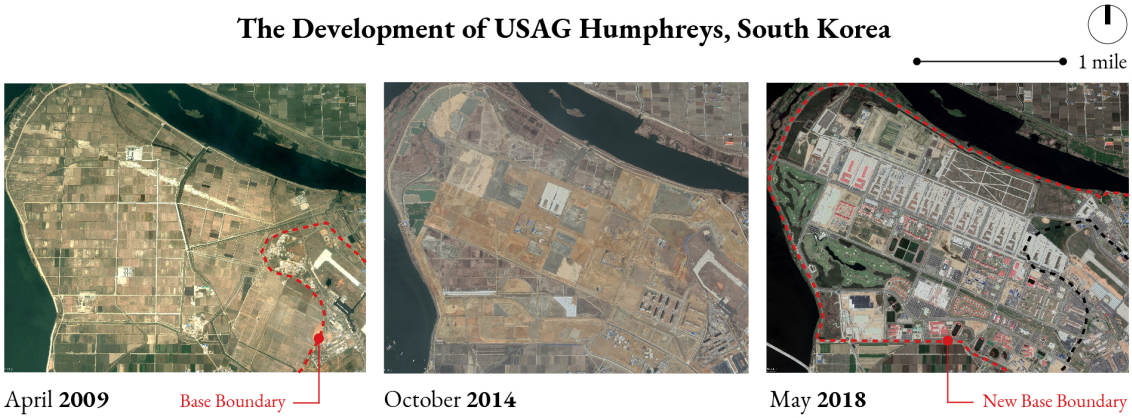


Figure 2.5. The development of USAG Humphreys. Images from Google Earth. Graphic created by the author.

More important than the fact that USAG Humphreys has over 650 new, antiterrorism-compliant buildings is the fact that existing development did not constrain initial planning. The 2,318 acres of new development sits atop what was once rice paddies (Figure 2.5). The base had to truck in 622 million cubic feet of dirt to make it even buildable.[43] Unlike JBLM's North Fort, there were no existing buildings or infrastructure. The USAG Humphreys expansion was truly the tabula rasa—the story of building a base from scratch.

Planners matched the massive expansion project with equally massive block sizes. The new barracks blocks at USAG Humphreys are three-and-a-half times larger (by area) than the post-standoff blocks at JBLM's North Fort. They are also seven times larger than the historic North Fort morphology, and nearly sixty-four times larger than the downtown blocks in Portland, Oregon. Described differently, just one block on the newly-expanded USAG Humphreys can hold almost sixty-four of Portland's small and walkable city blocks. For a military that promotes "walkable development patterns" in policy,[44] one-quarter mile blocks promote exactly the opposite.

While standoff undoubtedly controls access, it also created bases with few roads and bigger blocks, generating a morphology of dispersal. The comparative analysis in Figure 2.6 (stylistically borrowed from the book, *Streets and the Shaping of Towns and Cities*[45]) quantifies this change. In the exact same size area—one-half square mile—post-standoff designers cut the number of roads in half (54 percent fewer), reduced the number of blocks by two-thirds (67 percent fewer), and eliminated five out of six street corners (76 percent fewer). If the renovations at JBLM and the expansion of USAG Humphreys teach us anything on the influence of standoff on base morphology, it's that antiterrorism planners followed security policy to a tee. In doing so, they sprawled for safety, creating a morphology of fewer roads and bigger blocks.

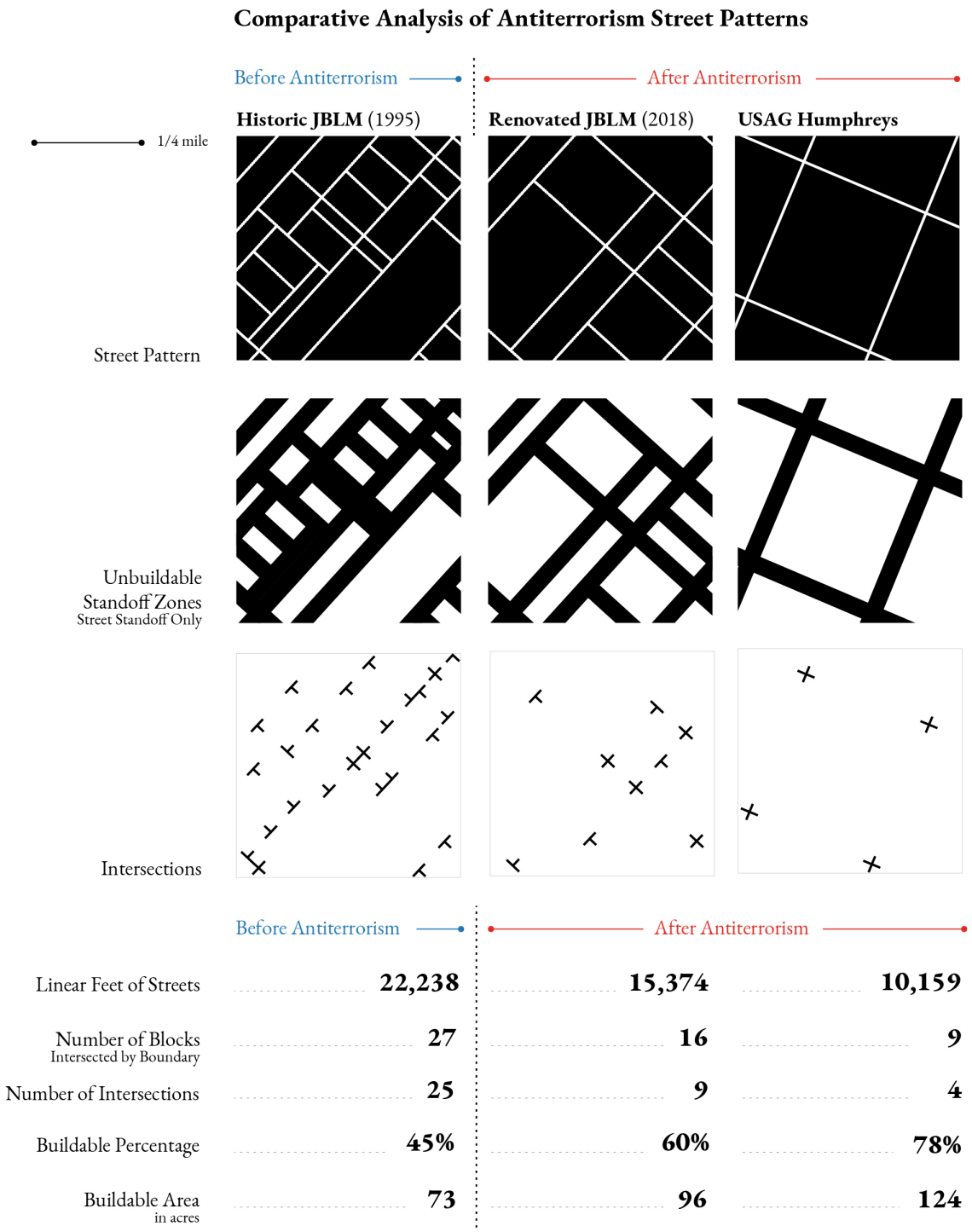


Figure 2.6. Comparative analysis of street patterns (after standoff). Graphic created by the author.

Figure 2.6 also illustrates why policy writers prescribed such a road-minimizing, block-maximizing strategy. With fewer roads, there are fewer standoff buffers. And fewer standoff buffers opens up more land area for development. It is simple geometry. Since eighty-two feet was static at

the time and didn't contract or expand with the size of the site, the larger a block becomes, the less standoff affects its development potential. Look at the difference between USAG Humphreys and historic JBLM in Figure 2.6. In each one of the figure-ground images—street patterns, standoff zones, or intersections—the difference between the two is drastic. Because of this growth in block size, the new morphology at USAG Humphreys frees up 51 acres (or 33 percent of the total site area) that were otherwise unbuildable in the small-block plan.

If the base were a machine, with engineers behind the scenes adjusting inputs like a game of SIM City to create a space-optimized solution, the antiterrorism morphology would clearly win. It is demonstrably more efficient. But the base is not a machine, especially the barracks. And the most efficient solution isn't always the most effective. Bigger block sizes unquestionably maximize land-use efficiency under self-imposed standoff rules, but they also come with externalities. Walkability is one of those unintended victims.

Walkability: The Need for Small Blocks

The first part of my argument is that standoff policy led military designers to create bigger blocks. But what's so bad about larger blocks? Well, they decrease walkability, and unwalkable neighborhoods (or barracks complexes) are less socially connected, and less socially cohesive.[iii] Before we get to the social impact on barracks residents, however, let's connect block size to walkability.

Many urbanists have advocated for smaller blocks. Jane Jacobs, Leon Krier, Michael Southworth, Peter Calthorpe, Andres Duany, and most New Urbanists are among them. In large part, their advocacy has to do with the claim that small blocks are more walkable.

A 2016 article in the journal *Urban Morphology*, describes two intuitive, but important points about walkability:

> Across studies, two critical environmental factors for walkability stand out. First, the number of walking trips observed in an area depends on the number of pedestrian destinations available (Boarnet et al., 2011; Cervero, 1996; Cervero and Duncan, 2003; Guo, 2009). The more destination attractions there are, controlling for covariates, the more reason people have to walk. Secondly, the probability of walking trips decreases with distance. People are more likely to undertake a short walk than a long walk, all else being equal (Handy and Niemeier, 1997).[46]

In essence, the more destinations, and the closer they are, the more likely someone is to walk. Block size plays an important role in both of these points.

[iii] See van den Berg et al., 2017; Rogers et al., 2013; Kaczynski and Glover, 2012; and Leyden, 2003 amongst others.

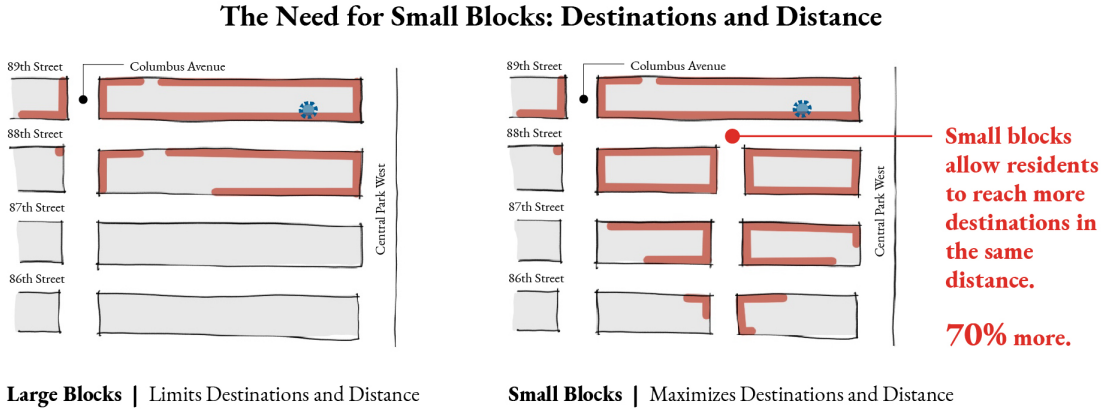


Figure 2.7. The need for small blocks, destinations and distance. Small blocks maximize potential destinations on foot. This graphic shows the accessible street frontage (in red) of the two morphologies for a pedestrian starting in the same location (blue circle) and walking the same physical distance. Destinations assume the pedestrian follows the street and crosses at designated intersections. Graphic created by the author.

If a greater quantity or closer destinations increase walkability, then small blocks help do both (Figure 2.7). They increase quantity and decrease distance—but do so differently than you might suspect. Take a look at Figure 2.7. It is an image of two hypothetical street networks from Jane Jacob's work on city planning.[47] The image on the left has longer, larger blocks. The street network on the right is the same, only with an additional dissecting cross-street cut in, halving the block size.

Now, suppose you live on 88th Street near Central Park West, where I've located the blue circle. Assuming that you don't jaywalk and you follow the on-street sidewalks, the red building facades indicate where you can walk to in a given amount of time—let's say five minutes. The difference between the two images is remarkable. In the exact same amount of time, you can access 70 percent more destinations with smaller blocks. The reason: quantity increases because access increases.

The key to the difference between the two is the distinction between "as the crow flies" distance, and walkable distance.[48] Think of walkable distance as the path you would actually travel if you were mapping your steps. As block sizes decrease and get smaller, the walkable distance (your mapped steps) becomes closer and closer to the "as the crow flies" distance. This creates two important effects. First, it expands the network of accessible destinations available in a five-minute walk (as we see in Figure 2.7). And second, it shortens travel times. Unless the intended destination is on the street where you happen to be standing, small blocks allow for more direct routes. And more direct routes are faster (and thus, appear closer).

This theory is not only hypothetical. Empirical research repeatedly confirms it. Studies in San Francisco,[49] Seattle,[50] Baltimore,[51] Galway,[52] and Seoul[53]—to name a few—all find positive correlations between block size and walkability. Smaller blocks (holding covariates constant) are simply more friendly to the traveler on foot.

Small is Social

If standoff policy led to larger blocks, and larger blocks decrease walkability, then how does walkability affect the social experience for barracks residents? To understand the connection between walkability and sociability, we again turn to the theory of Jane Jacobs.

For Jacobs, and her observations about the inner workings of a neighborhood, small-block walkability not only encourages residents to walk more, but creates diverse cross-use where daily paths lead people to meet each other more often.[54] I've re-created the graphic she uses to illustrate her point (see Figure 2.8). You'll recognize the two street networks from our previous discussion.

The Need for Small Blocks: Use and Daily Paths

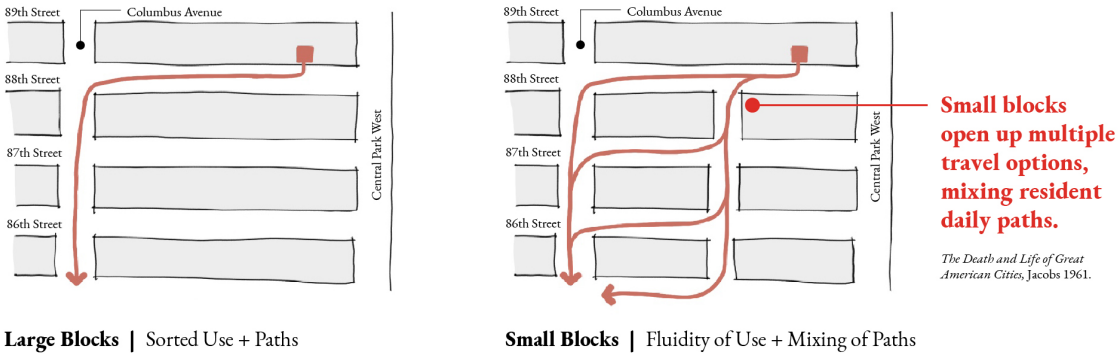


Figure 2.8. The need for small blocks, use and daily paths. Small blocks allow for fluidity of use and the mixing of travel paths. Re-drawn by the author from Jacobs (1961).

Jacobs asks readers to consider a man living on 88th Street, the same location that we hypothesized about earlier. To the problems of unwalkable large blocks for the man, she writes:

> He goes westward along his 800-foot block to reach the stores on Columbus Avenue or take the bus, and he goes eastward to reach the park, take the subway or another bus. He may very well never enter the adjacent blocks on Eighty-seventh Street and Eighty-ninth Street for years. This brings grave trouble. We have already seen that isolated, discrete street neighborhoods are apt to be helpless socially. This man would have every justification for disbelieving that Eighty-seventh and Eighty-ninth streets or their people have anything to do with him. To believe it, he has to go beyond the ordinary evidence of his everyday life.[55]

The benefits of small-block walkability is that it puts residents on the street more often, and increases the likelihood that they cross paths while they're there. For the man on 88th Street, opened access increases the convenience—or value proposition—of walking. He walks more often. And while he's walking, his path crosses more frequently with his neighbors.

Research indicates that the more time people spend walking, the higher the chances are for social interaction.[56] Dr. Kevin Leyden, a professor and researcher in Ireland, conducted one of the best studies on the subject. Describing this social cross-connection, he writes:

> This interaction can be intentional or accidental. Spontaneous "bumping into" neighbors, brief

> (seemingly trivial) conversations, or just waving hello can help to encourage a sense of trust and a sense of connection between people and the places they live.[57]

It is not about long, deep conversations. It is about casual and consistent contact. He illustrates his point in a study, testing whether residents of walkable, pedestrian-oriented neighborhoods versus car-oriented suburbs of Galway differed in their levels of social and community engagement. As he explains, Galway is a particularly valuable study location because of its contrasting neighborhood forms, but more importantly, because it lacked the "white flight" and other such attributes which have "historically affected American cities and that in many ways continues to distort decisions regarding where to live."[58]

The results are conclusive. The more walkable the neighborhood is, the higher the levels of resident social and community engagement are across the board. Residents of walkable neighborhoods are more likely to feel a part of their community (23% increase), know their neighbors (20% increase), and more likely to trust their neighbors (11% increase). What is even more remarkable is that neighborhood walkability accounted for these differences more than any other variable. It had a greater influence on social engagement than how long people had lived in their neighborhood, whether they had children, or whether they were active in the local church.[59] Walkability—the design of the neighborhood—made the biggest difference to the social lives of residents.

The results are the same on a military base. Using survey data from 845 barracks residents at Fort Hood,[60] I confirmed what researchers had already found across the globe. Walkability increases sociability (see Figure 2.9). Bases are no different.

On a sunny Hawaiian day in September 2019, I went to Schofield Barracks to find out why this might be the case. I went straight to the most walkable barracks complex I could find: the historic quads. Designed by General Macomb in 1912, the five 100-year-old quads are all in a line.[61] Each has four separate buildings that enclose a roughly 380-foot by 400-foot quad—hence, the name. For each quad, two of the four opposing buildings are barracks, and the other two contain administrative functions, a gym, and even the occasional dining facility. Just across the street from the quads are more dining options, another gym, a chapel, and a theater. It was the kind of place where you could park your car for days on end.

I found the barracks management office on the second floor. As I walked in the cavernous taupe room, I was greeted by two uniformed managers—both responsible for a new soldier's room placement, coordinating building maintenance and repairs, and all of the other odd-and-ends that you might visit the office of an apartment complex for. It was a slow day, they said, happily fielding my barrage of questions. As I sat on a dated, green upholstered chair on the side of the room, my

audience grew. After a few minutes, the two opinions turned into five. Each new soldier who entered the office, stuck around to join the conversation, each leaning on a different piece of furniture spread throughout the huge room.

I asked the group of five soldiers, *"Are these barracks a social place?"* The answer was swift and without hesitation. Yes. These barracks were an incredibly social place. I had to know more, and continued digging deeper.

"Why is that? Do you think there is anything about the design or layout that helps bring you together?" I asked.

Sergeant Carroll, one of the barracks managers, leaned back in his chair, contemplatively looking at the ceiling. He was the first to speak.

> The layout is the best thing that these barracks have. I think it helps with morale. It makes it easier to bring the unit together. It builds relationships because everything is here, you're always walking back and forth across the quad. You are constantly seeing the same people. You also see your unit, up and down the chain—other junior enlisted, NCOs [Non-Commissioned Officers], and officers. That face-to-face contact builds relationships.[62]

Everyone agreed. Sociability arose from casual and consistent contact.

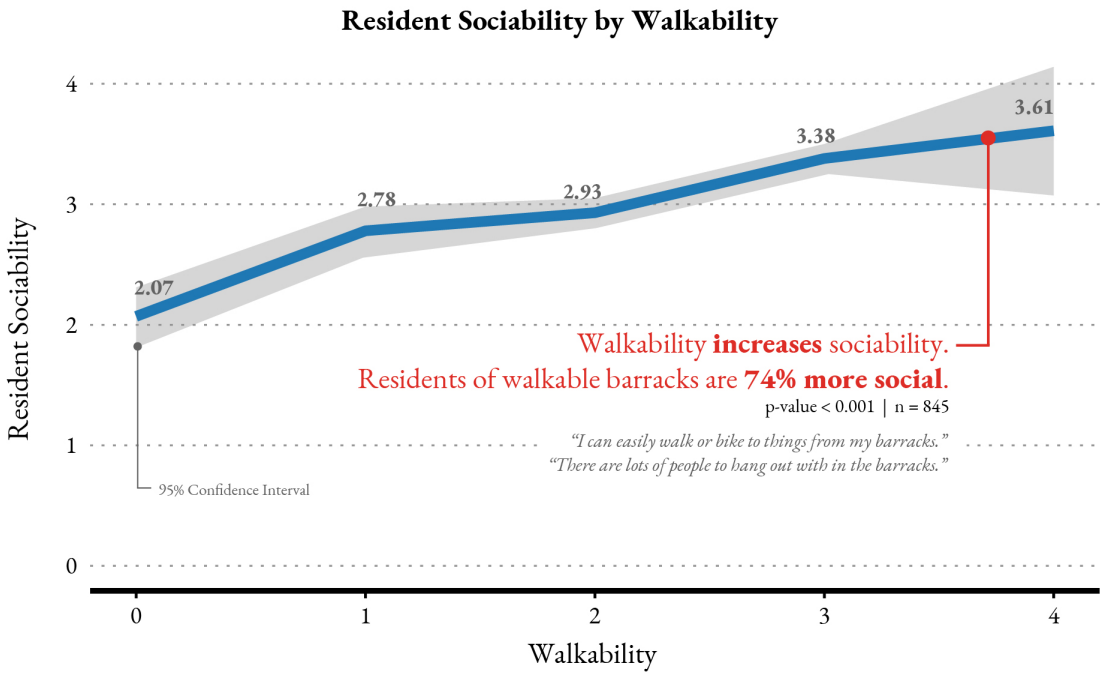


Figure 2.9. Resident sociability by barracks complex walkability. Raw data courtesy of Delgado-Howard (2018). Graphic and analysis by the author.

Figure 2.9—the 845 responses from Fort Hood—tells the same story. Residents of walkable barracks complexes are 74 percent more social than those of less walkable complexes. That is a startling difference. Most notably, unlike studies of off-base cities, there is no self-selection bias. One cannot counter-argue that social people tend to self-congregate in social, walkable

neighborhoods, thus accounting for the difference. For military barracks, that counter argument falls apart. The 845 residents included in the survey were assigned to their housing without any choice in the matter.

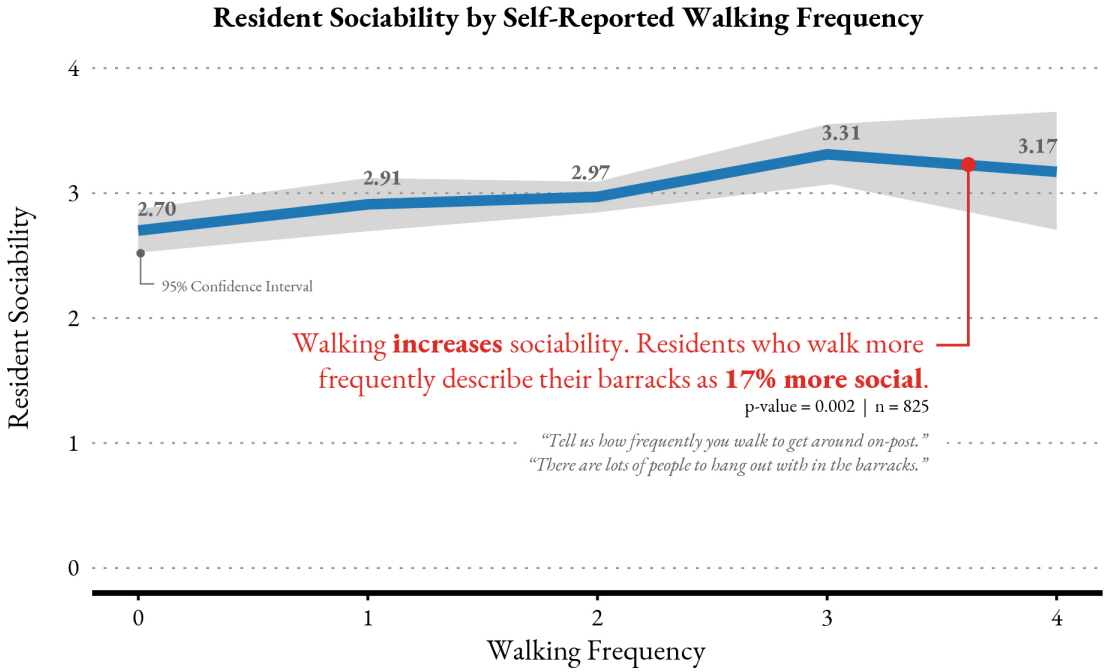


Figure 2.10. Resident sociability by self-reported walking frequency. Raw data courtesy of Delgado-Howard (2018). Graphic and analysis by the author.

Interestingly, not only did residents of walkable places say that they are more social, but those who decide to spend more time traveling by foot also reported an increase in their social activity. This data supports the two prior empirical findings. First, that walkability increases sociability (Figure 2.9). And second, that the more time you spend walking, the higher your chances for increasing social interaction (Figure 2.10).

Now, to summarize my first argument: standoff policy led military designers to create bigger blocks. Bigger block sizes decrease walkability, and unwalkable neighborhoods (or barracks complexes) are less socially connected.

Unobstructed Space

Standoff, block sizes, and un-walkability are not the only social ills attributable to antiterrorism policy. A second, and equally damaging prescription is 'unobstructed space.'

While standoff creates an encircling buffer to guard against the terrorist in the Toyota, unobstructed space guards against the backpack bomber by assuring that these new standoff buffers lay barren. Specifically, the language in the 2002 antiterrorism standards tells designers to:

> Ensure that obstructions within 10 meters (33 feet) of inhabited buildings or portions thereof do not allow for concealment from observation of explosive devices 150 mm (6 inches) or greater in height[63]… For trees or shrubs ensure that no foliage extends lower than 3 ft. (1 m) above the grounds to improve observation of objects underneath them.[64]

The standards go on to say that unobstructed space does not "preclude the placement of site furnishings or plantings around buildings,"[65] but in reality, that's exactly what they did. Along with arguments calling for "minimum maintenance"[66] landscapes, the combination of unobstructed space and standoff created clear zones—clear of vegetation, clear of differentiated social space, clear of everything but the occasional lawnmower.

Thus, the crux of my second argument is that unobstructed space provisions led to the elimination of outdoor social areas, separating buildings from their sites. The loss of integrated outdoor space decreases the opportunities and probabilities for resident social interaction.

The evidence of unobstructed space was visible at every site that I visited. Designers of post-antiterrorism barracks stripped them down and set them back. Integrated outdoor space became increasingly absent and uninviting. To guard against the hand-placed bomb, policy language all but forced designers to create landscapes of surveillance; to design modern-day grass moats where watchful eyes can detect anything larger than a dollar bill (exactly six inches) with an easy glance.

Unobstructed Space

Figure 2.11. Antiterrorism unobstructed space requirements. Images taken by the author.

DoD planners illustrate the secure landscapes that they're after, providing a hand-picked example

image of "good" clear zone planting design directly in policy (see Figure 2.11). Other than a handful of palm trees on a neighboring site, it is hard to see what "planting" is even there. The example of good clear zone planting contains nothing but grass. On the positive side, the DoD-endorsed example was not difficult for installations to follow. Near exact replicas of these lawned clear zones accompanied nearly all of the barracks that I visited built after 2004.

Walking around the site taking pictures of the contrasting landscapes in Figure 2.11, I ran into Specialist Mullen, an Army artilleryman and barracks resident returning from a late lunch at the dining hall. When he saw me, he slowed his walk, obviously curious why someone is photographing his barracks. Hailing from West Texas, Specialist Mullen is tall and wiry; sporting black-framed glasses and a friendly face. I could tell immediately that he's the kind of guy who could start up a conversation with anyone. As we talked, our discussion shifted to the contrasting barracks. It turns out that not only did unobstructed space requirements cause the barracks to look different from the exterior, but they also affected how residents experienced and felt about them. As he explained to me:

> There is a 'fratmosphere' to the older barracks. They're more like apartments. People are always hanging out on the balconies and in the common space. Here, people mostly stick to their rooms—no one hangs out. There's no common space. It feels like a prison.[67]

In eliminating places to hide explosives, designers inadvertently eliminated social options. These clear zones undoubtedly help visual surveillance, but at the same time, also help encourage the creation of physically and socially isolating places—physically distanced from their surroundings, and socially isolating their residents from one another.

Life Between Barracks

Jan Gehl—Danish architect, planner, author, and professor—has made the interplay between social life and buildings his lifelong passion. Rejecting Modernism, he took on the task of investigating how public space affects public life, publishing *Life Between Buildings* in 1971. The book is now translated into 20 different languages and is continuously updated to include an ever-expanding body of empirical public life research. During his decades of careful observation, he's found three inescapable truths. First, design affects social activity. Second, social activity induces more social activity. And third, it is quality, not quantity, that counts.

Gehl breaks down outdoor activities into three distinct types: necessary, optional, and social. Social activities are those that depend on others to be in the same space at the same time—after all, you can't be social if you're alone. These activities range from "greetings and conversations, communal activities of various kinds, and finally—as the most widespread social activity—passive contacts, that is, simply seeing and hearing other people."[68] According to his theory, social activities

are "resultant" from the other two types: necessary and optional.

Necessary activities are compulsory. They happen regardless of how architects and planners design exterior environments. These are trips to and from work, to get the mail, and all of the other tasks associated with daily life. They happen—and will continue to happen—regardless of design. Optional activities, on the other hand, are incredibly sensitive to the exterior environment. These are "those pursuits that are participated in if there is a wish to do so and if time and place make it possible,"[69] such as eating your lunch in the courtyard pavilion, reading a book on a bench under the sun, or simply hanging out on a shared outdoor balcony. When the weather and design are favorable, these activities occur with increasing frequency. The place and situation invites people to stop, sit, eat, or relax.

Just like how small blocks increase the value proposition of walking, thereby putting more feet on the street and increasing the odds that those feet meet, the design of exterior space can increase its appeal to optional users. Designers can create better or worse conditions for outdoor events. They can increase or decrease the allure of optional activities, and thus, change the probability that "resultant" social activities will emerge. As Gehl writes:

> In nearly all instances [social activities] evolve from activities linked to the other two activity categories. They develop in connection with the other activities because people are in the same space, meet, pass by one another, or are merely within view. Social activities occur spontaneously, as a direct consequence of people moving about and being in the same spaces. This implies that social activities are indirectly supported whenever necessary and optional activities are given better conditions in public spaces.[70]

His empirical observations support the theory. In a street life study in Melbourne, Australia, he found that the more time neighbors are outside, the more frequently they socialize (Figure 2.8).

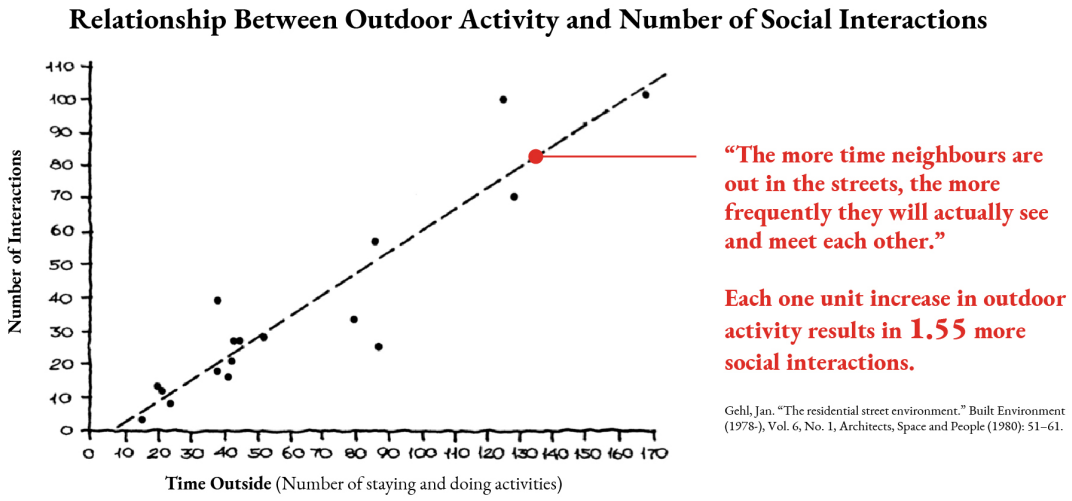


Figure 2.12. The relationship between outdoor activity and number of social interactions. From Gehl (1978). Annotations by the author.

Use led to interaction. To determine the role of design in this relationship, Gehl studied two neighboring housing developments: Galgebakken and Hyldespjældet, both just south of Copenhagen. As he explains:

> Both areas were built 1973-75 and are inhabited by comparable groups. Galgebakken (area G), has a markedly better designed and detailed arrangement of outdoor spaces compared to… Hyldespjældet (area H). A study of all outdoor activities in both areas taking place on Saturdays in the summer months of 1980 and 1981 showed that outdoor activities occurred at a 35 percent higher rate in area G.[71]

Design made the difference. A significant difference—35 percent more chances to wave hello, talk about the weather, or make a new friend. Design was able to increase the appeal and frequency of optional activities, and thus, increase the probability of social interaction.

For 828 barracks residents at Fort Hood in Texas, the inclusion—or exclusion—of outdoor common space made a similarly big difference in their "resultant" social lives (Figure 2.12).

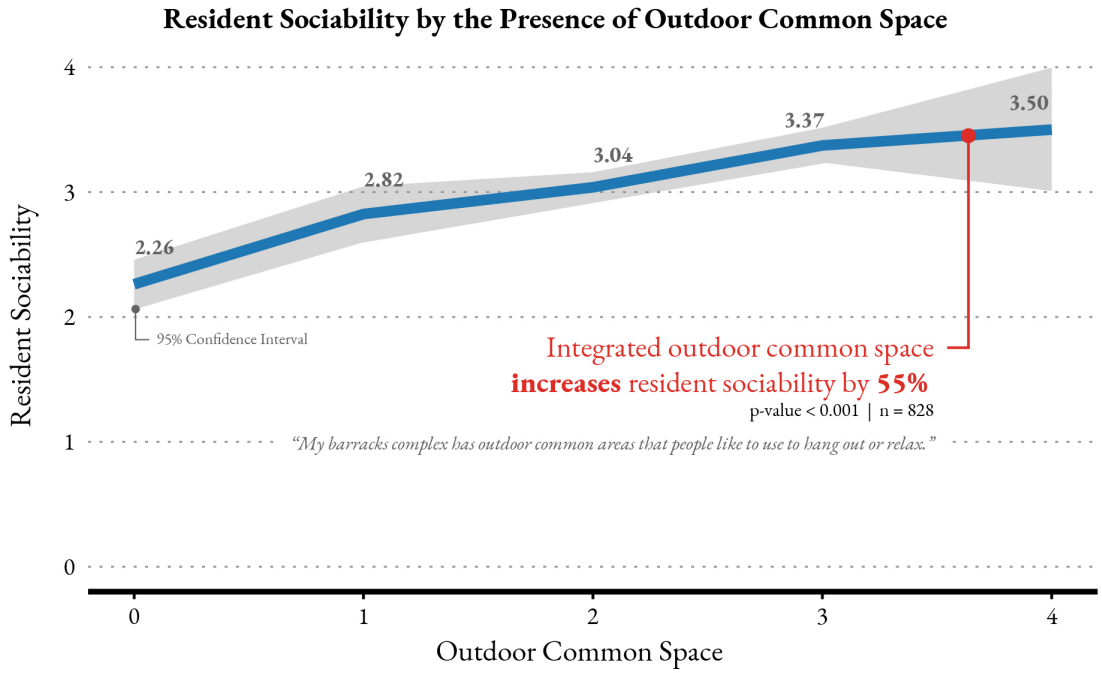


Figure 2.13. Resident perceived barracks sociability as a function of the presence of outdoor common space. Raw data courtesy of Delgado-Howard (2018). Graphic and analysis by the author.

Through design, sociability (individually self-defined as the quantity and availability of fellow soldier social interaction) blossomed. Residents of barracks complexes with integrated outdoor common spaces rated their barracks as 55 percent more social.

I wanted to find out what it is about these common spaces that encourage such connections amongst residents. My answer came from a front line terrorist defender—a military police officer by the name of Sergeant Kroll. Understated, but confident, Sergeant Kroll has experienced both the

good and the bad when it comes to a barrack's outdoor social space. He was staffing the front desk of a post-antiterrorism, six-story double-loaded tower design when I met him. He lived there—and wasn't too happy about it. The building was part of a six-building complex on Schofield Barracks, designed without exterior communal space, set amongst grass and parking lots, exactly as policy encourages.

Sergeant Kroll was stationed in Italy and Guam before arriving in Hawaii two years ago. Having experienced both ends of the spectrum, he explained to me just how much design made a difference to someone who calls the barracks home. In his words:

> If people don't even have the option to hang out at the barracks—like here—it pushes them to leave [and hang out elsewhere]. I really believe the lack of interaction here is due to the lack of communal space. I spent six months in Guam, and we stayed in these barracks that made this 'V' pattern with a common pavilion and volleyball court in the middle. Those six months were the worst shift work that I've ever experienced. It was brutal. We easily worked twelve-hour days—more than that when you take into account mounting up [getting weapons from the weapons vault]—and rarely did we have days off. It was horrible. But, you know what? That common space at the barracks brought people together. We bonded. I'd almost rather go back than what we have here.
>
> [That common space] felt like our space. It was like, 'We have this area, now we can do something.' It allowed you to separate work from life. It was a place where I felt like I could be me—a place where I could be human. I need human connection, and having a place to gather is vital.[72]

From Specialist Mullen in Washington to Sergeant Kroll in Hawaii, the feedback from soldiers is clear everywhere I went. Integrated outdoor social space encourages use and builds social relationships. Unfortunately, unobstructed space provisions encourage designers to forego common outdoor areas in favor of easy surveillance, citing visual disruptions as an unacceptable risk. To meet the new security threat, post-antiterrorism designers eliminated most exterior social spaces, thereby decreasing the opportunities and probabilities for resident interaction and cohesion.

Bye Bye Balcony

Urban form and outdoor space were not the only things to change after Khobar, however. The architecture of the individual barracks buildings also transformed. The exterior balcony corridor access design was the first to go.

Thus, we have arrived at my final argument about antiterrorism's social impacts. My first argument is that standoff increased block size and decreased walkability. Second, I claimed that unobstructed space razed exterior social areas and reduced the probabilities of interaction. Lastly, third, I argue that fears of flying hazardous debris killed the exterior balcony-access barracks, and moved the Army to a less social, double-loaded corridor model.

The engineers who analyzed the deadly aftermath of both Khobar Towers and the Alfred P.

Murrah Federal Building in Oklahoma City found that after accounting for progressive collapse, it was flying debris that caused most of the injuries.[73] The standards now saw exterior doors as a blast hazard, and effectively eliminated outdoor balcony-access barracks by writing that:

> Since doors can become hazardous debris during explosive blast events, doors designed to resist blast effects are expensive, and external hallways have large numbers of doors leading into inhabited areas, avoid exterior hallway configurations for inhabited structures.[74]

Exterior balconies were gone. Clear and simple. For safety and security, residents now had to access their rooms from the inside—no more "front" doors directly leading to the outside. The double-loaded corridor was back en-vogue and here to stay. Figure 2.13 below provides a picture of the changing architecture of post-antiterrorism barracks.

Figure 2.14. Barracks before and after antiterrorism. Fort Bragg images courtesy of Fort Bragg. JBLM images taken by the author.

If standard number thirteen, "Exterior Doors" (quoted earlier), closed the lid on balcony access barracks with the fear of flying hazardous debris, then recommendation number eleven, "Internal Circulation," made sure that lid wouldn't re-open. Instead of blast fragments, the new fear was a lurking terrorist. The standards instruct architects to:

> Design circulation within buildings to provide visual detection and monitoring of unauthorized personnel approaching controlled areas or occupied spaces.[75]

Circulation now had to be within the building envelope and allow for visual detection. In the balcony barracks, residents could come and go without oversight. There was no single point of entry, and no way the soldier tasked with working the front desk could visually detect or monitor

those coming or going when doors opened directly to the outside. After Khobar, policy forced designers into the double-loaded interior corridor, creating modern panopticons—the front desk acting as the all-seeing guard.

Of all three of my arguments (and their sub-arguments) in this chapter, the claim that antiterrorism killed exterior balcony access is the most definitive. For additional confirmation, I asked the man directly responsible for developing and issuing the standard barracks design to the Army, Mr. Steve Hultiss. When I brought up the question on what prompted their elimination of exterior balconies, he said:

> The prime driver on that was the safety and security of the soldier. The double-loaded corridor might offer a little bit of square footage benefit, but the prime driver was safety and security. It wasn't anything else.[76]

Let me be clear: I neither dispute nor agree with the claim that removing balconies make barracks safer or more secure. My argument is that antiterrorism's two provisions—exterior doors and internal circulation—ended the era of exterior balcony access. And this change had social consequences—consequences that were never considered in the decision to eliminate exterior access.

Unsocial Corridors

Architecture and sociability is the topic of Part Two, "Patterns of Interaction." We will dive head-first into room layout, circulation patterns, and the arrangement of social space to see what patterns correlate to increased probabilities of interaction. We explore theory, study past empirical findings, and venture inside the barracks. Exterior balcony access, as compared to the double-loaded corridor, stand in stark social contrast. I only offer a sneak preview here.

As Specialist Mullen said, "There is a 'fratmosphere' to the older [balcony] barracks. They're more like apartments. People are always hanging out on the balconies."[77] Use begets use, and frequency increases the probability of interaction. As Gehl explains:

> It is important that it is easy to go in and out of dwellings. If the passage between indoors and outdoors is difficult—if it is necessary, for example, to use stairs and elevators to get in and out—the number of outdoor visits drops noticeably [19, 39]. Residents in multistory buildings move about, of course, to and from their dwellings, regardless of which story they live on. This generates a comprehensive "coming and going" traffic, but many other outdoor stationary activities—especially short-term and spontaneous activities—more or less cease because it is too bothersome to come down and go out into the public areas.[78]

Similar to how small blocks increase the value proposition of walking by opening access and decreasing distance, exterior access balconies or landings remove barriers (and distance) to the public social realm. Optional activities become more appealing, they happen at a greater frequency, and "resultant" social interaction increases in probability.

To Specialist Franke, a chiseled Army Ranger from the famed 82nd Airborne, exterior balcony landings are a big part of his social life. As we stood together on "his" balcony (which is actually more of a shared exterior corridor), four floors above the activity of Fort Bragg below, he provided powerful support to a balcony's social value. He said:

> People really don't hang out anywhere else but those balconies. If we didn't have those, I probably wouldn't hang out with anyone.

Curious, I asked, *"Why do you think that is?"* Specialist Franke continued:

> One of the big reasons is that it's outside, but covered. A lot of soldiers like to smoke, so when people want to hang out, you're going to go where people can do that. People want to hang out where other people are. Being outside is nice too. There's a good view, and it's close to the rooms. That's big. Each floor has its space. It feels like ours. Our company is a lot closer together because we're out there off-duty.
>
> Just the other night, we brought camp chairs out here and watched the sun go down drinking beers. It's nice to get out of the room for a bit. I feel way closer to the company here—and I think these balconies play a big part.

In Part Two, I will continue our discussion with Sergeant Kroll and meet a host of new faces: Corporal Herrera, First Sergeant Akers, and Sergeant Lisk are among them. I will explore the architectural details, and find increasing support to the social ills of the long, double-loaded corridor.

Conclusion

The 1996 bombing of Khobar Towers was a demoralizing tragedy. Nineteen service-members lost their lives in the attack. As the country grappled with yet another blow at the hands of terrorism, questions and debate swirled. The public, Congress, and the Department of Defense all wanted to prevent another attack. In the political fervor that followed the blast, Khobar Towers became a watershed moment, forever changing the military landscape. Inspired by fear—both the fear of another looming attack and the political fear of inaction—the Department of Defense issued prescriptive force protection standards.

The standards had a direct impact on the design and planning of barracks. As standoff consumed real estate, planners eliminated connector roads to make bigger blocks, encircled new buildings with grass, and pushed buildings to the center of the site. The new clear zones became voluminous voids because of 'unobstructed space' rules, and barracks circulation moved to the closely-surveilled interior. Increasing security came at the expense of sociability.

In December of 2018, DoD authors re-wrote antiterrorism policy. Internal standoff is no longer a minimum prescription. Buildings can return to the street front, and the road-minimizing, block maximizing provisions are gone. The unobstructed space requirements and the explicit calls against exterior access remain. Those mandates didn't change. While it is unclear what effect standoff's removal will have on future development, antiterrorism continues to shape the architecture of the

barracks and the social experience for soldiers who call these buildings home.

CHAPTER III:
THE QUEST FOR QUALITY OF LIFE

> "Would you drop off your son or daughter at a college dorm, if it looked like some of the barracks we've seen?"
>
> Quality of Life Task Force Member,
> Task Force Meeting, June 27, 1995[1]

Spring of 2004, Indiana University of Pennsylvania.

Every year, thousands of bright-eyed high school seniors and their parents swarm college campuses across the country. Chipper sophomores outfitted head-to-toe in collegiate apparel proudly shepherd them around, showing off their schools and highlighting what college life might look like for these prospective newcomers. The students have a big decision to make. They've sat through the grueling entrance exams, labored over their application essays, and painfully waited for the embossed letters of congratulations to arrive in their mailboxes. There is only one decision left: where to enroll. The campus tour is one of the last opportunities for a school to influence that decision.

In the spring of 2004, Indiana University of Pennsylvania (IUP) was buzzing with the nervous excitement of visiting high school seniors. Located in the city of Indiana, Pennsylvania, IUP is a mid-sized college in the Pennsylvania State University system. With over 140 undergraduate degree programs, Master's and Doctoral degrees, and a full-fledged athletics program, IUP is "mid-sized" in enrollment only. It has everything that the flagship campuses have, but in a smaller package. In 2004, IUP's enrollment was 13,998 and slowly climbing. Since 1985, the school has never had fewer than 13,000 students, and in 2005—the very next year—they would jump above the 14,000 mark.[2]

Despite steady—and growing—enrollment numbers, university leaders were nervous. They heard troubling trends from the tours of high schoolers. The story was that "students would be accepted here, visit the campus, take one look at the outdated dormitories, and decide to go someplace else."[3] Universities rely on student enrollment to survive, and IUP's leaders decided to take action. The solution seemed obvious. To attract more students, they must replace the old

dormitories. All of them—bed for bed. The fourteen old dorms would come down, and eight new ones would take their place.

The design would also change. Surveys told university officials that incoming freshman wanted two things: privacy and amenities. IUP's self-proclaimed "Residential Revival" project focused on delivering both—building eight new "swanky, apartment-style"[4] residence halls. As the IUP student newspaper reports:

> The suites were designed to lure students to enroll with such features as individual bathrooms, carpeting, high-speed wired and wireless Internet, large-screen TVs, microwaves, and other creature comforts.[5]

At $270 million, it was the largest student housing replacement project in the nation[6]—an expensive gamble to increase enrollment, especially considering the school's student population was already growing every single year for the last decade.[7] It was currently going up, not down.

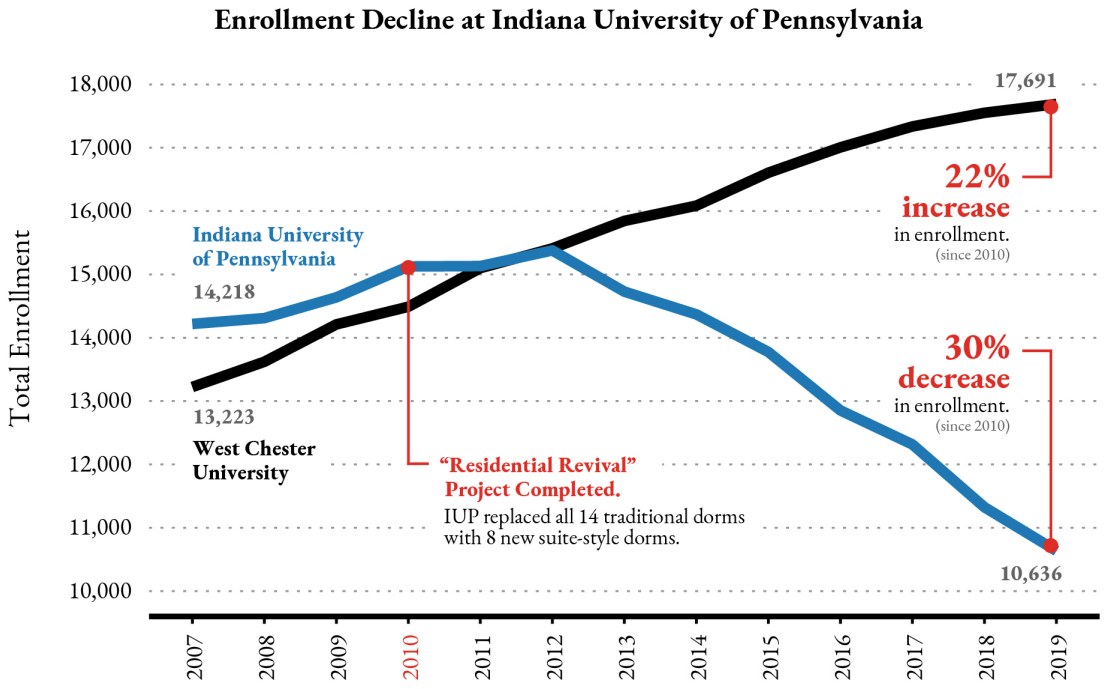


Figure 3.1. Enrollment decline at the Indiana University of Pennsylvania. Data from the Indiana University of Pennsylvania and West Chester University. Graphic and analysis by the author.

Shortly after 2010, with the residence halls revived, enrollment collapsed. Figure 3.1 shows the enrollment numbers from 2007 through 2019 for IUP and West Chester University (WCU)—also in the Pennsylvania State University System. At the time of the project's conception and completion, WCU and IUP were the two most similar schools within the university system in terms of total enrollment. After 2012, the two diverged drastically. The quarter-billion-dollar project, promising to usher in a new wave of incoming freshman, failed. It didn't work. Housing costs rose to pay for the

new dormitories and students voted with their feet (and wallets)—enrolling elsewhere more than before.

It's hard to fault IUP or its leaders. Dormitories—like all buildings—eventually require renovation or replacement, and IUP's were old. The argument for facility investment was sensible. And the connection between sparkling new housing, and enticing prospective freshman seems intuitive. Also logical is the argument to use student surveys to aid design—after all, why not hear directly from those who you are trying to influence? On the surface, it all makes perfect sense. It's no wonder why IUP wasn't the only university caught up in the "amenities arms race," re-defining the typology of dormitories to "focus on individualism and isolation, offering private rooms, individual bathrooms, and personal laundry facilities"[8] instead of communal sharing.

However logical or seemingly intuitive the arguments appear, they're problematic. Neither data nor current research supports them. Kevin McClure, a professor who studies higher education at the University of North Carolina at Wilmington, calls the amenities arms race the 'if you build it, they will come' mentality. Unfortunately, he says, "there aren't conclusive—or granular enough—data pointing to a causal link between building fancy dorms and achieving enrollment goals."[9] For IUP, the new dormitories with private rooms, private baths, and a higher price tag, clearly didn't work.

The Department of Defense is guilty of the same faulty logic. They, too, blamed retention on housing. They, too, surveyed residents which revealed privacy and amenities were the top desires. And they, too, re-imagined the typology of barracks to provide soldiers both at the expense of community. In doing so, the barracks similarly moved towards a philosophy of individualism and isolation—shifting from shared rooms to private rooms, making those private rooms larger, and deleting social gathering space to re-apportion square footage to the individual. It was the IUP playbook, only with a new military spin.

In this chapter, I explore these design shifts. I dig into their rationale and expose their flaws. I argue that a design paradigm centered on individualism and isolation is a dead end. Designing around satisfaction surveys is not the answer. It brings a host of externalities, including encouraging physical and social isolation, negatively correlating to loneliness and health, and having no effect on re-enlistment outcomes. Instead, a new design paradigm—one that moves away from individual and towards the collective community—is needed.

The Quest for Quality of Life

In 1981, Congress held its first dedicated hearing on quality of life ("QoL") in the military. Since then, they have reconvened nearly every year to exclusively discuss the topic. In 2005, Congress even made "Military Quality of Life and Veterans Affairs" its own sub-committee within the House of

Representatives.[10] Clearly, quality of life is—and has been—an important national topic. But, what exactly is "quality of life"? And why does Congress pay such close attention to it?

Despite nearly forty years of congressional transcripts, there is no consensus definition on what quality of life is, or isn't. In 1988, Barbara Pope, Deputy Assistant Secretary of Defense, said: "There has been much discussion about quality of life, but little attempt to define it."[11] She's right. There is no uniformly adopted definition. In part, that's because—as she states—"quality of life means different things to different people."[12] For the military family with young children, quality of life is access to child care. For those with older children, it's on-base schools. For the military member with a sick spouse or child, quality of life is timely medical care. And for many of the over four hundred thousand young, single enlisted members living in the barracks,[13] quality of life is the design of the place they live, and the morale, welfare, and recreation opportunities available to them.

In essence, as Major General Tice neatly summarizes, "the term embraces the human dimension of service life—the environment in which our people work and live."[14] Which brings us to our second question: why does Congress get so involved with this human dimension?

Retaining the Volunteer

Article I, Section 8 of the US Constitution states, "The Congress shall have the power to raise and support Armies; [and] to provide and maintain a Navy."[15] Part of that raising, supporting, and maintaining, is people. Missile-laden planes don't fly themselves (even drones—yet), and infantry units are not made up of Schwarzenegger-voiced, cyborg terminators that the Department of Defense produces behind the cloak of secrecy at some unnamed underground laboratory. The Army, Navy, Marines, Air Force, and Space Force, are services made up of people. And since 1973, everyone who dons the nation's uniform does so freely—as a volunteer. Without volunteers, there is no Army to raise or support, and there is no Navy to maintain or provide for. Thus, in the All-Volunteer Force era, Congress has a deeply-vested national security interest in recruiting and retaining personnel. A 1976 congressional report confirms that interest, claiming that ever since the initial commission to assess the viability of a volunteer force in 1969, its approval in 1971, and its implementation in 1973, "debate both in Congress and throughout the Nation has centered on the military services' ability to attract sufficient quantity and quality of personnel."[16]

Increasingly, military leaders are sounding alarms. In 2020, the Army's chief of staff, General James McConville, said, "We [the Army] are in a war for talent."[17] In 2018, Major General Malcolm Frost, commander of the Army's Initial Military Training Command, was more urgent. He predicted that: "The next existential threat we have … is the inability to man our military."[18] The reason for such alarm comes down to simple mathematics, according to General Dennis Laich. He calls it "All-

Volunteer Force (AVF) arithmetic."[19] According to General Laich, the problem is that after you account for those ineligible for service, and those uninterested in serving, the pool of potential volunteers is increasingly shrinking—leaving a razor-thin margin of error for the Department of Defense to meet its annual recruitment goals.

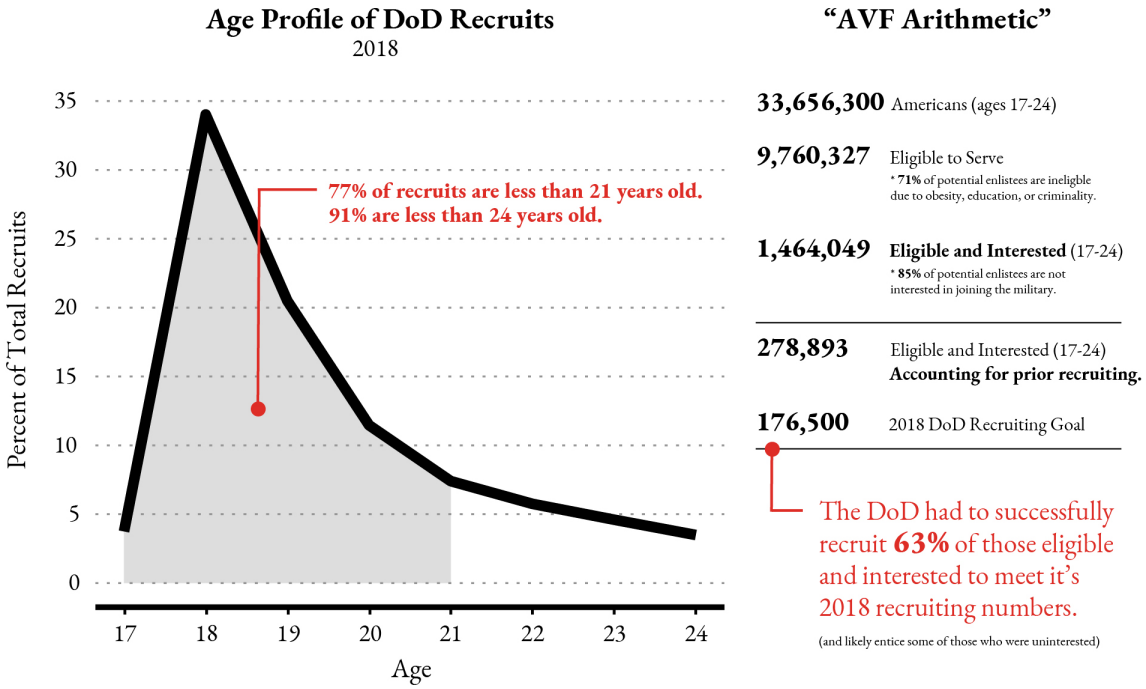


Figure 3.2. Age Profile of 2018 DoD Recruits and "AVF Arithmetic." Data from the Office of the Secretary of Defense, Personnel and Readiness, US Congress, and The Heritage Foundation. Graphic and analysis by the author.

In April of 2018, Secretary of Defense James Mattis revealed some startling statistics in front of the US Senate. He said, "71 percent of 18 to 24-year-old men and women in this country do not qualify for medical, legal, behavioral, intellectual reasons to enlist as a private in the US Army. 71 percent."[20] Off the top, only 29 percent of the original recruitment pool is left. Of those 29 percent (9.76 million Americans between the ages of 17-24 in 2018[21]), only 15 percent would even consider enlisting, according to recent Harvard research.[22] That leaves recruiters with 1.46 million people—but even that figure is misleading. 1.46 million is the total number of 17-24-year-olds who are eligible and interested, using raw population statistics alone. It doesn't take into account that the Army has already actively recruited some of those people (the 24-year-olds) for the past seven years. Many have joined and separated in that time. And those who haven't, are increasingly unlikely to sign on the dotted line with each passing year (see Figure 3.2). Also included in that 1.46 million are nearly 200,000 seventeen-year-olds. And while they are technically eligible to serve by age alone (with parental consent), many have not yet earned their high school diploma or GED required to do so. When you run the numbers accounting for prior recruitment and high school graduation, the

pool shrinks to a mere 278,893. Of that total, 63 percent (in 2018) need to ship off to boot camp for the military to meet its goal. With college, trade school, and the workforce calling, 63 percent is an extremely high bar. The military, and the Congress, are rightly concerned.

Recruitment (i.e., getting people to join) is one thing, but retention (i.e., convincing people to stay) is another. They both work together—side-by-side. Each plays its part to ensure that the military has the right number of service-members it needs. Think of them as riders on a tandem bicycle, which must maintain a constant speed. As one pedals slower, the other must work harder to pick up the slack. The congressional concern about military quality of life is just like that bicycle. To make up for the "AVF arithmetic," Congress—and the Department of Defense—believe this "human dimension" to service life can help pick up the slack, enticing more people to stay. And if the military can increase retention, they can lessen the strain on recruitment.

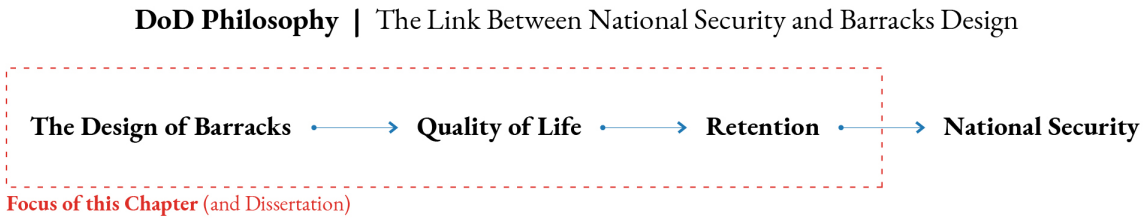


Figure 3.3. The Link Between National Security and Barracks Design. Graphic by the author.

The general Department of Defense philosophy is that barracks can increase quality of life, that quality of life increases retention, and that retention supports national security (see Figure 3.3). Representative Bo Ginn, from Georgia, may have summarized the philosophy best. In connecting barracks to retention under a volunteer Army construct, he says:

> "We could go back to the draft, sure, but when you do that, you are asking for a lot of problems. It is not quite as easy as it sounds, and if we pay our military personnel better and provide some of these quality of life facilities which are quite meaningful to them, then I think not only do we retain, but we have the quality and the enlisted quality in the future that we so desperately need… Under a volunteer concept, we are going to have to spend more money providing facilities for people to live decently in better living conditions."[23]

Similar statements making the string of connections illustrated in Figure 3.3 fill Congressional transcripts and military testimonies for the past 47 years. There is not a single hearing on quality or life or military appropriations in which I did not find such linkages explicitly mentioned.

Let's start with retention and work backward, highlighting just a small sample of such statements along the chain of Figure 3.3. Most recently, in 2019, Sergeant Major of the Army, Daniel Dailey, proclaimed that "Our retention rate is directly linked to [soldiers'] quality of life."[24] Twenty-three years earlier, Sergeant Major McKinney echoed the same sentiment, claiming that "Quality of life, more than any other single factor, influences a soldier's decision to reenlist or leave the Army."[25]

The two statements are unequivocal—the military sees quality of life as an avenue to improve retention.

For junior enlisted soldiers in the barracks (42 percent of the Army's total enlisted force as of February 2020[26]), quality of life often equates to housing. The Department of Defense believes in a clear connection between the two. In a written statement to Congress in 1996, the Army made their belief in that linkage more explicit, stating that "The condition of barracks represents a primary quality of life factor to our soldiers."[27] In 2009, Keith Eastin, the Assistant Secretary of the Army, reaffirmed the connection, saying, "If they [soldiers] are not living in housing that they can be proud of, it's harder to keep them and harder to bring them in."[28] Lastly, Master Chief Petty Officer of the Navy, John Hagan, left no doubt. In his written opening statement before the Committee on National Security, he wrote, "FACILITIES ARE DIRECTLY RELATED TO RETENTION"[29]—underlined and in all capital letters.

Since the end of the Draft, the Department of Defense's position is that barracks can increase quality of life, and that quality of life encourages Airmen, Soldiers, Sailors, and Marines to re-enlist. Like Indiana University of Pennsylvania, the DoD sees housing as an incentive—an incentive to keep soldiers in their uniforms by improving the human dimension of service life. The claim is logical. The question is, how. How did the military change barracks design to enhance quality of life? And did it work?

In this chapter, I present three arguments:

1. After the end of the Draft, the military shifted to a barracks design philosophy which placed increasing emphasis on individualism. The new philosophy moved from shared rooms to private rooms, made those private rooms larger, and deleted social gathering space to re-apportion square footage to the individual.
2. I argue that designing for individual satisfaction (through greater privacy, space, and amenities at the expense of community) does not increase retention—and that the DoD's central premise is flawed.
3. The military is aiming at the wrong design target. Barracks should attempt to increase the probability of resident social interaction, not aim to boost individual satisfaction. As sociability blossoms, so does health, retention, and incidentally, satisfaction too.

Individualism and Isolation

The military—to increase retention—moved to a design paradigm centered on the individual. Their goal was to achieve individual satisfaction, using surveys to determine soldier desires. In doing so, barracks moved from shared rooms to private rooms, made those private rooms larger, and

deleted social gathering space to re-apportion square footage to the individual.

Much like IUP, the DoD aimed to influence a soldier's decision to stay or go by appeasing the tangible desires of satisfaction surveys. Unfortunately, by catering to the individual, they physically and socially isolated soldiers from one another in the process.

Although barracks form didn't begin to dramatically change until 1971, when the Army needed to entice the new volunteer soldier, the 1960s "Rolling Pin" design foreshadowed what was to come. For the century prior—going back to the Army's first official standard design in 1860—barracks revolved around large open-bay sleeping rooms, with communal latrines and communal social space. The open bays were often further divided, but by furniture, not walls. The 1960s barracks design changed that. Walls and doors came in, creating smaller sleeping rooms for eight soldiers each. The communal latrines and communal social space remained—shifting only wardrobes and beds to behind closed doors. Representative Clarence Cannon of the House Armed Services Committee, voiced his support for the new changes in 1964, saying:

> I want to compliment the approach of the Army... These people have to live there from 2 to 6 years. And it has an effect on re-enlistments.[30]

Leaders began to make the implicit claim that more privacy leads to greater quality of life, and the explicit claim that such moves influence re-enlistment decisions. Ever since, barracks architecture has been on a one-way march towards greater privacy, increased personal space, and fewer common areas. Figure 1.18 shows the evolving barracks standards since 1971.

By the mid-1960s, the military believed that the eight-soldier rooms and communal latrines of their "Rolling Pin" barracks could no longer compete with the civilian world in the fight for personnel. The Deputy Secretary of Defense established a task force. The goal: find out what soldiers didn't like about their barracks. After two years and 14,500 soldier surveys, the results were not surprising—soldiers heavily criticized the lack of privacy and lack of comfort amenities. It was their number one complaint.[31] And just like IUP, military leadership decided something must be done. The task force recommended "a revolutionary change from the traditional open bay living environment."[32] The 1971 townhome-style design (nicknamed the "VOLAR" barracks for the new VOLunteer ARmy) increased per-person space allotments, decreased the number of soldiers per room, and added semi-private bathrooms. The premise was simple—through privacy, space, and amenities, the new design would increase retention through a higher quality of life.

This theme would repeat itself four more times. Nearly every ten years since 1971, the military decided that they needed to increase privacy and amenities to keep soldiers from swapping their fatigues for flannels. In 1983, barracks designers cut down the number of soldiers in each module by

two-thirds. According to General Delbridge, the new "2+2" design "will mean an enhanced quality of life with greater privacy...and more space."[33]

By 1995, "2+2" was no longer spacious or private enough. A 1992 tri-service survey found that barracks residents disliked the comfort and privacy of the current 1983 standard.[34] Twenty-four percent said private bedrooms would keep them in the service.[35] The 1995 "1+1" standard essentially halved the old 2+2 barracks model. Instead of two people sharing a room, it became one. Instead of four soldiers sharing a bathroom, it became two. In the new standard, designers increased physical privacy, increased room size, and added a small kitchenette—putting limited cooking capabilities in the rooms for the first time.

The 1995 standard lasted only four years before the Army gave it another look. In 1999, the Army Corps of Engineers conducted a housing review, eventually issuing a new design in 2004. The changes, called "1+1 Enhanced" or "1+1-E" barracks, increased the room size and added more extensive cooking facilities. Instead of a microwave and a small refrigerator, the new rooms came equipped with an oven and a two-burner stove.[36] The changes led to bigger rooms with more amenities. Figure 3.4 (below) illustrates the military's increasing shift towards private rooms.

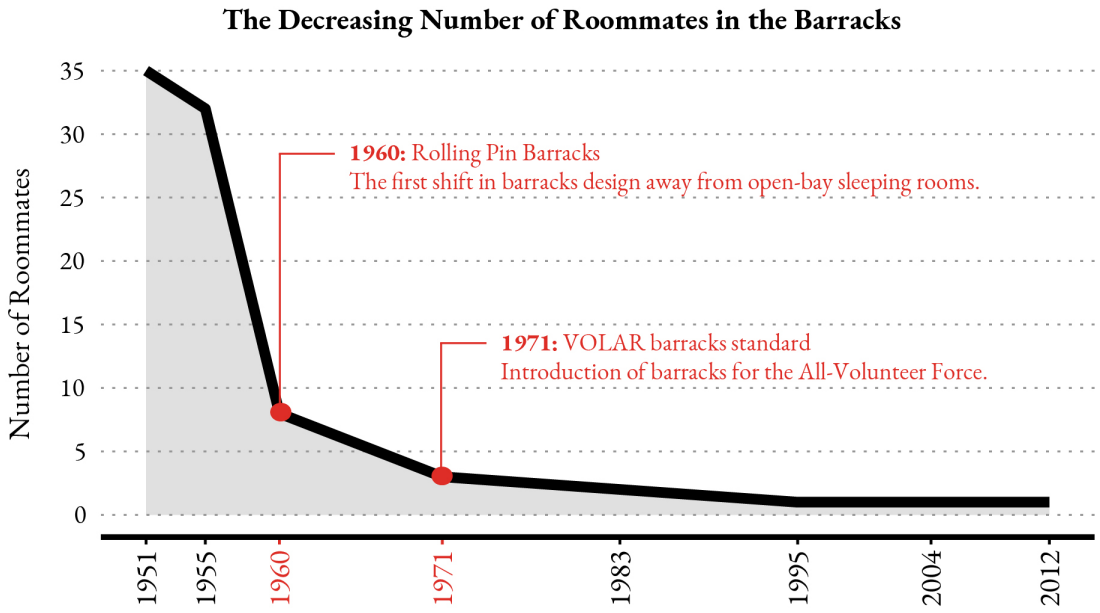


Figure 3.4. The number of roommates in Army barracks over time. Graphic created by the author.

Along with moving from shared rooms to private rooms, the military also made those private rooms larger. In 1971, 1983, and 1995 room size growth corresponded to increases in the allowable per soldier space authorizations from Congress. Since 1995, that number—measured by gross building square footage per resident—has remained constant. The Army cannot build a barracks larger than 366 square feet per soldier (or 388 square feet per soldier for barracks over three stories).

That hasn't changed in the last twenty-five years. Thus, to expand in one area, designers had to shrink in others. Since 2004, the growth of private rooms has come at the expense of communal space. The 2004 "1+1-E" standard tells designers that "communal functions should be integrated into the barracks buildings, and minimized to free up more personal space."[37]

The directive and design philosophy is clear. Personal space trumps communal space—and the individual takes priority over the community. Figures 3.5 and 3.6 (below) illustrate this increasing privatization of barracks space and the corresponding elimination of communal social space (day rooms and lounges).

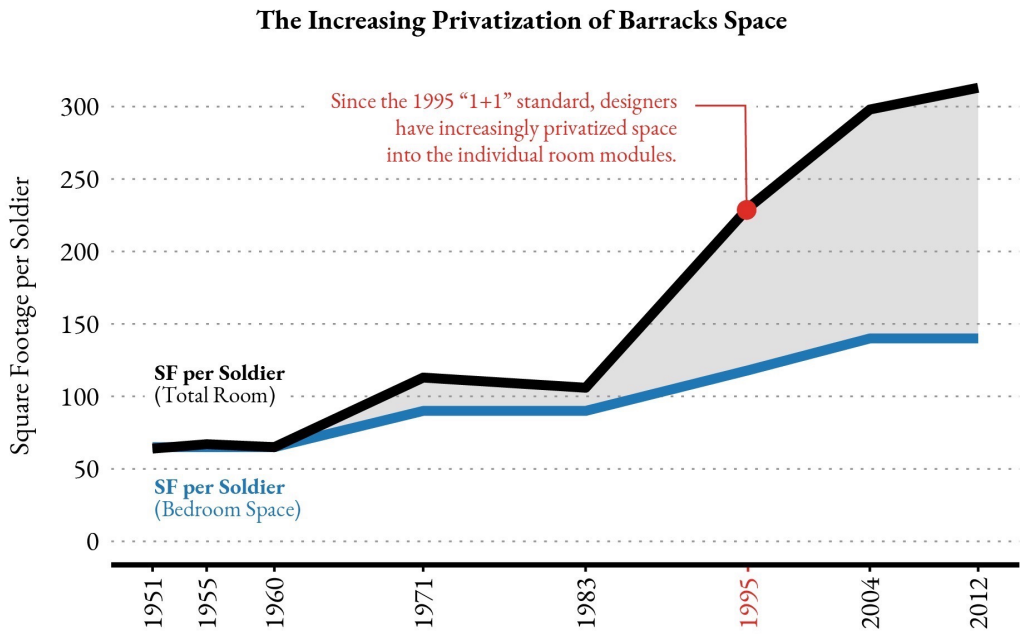


Figure 3.5. The square footage assigned to each soldier in Army barracks over time. Graphic created by the author.

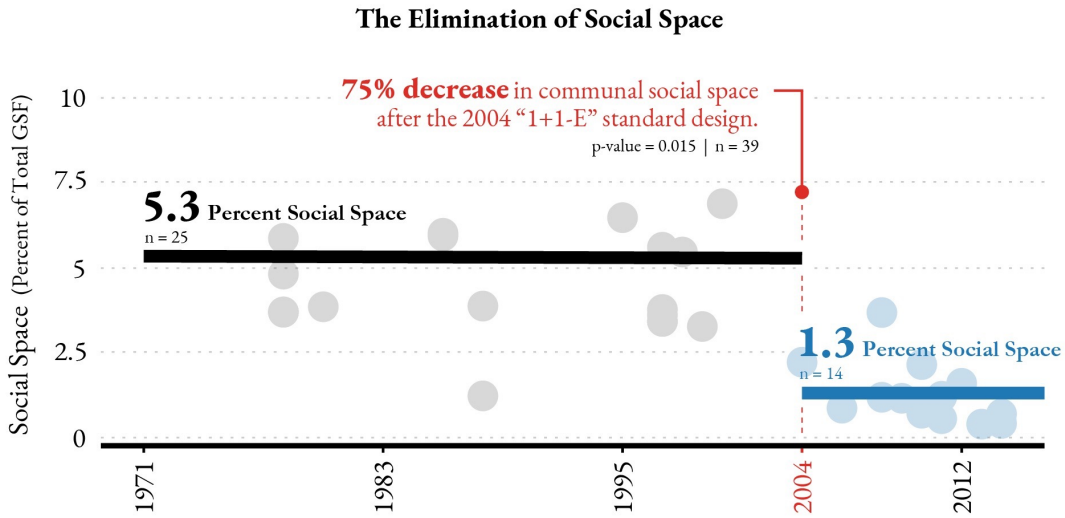


Figure 3.6. The elimination of communal social space at Joint Base Lewis-McChord. Data from the Army ePRISMS database (2020). Data for Fort Bragg and Schofield Barracks is unavailable. Graphic created by the author.

Taken together, Figures 3.4 (roommates), 3.5 (privatization), and 3.6 (social space) illustrate the two key points of my first argument. First, since the introduction of the All-Volunteer Force, the military has shifted to a design philosophy centered on individual satisfaction—using surveys to identify soldier desires, and design to provide them. The result is private rooms, larger rooms, and fewer communal social spaces. And second, the central premise behind these design changes over the past 47 years is the belief that individual satisfaction increases retention.

Exposing Flaws

My second argument is simple: the DoD's central premise is flawed. I argue that individual satisfaction (as obtained by privacy, space, and amenities at the expense of community) does not increase retention. My criticism is not aimed at the general philosophy that design can influence quality of life or retention, but rather, at the way that the Department of Defense believes it occurs.

Leading up to the 1971 barracks design, the military surveyed 14,500 residents. They went to every installation in the United States. They asked residents detailed questions on what they wanted. And then they built it.

Twelve years later, the 1971 standard wasn't providing the quality of life that the DoD desired. The 1983 designers took the old plan and increased both privacy and personal space.

Another twelve years down the road (now 1995), and the military felt they needed to make another change. They again distributed surveys, and again found the same result—residents wanted more privacy, more space, and more amenities. They built it—moving to individual rooms and more than doubling each soldier's assigned square footage.

Nine more years pass. It is now 2004, and the barracks are too small, too crowded, and too austere once again. The DoD believes that rooms need more space and more amenities. Designers add kitchens and break up the communal social areas, re-apportioning a few extra square feet to each soldier.

And finally, another eight years go by. The 2012 barracks design standard—the latest in a long line of iterations—makes more changes. And as you probably guessed, the rooms received additional space and additional amenities.

By military logic, residents in the 1970s VOLAR barracks should be miserable. They should be signing their separation paperwork en masse and leaving the Army in droves. They're living in the first version of post-all-volunteer military barracks, and the DoD has already moved on to version number five. With each new iteration, quality of life—and therefore, retention—has supposedly been improved. Rooms got bigger, more private, and more comfortable with each change. Retention should be steadily increasing over time, but when you look at the data, these successive

design changes did not affect soldier decisions at all. Figure 3.7 shows the re-enlistment likelihood of 828 barracks residents at Fort Hood.[38]

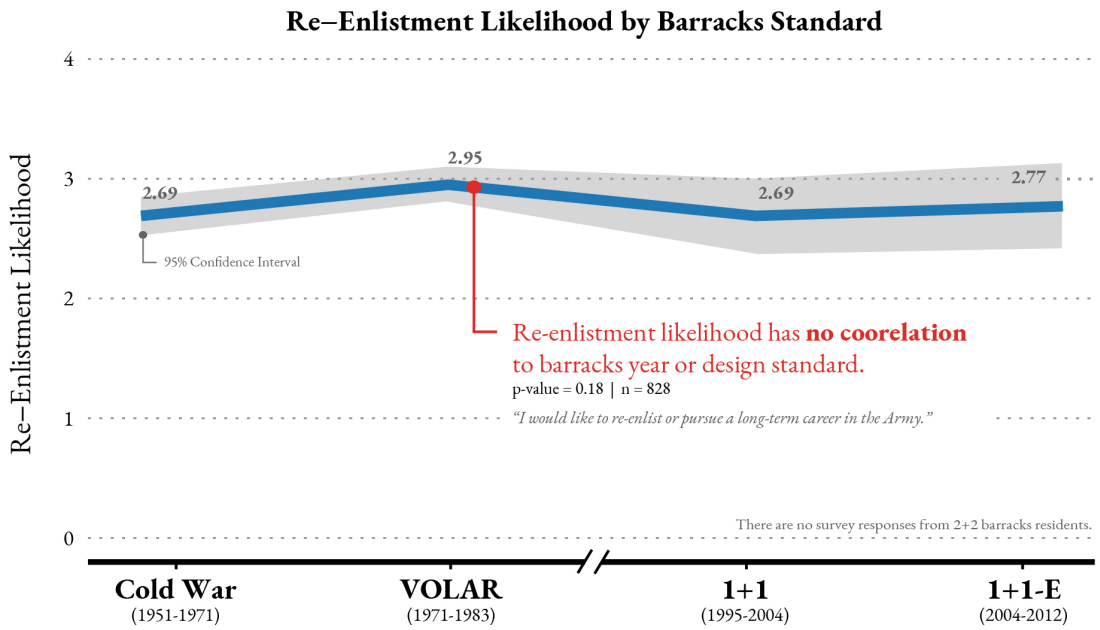


Figure 3.7. Resident self-reported re-enlistment likelihood for various Army design standards. Raw data courtesy of Delgado-Howard (2018). Graphic created by the author.

The survey asks barracks residents a simple question: how likely are you to re-enlist? The results expose some major flaws in the DoD's central premise. Contrary to popular military belief, the barracks standard does not influence their answer. Those in the oldest barracks on base—with the least amount of privacy, the smallest rooms, and fewest amenities—are just as likely to re-enlist as those in the newest barracks.

The question is, why? Space and privacy are believed to increase quality of life. And quality of life should increase retention. The graph should be going up, not flat-line without any statistical difference between the barracks types.

There are five possible explanations. First, the data is wrong—or more plausibly, self-reported likelihood is not a strong predictor of future behavior. Unfortunately, the answer to our dilemma is not so simple. A 2006 study determined that survey-reported career intentions are the best predictor of eventual re-enlistment behavior.[39] For re-enlistment decisions anyway, soldiers tend to do what they say. Later, we'll look at actual re-enlistment data which corroborate this study.

The second possible explanation is that architecture—any architecture—does not affect retention. Under this possibility, design is futile, playing no role in the individual calculus a soldier makes when deciding whether to stay or go. If that were true, it would explain Figure 3.7. Re-enlistment likelihood would not correlate to a barrack's design—no matter what changes architects

make—because neither has any bearing on the other. Architecture is irrelevant, just like how a barrack's design does not affect where a soldier grew up or what their favorite color is.

I will leave this possibility for further discussion in my final argument of this chapter and my final part in this dissertation, but to ease any architectural fears—spoiler alert—it turns out that design matters, a lot.

The third possible explanation is that the residents of older barracks are no longer sharing rooms as the standards originally intended. They are living privately in rooms designed for multiple soldiers—claiming the same space and privacy as those in the newer barracks. Thus, they are enjoying the same quality of life, and that thereby explains their similar re-enlistment likelihoods. It's plausible. But also untrue. At Fort Hood, private rooms are a 60/40 split. Sixty percent of residents have roommates, and forty percent do not. Those percentages align directly with which barracks standard the soldier lives. Thus, this explanation is false. Space-hungry soldiers living opulently in older barracks, subtly deceiving Figure 3.7, do not exist.

Which brings me to the fourth possible explanation: survey respondents incorrectly predicted their future satisfaction. They don't know what design attributes will actually make them happy, and the DoD's design changes did not result in increased satisfaction. While this possibility is even more plausible given rigorous scientific research on the "happiness paradox,"[40] it is also false—at least to some degree. From the same surveys at Fort Hood, each successive design standard results in a statistically significant increase in resident satisfaction (see Figure 3.8 below).

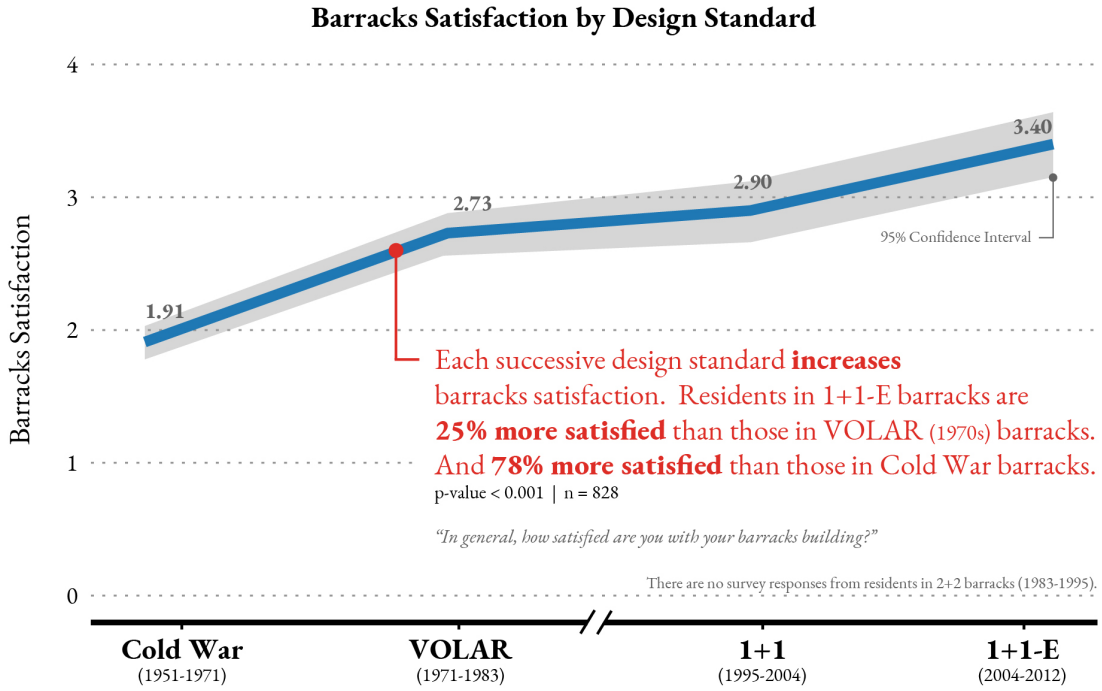


Figure 3.8. Barracks satisfaction as a function of design standard. Raw data courtesy of Delgado-Howard (2018). Graphic created by the author.

And thus, we arrive at the fifth possible explanation, and the crux of my second argument of this chapter: that individual satisfaction (as implemented) does not increase retention. It's not that design doesn't matter, but rather that prioritizing individualism and isolation doesn't work. Design may very well increase retention, but privacy, space, and amenities is not the way to do it.

For nearly fifty years, the military design philosophy for barracks has been consistent. The claim is that quality of life—and subsequently, retention—is achieved through privacy, space, and amenities for the soldier. Military leaders have expressed this explicitly in testimony and through their centrally-issued standard designs. Somehow, however, this belief has promulgated without any statistical backing. During the 1987 Hearing on Military Construction Appropriations, Representative Jim Kolbe first asked:

> "We all know intuitively that good facilities, good quality of life helps in terms of retention and reenlistment. Do we have any statistical data that will help with that and show the payback?"[41]

Captain Bland found out that the answer was no. In his 1990 thesis, he writes:

> No study was found...which established a statistical link between a military member's satisfaction with housing and the member's intent to remain in the military.[42]

In 1999, the Government Accountability Office, returned the same result, stating:

> DoD has not developed any direct, quantitative evidence showing that barracks improvements, as distinct from other factors, result in improved readiness and retention.[43]

In 2020, my research yielded the same finding as Captain Bland and the GAO. To be sure, I called Mr. Steve Hultiss, the designer responsible for developing the Army's standard barracks designs. I asked him the same question Representative Kolbe put in front of Congress. Without hesitation, he confirmed what I already knew: no. He went on to say,

> I would love to have that information because that would probably drive our decisions, but no. I don't know of anyone who has ever tied it back to actual, real retention numbers.[44]

Thus, the entire premise behind 47 years of DoD design is unproven at best, and ineffective at worst.

Some aspects of the Department of Defense barracks design strategy do succeed as advertised, however. The military aimed for individual satisfaction, and Figure 3.9 shows that each design iteration improves soldier satisfaction. The data demonstrates a clear, and statistically significant, correlation. What it doesn't prove is that satisfaction also increases retention.

This is the fundamental flaw in the DoD's design philosophy. This is where it breaks down. Figure 3.8 ("Re-Enlistment Likelihood by Design Standard") shows no effect. The space and amenities of each new design standard didn't influence career intentions—their ultimate intended purpose. When you isolate privacy alone (see Figure 3.9 below), the same story holds. There is no

correlation between increased privacy and retention.

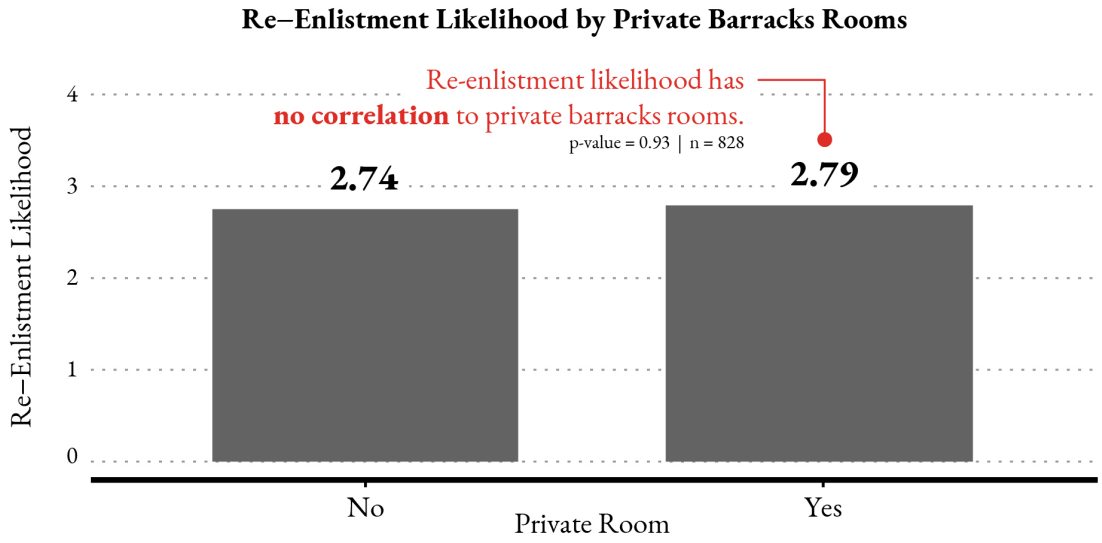


Figure 3.9. Resident self-reported re-enlistment likelihood as a function of whether they reside in private rooms. Raw data courtesy of Delgado-Howard (2018). Graphic created by the author.

My second argument of this chapter is that individual satisfaction (as obtained by privacy, space, and amenities at the expense of community) does not increase retention. Current evidence, combined with lack of any previous evidence, makes a strong case—if not to support that it doesn't, then to seriously question the military claim that it does.

A Social Paradigm

I've characterized the entire Department of Defense as uniformly supporting a design paradigm focused on individualism and isolation. That is not quite true. Not every branch of service agreed with this philosophy. The Marines, believing that the design trends would negatively affect social cohesion amongst their junior enlisted personnel, parted ways with the other three branches in 1995. They claimed that:

> Because of the isolation provided in private rooms, the Marine Corps believes the 1+1 standard does not allow for the unit cohesion and team building needed to reinforce Marine Corps values and develop a stronger bond among junior Marines.[45]

The Marines prioritized social connection and communal bonds over privacy and isolation. My third argument in this chapter makes that same claim.

I argue that the military is aiming at the wrong target. If the goal is quality of life and retention, satisfaction is a red herring. Instead, barracks should aim to increase the probability of resident social interaction and cohesion. As sociability blossoms, so does health, retention, and incidentally, satisfaction too.

The fundamental error is not philosophical, but rather methodological. The military used surveys, asking soldiers about their physical buildings. The questions were tangible—wondering what it is about the brick and mortar, the carpet and tile, or the number of beds in a room that they didn't like. As you would expect, soldier responses were equally tangible. They wanted space, privacy, and amenities. These are all perfectly fine answers, but to the wrong questions. To increase quality of life and retention, the questions need to be about quality of life and retention.

In 2018, RAND (a research and analysis think-tank for the Department of Defense) conducted such a study, wanting to learn about quality of life for our youngest military members. They sat down with 81 first-term soldiers. The researchers asked them about the best characteristics of life in their unit. The answers were overwhelmingly consistent:

> Soldiers report social bonds or camaraderie as the single "best part" of Army life.[46]

The young soldiers didn't mention the role that barracks design played, acting as influencing force, and working to encourage—or discourage—these social bonds. But it can. And it does.

Figure 3.10 uses the same survey of 828 barracks residents at Fort Hood. Instead of looking at satisfaction as a function of tangible improvements in space or privacy, I wanted to see if sociability also correlates to satisfaction. Figure 3.10 shows the correlation between two survey questions: one, "In general, how satisfied are you with your barracks building?" and two, asking them to rate how much they agree or disagree with the statement "There are lots of people to hang out with in the barracks."

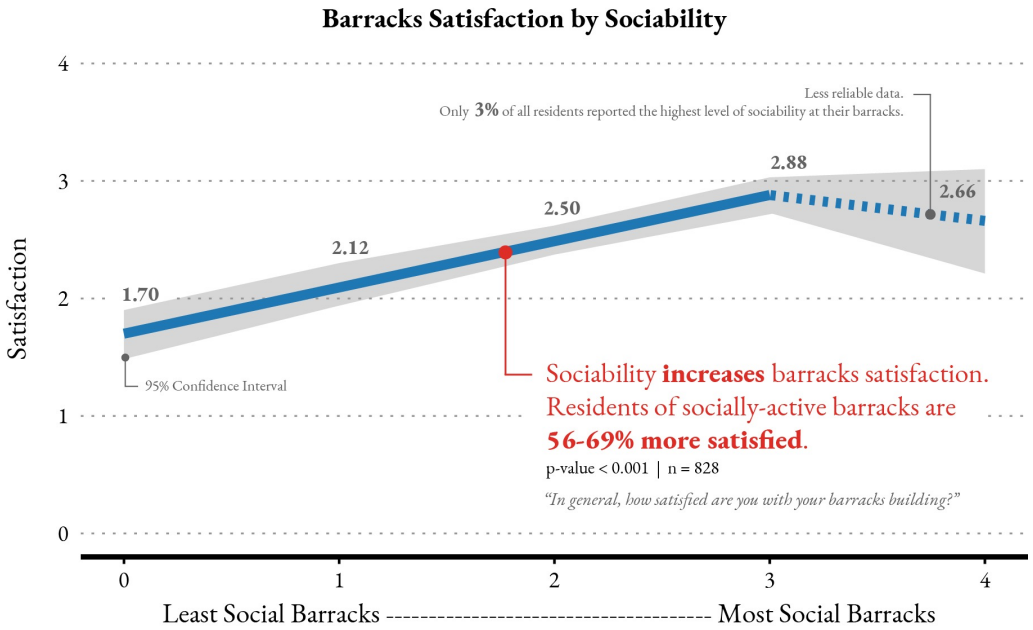


Figure 3.10. Barracks satisfaction as a function of sociability. Raw data courtesy of Delgado-Howard (2018). Graphic created by the author.

It turns out that more square footage and private rooms are not the only variables that increase soldier satisfaction with their buildings.

To learn more about social connection, design, and its impact on soldiers, I flew out to Schofield Barracks, Hawaii. I met with residents and military leaders. My tour started with Mr. Jim Collins, the base architectural historian. While sitting in an old barracks NCO suite—now turned into a corner conference room—he told me a story about the power of connection.

Schofield Barracks is home to the 25th Infantry Division (nicknamed "Tropic Lightning") and has been training ground soldiers since WWII. They also have barracks that date back to before WWI. Sergeant Carroll, and the four other soldiers from the last chapter, live in those barracks. In 1998, the base had three more of these "historic quads," before they tore them down to make way for a new complex of 1995 "1+1's" and 2004 "1+1-E's." In the late 1960s, the old quads were home to Frank Thompson, a green beret Vietnam veteran now living in New York. Mr. Thompson came back to Schofield Barracks every year, recreating a picture of himself in front of his old barracks—sending the photo to a group of his former barracks-mates. It was a tradition. In 1999, he called Jim Collins in a panic. Jim re-told the story to me, saying:

> He said, 'I heard the most terrible news, please tell me it isn't true?' Well, when I told him that what he heard was right—that we demolished those old quads—he broke down in tears over the phone. He was nearly sobbing. This was a green beret from Vietnam who hadn't lived in those barracks in almost fifty years. Those barracks, and the experience and connections he made during his time in them, just meant that much.
>
> I don't think anyone will ever feel that way about the barracks we put up today in their place.[47]

For Frank Thompson, the tears were not about the building. They were about what the building represented. They were about his memories and his social bonds with the soldiers living in the rooms to his left and to his right. It was these bonds that brought Mr. Thompson to tears, and what young soldiers today still describe as the "best thing" about Army life.

These bonds do more than just increase satisfaction. According to Mr. John Napalto, they're also a matter of mental health. As a long time Army architect and planner, he vehemently disagrees with the direction the Army has gone. As he told me:

> Barracks design standards have been evolving—significantly since we've gone away from the Draft—and this evolution has not always been good. We've created problems for ourselves. We've catered too much to these soldier surveys—they always want bigger rooms and more privacy.
>
> The 1 + 1 Standard—or at least, how we've designed for it—is not the way to go. The pendulum has swung too far towards individualization. We've isolated soldiers—separated from each other, separated from NCO's, separated by technology—and isolation is a soldier's worst enemy. It hurts communication, and it hurts them psychologically.[48]

To test Mr. Napalto's claim, I returned to the soldiers at Fort Hood, wondering if physical isolation leads to loneliness. As it turns out, sociability had both a strong and significant effect (Figure 3.11). More space and amenities didn't make a difference in reducing loneliness, but social connection did.

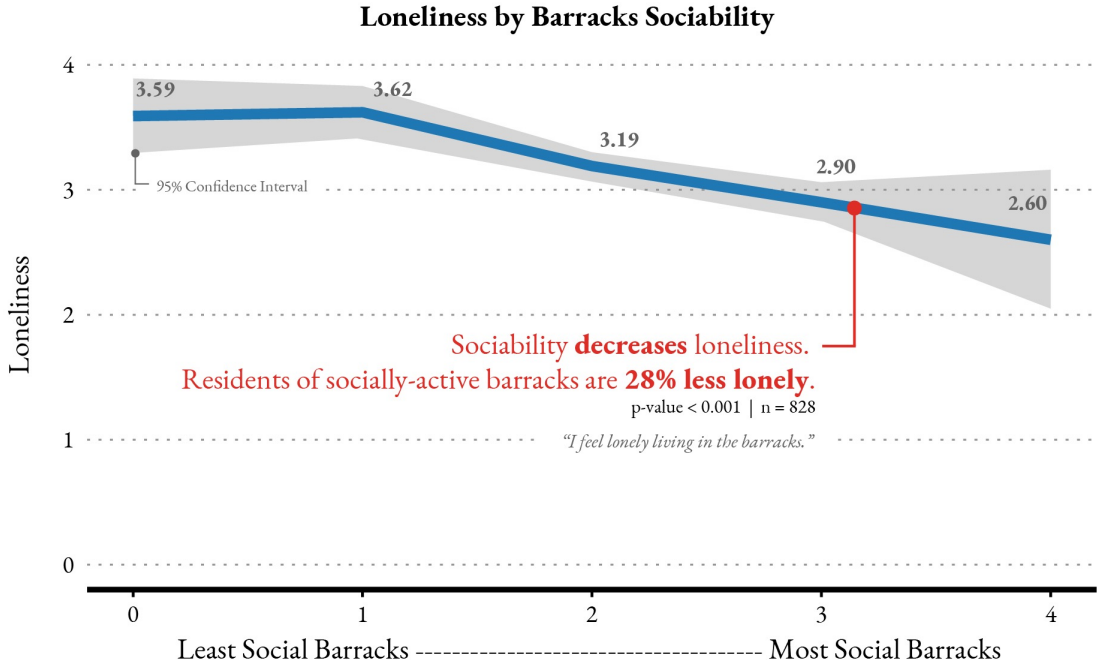


Figure 3.11. Resident self-reported loneliness as a function of perceived barracks sociability. Raw data courtesy of Delgado-Howard (2018). Graphic created by the author.

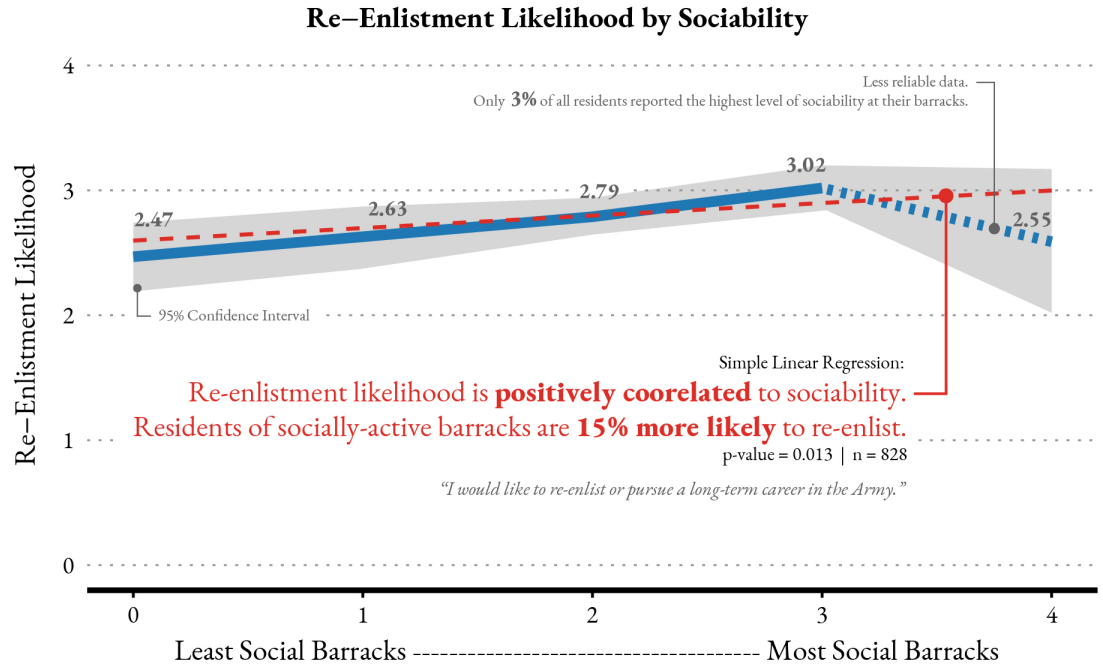


Figure 3.12. Resident self-reported re-enlistment likelihood as a function of barracks sociability. Raw data courtesy of Delgado-Howard (2018). Graphic created by the author.

Important to where we started this chapter, sociability is also a positive—and statistically significant—influence on retention. The more soldiers experience this "best thing" or develop the bonds that Mr. Thompson had, the more likely they are to keep wearing their uniforms.

My third argument claims that "satisfaction as the target" is the wrong strategy for the right concept. Barracks residents deserve a high quality of life, and the military has a national security interest in seeing that they do. But square footage, walls, and refrigerators are not a causal force. People are. In parts two and three, I try to prove it.

Conclusion

Let's go back to the Indiana University of Pennsylvania campus.

For IUP, fewer students are one problem, but another is the effect that the new dormitories are having on those who came. Donovan Daniel, a student resident adviser who has served in that role for both the old and the new dorms, says that "It's become a lot harder to get residents to come to programs [in the new dorms]."[49] Reginald Bolding Jr., another student resident adviser, has an idea why: students never leave their rooms. According to Reginald, the new dorms are less social. What does happen, is happening behind suite doors, he says.[50]

Campuses across the country are noticing what the Marines predicted back in 1995—designing for "individualism and isolation," leads to isolated individuals. Bowling Green State University in Ohio is one of those schools. In 2010, right when IUP finished its "Residential Revival" project, they were planning new dormitories of their own. Instead of joining the "amenities arms race," they followed the Marines, and broke with their peers. According to those studying the project:

> [The] new residence halls for underclass students emphasize community spaces over personal spaces. The halls have relatively smaller rooms but are also outfitted with attractive lounges, study spaces, and kitchenettes that encourage students to spend time outside of their rooms interacting with their peers. With the introduction of the new residence halls, Bowling Green saw a noteworthy increase in retention rates, from 69% in 2012 to 78% in 2015. While other changes also contributed to this rise in retention, campus leaders point to the new residence halls as a critical factor.[51]

While only one anecdotal story, it starts to paint a picture. A picture supported by data.

In part one of this dissertation, "Building the Barracks," I walked through the history of barracks design—from the Old Stone Barracks in Plattsburgh, New York to the 2/1 Market-Style standard. I explored the social effects of post-All-Volunteer Force architecture and planning. I saw how designing for terrorism can decrease the opportunities for casual contact, and how designing to satisfy the volunteer can physically isolate residents.

I argue that the military needs a new design paradigm—one not focused on individuals, but on communities. What I haven't shown are the details. The analysis thus far has been coarse and partly speculative. In parts two and three, I move from the macro to the micro. I travel to North Carolina, Washington, and Hawaii to dissect how architecture can influence social interaction, and how interaction can lead to health and retention.

PART TWO:
PATTERNS OF INTERACTION

Human connection is the foundation on which we build everything else.

- Dr. Vivek H. Murthy
19th US Surgeon General

Design is a social instrument. Built environments shape social relations. This is true for every place that we live and everywhere that we go.

The problem is an information deficit. If people understand just how much design matters, they'd care. And if they cared more, they'd change.

- Sarah Williams Goldhagen
Welcome to Your World

CHAPTER IV:
THEORIZING SOCIABILITY

> Call it a clan, call it a network, call it a tribe, call it a family. Whatever you call it, whoever you are, you need one. You need one because you are human.[1]
>
> Jane Howard
> *Families*

Rob McDowell wakes up to a beautiful view. He lives twenty-nine floors above the bustling downtown streets of Vancouver's Yaletown neighborhood. Every morning, he can sip a freshly brewed cup of coffee and look out through his floor-to-ceiling windows to see the ocean, the mountains, and the islands that dot the West side of Vancouver's waterfront. He has privacy, status, and views—tremendously spectacular views. But he was missing something. He wasn't happy. And he wanted to move.[2]

The story of Rob McDowell is not mine. It comes from Charles Montgomery's excellent book, *Happy City*, and illustrates how changing where you live can simultaneously change your social networks. It's the perfect segue into the subject of this chapter: environment-behavior theory.

But, first, before we get to the theory, back to Rob.

Rob's commute to work starts and ends the same way. From his front door, he takes a few short steps down a narrow hallway to the elevators, drops twenty-nine floors, walks through the spacious lobby, past the front desk, out the glass double-doors, down six steps, and he's on the corner of Pacific and Richards Street—experiencing the sights, sounds, and smells of downtown Vancouver. On the way home, he takes the same path in reverse. Each day he goes up and down, in and out. Yet, he knows no one. Hundreds of people live in his building, but he rarely recognizes anyone and doesn't know his neighbors. As Montgomery writes:

> McDowell felt increasingly claustrophobic. His view was no salve for solitude. "You go up the elevator, into your apartment, the door closes, and there you are, stuck alone with your beautiful view," he said. "I began to resent it."[3]

There are only nine other small, 500-square-foot units on Rob's floor, and to maximize leasable space, the architect made the hallway as short and narrow as possible. The odds of one of his neighbors leaving in the same 90-second window of time that it takes for the elevator doors to open is low. In the back, each condominium has an outdoor balcony, but the tower is circular—designed so each person has an incredible view, but none can see each other. Neither inside nor outside, front nor back provides opportunities for social interaction.

And then after nine months of living in his high-rise condo, something interesting happened. Rob moved. But not to a new part of the city, or even to a new building. He moved within the same complex—The 501—just twenty-six floors closer to the street and into one of the twenty-two townhouses attached to the base of the tower (see Figure 4.1).

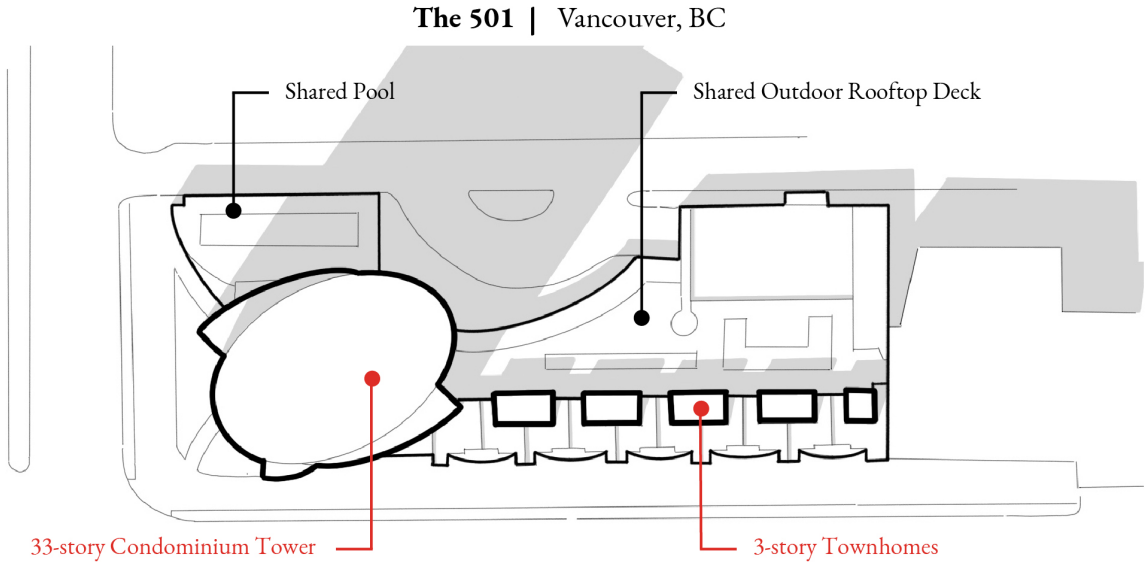


Figure 4.1. Site plan of The 501 residential complex in Vancouver, BC. Graphic created by the author.

According to Montgomery:

> Within weeks his social landscape was transformed. He got to know *all* his new neighbors. He joined in the weekend cocktail and volleyball sessions in the shared garden. He felt as if he had come home.[4]

The question is, why? Clearly, Rob was eager for social contact—that's a large part of why he moved—but were his new neighbors inherently more social and outgoing than his old ones? Or did the design of the physical environment influence his expanding social calendar?

Rob McDowell could have joined the weekend cocktail and volleyball sessions months earlier. The third-floor rooftop garden was a shared space—equally open to all residents of The 501, not just those living in the townhomes. His new neighbors would have gladly welcomed him. But Rob and the other tower-dwellers never joined. He was too detached. He was twenty-six floors away, and he

didn't know anyone.

After moving, Rob knew them all. The townhomes overlooked the shared garden, and each had a raised semi-private front porch. The shared outdoor space and the semi-private porches made it easy for residents to go in or out, and provided them options to linger in either area without breaking social norms. It gave Rob and his townhome neighbors a reason to occupy their mutual paths of daily travel, and allowed for easy, casual interaction. As Montgomery writes:

> These porches were a soft zone, where you could hang out or retreat as you wished. What would happen if a tower dweller decided to just "hang out" in the hallway in the adjoining tower? Not only would he be bored and uncomfortable, but eventually someone would call the police.[5]

In the tower, you were either in private space or public space—there was no in-between. The edges between the two were hard, functionally and physically separated by sterile horizontal and vertical circulation that encourages continuous movement. Opportunities for repeated, casual interaction were scarce or non-existent. In the townhome, however, the opportunities were effortless, and Rob's social networks blossomed. These new social ties are not just a nice story. According to Montgomery:

> Nine years on, McDowell babysits his neighbors' kids and keeps spare keys for their doors. His fellow townhouse dwellers dominate the building's management board. They vacation together. Where the tower pushes people apart, the townhouse courtyard draws them closer.[6]

In this chapter, I explore why we all need social connection, and how spatial context influenced the formation of Rob's new social ties. I use theory as a lens to see how design can limit or cultivate contact opportunities, encourage or discourage social interaction, and increase or decrease the probabilities of forming social bonds.

The Theory Before the Theory

What is theory? Why is it important? And what are my positions?

Relativity, evolution, the big bang, plate tectonics—these are all famous scientific, or "positive," theories. Positive theories are a means of explanation. They attempt to describe *why* something happened, and predict what *will* happen in the future. They are not untested hunches, but rather, a system of rigorously studied ideas or statements that explain how the world works in a value-free way. The theory of evolution by natural selection is not presuming or advocating that natural selection is the *best* way for species evolution to occur, or even that evolution *should* occur in the first place. It is only proclaiming that it does, and that natural selection is the mechanism by which it happens.

The power of theory is two-fold. First, it compresses data and knowledge into something

concise and easily communicable.[7] If we go back to the theory of natural selection, the idea is almost palpable. It is general, easily explained, and you don't need a Ph.D. in biology to understand how it works. And second, theory allows for transferability. As Amos Rapoport—architect, theorist, and one of the founders of environment-behavior research, claims, "only theory can be transferred, not specifics."[8] The value of positive theory is thus in its explanatory power.[9] Thinking back on Rob McDowell, if environment-behavior theory can help explain why his opportunities for social interaction increased after moving from the tower to the townhouse, then designers can transfer that theory to new, yet-to-be-designed places. Designers can affect future outcomes and future opportunities for interaction. That is the power of theory.

Positive theory does not stand alone, however. There is also "normative" theory, which instead of solely looking to explain or predict, adds value judgments. Jon Lang, the author of *Creating Architectural Theory*, explains it best. He writes:

> Normative theories are built on positive ones. They are based on perceptions of how the world works, but they are based also on perceptions of good and bad, right and wrong, desirable and undesirable, what is working well and what is working badly.[10]

Architecture is full of normative theory. Design "principles," "standards," or "manifestoes" on what makes *good* landscapes, *better* buildings, or *optimal* urban spaces all come from normative ideological positions.[11]

Now, before I go any further, I want to re-visit my two initial research questions. First, I ask how design—the architecture and planning of military barracks—affects resident interaction and social cohesion. And second, I ask how different levels of cohesion correlate to rates of re-enlistment, health outcomes, and the incidents of suicide for barracks residents. Neither of these questions are normative. They are positive. They ask for an explanation without imposing values or beliefs. And they ask for theory.

My positive theoretical position is that to understand how the built environment influences people's lives—or why Rob McDowell's physical change encouraged a corresponding social change —I need to understand the environment-behavior relationship of social interaction.

But, I also take a strong normative stance. Some paragraphs may even read like a "manifesto," calling for an architectural revolution. As such, my normative position builds upon my positive one, only adding that after we expand our knowledge of the environment-behavior relationship, we need to use it to design better—and more social—barracks.

This chapter deals with my positive position, and the first of my two research questions: understanding environment-behavior theory, and what it can teach us about social connection.

Why Social Connection?

Throughout the past few chapters, you have probably picked up on an assumption lurking in the background—a not-so-subtle implicit claim that establishes the foundation for my arguments. I claim that social connection is a good thing, and imply that connection correlates to positive physical and emotional benefits. So, before we dive into environment-behavior theory and how it helps to explain the link between architecture and social interaction, I want to spend a few moments to expose why social connection is a worthwhile design goal in the first place.

In 1938, Harvard University began what is now one of the longest running longitudinal studies on health and wellness.[12] Over eighty years later, it is still on-going, tracking existing subjects and enrolling new ones. Participants of the study diverge in nearly every measurable life characteristic imaginable. Some amassed incredible wealth while others lived in poverty. Some held high-profile careers in politics or medicine, while others became career criminals. Some lived long lives, and others died far too early. And some were healthy and happy, while some submerged into (or recovered from) extreme emotional or physical distress. For his 2020 book, *Together*, Dr. Vivek Murthy, a former US Surgeon General, met with the study's current director, Harvard professor Dr. Robert Waldinger. Dr. Waldinger shared that while he anticipated the findings of nutrition, exercise, and genetics as important factors in health and happiness, he never anticipated the magnitude and significance of social relationships.[13] As Dr. Murthy writes:

> According to Waldinger, the Harvard data showed that inner-circle relationships were better predictors of health and happiness throughout life than IQ, wealth, or social class. Having someone you can call for help at three a.m. can be a buffer against mental and physical decline. "The people who were the most satisfied in their relationships at age fifty," Waldinger said in his TED talk about the study, "were the healthiest at age eighty." These close relationships also are our primary defense against intimate loneliness.[14]

A 2010 study by Dr. Julianne Holt-Lunstad confirmed these findings. In her meta analysis of 148 individual empirical studies tracking over 300,000 people across the globe, she found that:

> Individuals with adequate social relationships have a 50% greater likelihood of survival compared to those with poor or insufficient social relationships. The magnitude of this effect is comparable with quitting smoking and it exceeds many well-known risk factors for mortality (e.g., obesity, physical inactivity).[15]

In other words, social disconnection has the same harmful effects to your health as picking up a cigarette habit. And it is more harmful than a poor diet, lack of exercise, and excess alcohol consumption. As far as your health is concerned, you would be better off eating only deep-fried foods, never leaving your couch, or becoming an alcoholic than losing your social network—a sobering statistic.

These are just two studies in a long line of research on the dangers of social disconnection. Decades of empirical research links disconnection to heart disease, high blood pressure, poor sleep, aggression, substance abuse, anxiety, depression, and suicide (amongst many others).[16] As the late Dr. John Cacioppo, the founder of social neuroscience and preeminent authority on loneliness, writes:

> Health and well-being for a member of our species requires, among other things, being satisfied and secure in our bonds with other people, a condition of "not being lonely" that, for want of a better word, we call social connection.[17]

Dr. Cacioppo's quote highlights the importance of terminology. While loneliness, disconnection, and isolation could easily masquerade as one another in many disciplines, they are not the same. Loneliness is the subjective feeling of lacking social connection—or feeling disconnected. Like Dr. Cacioppo in the quote above, I use the two terms—loneliness and social disconnection—interchangeably. If connectedness was on one end of a Likert scale, loneliness or disconnection would be on the other. They are two ends of a single spectrum, like happy and sad, or large and small.

Isolation, however, is distinctly different. While loneliness describes a subjective feeling, isolation is the physical state of being alone or rarely connecting with others. According to Dr. Murthy:

> Isolation is considered a risk factor for loneliness simply because you're more likely to feel lonely if you rarely interact with others. But physically being alone doesn't necessarily translate into the emotional experience of loneliness.[18]

In architecture, one can draw parallels to the terms of density and crowding. Density is an objective physical state, while crowding is a subjective feeling. What "feels" crowded in one person, may not feel crowded for someone else. The same is true of loneliness. Not everyone has the same loneliness threshold. For instance, extroverts may require more connection than introverts to keep them from feeling lonely.[19]

According to Dr. Cacioppo, the feeling of loneliness serves a vital function—working as an evolutionary distress call to steer us back on course to re-connect. He writes:

> Loneliness itself is not a disease; feeling lonely from time to time is like feeling hungry or thirsty from time to time. It is part of being human. The trick is to heed these signals in ways that bring long-term satisfaction. Just as thirst is the prompt that reminds us to keep the body hydrated, loneliness is the prompt that reminds us how much we depend on one another.[20]

When we do not heed that call, loneliness can manifest into a host of life-threatening conditions—from depression to suicide.[21]

As an architect—and not a doctor, epidemiologist, psychologist, or other medical professional—I cannot easily add to this field. I leave that to Dr. Murthy, Dr. Holt-Lunstad, Dr. Waldinger, and the host of other researchers building on Dr. Cacioppo's beginnings. For me, the interesting question is not how social connections affect us, but how our physical environments affect our social connections. For that, we must turn back to environment-behavior theory.

Two Basic Assumptions

As we move away from why social connection is a necessary and worthwhile design goal, and back towards how architecture influences social behavior, I must start with two underlying assumptions (or theories) from sociology. Without them, the rest of the environment-behavior theory we discuss falls apart.

1. *Social contact opportunities and social tie formation are positively correlated.*

This first assumption states that as the opportunities increase for two people to interact socially, the probability that they will develop a social bond also increases. Simply put, it claims that the more you are around someone, the more likely you are to get to know them. Architect Christopher Alexander put it this way: frequent, casual contact is a prerequisite for relationship development.[22] Or as sociologists Peter Blau and Joseph Schwartz wrote:

> Rates of social association depend on opportunities for social contact. It is virtually self-evident that people cannot become friendly unless they have an opportunity to meet… [this assumption] posits that the extent of contact opportunities governs the probability of associations of people.[23]

This may not sound like rocket science, but it is very important. Architecture can only go so far and do so much. As two Harvard sociologists recently published:

> Researchers on tie formation at the individual and dyadic levels largely agree that the probability that two strangers form a tie depends on two separate processes: coming into contact and deciding to associate.[24]

Architecture can influence the likelihood and frequency that these two strangers come into contact, but it cannot influence their decision to associate. This is an important distinction—it establishes the *probabilistic*, not *deterministic* nature of environment-behavior theory. Design does not generate friendships or social cohesion, and it does not turn two barracks-mates into buddies. It can only increase the odds of that happening by changing how likely those two people cross paths.

2. *Propinquity increases opportunities for social interaction.*

This second assumption states that opportunities for social interaction increase as distance

(physical and functional) decreases. The closer you are to someone, the more opportunity you have to interact with them. It follows Tobler's first law of geography, which claims:

> Everything is related to everything else, but near things are more related than distant things.[25]

This second assumption builds upon the first and adds a second link to the theoretical chain. Blau and Schwartz connected them, writing that:

> Spatial propinquity, because it increases the chances of fortuitous contacts, enhances the probability of friendship.[26]

Thus, propinquity increases interaction opportunities, and increased opportunities lead to a higher likelihood of forming social ties. From marriage to friendship, researchers have empirically confirmed this assumption over and over.

In 1932, James Bossard—then a professor of sociology at the University of Pennsylvania—conducted a study of 5,000 consecutive marriage licenses in Philadelphia to see what effect residential proximity had on how people found their spouses. He was directly testing our assumptions above. Explaining his research question, he writes:

> To what extent do the constant and repeated contacts of the neighborhood, in the drug stores, the shopping places, the churches, the street corners, etc., lead to more romantic relationships? [27]

Dr. Bossard found a stunning connection. Each subsequent increase in distance (as measured by the number of blocks between two people's homes) decreases the likelihood that those two people will marry. As he states, "Cupid may have wings, but apparently they are not adapted for long flights."[28]

It is not just marriage where propinquity matters. It also affects interaction and friendships in nearly every setting tested. In 1975, two researchers studied the communication patterns of over 5,000 workers in seven different research laboratories. They wanted to know whether the distance between desks affected the frequency of interaction between workers—especially after controlling for organizational structure, common tasks, or shared research backgrounds. As it turns out, physical distance mattered a great deal. Communication between two co-workers fell sharply as their desks got further apart, reaching asymptotic levels after 25-30 meters.[29] At that distance, workers were just as likely to communicate with someone that was on a different floor, a different building, or even a different state. Essentially, after thirty meters, it was almost as if the other co-workers weren't even there.

Researchers found similar effects in housing. Shortly after World War II, Massachusetts Institute of Technology (MIT) constructed two adjoining housing complexes for 270 married student veterans. The housing consisted of a largely homogenous population randomly assigned to units with varying physical properties. It was a perfect situation for research—much like the Army

barracks I explore in the following chapters. Three MIT psychologists—the famed Leon Festinger among them—wanted to know about the effect of housing location on the formation of friendships. Their findings have since become one of the most widely-cited works on propinquity.

Festinger and his team asked residents a simple question: who their friends are. In addition to differences between the housing complexes, they also found differences within each complex, and within each building. Westgate West (one of the two complexes) particularly reveals the effects of propinquity. Its buildings are designed much like a balcony-accessed barracks. They are each two stories tall, with five units per floor, and entered from an exterior corridor running the full length on both levels. After the researchers mapped the friendship ties to how far apart those friends lived from one another, the effects of distance became unmistakable (see Figure 4.2).

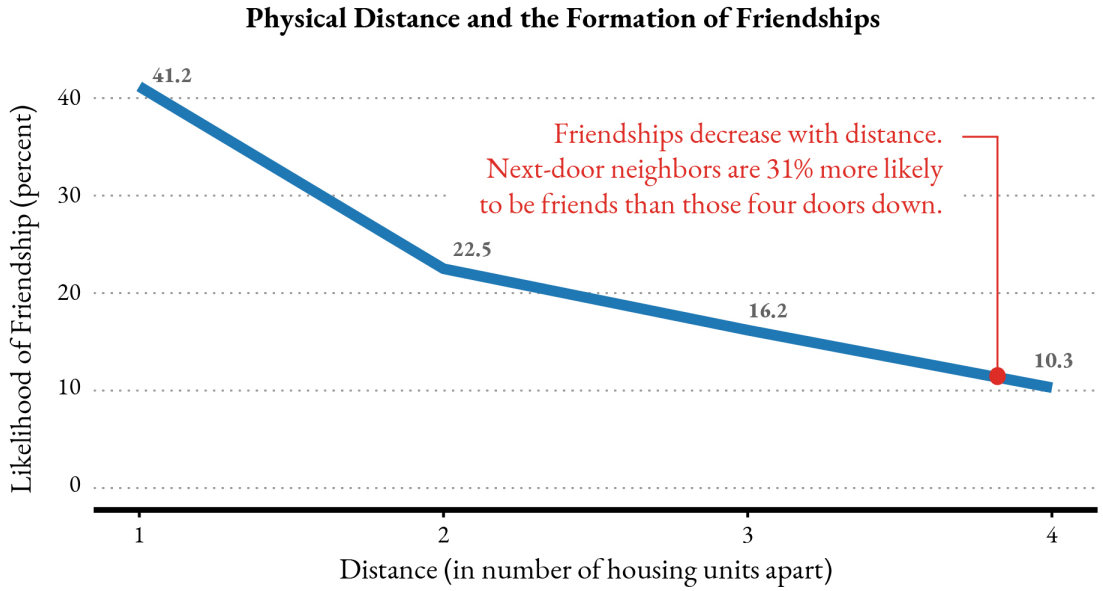


Figure 4.2. Physical distance and the formation of friendships. From Festinger et al. (1950). Graphic created by the author.

Figure 4.2 comes straight from the data table in the research team's publicized findings—a book by the name, *Social Pressures in Informal Groups*. As they write:

> The data show unequivocally that within the floor of a Westgate West building there is a high relationship between friendships and physical distance.[30]

As it turns out, with each increasing foot of separation, residents were less and less likely to be friends—despite units only sitting twenty feet apart and using the same balcony. Similar studies of different housing types in different geographic locations continuously find similar results. Study after study shows that distance decreases both interaction probability and the likelihood of social bonds.

For Rob McDowell, the move to the townhome decreased the functional distance between him and his neighbors (assumption two). He was always physically close, but now, the places of repeated,

casual interaction were literally just outside his front door. This increase in propinquity led to increased opportunities for social contact, and increased the probability of forming social ties with his neighbors (assumption one).

But these two assumptions only tell part of the story of how design influences social interaction potential. To understand the rest, we need to dive deeper into environment-behavior theory.

Environment-Behavior Theory

Environment-behavior theories build upon the idea that human behavior happens somewhere. It does not occur in a vacuum. Behavior is never void of spatial context, but enmeshed in space. You cannot separate how people behave or interact with one another from the environments in which those behaviors or interactions take place. Thus, environment-behavior theory says that if you want to learn about behavior, you must also study the place in which it occurs. They are not two separate things, but linked—each exuding some level of influence on the other.

Different theories have different takes on this relationship, however. My research centers on three: affordances theory, behavioral settings theory, and pattern language theory.

Before we explore each in detail, it is necessary to discuss the four macro-level, basic positions that one can take with respect to the environment-behavior relationship:

1. The **free-will** approach
2. The **possibilistic** approach
3. The **probabilistic** approach
4. The **deterministic** approach

On one end of the extremes, the free-will approach claims that the environment has no impact on behavior. They are completely separate—physical space or place does not influence someone's behavior at all. This is a difficult position to take. Fundamentally, environment-behavior research rests on the idea that there is a relationship between environment and behavior. Thus, as you might imagine, this worldview is not popular in the field. It is also difficult to defend, given our current knowledge and decades of empirical research. If we look only at our two assumptions, for example, it is an unconvincing argument to claim that the environment does not affect behavior when study after study reports with statistical confidence that propinquity correlates to friendships, marriage, or co-worker interaction. And that is only one environmental condition.

On the other extreme, the deterministic approach says that the environment (or in our case, design) is the primary driver of behavior. As Lang writes:

> The deterministic approach to the consideration of the environment-behavior relationship implies a simple cause-effect relationship between the two.[31]

The claim goes something like this: insert someone into a particular environment (the cause), and a specific outcome behavior (the effect) will ensue. If we take the MIT study as an example, a determinist would say that moving one person next-door to another will lead to friendship. Like the free-will approach, determinism is an untenable position. Propinquity certainly increases the odds of social ties, but it was far from deterministic—for the MIT veterans, friendships only occurred 41 percent of the time.

That brings us to the two positions in the middle. First, let's talk about the possibilists. They see the environment as a provider of allowable behaviors, but nothing more. To them, the environment determines the limits of possibility, but exudes no influence amongst the possibilities provided. Let's consider an example. Imagine an empty bedroom in Rob McDowell's downtown high-rise condo. Inside sit two chairs back-to-back. One faces a blank white wall to your right, and the other looks out a window to your left. The chair on the left provides a view of the Vancouver skyline, the chaotic streets below, and the serene mountain landscape in the distance. Perhaps both chairs are the same, or maybe the one in the window has a big, comfortable cushion. To the possibilists, none of that matters. The environment allows two places to sit and a single view. There is no claim that the comfortable seat by the window will encourage more frequent or more prolonged use. They only claim that the environment creates possibilities. The relationship with behavior is binary—behaviors are either allowed or not allowed.

That leaves the probabilists. I am a probabilist, and this dissertation takes a probabilistic position. My beliefs follow Lang's when he writes:

> "Given an individual A with attributes a, b, c, set in an Environment E with characteristics d, e, f, and with Motivation for action M, it is probable that A will perform Behavior B." This position recognizes the uncertainty of the systems within which human behavior takes place and within which environmental designers act, but it assumes that human behavior is not entirely capricious.[32]

To probabilists, the environment can signal, it can encourage, and it can increase or decrease the likelihood that certain behaviors occur. The probabilistic position argues in odds and chance based on past empirical studies. In Rob McDowell's hypothetical two chair bedroom, the possibilistic position sees only allowed and disallowed behaviors, while the probabilistic position sees an environment that increases the likelihood of a specific behavioral outcome (sitting by the window) because of its design.

For architects, the probabilistic position claims that design details matter. Each decision large or small—the width of the balcony, the location of the stairs, the orientation of the paths, the number of steps, the view from the window—changes the probability of who meets whom, where they meet, and how often they're likely to cross paths. It changes the odds of social connection, and it

influences the probability that Rob McDowell, Specialist Mullen, or Sergeant Kroll know their neighbors. What this probabilistic position doesn't tell us, is how.

Theory One: Affordances

Three theories of increasing complexity and increasingly probabilistic positions help us analyze the question of "how"—that is, how the built environment influences the social environment. These three theories are affordances, behavioral settings, and pattern language.

Affordances theory deals with how we perceive and experience our environments. The idea is that all physical environments contain multiple "affordances." These affordances provide opportunities for certain behaviors. A bench *affords* a place to sit. A window *affords* a view. A park *affords* a place for reflection, or a picnic, or an area for recreation. Affordances are non-verbal clues enmeshed or expressed through the physical features or configuration of our environment.[33] Clues that allow, not force, behavior.

J.J. Gibson, the founder of ecological psychology, coined the term in the 1970s. To Gibson, the environment—through its composition and configuration of natural and human-made features—offers individuals an array of possible opportunities for behavior. As Jon Lang writes:

> The concept of affordance is a simple yet powerful one. It is fundamental to environmental design theory. Different patterns of the built environment afford different behaviors and aesthetic experiences. The affordances of the environment thus limit or extend the behavioral and aesthetic choices of an individual depending on how environment is configured.[34]

Affordances theory is *possibilistic*. According to the theory, the environment sets the range of afforded behaviors, but it is up to the individual to decode the opportunities and decide what to do, or not do, with them. Not all individuals will pick up on the same opportunities, and not all individuals will act on what they perceive. The theory itself does not insert probabilities, but rather, establishes the possibilities. Lang captures the crux of this theory, writing:

> Even though an environment affords a particular set of behaviors, this does not mean that the behaviors will take place, even though the people perceive the affordances and are competent enough to use them. On the other hand, if the affordances are not there, the behavior cannot take place.[35]

The last sentence is particularly important to our analysis. For built places, the designer plays a critical role in determining the bounds of possible behaviors. A room with a view is only *afforded* with a window, and social gathering is only *afforded* with a place to gather. For the barracks of Joint Base Lewis-McChord, Fort Bragg, and Schofield Barracks, I will use this theory to compare the ranges of possible behaviors, and ask what clues, or affordances, either allow or prevent social interaction amongst residents.

Theory Two: Behavioral settings

Like affordances, behavior settings theory is a means of analyzing the environment-behavior relationship, but it sees that relationship in a slightly different light. Instead of viewing the environment as solely a provider or inhibitor of opportunities, this second theory focuses on the "setting"—the environment—and how it encourages or discourages certain behaviors.

The experiments of Roger Barker and his long-time colleague Herbert Wright led them to formulate behavioral settings theory in the late 1940s. At the time, they were working with young children and noticed that particular behaviors tended to consistently occur in a given environment. Describing Barker and Wright's experimental outcomes, Sarah Williams Goldhagen writes:

> Barker and his colleagues found that they could better predict a child's conduct at a given time by specifying her environment and its action setting than they could by delving into her individual, psychological profile. Barker wrote that the "variability in behavior of different children in the same setting at a particular time was smaller than the variability in behavior of the same child across his or her entire day."[36]

This revelation led to a theory. According to Barker and Wright, behavior "settings" consist of four different elements: a recurrent activity (or pattern of behavior), a milieu (the particular layout of a place), a synomorphy (the congruence between the activity and the milieu), and a specific period of time.[37] How these four elements interact shapes—to some degree—the behavior that takes place. Not all of these elements are influenced by design or the designer, however. Geographical and climatic forces, like an unseasonably brisk and windy day, influences the behavior of beach-goers. And social forces, like the ritualistic patterns of religious services such as standing or kneeling, silence or singing, and joining hands or the bowed heads of prayer, influence the behavior of others. There are also physiological forces, perceptual forces, and physical forces. These physical forces are where architects most directly see the influence of their decisions on the behavior of those who occupy their spaces. Phil Schoggen, an understudy and collaborator of both Barker and Wright, published a book on the theory aptly titled *Behavior Settings* in 1989. In the book, he describes the theoretical stance on physical forces, writing:

> Physical arrangements can enforce some patterns of behavior and prevent others. School corridors, for example, allow locomotion in certain directions only, their narrowness prevents the playing of circle games, and the absence of chairs or ledges encourages standing and walking and discourages sitting or lying. The layout of streets and sidewalks, the size and arrangement of rooms, and the distribution of furniture and equipment are often important factors in coercing certain features or standing patterns of behavior and in restricting others. The physical forces impelling and hindering behavior do not have to be absolute, like a wall that cannot be breached; they can be effective by making actions of some kinds easier than others.[38]

Like affordances, behavior settings theory rests on the idea that particular environments are consistently associated with specific behaviors. The main difference between the two is the "degree

of coercion granted to the physical environment in shaping human activity."[39] Behavior settings theory assigns the environment more coercive power over behavior. It moves from a *possibilistic* position to a *probabilistic* position by recognizing the environment's ability to "nudge."

I use these two theories as compliments to one another, not as opposing forces. I look to what the barracks afford, before examining how they persuade. For example, do certain spatial layouts nudge residents towards greater opportunities for routine chance encounters? Or do certain spaces, like that of a shared balcony or landing, encourage subconscious surveillance, acting as a catalyst to draw residents together?

Theory Three: Pattern language

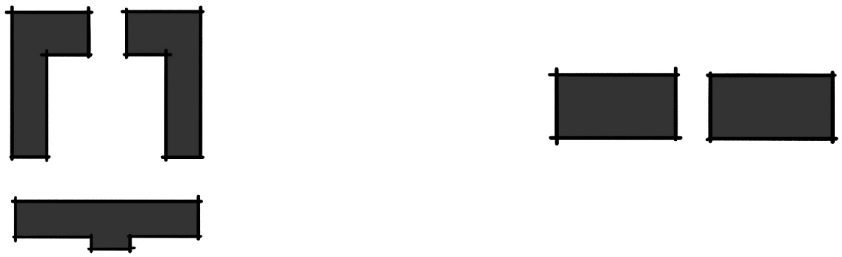
Lastly, there is pattern language theory. Like the other two, it links social behaviors to physical geometry. This theory claims that "every place is given its character by certain patterns of events that keep on happening there. These patterns of events are always interlocked with certain geometric patterns in the space."[40] The central idea is the concept of "fit"; different environmental or design patterns *fit* different patterns of behavior.[41] The stronger the fit, the easier it is for that pattern of behavior to occur. The weaker the fit, the harder it is to overcome this environment-behavior mismatch. In this way, pattern language theory is very similar to the behavior settings idea of synomorphy—the congruence between behavior and space. The two theories also hold the same probabilistic ideological view. Neither makes any deterministic or causal claims. Pattern language theory is explicit in its position: geometric "patterns" do not cause behavior; they only increase the likelihood of specific behavioral outcomes.[42]

As opposed to the other two theories, pattern language is much more firmly rooted in the design fields. Christopher Alexander, architect and retired professor at the University of California at Berkeley, published *A Pattern Language* in 1977. The 1,215-page book contains a collection of 253 patterns of socially active places. Each pattern is empirically driven and connected to numerous other patterns. In providing a manual of how to use the book, Alexander writes that each of the 253 sections describes:

> the empirical background of the pattern, the evidence for its validity, the range of different ways the pattern can be manifested in a building, and so on. Each pattern is connected to certain "larger" patterns which come above it in the language; and to certain "smaller" patterns which come below it in the language… In short, no pattern is an isolated entity.[43]

Pattern language theory almost exclusively focuses on physical forces—the geometric "patterns" which correlate to certain behaviors. The theory is probably best explained with an example from the book. Pattern 106 is "Positive Outdoor Space." For this pattern, Alexander provides a graphic illustration between positive outdoor space (left) and negative outdoor space (right).

Pattern 106 | Positive Outdoor Space



This space can be felt: it is distinct. *This space is vague, amorphous, "nothing."*

Figure 4.3. Pattern 106: Positive Outdoor Space. From Alexander et al. (1977).

Describing the pattern and its empirical support, Alexander writes:

> Outdoor spaces which are merely 'left over' between buildings will, in general, not be used. Positive spaces are partly enclosed… Negative spaces are so poorly defined that you cannot really tell where their boundaries are… We put forward the following hypothesis. *People feel comfortable in spaces which are "positive" and use these spaces; people feel relatively uncomfortable in spaces which are "negative" and such spaces tend to remain unused.* The case for this hypothesis has been most fully argued by Camillo Sitte, in *City Planning According to Artistic Principles*… Clare Cooper has found the same thing in her study of parks: people seek areas which are partially enclosed and partly open—not too open, not too enclosed.[44]

Pattern language is not only a manual of assembly, providing empirically supported geometrical patterns proven to encourage socially active outcomes (in this case: the use of outdoor space), but it is also a theory of disassembly.

Let's reconsider Rob McDowell's changing physical and social landscape. In his high-rise Vancouver tower, the transition from public to private space was stark and dramatic. He was either in one or the other. In the townhome, the transition was gradual. The raised semi-private front porch was clearly his territory, but it also partially sat in the public realm. He could simultaneously occupy both worlds at once. According to Rob, this privacy gradient allowed him to interact more frequently with—and develop social ties with—his neighbors. But why?

Affordances theory would claim that the physical environment of the tower did not allow for frequent interaction with his twenty-ninth floor neighbors. Neither the front doors nor the back balconies *afforded* opportunities for casual or consistent contact. Behavioral settings theory would look more closely at the details, moving its analysis from binary possibilities to probabilisitic likelihoods. It would claim that the short, narrow hallways absent of natural light or places to stop encourages linear travel and discourages any two people from occupying the space. The theory would point to the absence of use, and thus the low likelihood of contact, as a rationale for his lack

of neighborly interaction. Lastly, pattern language theory would point to pattern 127, "Intimacy Gradient." According to the theory, "in every building the relationship between the public areas and private areas is most important."[45] Alexander goes on to say that spaces which are homogenous in privacy degree, or provide no gradient between levels, eliminate "all possible subtlety of social interaction in the building."[46] For Rob, he was in either public space or private space. There was no in-between.

The power of theory is in its ability to explain and transfer—to understand the environment-behavior relationship better and apply that understanding to new places. As we transition into the barracks over the next two chapters, theory provides a lens to view—and postulate—why some physical characteristics correlate to different social outcomes.

CHAPTER V:
UNSOCIAL SECURITY

US Army Corps of Engineers Protective Design Center
Omaha, Nebraska

My interview with Mr. Phil Delainey was nearly two hours long. We sat on either side of his desk with a tape recorder between us, but the discussion was far from rigid or reserved. It was casual and comfortable—like a conversation between two co-workers on a late Friday afternoon, both ready for the weekend and neither wanting to return to their cubicles. Inside Mr. Delainey's small private office was a desk, two chairs for visitors in the front, and a six-foot-tall bookcase in the back. It wasn't fancy, but it wasn't lacking either.

Phil started at the Protective Design Center—a specialty branch within the US Army Corps of Engineers—in 1986. He was one of the Center's first hires and an author on its first publication—a 1987 security engineering handbook. As he walked me through each step in the chronological history of the Department of Defense antiterrorism policy, he would reach behind him and pull down a document from his bookshelf. Thumbing through each old standard, he told me stories about the context which initiated the need for a policy change and what they—the writers—were trying to achieve with each new version. It was almost as if the act of holding the old document and paging through the words he once wrote allowed his memories to come rushing back.

Over the next two hours, he told me the complete history of antiterrorism design policy—from the Center's first publication in 1987 to its latest revision in December 2018. As our historical journey caught up to the present day, I asked him one final reflective question.

"Have you noticed any changes in the design of installations—the buildings themselves or their planning layout—which you attribute to the standards?" I asked.

His answer was long, contemplative, and remarkably frank. He spoke about the direct impact of specific measures—like relocating a building's mechanical equipment and adjusting base entry control gate design—but also, the unintended consequences of others. The unintended consequences were the most interesting. They revealed the hidden stories—something you could never learn by reading the published standards or analyzing base architectural changes. In particular,

he said:

> Once [antiterrorism policy] started becoming ingrained into standard design practices, you began to see things change. So what you have are areas of the installation that were designed pre-standards that have parking right up against them, and then you have buildings constructed according to the new standoff rules. And for the longest time, we had standoff distances at 82 feet. Frankly, we thought that 82 feet was beside the point. It was so far away that we figured surely the designers and going to conduct a [blast] analysis on every new building to bring it in closer.[1]

My ears perked up. I was surprised, and I had to clarify. *"Wait, so actually the writers of the policy–you guys–had no intentions of designers using 82 feet for building standoff?",* I asked.

> No. No, we didn't. But then we noticed people were always going out to 82 feet, and you don't need to do that. Particularly when you're building with concrete masonry, you can get a lot closer than that. But folks would point [to the policy] and say, "it says 82 feet" and stop reading.
>
> So, in 2012, we changed the policy.[2]

For military designers, this revelation may come as a shock. The policy writers listed 82 feet with no intention of designers ever using it. They assumed that the number was so outlandishly oversized, that surely designers will do everything in their power not to follow it. Unfortunately, the designers never got this message. Most—according to Mr. Delainey—saw 82 feet listed in writing, accepted it, and moved on to other issues. Eighty-two feet became the standoff distance default setting—precisely the opposite of its original intent.

Mr. Delainey and his other military counterparts wrote antiterrorism standards to protect people. They did not write the standards to create sprawl through excess or unnecessary standoff. They did everything in their power to generate only positive outcomes—not to create negative ones. But as with nearly every large-scale policy decision, there were unintended consequences. And in 2012, after noticing the unintentional effects of standoff, the writers corrected the error and revised the standards by offering numerous exemptions and linking standoff distance to construction type.

In this chapter, I argue that sprawl is not the only unintended consequence of antiterrorism design provisions. I argue that the standards also discourage interaction and negatively affect social health. These effects are not the result of malpractice or the lack of human compassion. Mr. Delainey and his team of talented engineers do what they do precisely because they care. But instead, they stem from a lack of knowledge. According to architectural critic Sarah Williams Goldhagen, designers are often untrained on the environment-behavior connection. She writes:

> Designers simply lack sufficient knowledge about human-environmental experience. This deprives them of their most compelling argument to advance good design—its powerful effects on human health and well-being.[3]

If designers themselves lack this knowledge, then certainly one cannot fault the six structural

engineers who wrote the antiterrorism policy for not foreseeing the social impacts of architectural changes.

Fortunately, we no longer need to rely solely on foresight. We don't need to guess on how antiterrorism design provisions encourage or discourage social behavior—we have twenty years of policy-compliant development that we can measure.

As Verlyn Klinkenborg, professor of English at Yale, wrote:

You can't prevent yourself from repeating a mistake you haven't noticed.[4]

Klinkenborg was talking about improving your writing, but the philosophy applies here. To improve military barracks or antiterrorism policy, we must first notice its effects. In 2012, the Department of Defense revised the 82-foot standoff language. In 2018, they largely removed the standoff requirement all together (at least for buildings more than fifty feet inside the base perimeter). These changes started with noticing—noticing the effects of policy.

Since the Department of Defense published its interim standards in 1999—the first set of mandatory antiterrorism design requirements—two provisions have remained untouched: unobstructed space (the clear zones surrounding buildings), and the prohibition against exterior balcony circulation. To date, the social impacts of these two provisions are unknown and not factored into policy revision decisions. And while the cost-benefit decision analysis to remove, revise, or retain an antiterrorism requirement considers far more than social impacts, right now, they are not considered at all. They are left off of the decision scale entirely—and treated as zero—as if they do not exist.

But these two provisions do have social effects. And they are not zero.

The Data

Before I examine the effects of antiterrorism design on soldier social connection, I need to make a rather abrupt detour. I need to first look at the data behind my upcoming analysis.

If you were deciding whether or not to water your lawn and I told you that it was going to rain tomorrow, the source of my data would likely influence your decision. You would want to know whether I base my claim on rigorous and robust meteorological models with high historical accuracy rates, or an inner gut feeling based on a blog that I read on how to spiritually connect with mother Earth. The data source behind my claims matters. That is not to say that my gut feeling cannot come true, or the meteorological models cannot be wrong, but simply that the reliability between the two data is quite different. And before you can judge a claim on its own, you must know about the data which supports it.

For my analysis of social connection across barracks, I use the Army's Global Assessment Tool (GAT)—an online survey to measure soldier health and well-being. The Army's Comprehensive Soldier and Family Fitness program owns and operates the GAT system. The program's website describes the tool as follows:

> The Global Assessment Tool (GAT) is an online survey that combines objective health data with survey-based questions, providing the individual self-awareness in the five dimensions of strength (as defined by the World Health Organization): emotional, social, spiritual, family and physical. Developed by experts from the U.S. Military, civilian universities, hospitals, and industry professionals, the GAT is built upon a foundation of scientifically validated measures of health and resilience.[5]

The purpose of the program—established in October 2009—is to build and maintain ready and resilient soldiers.[6] The Army's definition of resilience is instructive here, as it provides a glimpse into the program and its rationale. They define "resilience" as:

> [T]he mental, physical, emotional, and behavioral ability to face and cope with adversity, adapt to change, recover, learn, and grow from setbacks. A resilient and fit individual is better able to leverage intellectual and emotional skills and behaviors that promote enhanced performance and optimize their long-term health.[7]

One lens to view the Comprehensive Soldier and Family Fitness program—to which the GAT survey is the measurement component—is as an expansion on the definition of health. The Army has a long-standing association with physical health. Watch any military movie, and you'll probably see a training montage of soldiers marching, running, or performing grueling physical tasks. Physical fitness is deeply connected to military culture. Before a potential recruit can even join, they undergo a battery of assessments. The Army wraps a tape measure around their waists, asks recruits to step on the scale to record their weight, and holds a stopwatch while hopeful enlistees perform sit-ups, push-ups, and a two-mile run. Soldiers are subsequently assessed every year they continue to serve. If they fail, the Army gives them the support and resources to improve their fitness.

With the Comprehensive Soldier and Family Fitness program, the Army takes a physical fitness approach to the other four dimensions of health. As three of the developers of the GAT survey write in a 2011 article for *American Psychologist*:

> The [GAT] aims to do for psychosocial fitness what has long been done for physical fitness: measure the strengths and assets of soldiers as well as their problems, use the results to identify appropriate training for a given soldier in a given area, and then provide that training.[8]

For physical health, the Army uses the fitness test—the sit-ups, push-ups, and run—as the assessment instrument. They test soldiers consistently throughout their careers, allowing individuals to self-assess their current fitness level and providing the Army the ability to monitor service-wide trends. Likewise, for the other four dimensions of health under the Comprehensive Soldier and Family Fitness program, the GAT is the fitness test equivalent—providing the quantitative snapshot

of an individual soldier's health at a single moment in time.

To target the five dimensions of health, the GAT survey focuses its questions on eleven areas:

1. Psychological strengths
2. Catastrophic thinking/cognitive flexibility
3. Good/bad coping strategies
4. Spiritual fitness (not religiosity)
5. **Quality of friendships/loneliness**
6. Optimism
7. Work engagement
8. **Social factors (trust, engagement with others)**
9. Depression
10. Family fitness
11. Positive/negative affectivity[9]

For my analysis, I use the GAT survey to see whether the design of barracks has any correlational effect on resident social health. Within the eleven question areas, two (highlighted in bold text above) explicitly target social health. Within those two, I use the following six questions from the GAT survey as my means to assess soldier social connection (Figure 5.1 below).[iv]

Social Survey | Army Global Assessment Tool (GAT)

1. I trust my fellow soldiers in my unit to look out for my welfare and safety.

2. I have someone to talk to when I feel down.

3. How often do you feel part of the group?

4. How often do you feel left out?

5. How often do you feel close to people?

6. How many people are there that you can always count on if you have serious problems?

Figure 5.1. The social health questions on the Global Assessment Tool (GAT) survey. Graphic created by the author.

According to Dr. Mike Jensen, a retired Army flight surgeon and now a senior scientist with the

[iv] Important to note is that not all questions are phrased with the more "favorable" or "positive" position consistently on one end or the other of the survey's 5-point Likert scale. Take questions three and four, for example. A response of "never" (the left side of the survey scale for the GAT) is a bad thing for question three, but a good thing for question four. Thus, for consistency and ease of analysis, I have re-coded all "favorable" or "positive" responses to correspond to the higher numerical values. A value of five is now no longer linked to the response choice on the right side of the survey, but rather linked to the most morally positive response. Or in other words, I've re-coded the survey so high numbers are good and low numbers are bad.

Army Analytics Group—the organization responsible for connecting researchers to Army data—the GAT has never been used to study design or housing.[10] But it should be. The GAT offers three distinct benefits to the architectural researcher: it is complete, it is robust, and investigators can directly tie responses to specific barracks buildings.

Complete

The GAT survey is mandatory. All soldiers must complete it. Specifically, Army Regulation 30-53, *Army Comprehensive Soldier and Family Fitness,* states:

> All Soldiers must complete the GAT annually, unless they are in a deployed status when their GAT expires. In this case, Soldiers must complete the GAT within 60 days of [returning].[11]

Thus, deployments excluded, every soldier should have a survey in the system for every year. Unfortunately, this does not mean that I have full population data, however. To maintain anonymity and encourage unbiased responses, the GAT allows soldiers to control access to their data. The GAT already categorically prohibits anyone—regardless of their position or authority—from obtaining any one individual's survey responses. The access consent option takes privacy protection one step further. If soldiers deny consent, their data is not only individually protected, but excluded from de-identified statistical reports—like the ones that I use for this study. Figure 5.2 (below) shows the response rates included in my analysis.

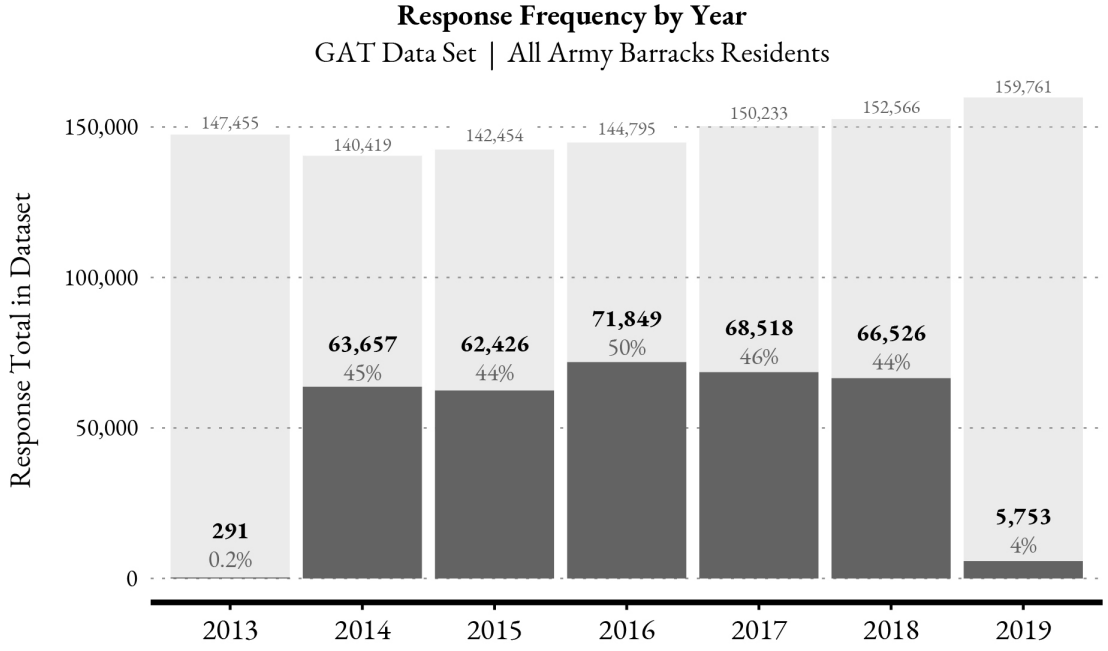


Figure 5.2. Response frequencies by year for the Global Assessment Tool (GAT) survey. Active duty US Army barracks residents only. Total barracks population data courtesy of the Defense Manpower Data Center (DMDC). Survey response counts courtesy of GAT. Graphic created by the author.

The dark gray bars represent the yearly number of survey responses from barracks residents in relation to the total barracks population (the light gray bars behind) for that year. The data range from a mere 291 responses (0.2% of the population) in 2013 to an impressive 71,849 responses in 2016 (50% of the total population). If we take 2016 as an example, the graphic shows that I have survey data for 50% of the total number of soldiers living in Army barracks across the globe. The other 50% are missing. While I suspect the majority of the missing responses come from either deployed soldiers or those who did not provide consent, it is impossible for me to know how many soldiers fall into each category or whether there is a third, unexplained rationale for missing data.

The two bookend years—2013 and 2019—also deserve an explanation. For both years, the reason for their low response rates comes from the continual improvement efforts by members of the survey team. In late 2013, the Army transitioned away from a previous survey iteration. Because the new questions differ from the old ones and raise serious concerns of instrument consistency across my study, I excluded the old survey in my analysis. In 2019, the Army again transitioned to a new survey—this time removing questions to decrease the time burden on soldiers. Even if I wanted to include the new survey (I would choose not to for the same reason as the pre-2013 survey), 2019 data is not yet available to researchers at the time of my writing.

In total, the GAT dataset for barracks residents contains 339,020 surveys (of which 98% of them come from the core five years of 2014-2018). Looking at this middle 98%, the average response rate for consented data is 46% (332,976 responses from a total population of 730,467) across all five years.

For this study, however, the 332,976 number is a bit misleading. That number includes barracks residents at all Army installations across the globe. But I am not analyzing every barracks or every base. I am only looking at three installations and only a small selection of units within each of those three bases. After performing two additional data filters (first to narrow down the total responses for my three sites and second to narrow for my select units), I am left with 23,055 surveys. I further whittled that down to a grand total of 20,361 by cleaning the data according to two factors: "blind" responses and impossible fitness scores.

First, "blind" responses are those soldiers who provided the same answer for every question. Whether they clicked down the far left, far right, or right down the middle for all of the 5-point Likert survey choices, these soldiers were aiming for speed, not accuracy. Looking back on questions three and four, for example, a "blind" respondent claims that they *always* (or never) feel part of the group and *always* (or never) feel left out at the same time. Or further down the survey, the blind respondent claims that they simultaneously feel happy and sad, or angry and peaceful. They are claiming two incongruent answers because their answers are independent—or blind—to the

questions. Most likely, they didn't even read them.

And second, despite the Army fitness test having only 300 possible points, some soldiers couldn't resist themselves from inserting impossible scores. One soldier claims to have earned 63,235 points on his latest test—a whopping 20,978% more than the maximum. To reach that total, even cumulatively (which the survey question is not asking), a soldier would have to earn a perfect score every year for the next 211 years. The response is either a mistake or intentionally misleading. In either case, it is wrong.

Both data cleaning factors—blind responses and impossible entries—present significant validity concerns, and thus, I eliminated those records from my analysis. That does not guarantee all remaining answers are accurate self-reported figures, but it removes the obviously unreliable ones.

Lastly, the GAT data is complete with respect to gender and rank. Figure 5.2 (previously) shows that the soldier survey response rate remains relatively consistent year to year at 46% consented data. But it doesn't tell you anything about whether the surveys collected are a representative sample of the population. Figures 5.3 and 5.4 (below) explore that question, showing the percentage of survey respondents by gender and rank, respectively, for my three case study locations as compared to the total population of Army barracks residents. Other demographic variables, such as race or age are not possible to comparatively determine with the available data that I have.

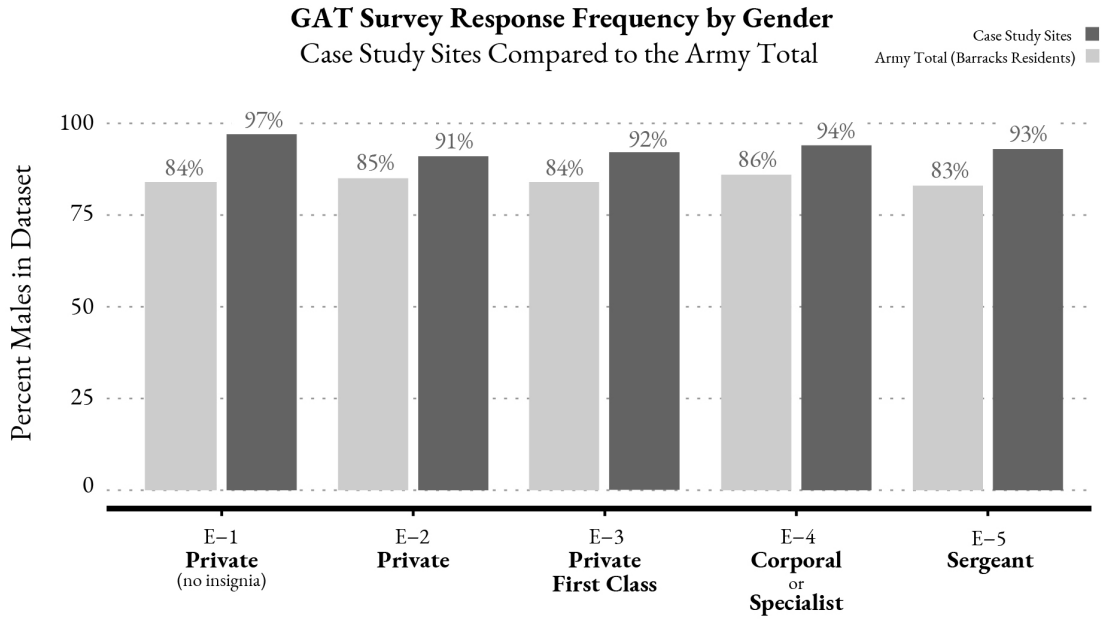


Figure 5.3. Response frequencies by gender for the Global Assessment Tool (GAT) survey at my three case study locations as compared to the active-duty US Army barracks total population. Total population data courtesy of the Defense Manpower Data Center (DMDC). Survey response counts courtesy of GAT. Graphic created by the author.

The gender data deviates from the Army totals in exactly the ways that I would expect. Since my

three case studies focus exclusively on Brigade Combat Teams (more on those in a moment), my study population largely consists of infantry units. Up until 2017, the Army banned women from serving in the infantry.[12] Thus, I wholly expected my case study data to skew further towards males than the Army as a whole. That proved to be the case. If it didn't, my sample would raise concerns.

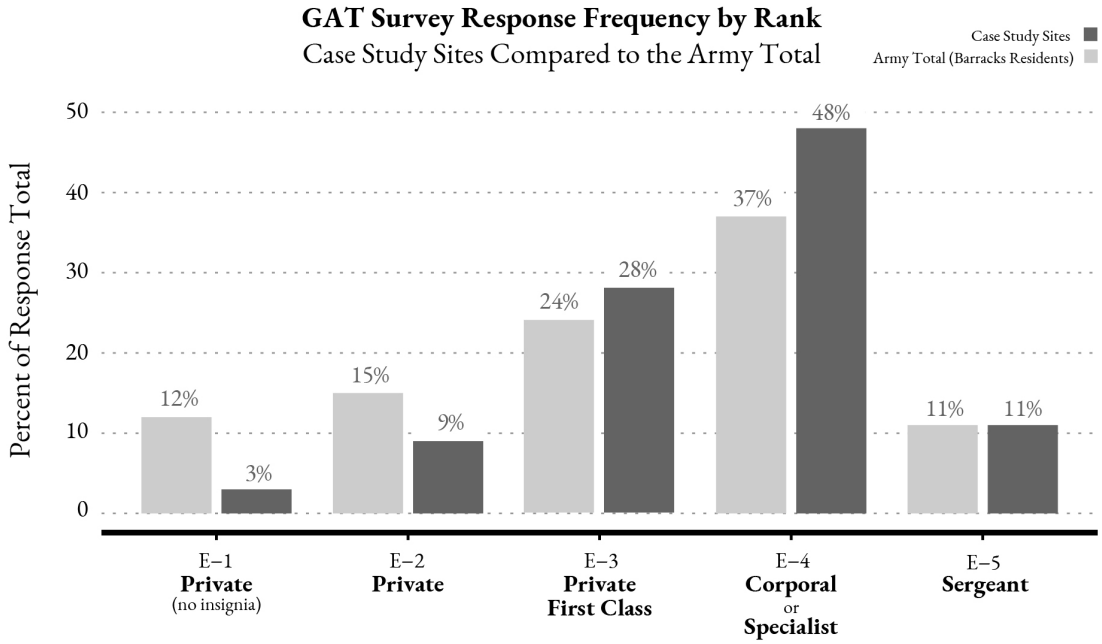


Figure 5.4. Response frequencies by rank for the Global Assessment Tool (GAT) survey at my three case study locations as compared to the active-duty US Army barracks total population. Total population data courtesy of the Defense Manpower Data Center (DMDC). Survey response counts courtesy of GAT. Graphic created by the author.

In addition, my case studies look at only permanent duty location barracks. Because of that exclusive focus, the data skewing towards slightly higher ranks is natural and expected. As opposed to the higher ranks, many Privates are still in their introductory training phases of the Army and have not yet reported to their first permanent duty location. They often live in training barracks at training locations until they are fully-qualified to join a unit. Thus, the fact that the GAT data for my three case study sites has a lower proportion of the most junior enlisted ranks is consistent with a complete and representative sample.

Taken together, all three figures demonstrate complete data—a large and consistent sample size across all years, with no apparent demographic anomalies.

Robust

If the first check is to see whether the data is complete as a useable sample, the second check is to see if the data is robust—or, more simply, whether the survey questions are reliable measures for the intended items.

For the GAT, the questions stand on robust and reliable foundations. A collaboration of experts across universities, hospitals, and within the Army medical community crafted the survey. The team met in Philadelphia in 2008 to discuss each and every potential question. The Army then validated the considered questions using a pool of 8,000 soldiers to ensure the survey was reliable.[13] As three of the original GAT creators write:

> A guiding principle in the creation of the GAT was wherever possible to adapt items from publicly available and well-established psychological surveys with good reliability and validity evidence, in particular, those with strong associations with psychosocial fitness broadly construed.
>
> With the goal of making the GAT as efficient as possible, we shortened it by identifying the "best" (most predictive) items in each domain and subdomain, those that had the highest independent correlations with the total score, after controlling for the other items. Items were retained that together predicted at least 95% of variance in the total scale score. The shortened GAT consisted of about 110 items. This item-reduction strategy ran the risk of reducing the internal consistencies of domain and subdomain scores, but all of the shortened scales had alphas that exceeded .80.[14]

The survey team chose the most meaningful questions (those that predicted greater than 95% of the variance), and those which produce the most reliable answers (alphas exceeding 0.80). The GAT data is both complete and robust.

The Link to Housing

The third significant benefit to using GAT data is the ability to tie survey responses directly to the barracks buildings in which those soldiers live. The Army has a "unit integrity" policy when it comes to housing, prioritizing the desire for all soldiers of a unit to live together. With rare exception, all 85 barracks buildings across the three bases that I visited, housed a single unit. This is important because the GAT survey—as well as the suicide and retention data that we discuss later—does not provide building numbers. Instead, they provide unit identification codes, or UICs. Each unit has its own distinct code, a string of six alpha-numeric characters. Once you decipher the code, you know which unit that soldier is assigned to, and which barracks building they live (assuming they are a barracks resident—i.e., Sergeant or below without a spouse or child). So, not only is the GAT data complete and robust, but it is also directly linked to each soldier's place of residence by unit identification codes.

Military barracks themselves provide an unusually rich setting for environment-behavior research. For starters, the population of residents is uniquely homogenous in age, income, profession, and gender. And secondly, the architecture is tightly controlled. The Army governs design through a centrally issued standard, which must conform to strict Congressional regulations.

As we've seen in part one, these regulations narrowly define each individual soldier's authorization for physical space. Barracks design variations are thus limited to a finite set of variables such as spatial layout, orientation, and functional adjacencies.

Maybe most significantly, however, is that unlike nearly all other types of permanent housing—inside or outside of the military—there is no self-selection bias. All junior enlisted soldiers without dependents must live in the barracks. They do not have a choice to live in a different housing type or style, and they have no input into which barracks building or room they are assigned. As a researcher, this level of homogeneity and regulation is tremendously valuable. The gold standard for correlational research is the randomized clinical trial, where subjects are exposed to two different interventions while holding all other variables constant. It allows for a rigorous analysis of differences to investigate the effect of the intervention.

While the military barracks would never hold up to the standard of a randomized trial, they may be as close as any ethical researcher can get when studying the permanent housing of people.

Back to the Barracks

Back in chapter two, "Fear: Life After Khobar," I presented two arguments about the effects of current antiterrorism mandates on soldier social interaction in military barracks:

1. Unobstructed space provisions led designers to strip out most differentiated outdoor social spaces from barracks complexes. Removing these spaces separated barracks from their sites, and decreased opportunities for casual social interaction.
2. The fear of flying hazardous debris forced designers away from the exterior, balcony-access barracks model, and into the double-loaded corridor design. The double-loaded corridor increases the physical and psychological distance from private to public space, makes that transition more cumbersome, and discourages routine interaction.

Using the GAT dataset, in this chapter, I examine the merits of those two claims at three different installations: Schofield Barracks in Hawaii, Fort Bragg in North Carolina, and Joint Base Lewis-McChord in Washington. At each of the three locations, I've singled out Brigade Combat Teams as the focus of my analysis.

Brigade Combat Teams (or BCTs) are large organizational units that have multiple battalions of infantry, artillery, engineering, cavalry, and support units. According to a recent Congressional report on military force structure, the Army "provides the bulk of ground combat forces… organized primarily around brigade combat teams (BCTs)."[15] The report goes on to say:

> The vast majority of the Army's support units exist to support combat operations by BCTs, and the vast majority of the Army's administrative units exist to create, train, and maintain BCTs and

their support units.[16]

BCTs are thus, a central component to the Army. They contain 4,400 to 4,700 soldiers apiece, and each of my three case study sites houses multiple BCTs.

Figure 5.5 (below) illustrates a typical organizational structure.

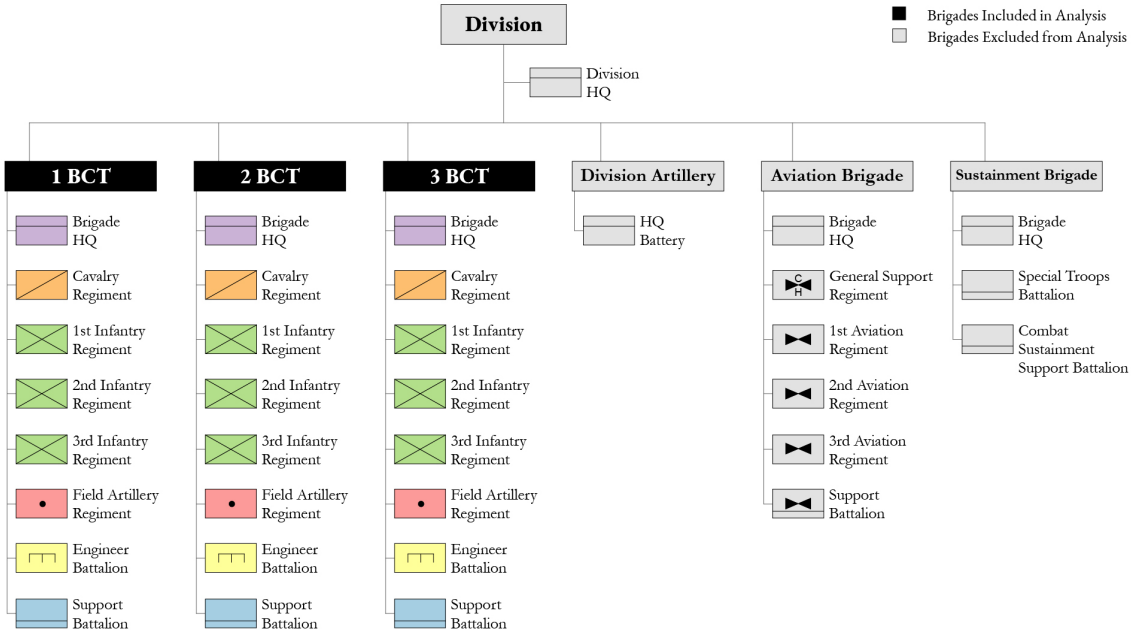


Figure 5.5. Notional organizational structure of an Army Brigade Combat Team. Composition and organization based on the structures of all three case study sites and Army Field Manual 3-96, *Brigade Combat Team*. Graphic created by the author.

The intent of each BCT is to be interchangeable, having the same composition and the same capabilities. They are essentially replica units, repeated so that the Army can easily replace one for another in combat and not lose a beat.

Across the Army, there are only ten domestic bases with multiple BCTs and thirty (active duty) BCTs in total. I've chosen three of those ten installations, and seven of the thirty units for my study. As a researcher, the compositional similarity across BCTs is incredibly valuable. It allows for more direct comparisons and removes unnecessary variation. By design, a calvary unit in one BCT is incredibly similar to a cavalry unit in another. They perform the same mission, they have the same training requirements, they have the same number of people and equipment, they fall under the same Division-level command, and junior enlisted soldiers have no input on which BCT they are assigned. The same goes for the artillery, engineer, infantry, and support battalions as well. They each have a replica counterpart (or multiple counterparts) in their sister BCTs.

In selecting barracks buildings to compare across and within my selected BCTs for this study, I set four rules:

1. The barracks architecture needed to demonstrate the contrasting physical variable (e.g., balcony-access versus interior double-loaded corridor).
2. The units need to be of the same type (e.g., infantry unit versus infantry unit).
3. The barracks need to be on the same base (e.g., Fort Bragg barracks versus Fort Bragg barracks).
4. Where multiple barracks could equally comply with the previous three rules, I will select the units that are the closest in demographic variables (i.e., age, rank, and gender).

With an understanding of the data and the organizational units that make up my study, it's time to examine antiterrorism's social impacts—starting with unobstructed space.

A Clear View of Inactivity

Let's quickly revisit the theory on unobstructed space from chapter two. Most of it comes from Danish architect, author, and professor, Jan Gehl. Gehl has studied the interplay between buildings and their surrounding context for over fifty years. Over the course of that work, he has developed what he calls three types of outdoor activities: necessary, optional, and social. Social activities range from conversations to passive people-watching. They require you to be in the presence of other people and happen as a "result" of his other two activity types: necessary and optional.[17]

Necessary activities are precisely that—necessary. They are independent and occur regardless of design. Leaving for work, returning from work, and dining at the mess hall are all necessary activities for barracks residents, which require them to leave their room and venture into their barrack's outdoor public realm. Optional activities, on the other hand, are directly correlated with design. According to Gehl, when the weather and design are favorable—and the individual is predisposed to the affordances provided—optional activities occur with increasing frequency. Designers can thus increase the probability that "resultant" activities occur by creating behavior settings which "nudge" barracks residents to engage in optional activities more often. Neatly summarized, Gehl writes:

> Social activities are indirectly supported whenever necessary and optional activities are given better conditions in public spaces.[18]

My claim is that unobstructed space provisions led designers to create landscapes of surveillance, eliminating both the opportunities and allure of optional outdoor activities—thereby decreasing the probability for resident interaction.

To test this claim, I must travel to the barracks.

Case One: Joint Base Lewis-McChord

For the first case, I studied Joint Base Lewis-McChord (JBLM) in Washington. JBLM has two

Brigade Combat Teams (BCTs), one in the North and one on the South end of the base. I will eventually visit both, but first, I start in the South. Figure 5.6 below shows a site plan of the South BCT (1st BCT), with the case study barracks highlighted in red.

Figure 5.6. Locations of 5-20 INF and 1-23 INF at Joint Base Lewis-McChord. Graphic created by the author.

The 1st BCT houses all of its battalions in three different barracks standards. I will look at two of them: the 1970's VOLAR barracks and two post-antiterrorism 1+1-Enhanced barracks.

Of the 1st BCT's three infantry regiments, one lives in the older VOLARs (1-23 INF), and the other two live in the opposing 'L'-shaped designs. Either 1+1 barracks would have been an excellent candidate to explore the effects of unobstructed space. Both of the new barracks had to comply with the standard, while the 1970s barracks did not. To choose which 'L' to compare, I followed my fourth rule and simply selected the regiment which demographically was most similar to 1-23 INF in the VOLARs—which happened to be 5-20 Infantry Regiment (5-20 INF). Figure 5.7 (below) shows their demographic profiles.

		Age	Rank[1]	Gender[2]	Building Year	Barracks Standard	S.F. per Soldier[3]
5-20 INF After Unobstructed Space N = 475	Mean	**22.25**	**3.41**	**1.99**	**2009**	**1+1-E**	**298**
	Standard Deviation	2.816	0.971	0.091	—	—	—
1-23 INF Before Unobstructed Space N = 574	Mean	**22.13**	**3.37**	**1.98**	**1978**	**VOLAR**	**113**
	Standard Deviation	2.884	0.992	0.137	—	—	—
	P-Value	0.298	0.898	0.145			

1. Rank is converted to a numerical value (E-1 Private =1 ... E-5 Sergeant = 5)
2. Gender is converted to a numerical value (Female =1 and Male = 2)
3. Square footage per soldier per module

Figure 5.7. Demographics of 5-20 INF and 1-23 INF at Joint Base Lewis-McChord. Graphic created by the author.

Age, rank, and gender are remarkably similar. Statistically, there is no difference between the two. As a case study, the VOLAR barracks of the 1-23 INF and the 1+1-Enhanced barracks of the 5-20 INF present a compelling comparison. Both are infantry units within the same Brigade Combat Team, both barracks sit less than 200 meters apart, both are three stories tall, and both have very different outdoor social spaces. Figure 5.8 provides a photographic tour of the two barracks.

Figure 5.8. Photographic comparison of 5-20 INF and 1-23 INF at Joint Base Lewis-McChord. Photographs were taken by the author.

Whereas it looks like someone strung invisible caution tape around the newer 'L'-shaped barracks to prevent vegetation or activity from occurring in that space, the facade variation of the 1970s VOLAR barracks intentionally creates pockets of activities immediately outside its entries, overlooked by its central, open-air circulation and in-room windows.

As Christopher Alexander writes about Pattern 124, Activity Pockets:

> The process of lingering is a gradual one; it happens; people do not make up their minds to stay; they stay or go, according to a process of gradual involvement. This means that the various pockets of activity around the edge should all be next to paths and entrances so that people pass right by them as they pass through. The goal-oriented activity of coming and going then has a chance to turn gradually into something more relaxed.[19]

According to environment behavior theory, and the works of Alexander, Gehl, and William Whyte, the human-scale, wall-hugging, social refuge spaces of the VOLAR barracks should encourage more optional outdoor activities to occur, increase the probability that two soldiers cross paths, and improve the odds of social tie formation.

To test this hypothesis, I turn to the GAT data. Figure 5.9 illustrates the statistical analysis of social health between the residents of the two barracks using an independent samples t-test.

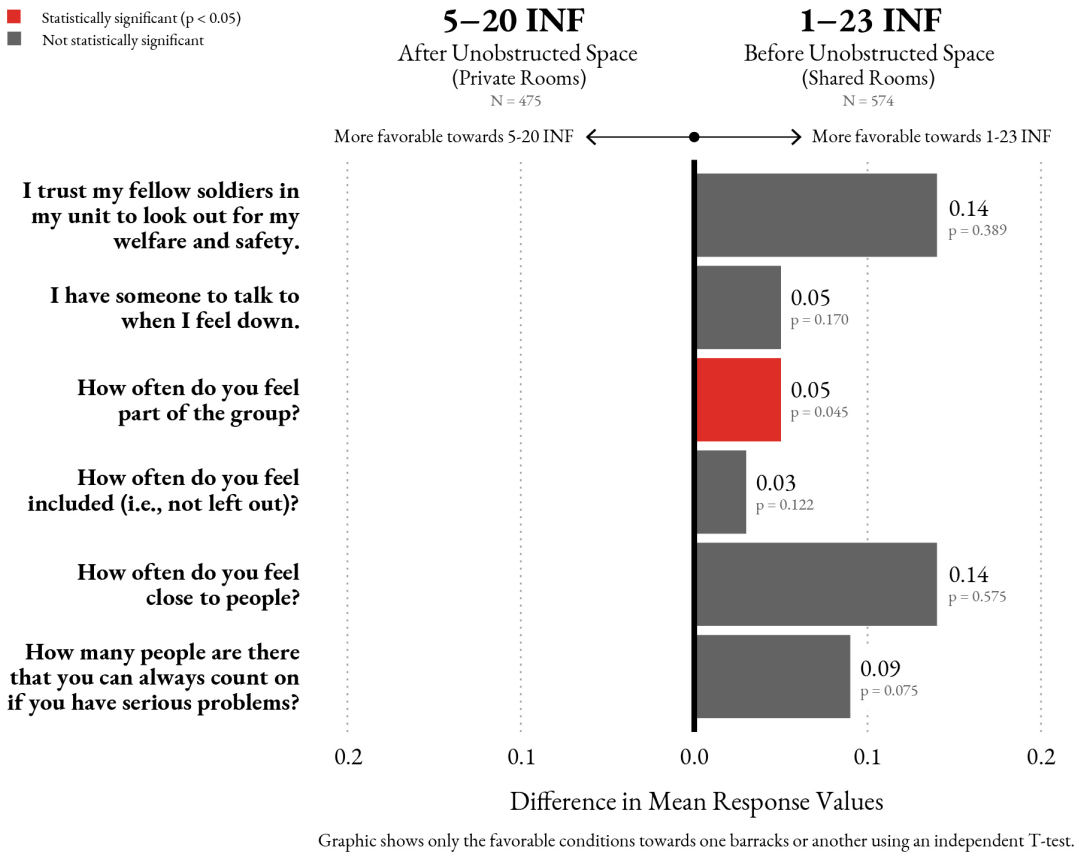


Figure 5.9. The social impact of unobstructed space. 5-20 INF compared to 1-23 INF at Joint Base Lewis-McChord. Graphic created by the author.

I use these same charts for all of my social comparisons, and as such, I will spend a few extra sentences explaining this one.

The six GAT questions line the left side with their corresponding mean resident response values on the right. On the top of the chart, I list the two barracks—and their differing design attributes—along with the number of survey responses for each barracks. As a graphic of comparison, the vertical bar chart shows which barracks performed more favorably for each of the six questions. Whichever side of the central, bold black line the bar falls, residents of that barracks answered more positively. Remember, high values are good and low values are bad. Next to the bar sits two numerical values. The larger number represents the difference between the mean response values of the two barracks—or in other words, the magnitude of difference (or length of the bar) for that question. In smaller text below is the p-value to test for statistical significance using an independent samples t-test. For my analysis, I use a significance level of 95%. Thus, if there is a less than five percent chance that the difference in response values happened by natural or random variation (using Levene's test for equality of variances), I claim that there is a statistically significant difference between the two means. All statistically significant findings are denoted in red and have p-values less than 0.05.

In this case, my analysis consists of 1,049 surveys from the residents of both barracks. 1-23 INF (the VOLAR barracks with the pockets of social space) performed more favorably across all six questions with one statistically significant finding. Residents of the older barracks are more likely to feel included as "part of the group" more often—an indicator of social belonging.

This finding is not surprising. As I walked into both barracks on a wet Pacific Northwest morning, the difference between the two was stark. In the new barracks, a single soldier sitting behind the front desk greeted me. The hallways were silent, and I saw no one. I proceeded to encircle the building, taking the photographs you see in Figure 5.8. As I returned to the front desk to ask the young soldier some questions, it didn't dawn on me until I had left the site that he was the only other person that I saw. His name was Private First Class Gomez. *"I'm sorry, but I'm not sure that I'm going to be a ton of help for you, sir,"* he said, *"other than basic training, this is the only barracks that I've lived in."*[20] But he was a big help. He told me that the barracks were quiet, that people mostly stick to their rooms, and the only place outside where he has ever noticed any social activity is the parking lot.

Across the street, the VOLAR barracks of 1-23 INF looked and felt much different. As I approached, two soldiers were using the outdoor "activity pocket." One was sitting on the table-top with his feet on the bench while the other leaned against the railing of the handicap ramp. Both were smoking cigarettes and carrying on a casual conversation. When I got closer, they turned, and

Specialist Miller—the one leaning against the railing—said hello. I took the greeting as an open invitation to ask the two soldiers a few questions. While they complained about the buildings being old and not having private rooms like their 'L'-shaped neighbors, both loved the "mini courtyards" (as they called them). *"We come out here to hang out and drink beer on the weekends all the time,"* Specialist Miller said. *"You'll see people using them during the week, too,"* his buddy, Corporal Palack chimed in. *"They are popular spots to sit and talk on the phone, smoke, or just hang out. The guys down there [pointing to their neighbors to the South] are always grilling in theirs"* Corporal Palack continued.[21] Inside, there was even more social activity happening. The dayroom had at least ten soldiers inside—some crowding around a video game, and others just talking.

While it is interesting that the 1970s barracks residents reported higher values of social health along all six questions (one significantly) matching the theoretical prediction, and that my anecdotal experience aligns to the survey results, that alone is only one case and one forty-five-minute visit. I could have had a very different experience at a different time or a different day, or had I just crossed paths with different soldiers. The two buildings also differ beyond just their outdoor social affordances. The VOLAR barracks are older and have smaller—and shared—rooms. These could both be influencing the responses.

To address issues of result validity, I've taken the approach of using multiple case study locations, providing multiple data points, and a means to triangulate (or counter) individual case results. As a second case examining the social effects of unobstructed space, I move across the country to the other coast, and explore Fort Bragg, North Carolina.

Case Two: Fort Bragg

Fort Bragg is home to the storied 82nd Airborne. It is a huge and historic base, housing three BCTs across a wide range of barracks types. Like JBLM, it offers an exceptional case to study the social impact of unobstructed space. Unlike JBLM, however, I did not need to look to a 1970s-era building to find a comparative case. Fort Bragg has some of the last barracks built before the antiterrorism provisions went into effect.

For my second case, I again look to the barracks of two infantry regiments—one in the 1st BCT (1-504 INF) and one in the 3rd BCT (1-508 INF). Figure 5.10 shows a site plan of those two barracks.

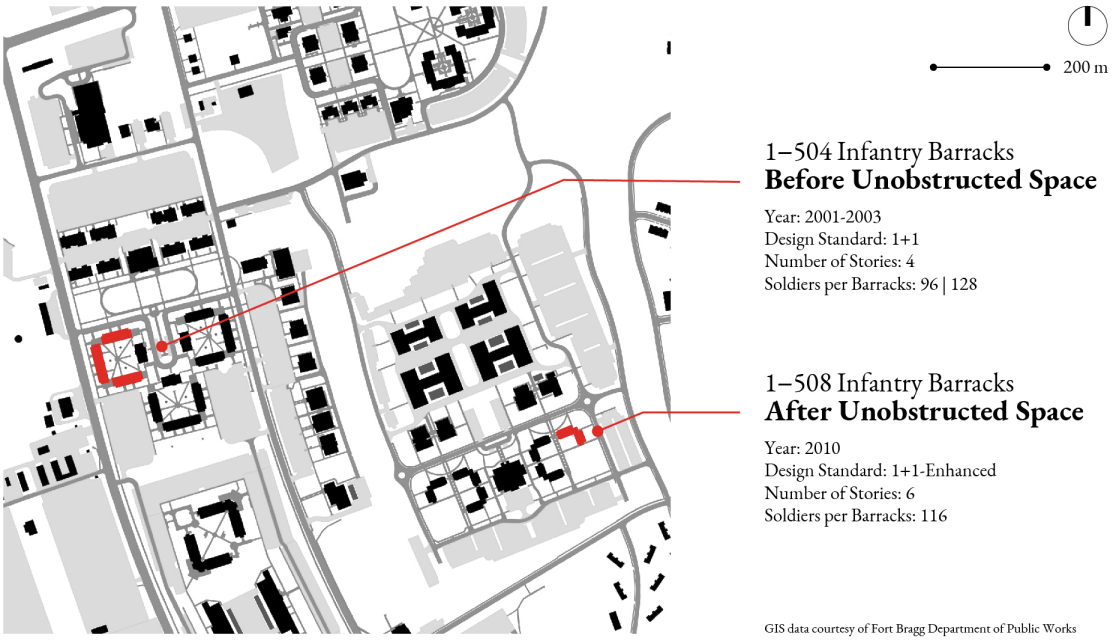


Figure 5.10. Locations of 1-504 INF and 1-508 INF barracks at Fort Bragg. Graphic created by the author.

The two barracks represent an excellent case. They sit just a short walk apart from one another in distinct, but separate campuses with barracks, dining, and administrative functions all tightly connected. The two barracks designs are also similar. The architects of both complexes used narrow-wing buildings arranged in a multi-barracks square to enclose nearly identically-sized courtyards. They both have private rooms accessed from a central corridor and house a similar number of soldiers in each building.

On the ground, however, the barracks are not so similar. Most noticeably is the difference between their exterior spaces. The barracks constructed after antiterrorism's unobstructed space requirement (1-508 INF) are completely void of exterior social affordances. There are no places to stop, sit, observe, or congregate. Occupying the empty courtyard, I felt exposed and alone.

The courtyard of 1-504 INF is different—in looks and experience. As I occupied that space, I felt comfortable and protected. I moved from the tables, to the overlooking second-story balcony, to the buildings themselves. All the while, soldiers were coming and going, moving across the courtyard. Another soldier sat underneath one of the covered pavilions eating his lunch and looking at his phone. Neither the soldier enjoying his lunch break nor the soldiers coming and going gave me a second look. I could occupy the space and enjoy the affordances without breaking any social norms. Figure 5.11 provides a photographic comparison of the two barracks.

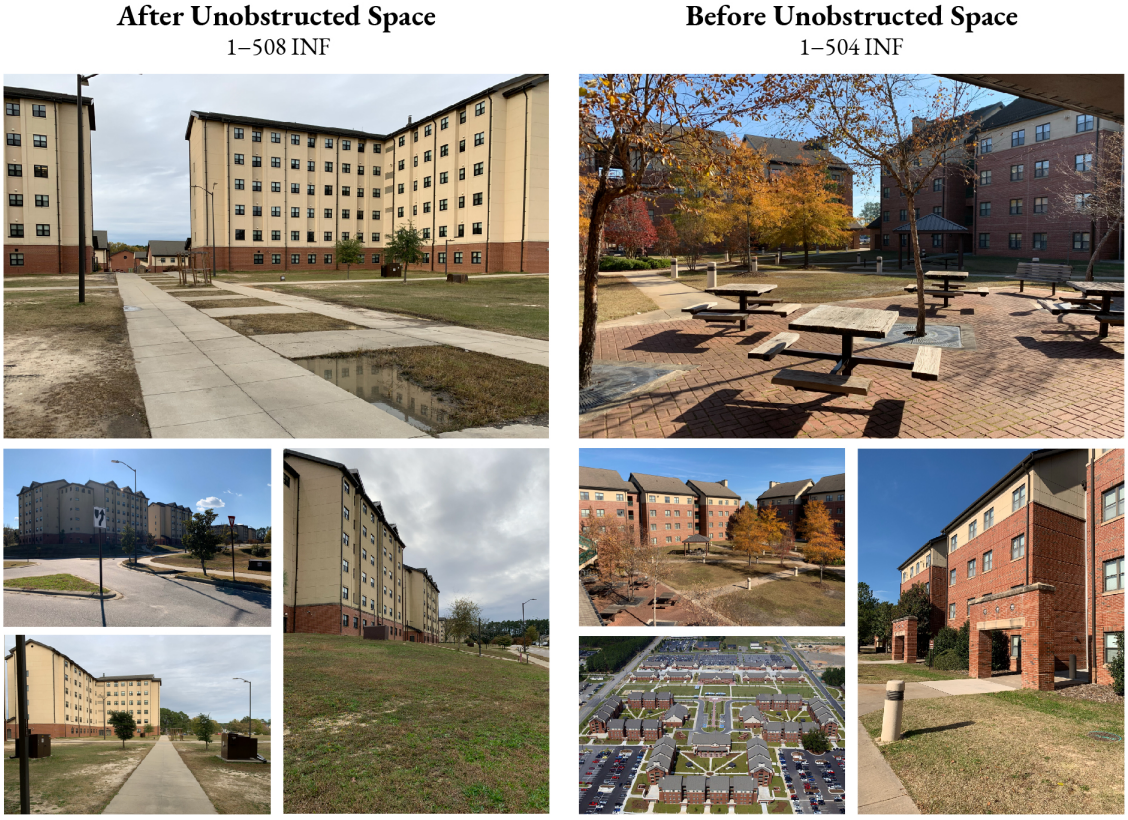


Figure 5.11. Photographic comparison of 1-508 INF and 1-504 INF barracks at Fort Bragg. Aerial image of 1-504 INF is from the US Army Corps of Engineers. All other photographs were taken by the author.

The question is whether these spaces also encourage resident social interaction. Before turning to the GAT data, I want to quickly discuss my selection rationale for these two specific battalions. Obviously, the physical contrast makes a great case. But the same would be true of any of the infantry regiments in the 1st BCT (all three occupy near-exact replicas of the articulated courtyard barracks which house 1-504 INF—see the site plan, Figure 5.10). The same is not true of 1-508 INF and the other infantry regiments of the 3rd BCT. Only 1-508 INF lives in the complex shown in Figure 5.11. The other two infantry units are elsewhere. Thus, my selection focused on which of the three articulated courtyards to use as a comparison. Like JBLM, my rationale came down to my fourth rule—selecting the unit most comparable in demographics—in this case, 1-504 INF.

		Age	Rank[1]	Gender[2]	Building Year	Barracks Standard	S.F. per Soldier[3]
1-508 INF After Unobstructed Space N = 610	Mean	**23.27**	**3.70**	**1.98**	**2010**	**1+1-E**	**298**
	Standard Deviation	3.339	0.832	0.127	—	—	—
1-504 INF Before Unobstructed Space N = 565	Mean	**22.89**	**3.68**	**2.00**	**2003**	**1+1**	**230**
	Standard Deviation	3.119	0.790	0.042	—	—	—
	P-Value	0.175	0.624	0.009**			

1. Rank is converted to a numerical value (E-1 Private =1 ... E-5 Sergeant = 5)
2. Gender is converted to a numerical value (Female =1 and Male = 2)
3. Square footage per soldier per module

Figure 5.12. Demographics of 1-508 INF and 1-504 INF at Schofield Barracks. Graphic created by the author.

As you can see in Figure 5.12 above, the demographics are similar, but not identical. Statistically, they are significantly different in gender composition. Whereas 1-504 INF had only one survey response from a female (0.2% of the total), 1-508 INF had ten (1.6% of the total). This is a nine-fold increase in female participation percentage. Despite the significant increase, controlling for the variance in gender responses made an imperceptible difference in the overall means. First, female infantry soldiers (granted, a very small sample size) responded very similarly to males across all six social questions. And second, since females make up such an extreme minority in both cases, even a large variance would hardly shift the overall mean. Despite the lack of effect, it is important to recognize statistical differences amongst compared groups and note that I have controlled for the difference.

Like JBLM, the post-antiterrorism barracks perform demonstrably worse. Residents of barracks with a more extensive array of outdoor social affordances—where unobstructed space provisions did not restrict designers—report higher values for every question. Also like JBLM, residents with the articulated exterior social spaces are more likely to feel part of the group. In this case, there is also a statistically significant increase in the number of people that 1-504 INF soldiers (those with the social courtyards) feel that they can count on if they have serious problems. In areas of belonging and social support, unobstructed space appears to negatively affect soldier social health.

Figure 5.13 (below) compares the social response values for the two barracks.

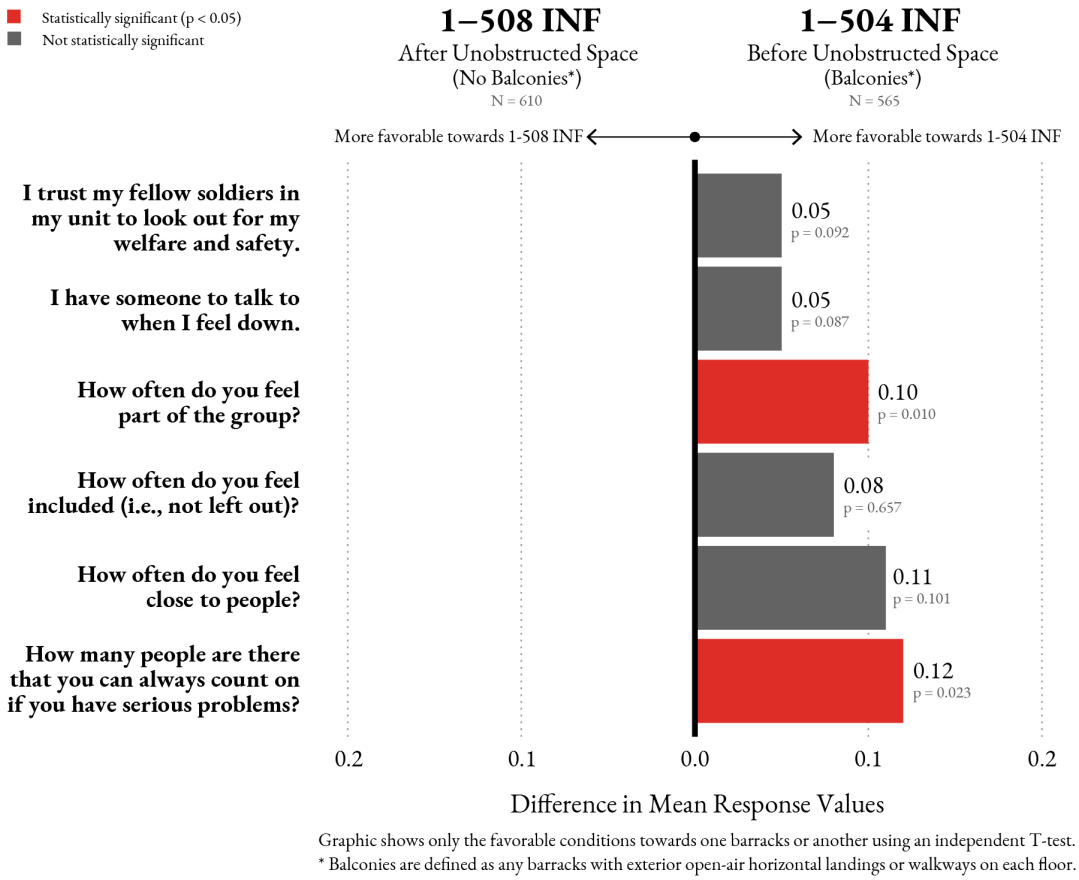


Figure 5.13. The social impact of unobstructed space. 1-508 INF compared to 1-504 INF at Schofield Barracks. Graphic created by the author.

Taken together, both cases appear to support environment-behavior theory. The exterior social affordances eliminated to create landscapes of surveillance seem to negatively influence soldier social health. In both cases, the barracks designed with clear zones performed worse on every question. Social belonging—whether soldiers felt part of the group—was consistently statistically significant across both sites. At Fort Bragg, the residents of clear zone barracks also felt like they had fewer people to count on when they had problems.

It is important to recognize that these cases are not laboratory tests where unobstructed space is the only uncontrolled variable. Instead, in every case—across every aspect that I compare—there are always other differences. For case one, the 1970s-era VOLAR barracks were 31 years older, had far fewer in-room amenities, and forced soldiers into shared bedrooms (we explore private versus shared rooms in the next chapter). For case two, the post-antiterrorism barracks added cooking capabilities into each module, while designers of the older barracks slightly separated each module block to add a small outdoor balcony between them—spaces which prove critical to social health.

The existence of other differences, however, does not negate the trends across both sites. I

selected both cases as the best examples of contrasting exterior social landscapes while holding as many intervening variables constant as possible in a real-world setting. And across both cases and every social question, residents of barracks with their sites cleared for surveillance responded more negatively.

The Double-Loaded Corridor

Unobstructed space is not the only antiterrorism requirement to affect the social landscape of the barracks. Fears of flying hazardous debris eliminated the exterior balcony-access barracks and moved the Army to a double-loaded corridor model. For safety and security, residents now had to access their rooms from the inside—no more "front" doors directly leading to the exterior.

According to the theory, the social benefit of balconies is their ability to remove barriers (and shorten functional distance) to the public social realm. Optional activities become more appealing, they happen at a greater frequency, and "resultant" social interaction increases in probability. As Gehl explains:

> If the passage between indoors and outdoors is difficult—if it is necessary, for example, to use stairs and elevators to get in and out—the number of outdoor visits drops noticeably… [and] many other outdoor stationary activities—especially short-term and spontaneous activities—more or less cease because it is too bothersome to come down and go out into the public areas.[22]

Think back to Rob McDowell, the Vancouverite in the previous chapter. His new townhome is not accessed from a balcony, but his move similarly shortened the functional distance from his residence to the public social realm. He was no longer burdened with a 26-story elevator ride and walk through the complex's large lobby. He could simply open his front door—and his social activity blossomed. Likewise, for balcony-access barracks, soldiers are afforded the same opportunity.

In the next section, we test the social effects of this shortened functional distance to see if they similarly provide the same social benefit to soldiers as they did to Rob.

Case One: Schofield Barracks

The first case in the comparison of balcony access against double-loaded corridor designs comes from Schofield Barracks in Hawaii. Schofield Barracks has two Brigade Combat Teams, and the two live in very different barracks. The 2nd BCT (I should note that the 1st BCT is in Alaska for those curious about the numbering scheme) resides in post-antiterrorism double-loaded corridor designs, while the 3rd BCT lives in the "historic quads"—buildings that in some cases date back to before the first World War (although the Army recently renovated all of them to comply with the 1+1 standard). Located just 200 meters apart, the 2-35 Infantry Regiment of the 3rd BCT and the 1-21 Infantry Regiment of the 2nd BCT are an excellent case to examine the social value of balconies (see

Figure 5.14 below).

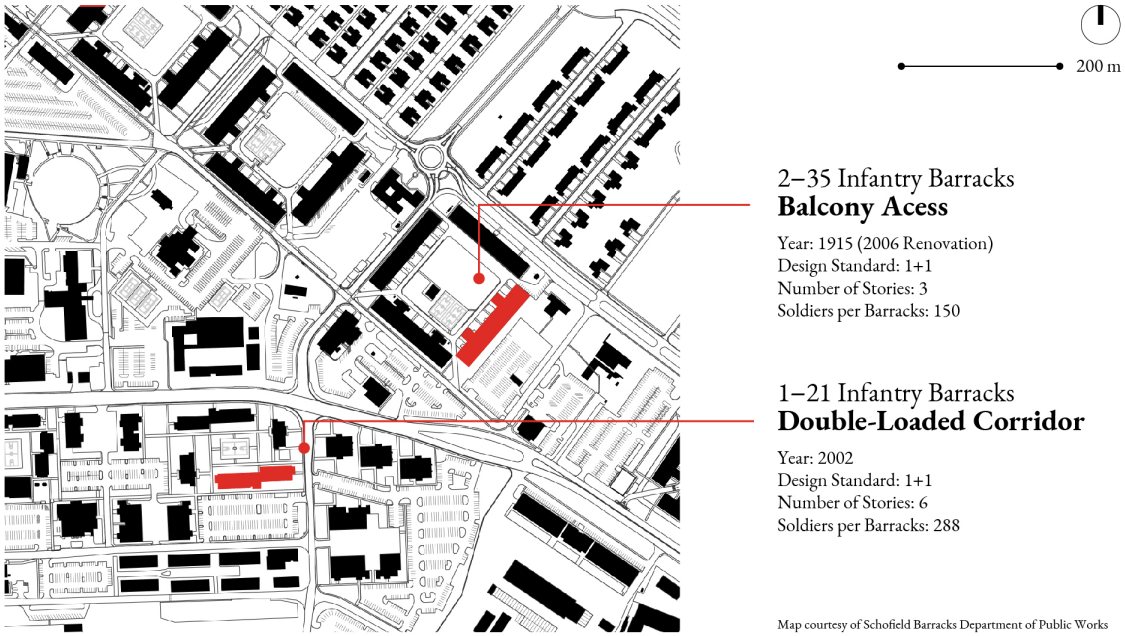


Figure 5.14. Locations of 2-35 INF and 1-21 INF at Schofield Barracks. Graphic created by the author.

Both barracks buildings are long, linear, and comply with the same barracks standard—the 1+1. They both enclose one side of a quad with open space and recreation facilities to their fronts and parking to their rears. Despite their dramatically different years of original construction (1915 for 2-35 INF and 2002 for 1-21 INF), after considering renovation, they are very similar. The post-antiterrorism double-loaded corridor barracks (1-21 INF) was finished in 2002, while the balcony barracks (2-35 INF) was completely gutted down to the structure and remodeled in 2006.

Demographically, they are the closest of any case that I compare. Their gender distributions are identical, the average age difference between residents is only 0.03 years (about 11 days), and their average ranks are within 0.02 (see Figure 5.15 below).

		Age	Rank[1]	Gender[2]	Building Year	Barracks Standard	S.F. per Soldier[3]
1-21 INF Double-Loaded Corridor N = 610	Mean	**22.76**	**3.53**	**1.97**	**2002**	**1+1**	**230**
	Standard Deviation	2.970	1.012	0.165	—	—	—
2-35 INF Balcony Access N = 408	Mean	**22.73**	**3.55**	**1.97**	**1915** 2006 Renovation	**1+1**	**230**
	Standard Deviation	3.024	0.902	0.162		—	—
	P-Value	0.746	0.638	0.931			

1. Rank is converted to a numerical value (E-1 Private =1 ... E-5 Sergeant = 5)
2. Gender is converted to a numerical value (Female =1 and Male = 2)
3. Square footage per soldier per module

Figure 5.15. Demographics of 1-21 INF and 2-35 INF at Schofield Barracks. Graphic created by the author.

As with the two earlier cases, the similarities stop on paper. The physical barracks themselves are quite different. Figure 5.16 (below) gives a photographic tour between the two barracks.

Double-Loaded Corridor
1–21 INF

Balcony Access
2–35 INF

Figure 5.16. Photographic comparison of 1-21 INF and 2-35 INF at Schofield Barracks. Images of 1-21 INF are of a different, but replica, building. They come courtesy of the Schofield Barracks Department of Public Works. Images of 1-21 INF were not available. All other photographs were taken by the author.

One of the most interesting and valuable aspects of these two barracks as a case study (in addition to their demographic homogeneity) is that the balcony-access barracks (2-35 INF) is not exclusively balcony-access. Instead, it is both. The primary circulation around the inside of the quad is through an exterior balcony, however, residents enter the rooms themselves from an interior double-loaded corridor, just like the 1-21 INF barracks that I compare it against (see Figure 5.17 below).

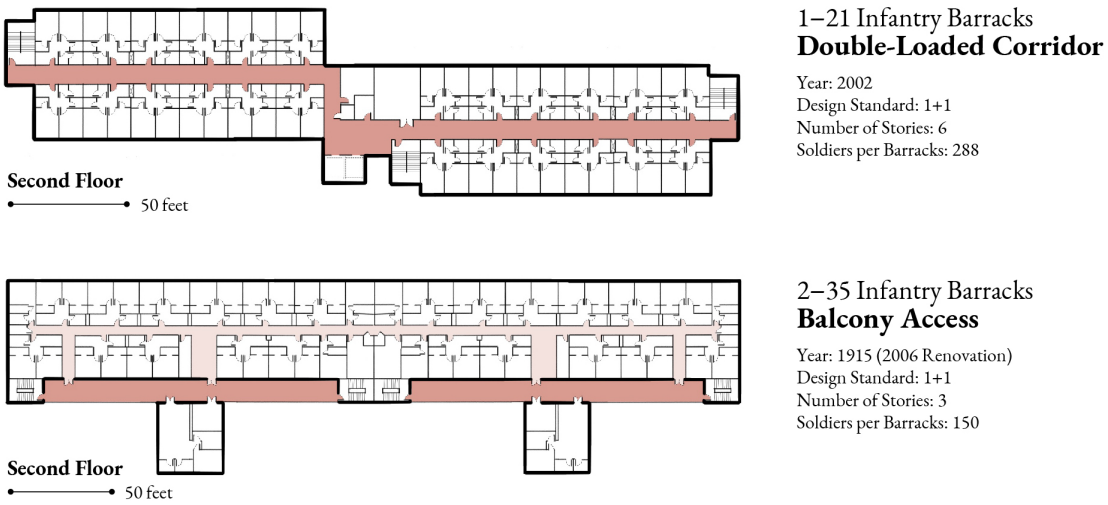


Figure 5.17. Floor plans of 1-21 INF and 2-35 INF at Schofield Barracks. Graphic created by the author.

The barracks of 1-21 INF is a typical standard design after antiterrorism policy took effect (and in some cases, even before). The center between the two wings of rooms has the elevators, mechanical and utility rooms, and the communal laundry area. Branching off from the center core are 1+1 room modules accessed from an interior, double-loaded corridor running the full length of the building and terminating into vertical stairwells. This standard arrangement exists on every base that I visited. 1-21 INF's only slight departure from the prototypical design, is its offset between the two wings of rooms. More commonly, designers have left the hallway straight—as it is in the 2-35 INF barracks. Since I find no site constraint or functional reason for the offset, presumably, designers made this move to decrease the "institutional" feel of long, straight double-loaded corridors.

The balcony barracks of 2-35 INF provide an excellent comparison to the double-loaded corridor of 1-21 INF. The functional arrangement of the room modules are nearly identical, and both barracks use the modules to line an interior double-loaded corridor with communal support functions in the middle. The major difference is the addition of the balcony. Rooms are never more than three doors from a short hallway connecting them to the public social realm. The functional distance to public space is shortened significantly, providing hierarchy to resident social participation

options—a middle ground that is not entirely public (like the center of the quad), but entirely private (like their room) either. It gives soldiers a place to socialize and observe, where they can easily extend or retreat as they desire.

The GAT survey data lends convincing support to the role of balconies in supporting soldier social connection (see Figure 5.18 below).

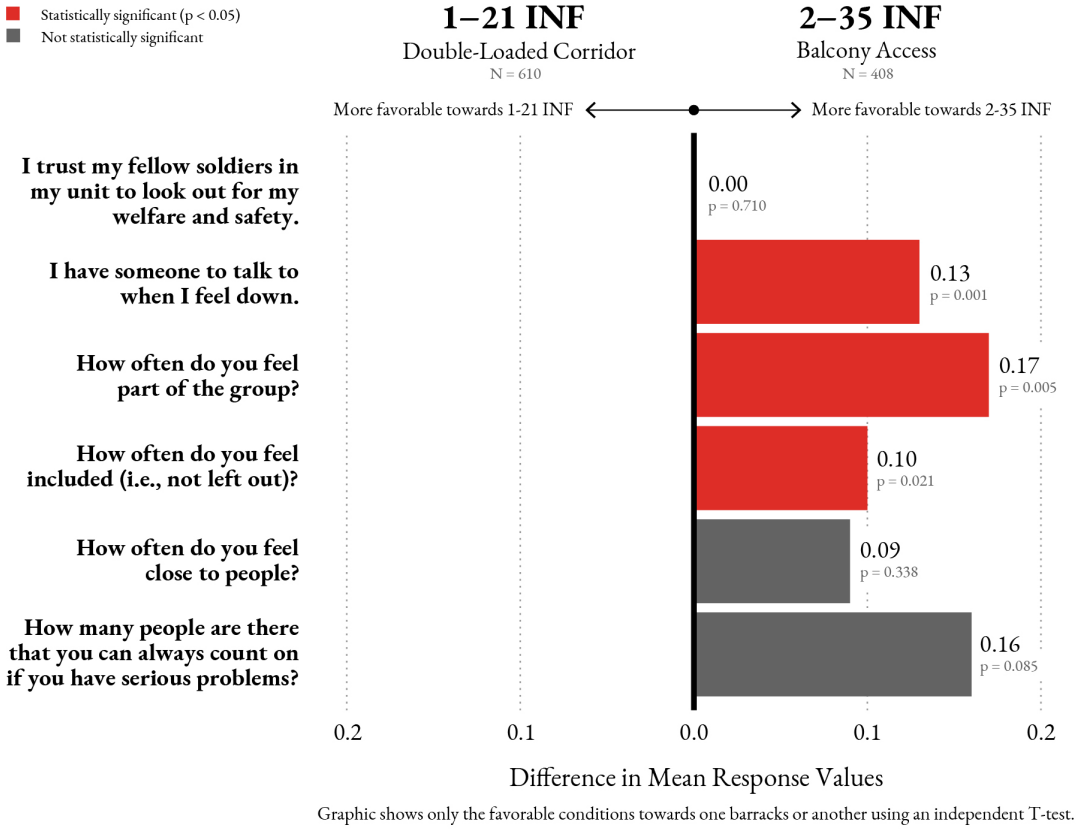


Figure 5.18. The social impact of balconies. 1-21 INF compared to 2-35 INF at Schofield Barracks. Graphic created by the author.

Like articulated outdoor social space in the previous section, the addition of balconies on the 2-35 INF barracks appears to encourage significant social benefits. Outside of the question on trust where there was no difference between the two, the balcony barracks performed more favorably on every other question. Three of those five questions—someone to talk to when feeling down, feeling part of the group, and not feeling left out—were statistically significant.

Standing on the second-floor balcony of the 2-35 INF barracks taking a picture down into the quad, I heard a soldier coming up the stairs. When he saw me, he offered a smile and a friendly greeting—it was the type of greeting that was two parts natural and general kindness, and one part curiosity. Clearly, an unknown service-member taking pictures of the barracks was not a common

sight. I told him about my study and how I was talking to soldiers to learn about the social experience of different barracks types, and he said, *"I might just be your guy. I grew up in this quad-style barracks, but I've seen nearly everything the Army has in my past 22 years."* His name was First Sergeant Ron Akers, one of the senior enlisted members for the 2-35 INF. Back in his office, he began with a story:

> Before coming to Schofield, my previous Brigade had both the "tower-style" and the "quad-style." And we experienced something that nobody could figure out. The tower barracks had all the personnel problems. When we moved people to the quads, the problems went away. No one could figure out why.[23]

I dug a little deeper, asking, *"What kind of problems did you see? And what do you think it is about the quad-style barracks that helped?"* His answer was quick and definitive as if he had been thinking about it for years:

> We had all sorts of problems. Personnel-type issues—soldiers were getting into trouble, showing up late, those sorts of things.
>
> But, on the second question, the quads are just better for socializing—and I think that builds a better unit. These guys hang out together. I see them hanging out on the hallway balconies all the time. They're always together. In the tower-style design, you don't see that.[24]

After analyzing 1,018 GAT surveys between the tower-style of 1-21 INF and the balcony-style of 2-35 INF (or "quad-style" as First Sergeant Akers would say), there is some quantitative truth behind his 22-year career observations. Residents of the balcony barracks reported statistically significant higher levels of belonging—they feel part of the group more often and were less likely to feel left out.

Environment-behavior theory claims that part of the mechanism which gives balconies its social value is their ability to shorten the functional distance to the public social realm. To check that theory, Fort Bragg has the perfect case.

Case Two: Fort Bragg

For this next case at Fort Bragg, I again look at two infantry barracks. But this time, instead of comparing one Brigade Combat Team unit against the same type of unit in a different Brigade Combat Team, I compare two infantry units within the same BCT—2-325 INF and 1-325 INF, both in the 82nd Airborne's 2nd BCT.

What makes this such a great case is just how similar the two barracks are, minus one crucial design detail—their corners. Both barracks are six-story, 'L'-shaped double-loaded corridor designs. They both use the same room modules (the 1+1-Enhanced standard) and functionally arrange them in the same way. In plan, both barracks sit adjacent to another 'L'-shaped building to create and enclose a central quad.

Figure 5.19 (below) shows the location of the two barracks and their surrounding base context.

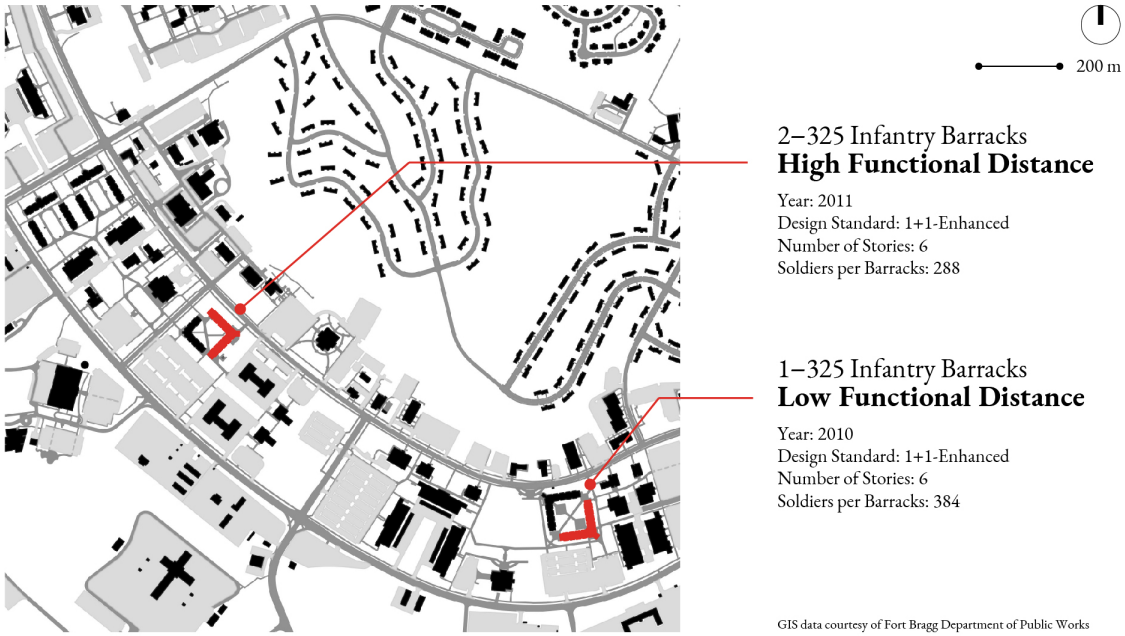


Figure 5.19. Locations of 2-325 INF and 1-325 INF barracks at Fort Bragg. Graphic created by the author.

Where the two barracks differ is in their design details—particularly, in how the two architects treated the corners. Figure 5.20 (below) provides a plan section of the two corner conditions.

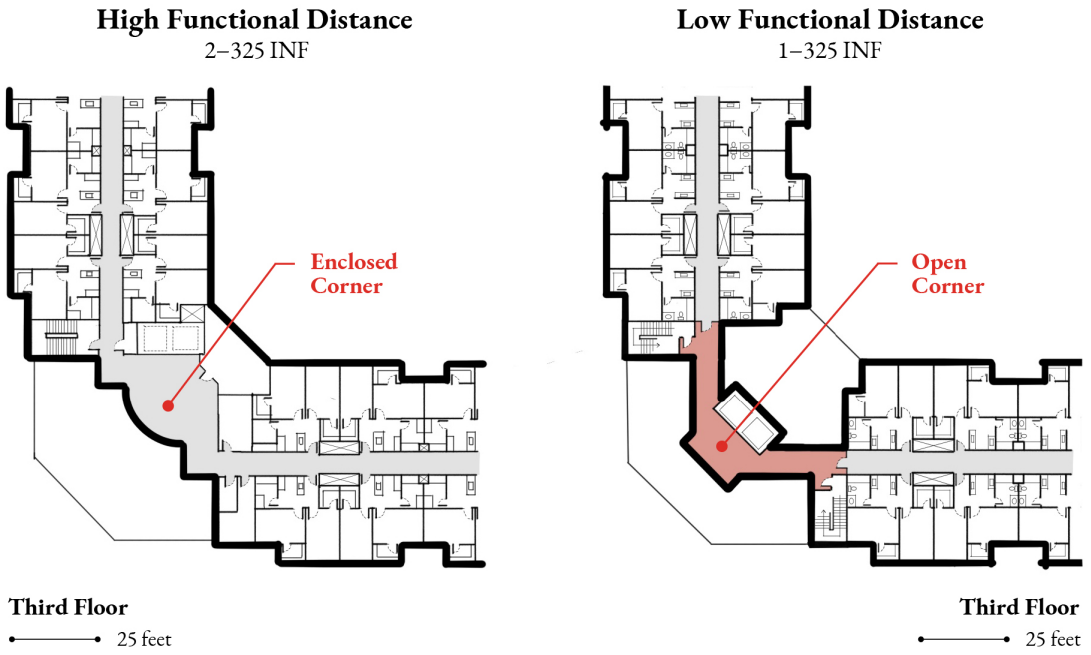


Figure 5.20. Floor plan comparison of 2-325 INF and 1-325 INF barracks at Fort Bragg. Graphic created by the author.

In the 2-325 INF barracks, the architect enclosed the corners, making the place where the two

double-loaded corridors meet a simple extension of both internal hallways. In the 1-325 INF barracks, the architects had a different idea. Instead of enclosing the corner, they exposed it. After the last room module on both sides of the 'L,' the hallway turns into an open-air balcony until the two walkways meet at the elevators. In Figure 5.20 (above), the gray represents interior corridor space, while the red shows exterior, open-air balcony areas.

Figure 5.21 (below) provides photographs of the two corner conditions.

Figure 5.21. Photographic comparison of 5-20 INF and 1-23 INF barracks at Fort Bragg. 2-325 courtyard and 1-325 front facade images are from the US Army Corps of Engineers Savannah District. All other photographs were taken by the author.

In the low functional distance barracks (i.e., the open corners—or shorter functional distance to the public social realm) the building has an extra module of rooms attached to each end of the 'L,' and the brick exterior comes up higher on the facade, but otherwise, the primary design difference is the corner condition. As you move away from the corner to where the soldier rooms begin, the floor plans are identical.

According to theory, these open corners act in the same manner as the balconies at Schofield Barracks. They provide an in-between zone, an easily accessible space for the residents on each side of each floor. As I took the photos of the 1-325 INF barracks, Specialist Franke was by my side, walking me through barracks and telling me about the social dynamics of the building. He told me

that these open corners were socialization hot spots—the prime location where he and his fellow soldiers hang out. The reason, he said, was that they afford an opportunity for the soldiers who smoke to join, they have a great view, they're close to the rooms, and each floor has their own space. As he told us in chapter two, you can often find Specialist Franke and his barracks mates sitting on these balcony corners during a nice North Carolina evening, beer in hand, talking, and building camaraderie—what the 2018 RAND report found to be "the best part" of Army life.[25]

In the 2nd BCT at Fort Bragg, two of the three infantry regiments live in the corner balcony barracks. Only 2-325 INF occupies the enclosed corner design. To decide which of the two other infantry units to compare, I again used my fourth rule and selected 1-325 INF since it is the most demographically similar (see Figure 5.22 below).

		Age	Rank[1]	Gender[2]	Building Year	Barracks Standard	S.F. per Soldier[3]
2-325 INF High Functional Distance N = 469	Mean	**23.63**	**3.73**	**2.00**	**2011**	**1+1-E**	**298**
	Standard Deviation	3.762	0.855	0.00	—	—	—
1-325 INF Low Functional Distance N = 310	Mean	**23.41**	**3.82**	**2.00**	**2010**	**1+1-E**	**298**
	Standard Deviation	3.050	0.789	0.00	—	—	—
	P-Value	0.019*	0.249	1.00			

1. Rank is converted to a numerical value (E-1 Private =1 ... E-5 Sergeant = 5)
2. Gender is converted to a numerical value (Female =1 and Male = 2)
3. Square footage per soldier per module

Figure 5.22. Demographics of 2-325 INF and 1-325 INF at Fort Bragg. Graphic created by the author.

Although the two units are demographically the closest between the three, they are not the same. There is a statistically significant difference in their average age—23.63 years for the enclosed corner, and 23.41 years for the open corner barracks. After adjusting for age—a whopping difference of 0.22 years, or less than three months—the mean social scores did not budge. Age is not linearly correlated with any of the six social questions, and adjusting for the 0.22-year difference did not alter any of the means while keeping my rounding convention to the hundredth place.

Specialist Franke told me a convincing story about the power of the open corners. His story aligns with Gehl's theory that easing the burden to pass between indoors and outdoors, and private to public will encourage more optional activities, and give more opportunities for social activities to emerge. It also aligns with the theory of affordances, behavior settings, and Alexander's Pattern 166,

Gallery Surround. In that pattern, Alexander writes:

> If people cannot walk out from the building onto balconies which look toward the outdoor space around the building, then neither they themselves nor the people outside have any medium which helps them feel the building and the larger public world are intertwined.[26]

The GAT data support all of these claims (see Figure 5.23 below).

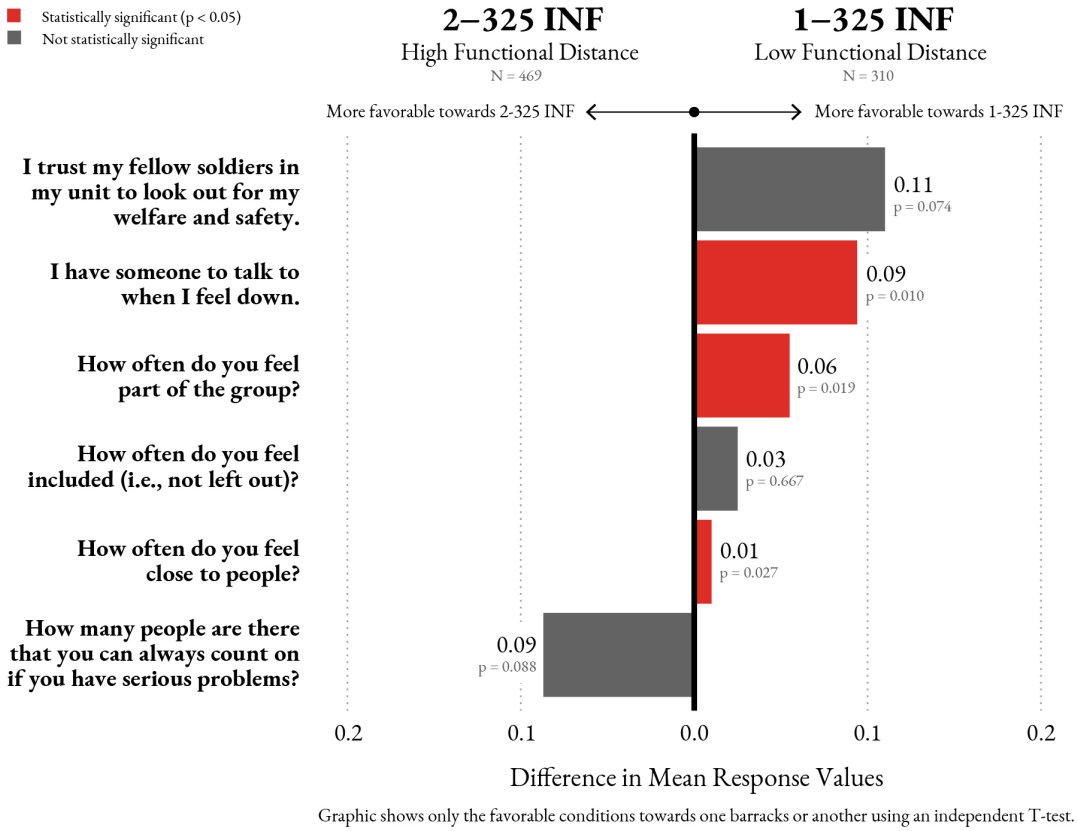


Figure 5.23. The social impact of functional distance. 2-325 INF compared to 1-325 INF barracks at Fort Bragg. Graphic created by the author.

Residents of the open corner barracks responded more favorably to five of the six questions. Three of those five were statistically significant—I have someone to talk to when I feel down, I feel part of the group, and I do not feel left out. For those keeping score at home, in every single case of this chapter—unobstructed space or balconies—group belonging was statistically affected. Antiterrorism's design provisions have decreased soldier feelings of social belonging in every case—a significant finding.

Interestingly, the open corners did not perform a clean sweep across all six questions like all of the other cases thus far. The enclosed corner residents reported having more people that they can count on if they have serious problems—an indicator of increased social support. While the

difference in means response values for this question was not statistically significant, it illustrates a point that I have not yet had the chance to reinforce. That is, all of the GAT questions target tremendously complex interactions. Human social variables are not simple. Belonging, social support, and social trust are affected by a host of factors, and some that leading researchers are likely not even aware of yet. The built environment is only one of many factors which may encourage or discourage various social behaviors, subtly pushing the needle for these six question in one direction or another.

When looking at the quantitative responses, we must look at trends, and not take any one case or any one question as absolute definitive truth of a universal correlation. And what this collection of case studies does show is that consistently, and across multiple sites and multiple geographic regions, design influences the social life of soldiers—for better or for worse.

Conclusion

To conclude this chapter, I want to share one last story from a soldier I met walking around Schofield Barracks. His name is Corporal Herrera, a resident of the double-loaded corridor design. I caught up with Corporal Herrera while he was working Charge-of-Quarters (CQ)—a rotating extra duty for soldiers to occupy the front desk of the barracks. When I asked how the social dynamics of his current barracks compared to his previous ones, he said:

> This is my third base, my third time living in the barracks—if you don't count basic or training—my third permanent barracks, and this one is the most anti-social. I don't even feel like I know my unit. At my last base, the barracks were similar, but two things were different. First, each room had a door to the outside. There wasn't a long inside hallway. Those barracks felt a lot more like apartments. And second, they had pavilions, grills, and outside spaces for people to use. And people used them too. I think that's part of the reason we all knew each other. That doesn't happen here.
>
> I've been living in these specific barracks for over a year, and I haven't seen a single barracks party—not one. When I was at my last base, we had quad-style barracks, and we were always out. When it got too cold in the winter, we just moved inside to the day room. But we were always doing things together. Here, there's nothing. No day rooms, no pavilions, no tables or benches, not a single shaded place to hang out outside.[27]

In one short quote, Corporal Herrera summarized this chapter's findings.

By preventing places to hide explosives through antiterrorism's unobstructed space provisions, designers inadvertently eliminated social options. These clear zones help visual surveillance, but at the same time, they decrease self-reported social health. And second, by fearing the aftereffects of blown-in doors, antiterrorism policy unintentionally increases the function distance between a soldier's private room and the public social realm. When the burden of functional distance grows—as is the case for the residents of double-loaded corridor designs or the enclosed corner barracks at

Fort Bragg—soldier reported social health dwindles.

In both cases, antiterrorism's two policies—unobstructed space and the prohibition of balcony-access—display troubling consequences for soldier social health.

CHAPTER VI:
AN ARMY OF ONE

You can't have a community without community space.

Eric Klinenberg
Palaces for the People

The commercial opens with the shot of a lone soldier running through a barren desert straight at the camera. He's in fatigues and wearing a plain brown Army t-shirt with a pack strapped to his back. The shiny silver dog tags around his neck bounce from left to right across his chest as he takes each stride. Over the sound of his strained breathing and the low, dramatic instrumental music in the background, he says:

> I am an Army of one. Even though there are 1,045,690 soldiers just like me, I am my own force. With technology, with training, with support, who I am has become better than who I was. And I'll be the first to tell you, the might of the US Army doesn't lie in numbers. It lies in me. Corporal Richard Lovett. I am an Army of one.[1]

The commercial first aired in 2001 as part of a new Army advertising campaign with the slogan, "An Army of One."

When a reporter asked the Secretary of the Army, Louis Caldera, why the Army was switching slogans, Caldera pointed to recruiting. According to news reports of the interaction, Caldera stated:

> [T]he Army had missed its recruiting target in three of the past five years. "It was not working," he said.[2]

Thus, to improve recruiting, the Army revamped its image, placing focus squarely on the individual. Criticism of the new slogan was swift, some claiming that it "misrepresented the Army as a group of individuals rather than a team."[3] And others writing that the slogan was "incongruous for the Army, which for two centuries has trained its recruits in the art of selflessness and unit cohesion, to promote itself as an incubator of self-actualization."[4] Five years later, "Army of One" was history, replaced by "Army Strong" in 2006.

The 2001 "Army of One" campaign aimed to improve recruitment by promoting individualism

and personal attainment. I argue that barracks design subscribes to a similar philosophy. Only instead of trying to entice people to join the service, the Army uses barracks as a tool to keep them from leaving.

To increase retention, the Army moved to a design paradigm centered on individualism—just like the 2001 advertising campaign. Their goal was to achieve individual satisfaction, using surveys to determine the desires of residents. Soldiers wanted space, privacy, and amenities. To meet these desires, designers moved from shared rooms to private rooms, and made those private rooms larger by deleting interior social common space and re-apportioning square footage to the individual.

The Army aimed to influence a soldier's decision to stay or go by appealing to the tangible desires of satisfaction surveys. Unfortunately, by catering to an individual's appetite for space, I argue that they physically and socially isolated soldiers from one another in the process.

In this chapter, we explore the social consequences of the Army's two retention-seeking design moves:

1. Moving from shared rooms to private rooms
2. Making individual rooms larger by removing communal social space

Taking Off the Doors

Since 1995 and the publishing of the 1+1 standard, the military has mandated individual bedrooms on all new construction. Barracks with shared sleeping rooms are slowly fading from the Department of Defense inventory. Of the 85 barracks that I visited throughout this study, only twelve had shared rooms. And of those twelve, JBLM's 1970s VOLAR design discussed in the last chapter (and again in a few pages), made up exactly half (6) of that total.

As my research travels took me from Schofield Barracks to Fort Bragg to JBLM, I heard rumblings of the same story. A barracks manager, two base planners, and a base architect asked me the same question. *"Are you here researching the barracks because of the door idea?"* they would say. The first time that I was asked that question was at Fort Bragg. The confused look on my face must have gave away the answer, because Mr. Pearson, the base planner, immediately launched into an explanation. *"Apparently, the Army was—or maybe is—looking into taking the doors off barracks bedrooms to help with suicides,"* he told me.[5] Mr. Pearson didn't know much more about the story, but it stuck with me. I was intrigued. I received the same question at JBLM, but again, the barracks manager who asked knew no more than I did—a second-hand rumor of something happening somewhere. Just as I was beginning to think that I may never get the full story, I called Mr. Steve Hultiss, one of the designers charged with developing the Army's standard barracks design.

"Oh, yeah," he said after I brought up the story, *"I know all about that. I've even been in on some of the calls."* He then proceeded to give me the executive summary, saying:

> At Fort Hood, one of the commanders ordered all of the doors to be taken off the bedrooms. Not the door entering the room module itself, but the bedroom doors, because he felt that was an effective way to help with suicide prevention. He felt soldiers were being isolated in their bedrooms. So the Army Installation Management Command (IMCOM) put a request up to [the Pentagon], saying, "we want to look at going away from private room modules and put multiple people in a room so we force more interaction. We don't want soldiers sitting around in their room, isolated and unable to deal with issues, and committing suicide."
>
> We [Mr. Hultiss' barracks design office] were involved in that discussion, and what was really interesting was Medical Command (MEDCOM) got on and said: "what medical professional has evaluated this and determined that it is actually beneficial in suicide prevention?" And everybody on the phone went silent. So they said, "okay, come back to us when you've actually determined this to be a viable action to prevent suicides."
>
> The idea stalled right there from what I know. I'm not sure they ever came back with scientific medical support.[6]

I tell this story for a couple of reasons. First, it highlights a recognition by the Army into some of the same issues that launched this study—the social isolation of soldiers. And second, it supports a military belief (at least for some) that our physical environment can have a profound effect on our lives.

Unfortunately, I also find this story a bit troublesome. While environment-behavior theory supports the claim that increased social interaction improves the likelihood of social tie formation and increases an individual's social support resources, the mechanism that the Army promotes—removing doors to force interaction—misses some nuance in the current body of research on privacy regulation.

Yin and Yang

In the first chapter of this section (Theorizing Sociability), I introduced the sociological theory on propinquity. The theory claims that opportunities for social interaction increase as distance (physical and functional) decreases. Thus, the more that people separate—physically, through measured distance, and functionally, through doors and walls—the less likely those people are to interact, form a social tie, and benefit from mutual social support. By proposing to take the doors off of barracks bedrooms or returning to the era of shared rooms, the Army is seeking to increase propinquity—and thus, hopefully, increase social support amongst soldiers.

But, with phrases like "force interaction," this proposal seems to miss—or at least under-value—the role that privacy plays in encouraging interaction. Amos Rapoport defines privacy as:

> [T]he ability to control interactions, to have options, and to achieve desired interactions.[7]

Similarly, Charles Montgomery writes:

> We tolerate other people more when we know we can escape them. People who live in areas with crowded streets report feeling much better when they have rooms of their own to which they can retreat. There's a correlation between societal happiness and the number of rooms per person: it's not so much square footage that matters, but the ability to moderate contact with other people.[8]

What these quotes illustrate is that privacy and conviviality work together. They are not the opposing ends in a game of 'tug-of-war' where increasing one comes at the expense of the other, but rather, two balloons bound to the same string—each flies higher because of, not despite, the other.

In 1973, Stuart Valins and Andrew Baum, two psychologists at Stony Brook University in New York conducted a study. Curious on whether architecture influences perceptual feelings of crowding, they compared two dormitories on the university campus. In one residence, thirty-four students lived in shared rooms lined on either side of a long, double-loaded corridor with central bathrooms and a central lounge. In a second dorm with a similar number of residents, the students lived in individually-accessed suites—with two or three double-occupancy rooms surrounding a small lounge.

Both sets of residents lived in shared rooms, both had the same amount of physical space, and both dormitories had the same number of total students, but resident responses between the two dormitories were hardly the same. Valins and Baum found that the corridor residents were socially overloaded. They could not control the amount or timing of their social interactions, and thus, felt crowded and stressed. They complained of unwanted interaction at unwanted times.[9]

The research didn't stop there, however. Valins and Baum brought the same students of both dormitories into their lab one-by-one for a second phase of the study. They hypothesized that feelings of crowding and social overload might manifest into anti-social behavior in other settings of the residents' lives. They set up a brilliant experiment. When the student showed up, they told them to wait in a lobby until it was their turn to participate in the research—only the students didn't know that the real research was happening while they waited. Valins and Baum planted an accomplice in the lobby, already seated, to test how closely the residents of the two dorms sat to the accomplice and how often they initiated social interaction. As it turns out, residents of the corridor design:

> [S]it further from the confederate, they look less at the confederate, they talk less, and they feel more uncomfortable in the situation. In conjunction with our data indicating that they feel crowded, meet too many people on their floor, and tolerate fewer people in social spaces, these data suggest that living in these dormitories is having a substantial effect on the mood and behavior of the residents.[10]

While too much privacy may lead to social isolation, Valins and Baum's work also cautions against too little privacy. Or, as Donia Zhang claims:

> Privacy and community is like the Yin and Yang that require a healthy balance. And, of course, different people require a different balance.[11]

As the Army considers a policy shift towards shared rooms, it is crucial to recognize both privacy and propinquity—and how both contribute to interaction. With GAT data and a few good comparative cases, we can investigate the effect—if one exists—of private rooms on the social health of barracks residents.

Case One: Joint Base Lewis-McChord's Engineers

You would be hard-pressed to design a better case to isolate the effects of private rooms than the two engineer barracks on Joint Base Lewis-McChord's North Fort. The two barracks sit side-by-side, literally feet from one another (see Figure 6.1 below).

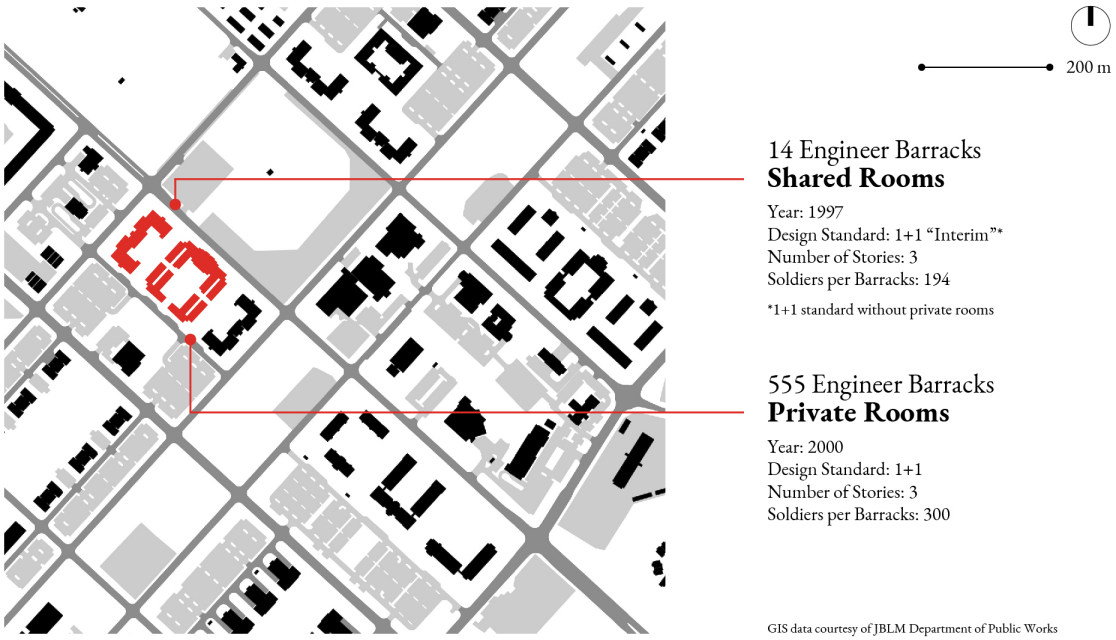


Figure 6.1. Locations of 14 BEB and 555 EN barracks at Joint Base Lewis-McChord. Graphic created by the author.

On top of their geographic similarity, the two barracks are architecturally similar as well. Both pre-date the antiterrorism standards that we examined in the last chapter, and the exterior environments of both buildings have a striking resemblance (photographs upcoming). The barracks of the 14 Engineers are only three years older than the 555 Engineer barracks next door. In those three years, however, design standards changed. Architects of the 1997 barracks used a "1+1 Interim"[12] standard, a hybrid of sorts between the 2+2 plan and the 1+1 plan. Instead of four soldiers per module—two per room—with all four sharing a single bathroom (as is the case for the 2+2 design), the 14 Engineer barracks follow the 1+1 occupancy standards. They have two soldiers per module with one bathroom between the two people. In that sense, the interim standard is exactly like the final 1+1 design. Unlike the 555 Engineer barracks and the implemented 1+1 model,

however, the 14 Engineer barracks do not have private rooms. The two residents share the space without hard physical separation. Figure 6.2 (below) show floor plans of the two barracks.

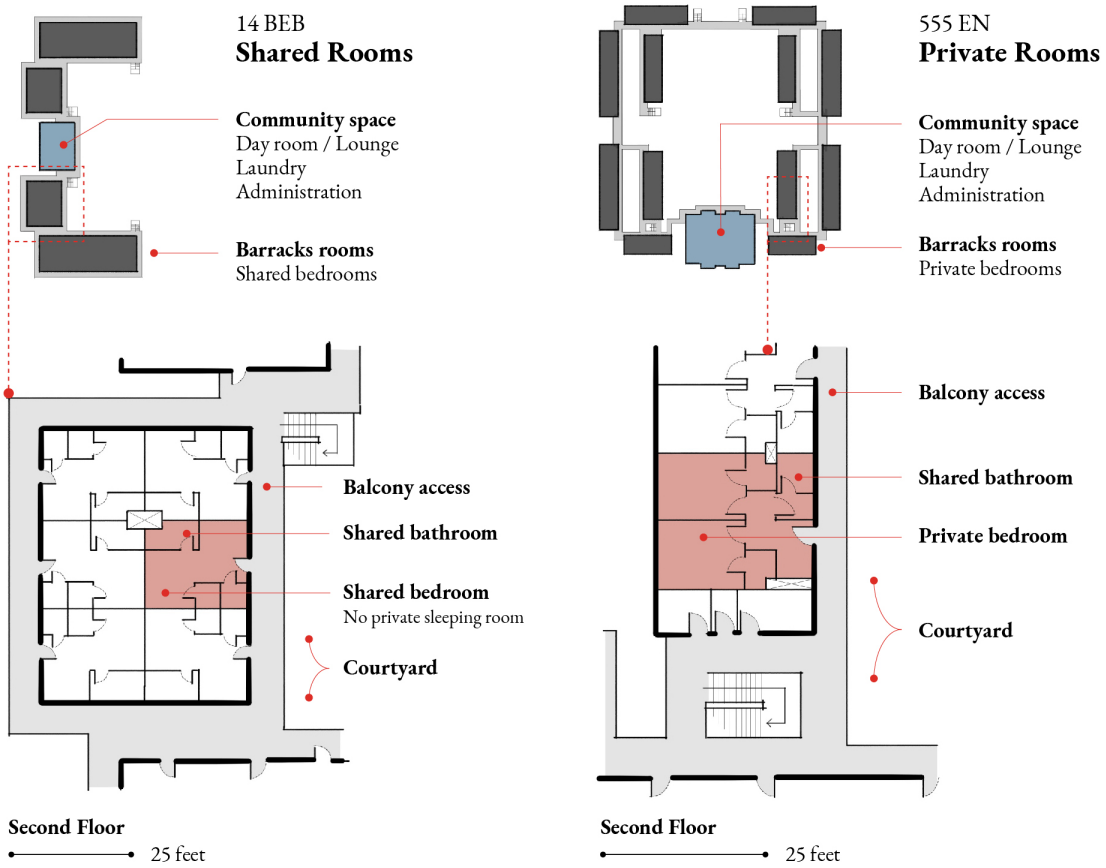


Figure 6.2. Floor plan comparison of 14 BEB and 555 EN barracks at Joint Base Lewis-McChord. Graphic created by the author.

In addition to in-room privacy, there are a few other architectural differences that set these two barracks apart. For starters, the 555 Engineer barracks are much larger (another unit occupies part of the building with them). Second, the older barracks stack their rooms back-to-back with full wrap-around balconies. The 555 Engineer barracks do not. Their rooms are only one unit deep—allowing natural light on both sides—and have a single-loaded exterior balcony. In addition, the new, larger barracks arranged its housing blocks to create a hierarchy of exterior space. There is one central quad, with more intimate quads shared by a smaller number of residents in the corners.

Despite these subtle differences, the two barracks are still incredibly similar. The architects created small blocks of rooms with balconies weaving and splitting between them. The barracks enclose (or provide the perception of enclosing) a vegetated quad with ample places to sit, interact, or simply observe from the balconies above. And they both also have a central interior social lounge. Figure 6.3 (below) provides a photographic comparison of the two.

Figure 6.3. Photographic comparison of 14 BEB and 555 EN barracks at Joint Base Lewis-McChord. All photographs were taken by the author.

Demographically, the two engineer units are not the same. They are statistically different in their composition of military ranks. 14 BEB (shared rooms) houses more senior residents (in rank—see Figure 6.4 below).

		Age	Rank[1]	Gender[2]	Building Year	Barracks Standard	S.F. per Soldier[3]
14 BEB Shared Rooms N = 326	Mean	**22.72**	**3.56**	**1.85**	**1997**	**1+1 Interim**	**154**
	Standard Deviation	3.383	0.902	0.355	—		—
555 EN Private Rooms N = 98	Mean	**23.21**	**3.17**	**1.85**	**2000**	**1+1**	**230**
	Standard Deviation	3.673	1.227	0.362	—	—	—
	P-Value	0.166	0.018*	0.887			

1. Rank is converted to a numerical value (E-1 Private =1 ... E-5 Sergeant = 5)
2. Gender is converted to a numerical value (Female =1 and Male = 2)
3. Square footage per soldier per module

Figure 6.4. Demographics of 14 BEB and 555 EN barracks at Joint Base Lewis-McChord. Graphic created by the author.

To ensure a fair comparison across the GAT response data, I've controlled for rank. Like the previous cases with statistical differences in their demographic profiles, controlling for rank made little impact on the mean response values—moving them by no more than 0.01 in the most significant case.

Figure 6.5 (below) shows the mean response values across the two barracks.

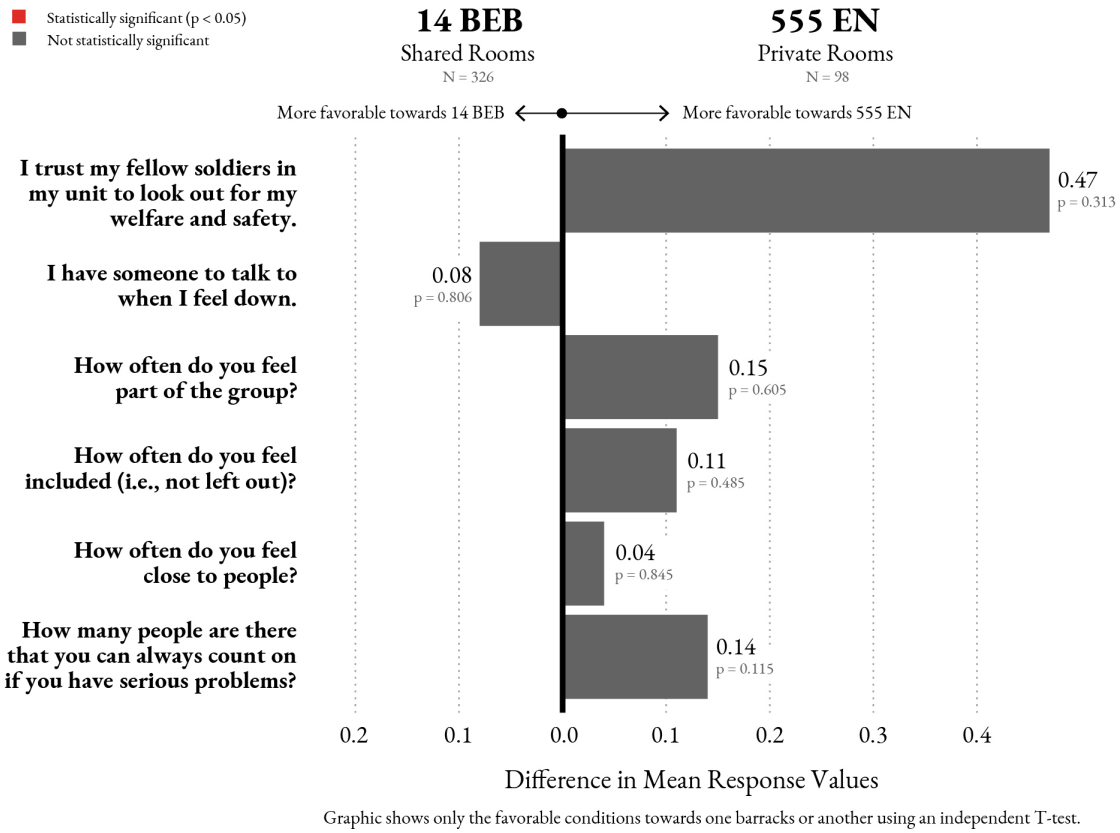


Figure 6.5. The social impact of private rooms. 14 BEB compared to 555 EN at Joint Base Lewis-McChord. Graphic created by the author.

The GAT results do not provide definitive evidence for either shared or private rooms. Across the six questions, residents of the private room barracks report higher social values for five of the six (with 'having someone to talk to when feeling down' as the only exception). Still, none of them are statistically significant—even if one lowered the significance level to 90% in a desperate attempt to find results.

Case Two: Joint Base Lewis-McChord's Support Battalions

I stay at Joint Base Lewis-McChord for a second case to examine the difference in social health for soldiers in private versus shared rooms. The two Brigade Support Battalions (BSBs) across

JBLM's two Brigade Combat Teams offer a good second data point. Although the two units sit on opposite ends of the base, the demographics of the units, and the architecture of their housing, is similar. The 296 BSB resides in the 1970s VOLAR-design barracks that we've already discussed. The 2 BSB barracks are 25 years newer, but contain some similarities to the VOLAR design. Instead of the double-loaded corridor or exterior balcony model, both buildings are of the "garden-style" or "suite-style" plan where individual entries provide access to a small collection of room modules. In both barracks, each entry feeds four modules per floor (assuming utility or communal spaces have not taken the place of a room). In plan, there are three primary differences. One, in the older 1970s design, the circulation dissected the entire building, providing equal access from either side. In the newer barracks, access is unidirectional. Two, the newer barracks simplified the floorplate, making one long, linear form. The VOLAR design offset each module block to create semi-enclosed and protected pockets of outdoor social space. Three, and most important for this study, the newer barracks contain private rooms while soldiers share rooms in the older barracks.

Figure 6.6 (below) provides a graphic comparison of the two floorplans.

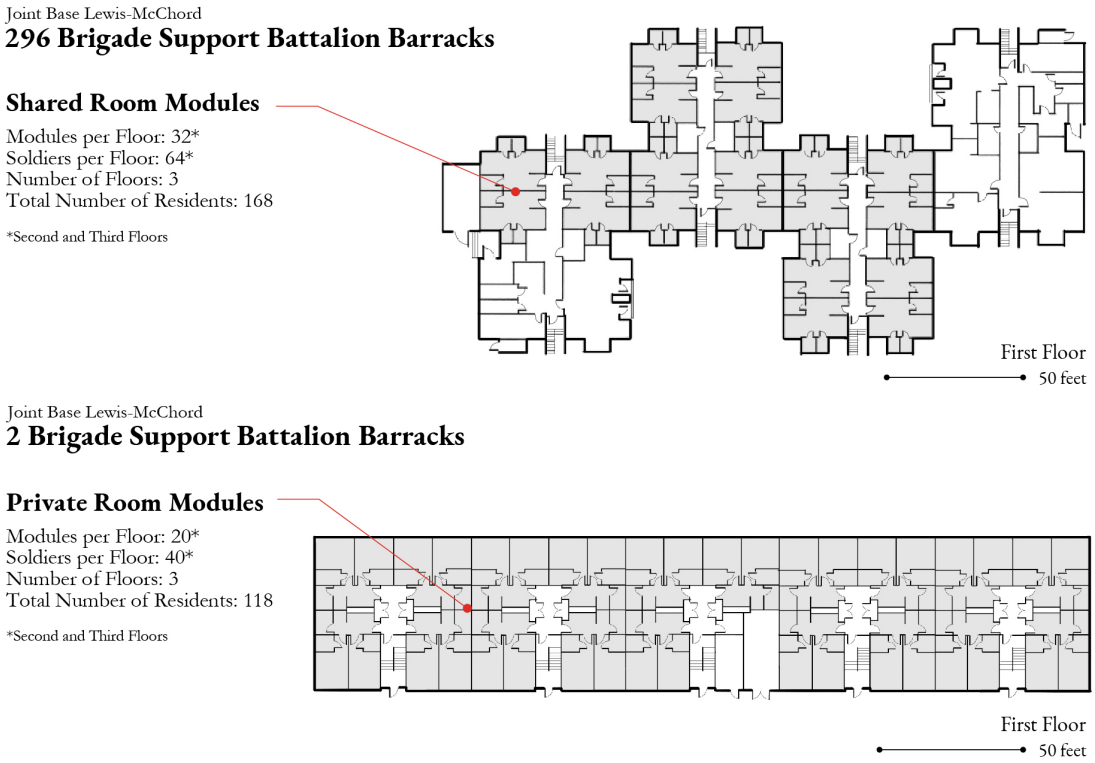


Figure 6.6. Floor plan comparison of 296 BSB and 2 BSB barracks at Joint Base Lewis-McChord. Graphic created by the author.

Walking through the site of both barracks, subjectively, I found them far more similar in experience than how they compare in plan. Frankly, I expected the new barracks to feel barren and

exposed. But that was not the case. While they are not the same, they are not worlds apart either. Figure 6.7 (below) provides a photographic tour of the two barracks.

Figure 6.7. Photographic comparison of 296 BSB and 2 BSB barracks at Joint Base Lewis-McChord. All photographs were taken by the author.

Along with architectural similarities (minus the private versus shared rooms), demographically, there is no statistical difference between the two units (see Figure 6.8 below).

		Age	Rank[1]	Gender[2]	Building Year	Barracks Standard	S.F. per Soldier[3]
296 BSB Shared Rooms N = 625	Mean	**22.93**	**3.41**	**1.73**	**1980**	**VOLAR**	**113**
	Standard Deviation	3.994	0.900	0.443	—	—	—
2 BSB Private Rooms N = 604	Mean	**22.63**	**3.44**	**1.77**	**2005**	**1+1-E**	**298**
	Standard Deviation	3.689	0.855	0.420	—	—	—
	P-Value	0.607	0.222	0.116			

1. Rank is converted to a numerical value (E-1 Private =1 ... E-5 Sergeant = 5)
2. Gender is converted to a numerical value (Female =1 and Male = 2)
3. Square footage per soldier per module

Figure 6.8. Demographics of 296 BSB and 2 BSB barracks at Joint Base Lewis-McChord. Graphic created by the author.

Turning now to the social results, it turns out that the second case doesn't yield much more than the first. In the first case, the question asking residents about 'having someone to talk to when they

are feeling down' was the only one which favored shared rooms (although, the p-value was 0.806). In this case, that same question is the only one to reach statistical significance—this time in favor of the private room barracks (see Figure 6.9 below).

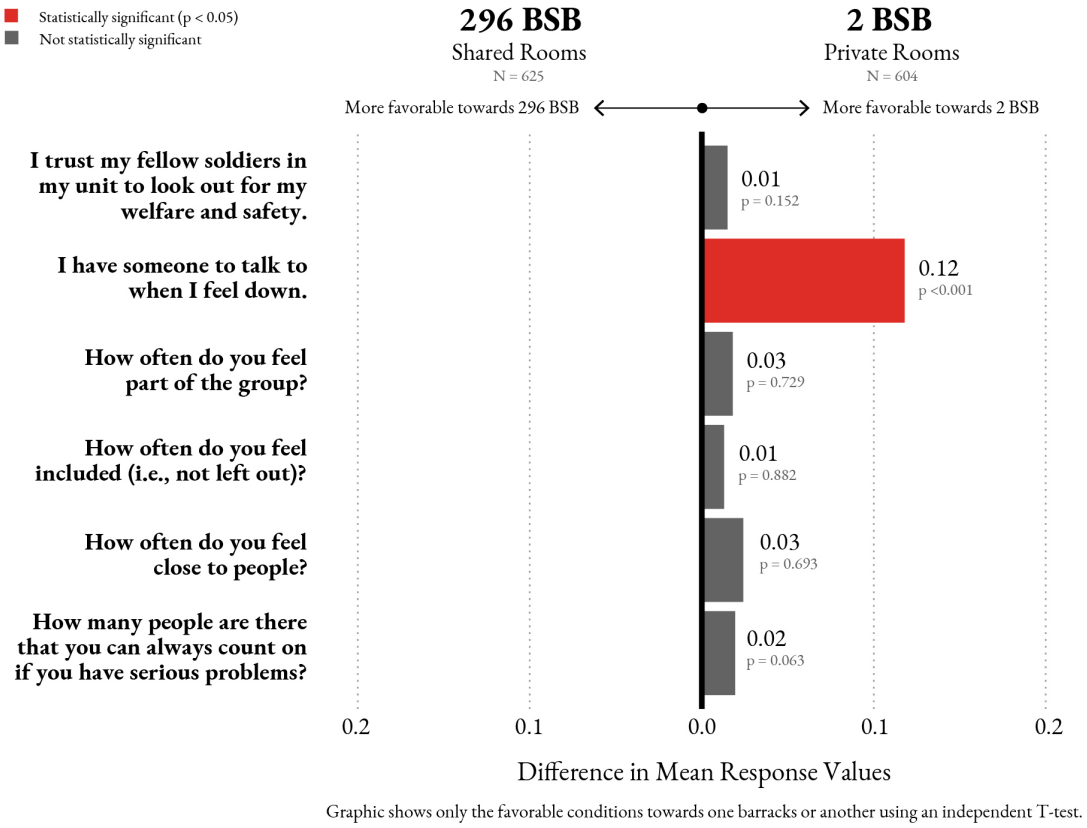


Figure 6.9. The social impact of private rooms. 296 BSB compared to 2 BSB barracks at Joint Base Lewis-McChord. Graphic created by the author.

Outside of that single question, the remainder of the mean response values are nearly identical.

Compared to the findings across the two antiterrorism provisions of the previous chapter, the GAT survey responses on the social effects of private rooms is far less convincing—for either room style. I found no positive support for the claim that bedroom door removal or a return to shared rooms will significantly increase soldier social health. In the first case, the differences in means were relatively large and consistently in favor of private rooms, however, the p-values were also large. Thus, the first case had big findings, but little confidence in those findings. In the second case, there is one statistically significant result, but it also corresponds with the only opposite result in the previous case.

Three reasons might explain these findings. One, there is simply just not a consistent social effect between the two-room types for barracks residents. Soldiers may prefer one or the other, but

neither is significantly affecting their social health. Two, the cases selected had too much variability in other factors, and thus, neither case isolates the true impacts of private rooms (positively or negatively). Or three, the architects of the two shared room barracks that I selected designed them in such a way that opportunities for retreat mediate social overload—either by the way the designers broke up the large barracks into small units, or how they designed the short functional distance to exterior spaces, allowing residents the psychological comfort of easy retreat when needed.

Of course, there is always reason number four as well—that all of these three factors (plus some) play a role, mixing more like tie-dye than clean layers of color. In any case, more research in this area is needed. With shared room barracks dwindling in numbers across the Army, that will become tougher and tougher.

Social Space

The second change in barracks design in the name of retention is the privatization of social space. To make rooms larger without breaking Congressional per soldier space authorizations, barracks designers robbed Peter to pay Paul—eliminating communal space and re-apportioning square footage to the individual. When I asked Mr. Hultiss, a designer with the Army's barracks standardization office, about this move, he said:

> They [the soldiers] really just prefer the larger living space in their room. Because when you get off work you really just want to go relax, you don't necessarily want to have to go to a building or another room to watch tv which might not be playing what you want to watch. They just want to relax. So there's definitely a trend toward putting more space in the room module.
>
> And it's what the soldier, when asked, prefers. There are other community functions on base as well, the community centers, if you really want community space.[13]

There are a few implicit claims in this statement worth mentioning. First, group social activity is not "relaxing." Second, that trips to reach communal social space are burdensome. And three, that community space in a separate building—and a likely different portion of the base—is a suitable substitute for social space in the barracks. While I disagree with all three of these claims, they accurately capture the philosophical underpinnings to the shifts in the barracks design standards that I highlighted in chapter three, "The Quest for Quality of Life."

Not all Army designers agree with Mr. Hultiss' claims, however. Mr. John Napalto, the planner at Schofield Barracks, had a different idea. When I asked him about the disappearing communal spaces, he said:

> The concept of the day room is very much still relevant. And we've gone away from them... We've catered too much to these soldier surveys. They always want bigger rooms and more privacy. We've isolated soldiers, and isolation is a soldier's worst enemy.[14]

The question for this last section in Part Two is to investigate these two positions. On the one side, Mr. Hultiss believes that the privatization of space benefits the soldier. The Army—through its published standards—agrees. On the other side, is Mr. Napalto's argument—the idea that the loss of community space has resulted in a loss of community.

Case One: Fort Bragg

In the first case, I wanted to test the mere presence of communal social space. I chose two barracks at Fort Bragg—both of which we've already used to explore antiterrorism factors in the previous chapter. The two barracks are the 1-508 Infantry Regiment barracks and the 2-235 Infantry Regiment Barracks. In the previous chapter, both of these were on the losing end. I contrasted the 1-508 INF barracks with the articulated courtyards to illustrate the social value of exterior spaces. And for the 2-235 INF barracks (i.e., the enclosed corner barracks), I contrasted it with the balcony corners to show the benefits of shortened functional distance and distributed social spaces.

Figure 6.10. Photographic comparison of 1-508 INF and 2-325 INF barracks at Fort Bragg. Images of 2-325's courtyard and its exterior facade with the Army runners are from the US Army Corps of Engineers Savannah District. All other photographs were taken by the author.

As the title above each set of photographs in Figure 6.10 (above) indicates, I use this case to examine the social effects of social space—particularly, its mere presence. In the previous chapter, I discovered that the residents of 2-325 INF responded with statistically lower levels of social health across three of the six questions as compared to its balcony-corner neighbor, and I hypothesized that the distributed social spaces and decreased functional distance of the corners encouraged greater use

and increased soldier interaction. 2-325 INF, with its enclosed corners, did not see those same benefits. And neither does 1-508 INF, the barracks on the left side of Figure 6.7.

Both barracks are six-story, double-loaded corridor designs using the 1+1-Enhanced standard. Both are 'L'-shaped and enclose a barren, but lawned courtyard. Even down to their color and bottom coursing of brick, the two barracks are aesthetically similar from the outside. In plan, however, the start to diverge (see Figure 6.11 below).

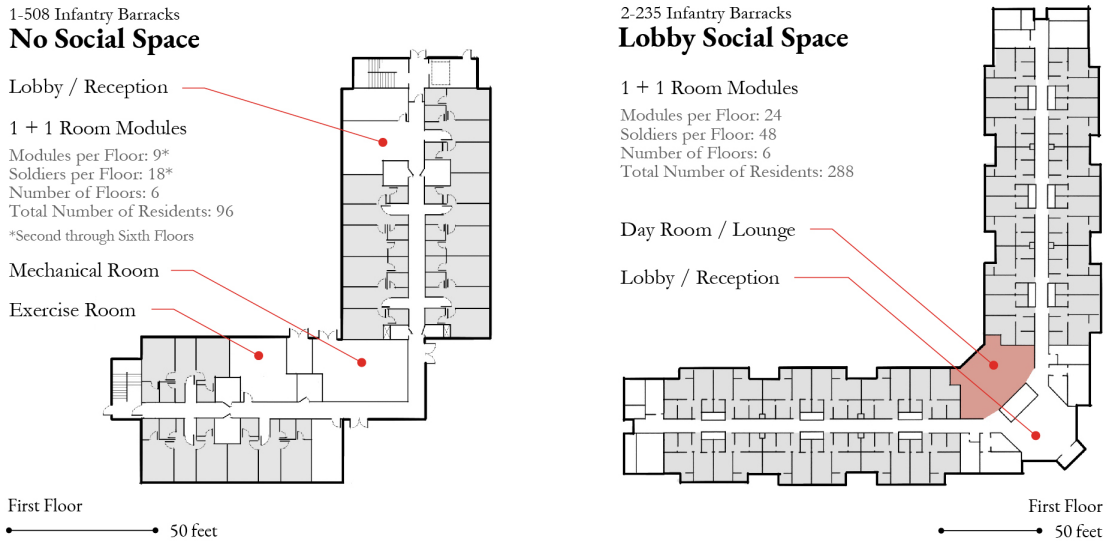


Figure 6.11. Floor plan comparison of 1-508 INF and 2-325 INF barracks at Fort Bragg. Graphic created by the author.

Not only are the two barracks different sizes, but the architects designed them quite differently as well. In the 2-325 INF barracks, architects highlighted the corner, placing both the entry, lobby, and day room all in that space. It acts—or intends to act—as the central communal hub. In the 1-508 INF barracks, the architects disregarded the corner, taking up most of that space with a mechanical room, and moved the main entrance to one of the ends.

In both barracks, the first floor is the only level with spaces other than room modules. Most notably, the designers of the 1-508 INF barracks opted against social health spaces in favor of a physical health space—the exercise room.

		Age	Rank[1]	Gender[2]	Building Year	Barracks Standard	S.F. per Soldier[3]
1-508 INF No Social Space N = 610	Mean	**23.27**	**3.70**	**1.98**	**2010**	**1+1-E**	**298**
	Standard Deviation	3.339	0.832	0.127	—	—	—
2-325 INF Lobby Social Space N = 469	Mean	**23.63**	**3.73**	**2.00**	**2011**	**1+1-E**	**298**
	Standard Deviation	3.762	0.855	0.00	—	—	—
	P-Value	0.139	0.832	0.005*			

1. Rank is converted to a numerical value (E-1 Private =1 ... E-5 Sergeant = 5)
2. Gender is converted to a numerical value (Female =1 and Male = 2)
3. Square footage per soldier per module

Figure 6.12. Demographics of 1-508 INF and 2-325 INF barracks at Fort Bragg. Graphic created by the author.

Controlling for the statistical difference in unit gender composition (Figure 6.12 above), I used the GAT data to determine whether the presence of a day room in the 2-325 INF barracks—even if it is sub-optimal compared to the distributed spaces in the balcony corner barracks—correlated to an increase in social health over the residents of 1-508 INF. Figure 6.13 (below) displays those results.

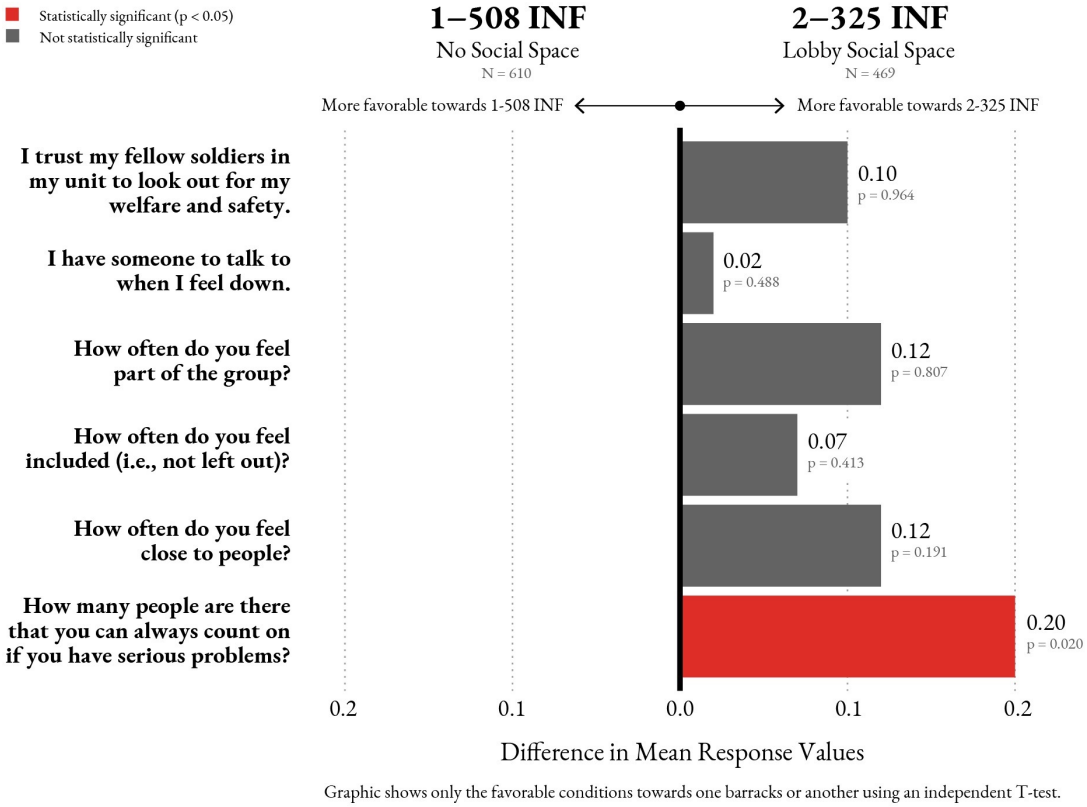


Figure 6.13. The social impact of social space. 1-508 INF compared to the 2-325 INF barracks at Fort Bragg. Graphic created by the author.

The GAT survey data shows consistent, but mostly insignificant support for the mere presence of social space. All six of the mean response values favor the 2-325 INF barrack with the dayroom in the corner lobby, and one of the six questions was statistically significant—the number of people that soldiers can rely on during serious problems. The other measure of social support—having someone to talk to when feeling down—was insignificant.

In a second case, I test the idea that it is design that matters, not mere presence alone. Since distributed social space already proved a boon with the balcony corner barracks, I aimed to triangulate those findings with another case—this time, at Joint Base Lewis-McChord.

Case Two: Joint Base Lewis-McChord

For the last case in this chapter, I again return to the 1970s-era VOLAR barracks at JBLM. I compare them to one of its two neighboring 1+1-Enhanced barracks (the one I haven't looked at yet), this time to determine whether resident social health improves as communal social spaces disperse closer to the soldier rooms. Figure 6.14 shows a site plan of the two selected barracks (below).

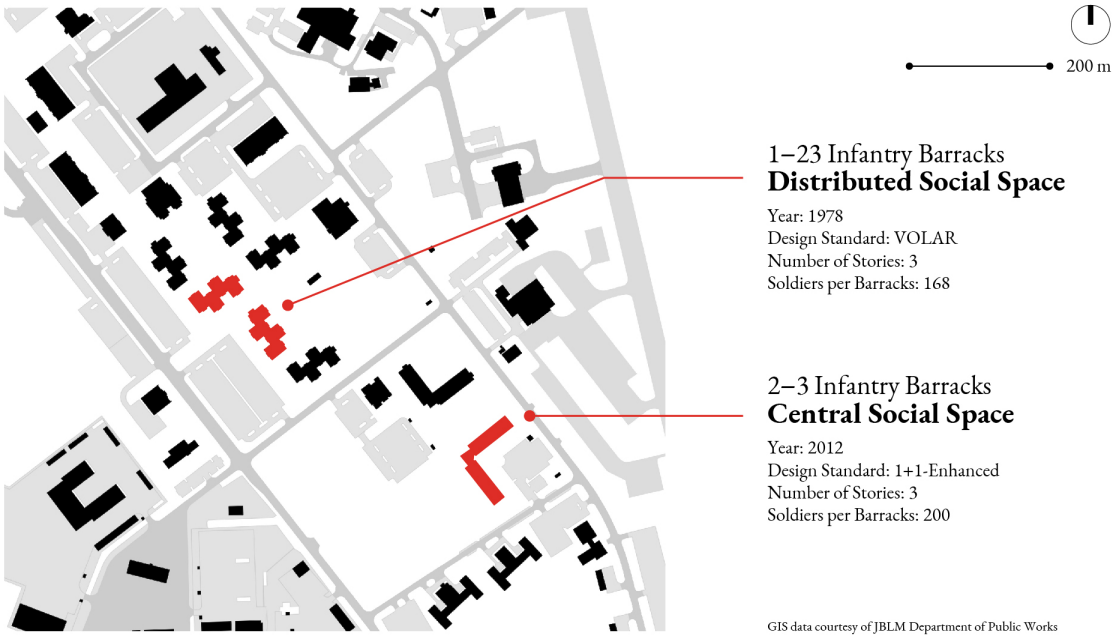


Figure 6.14. Locations of 1-23 INF and 2-3 INF at Joint Base Lewis-McChord. Graphic created by the author.

The two barracks make a good case since both are in the same complex and house the same type of unit under the same Brigade Combat Team (infantry in the 1st BCT). Demographically, both units are also statistically similar (see Figure 6.15 below).

		Age	Rank[1]	Gender[2]	Building Year	Barracks Standard	S.F. per Soldier[3]
2-3 INF Central Social Space N = 578	Mean	**22.17**	**3.41**	**1.98**	**2012**	**1+1-E**	**298**
	Standard Deviation	2.823	0.967	0.148	—	—	—
1-23 INF Distributed Social Space N = 574	Mean	**22.13**	**3.37**	**1.98**	**1978**	**VOLAR**	**113**
	Standard Deviation	2.884	0.992	0.137	—	—	—
	P-Value	0.653	0.868	0.693			

1. Rank is converted to a numerical value (E-1 Private =1 ... E-5 Sergeant = 5)
2. Gender is converted to a numerical value (Female =1 and Male = 2)
3. Square footage per soldier per module

Figure 6.15. Demographics of 2-3 INF and 1-23 INF at Joint Base Lewis-McChord. Graphic created by the author.

Architecturally, the two barracks contain a similar total quantity of soldiers, have the same number of floors, and are of the same "garden style."

Figure 6.16 (below) provides photographs of the two barracks.

Central Social Space
2-3 INF

Distributed Social Space
1-23 INF

Figure 6.16. Photographic comparison of 2-3 INF and 1-23 INF at Joint Base Lewis-McChord. All images were taken by the author.

As the photographs reveal, the two barracks are also much closer in their exterior social spaces than the 'L'-shaped 1+1-E barracks compared during the unobstructed space analysis. By design, the goal of this case, is to focus inward—at the interior social spaces—and have the exterior space not be a factor (or at least, not much of one).

Turning now to the two barracks' respective floor plans, we can see the different distributions of their interior social spaces (see Figure 6.17 below).

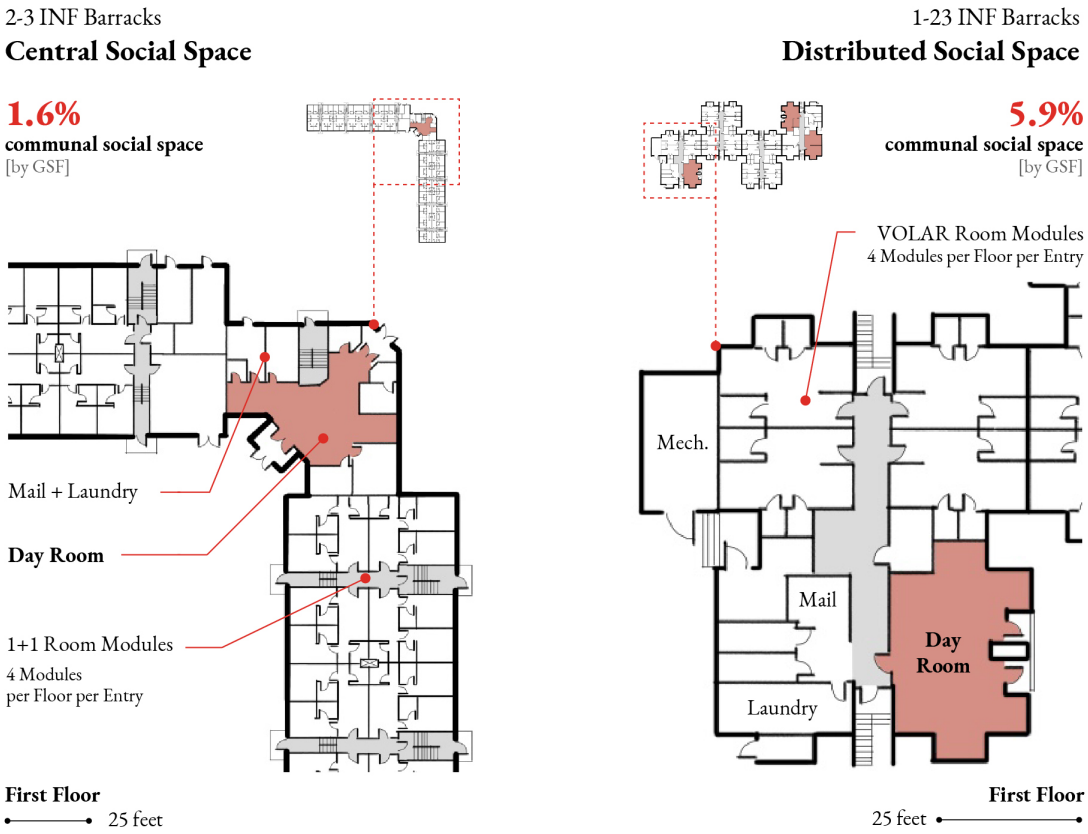


Figure 6.17. Floor plan comparison of 2-3 INF and 1-23 INF at Joint Base Lewis-McChord. Graphic created by the author.

For the newer 1+1-Enhanced barracks, social space only exists in the corner entry, just like the 2-325 INF barracks at Fort Bragg. For the 1-23 INF barracks, on the other hand, day rooms and lounges are split and dispersed into three different locations across the four-block barracks building. While the 2-3 INF barracks contain only 1.6% communal social space (by gross square footage), the 1970s VOLAR design has 5.9%—a 269% increase.

Figure 6.18 (below) illustrates the GAT survey results for these two barracks.

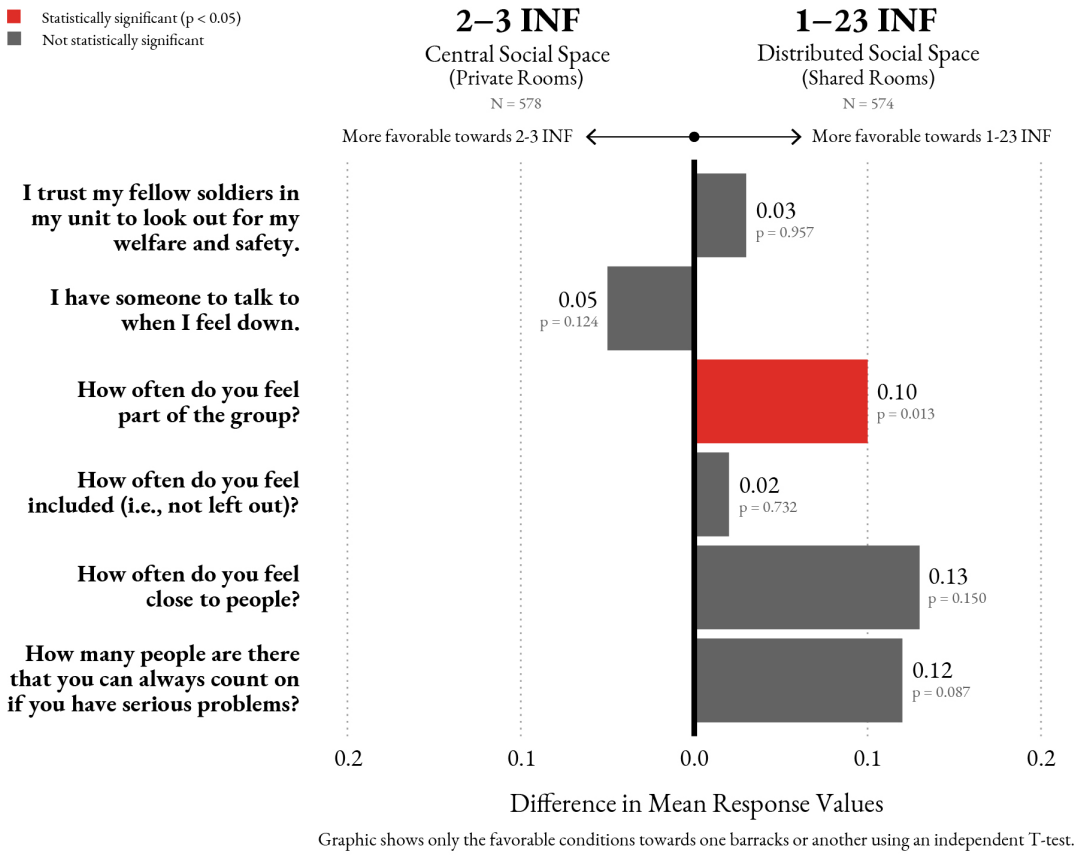


Figure 6.18. The social impact of social space. 2-3 INF compared to 1-23 INF at Joint Base Lewis-McChord. Graphic created by the author.

Like the results from the corner balcony barracks at Fort Bragg, five of the six questions favored the residents of barracks with distributed social spaces. In both cases, the one question favoring the other side asked about social support, and neither was significant. Also similar between the two cases, was a statistically significant finding for increased belonging—how often soldiers 'feel part of the group.'

Conclusion

Mr. John Napalto—a base planner for Schofield Barracks—is not afraid to tell you what he thinks. When I asked him his thoughts on barracks design trends, he said:

> The 1+1 Standard—or at least, how we've designed for it—is not the way to go. The pendulum has swung too far towards individualization. Soldiers are individualized—separated from each other, separated from NCO's, separated by technology... The standard design needs to be re-done. Everything about design has an impact [on soldiers], and we've lost the most important factor—we've lost soldier social interaction.[15]

The GAT data, across the cases presented, only partially support that claim. I found no significant

evidence to lend credence to the idea that shared rooms improve soldier social health. On the other hand, communal social space—particularly when it is hierarchical, and easily accessed—appears to strengthen belonging and social support for residents.

As we leave part two, we move away from the link between architecture and social connection, and towards the effects of social connection on retention, health, and incidents of suicide.

PART THREE:
THE CONSEQUENCES OF (DIS)CONNECTION

CHAPTER VII:
RETENTION

In his 1990 thesis, Captain David Bland defined retention as, "keeping trained personnel in the military service after their initial commitment."[1] Since 1973, when the Department of Defense ended the Draft and started relying entirely on volunteers to fill its ranks, recruitment—and retention—became a national security issue. The military is a fighting force of people. Tanks are nothing without their drivers, planes are nothing without their pilots, and ships are nothing without their captains. It is service members which enable the nation's defense mission, and the military no longer has endless conscripts of young men and women waiting in the wings. Instead, they have to compete for—and retain—talent. To keep people in the service, the Army has to convince soldiers that the value proposition of staying is greater than the value proposition of leaving. They have to sell, and housing is part of that pitch.

To make up for the "AVF arithmetic" from chapter three, Congress and the Department of Defense believe that "quality of life" can entice people to wear their uniforms a little longer. If barracks only had more space, privacy, and amenities—the things that service members say they want in repeated satisfaction surveys—Airmen, Soldiers, Sailors, and Marines would surely re-enlist. Or at least that is what residents tell military researchers[2] and what military and congressional leaders tell themselves.

The small collection of quotes below highlight the Army's belief in the connection between barracks and retention:

1975: In an all-volunteer army, now that you have become employers, you have to treat the employees well... These changes [to the barracks] came about to induce young men to enlist, as part of the inducement, and retain them in the service, give them the type of living conditions they were seeking.[3]

Congressman Robert McEwen

1989: Service people are the basic component of our national security. Good housing is an investment in morale and readiness.[4]

Congressman Mickey Edwards

1995: Comfortable housing improves morale and encourages qualified individuals and their families to make careers of military service, thus promoting retention and readiness, now and in the future.[5]

Report of the Defense Science Board Task Force on Quality of Life

1996: Quality of life, more than any other single factor, influences a soldier's decision to reenlist or leave the Army[6]... The condition of barracks and family housing represents a primary quality of life factor to our soldiers and their families.[7]

Gene McKinney, Sergeant Major of the Army
US Army prepared remarks, Congressional Hearing on Appropriations

1996: FACILITIES ARE DIRECTLY RELATED TO RETENTION[8]

John Hagan, Master Chief Petty Officer of the Navy

2009: We are out there competing with the Toyota plant, with the Home Depot plant, and with the hardware store for employees. If they [soldiers] are not living in housing that they can be proud of, it's harder to keep them and harder to bring them in.[9]

Keith Eastin, Secretary of Defense

2019: Our retention rate is directly linked to [soldiers'] quality of life.[10]

Daniel Dailey, Sergeant Major of the Army

The Department of Defense claims are consistent: quality of life for single, junior enlisted soldiers—and subsequently, retention—is achieved through better barracks. And better barracks in the minds of some have more privacy, space, and amenities for the soldier. Military leaders have directly expressed this in Congressional testimony (some of those statements you just read), and through each new centrally-issued design standard. Every iteration yielding more space, privacy, and amenities.

Despite decades long claims, however, there is little evidence or research to support them. In 1987, Congressman Jim Kolbe first asked the military if they had statistical proof linking housing improvements to increased retention rates. The military answer was long-form for "no," saying, "We don't have anything that we could put our fingers on."[11] In 1990, Captain Bland found that statistical evidence was still non-existant.[12] And again in 1999, the Government Accountability Office (GAO) discovered the same result, writing that the:

> DoD has not developed any direct, quantitative evidence showing that barracks improvements, as distinct from other factors, result in improved readiness and retention.[13]

Twenty-one years after the GAO report, Mr. Hultiss—one of the chief designers with the office charged with developing and distributing the Army barracks standards—confirmed to me that the answer is still the same.[14] The Army has belief and intuition, not evidence.

Retention and the Global Assessment Tool (GAT)

Using the self-reported career intentions of 828 barracks residents at Fort Hood, I found that the barracks standard has no correlation to soldier re-enlistment likelihood (see Figure 3.8). Residents with less space, less privacy, and fewer amenities were equally likely to report long-term military plans. But that was only one base, and only 828 soldiers without any recognition of the inherent retention differences across career fields. I was curious what happens with a much larger data set—one with more residents, more barracks, and more bases. The GAT data has all of those.

Unfortunately, the GAT survey focuses on health, not retention. And it's one career-related question is phrased as a somewhat obtuse retrospective reflection, and not as a straight-forward "are you planning to re-enlist?" It asks whether residents would choose the military again if given the chance. One could argue that a service member's point of re-enlistment (typically, at the four year mark) is that "chance" and this question targets their future intentions. One could also argue that this question hits something deeper, a more reflective inquiry into their overall satisfaction with the life path that they've chosen. For instance, one could say that they would not choose the military again, yet still re-enlist because they feel that they're "committed" or no longer have other options.

These issues certainly raise a concern, but we should not dismiss the question or the data. It still provides an indicator of career satisfaction—a second data point to investigate the effect of barracks standards. This time, however, across over 20,000 soldier surveys, not 828.

* Correlation is significant at the 0.05 level
** Correlation is significant at the 0.01 level

Correlations for All GAT Respondents

		Choose Military Again	Year of Construction	Square Footage	Number of Residents	Private Rooms
Choose Military Again	Pearson Correlation	1	-0.015*	0.004	0.004	0.005
	Significance	-	0.030	0.594	0.604	0.515
	N	20,343	19,958	20,176	20,176	20,176
Year of Construction	Pearson Correlation	-0.015*	1	0.176**	0.224**	0.156**
	Significance	0.030	-	0.000	0.000	0.000
	N	19,958	19,969	19,969	19,969	19,969
Square Footage	Pearson Correlation	0.004	0.176**	1	0.947**	0.204**
	Significance	0.594	0.000	-	0.000	0.000
	N	20,176	19,969	20,187	20,187	20,187
Number of Residents	Pearson Correlation	0.004	0.224**	0.947**	1	-0.020**
	Significance	0.604	0.000	0.000	-	0.004
	N	20,176	19,969	20,187	20,187	20,187
Private Rooms	Pearson Correlation	0.005	0.156**	0.204**	-0.020**	1
	Significance	0.515	0.000	0.000	0.004	-
	N	20,176	19,969	20,187	20,187	20,187

Figure 7.1. Choosing the military again. Correlation table between GAT question and barracks design demographics for all residents at the three case study sites. Data courtesy of the GAT. Graphic created by the author.

Figure 7.1 (above) gives the computed correlation values across the set of five variables running on the top and left side of the matrix. The table is visually intimidating, but easy to decipher. To view how one variable interacts with the others, you can either read down the columns or across the rows—both provide the same information. I prefer the former and have highlighted our career choice question in gray. Moving down the column, each variable-to-variable interaction has three numerical values: the correlation (Pearson's r), the significance (p-value), and the number of surveys included in the analysis. In the first row of the first column, the correlation is one, or perfect. As it should be. The cell displays the correlation between the question (would you choose the military again if given the chance) and itself. Just like if you were correlating your height with your height, it's a perfect match.

The most curious result occurs in the second row—the barracks year of construction highlighted in red. Not only is it statistically significant (p-value <0.05), but it is also negative. Thus, as a barracks year increases (is newer), the likelihood of residents reporting that they would "choose the military again" goes down. While, again, not a direct measurement of retention, the GAT data show that newer barracks perform statistically worse in one indicator of career satisfaction—exactly the opposite of DoD claims. Figure 7.2 (below) shows the consolidated mean responses by design standard.

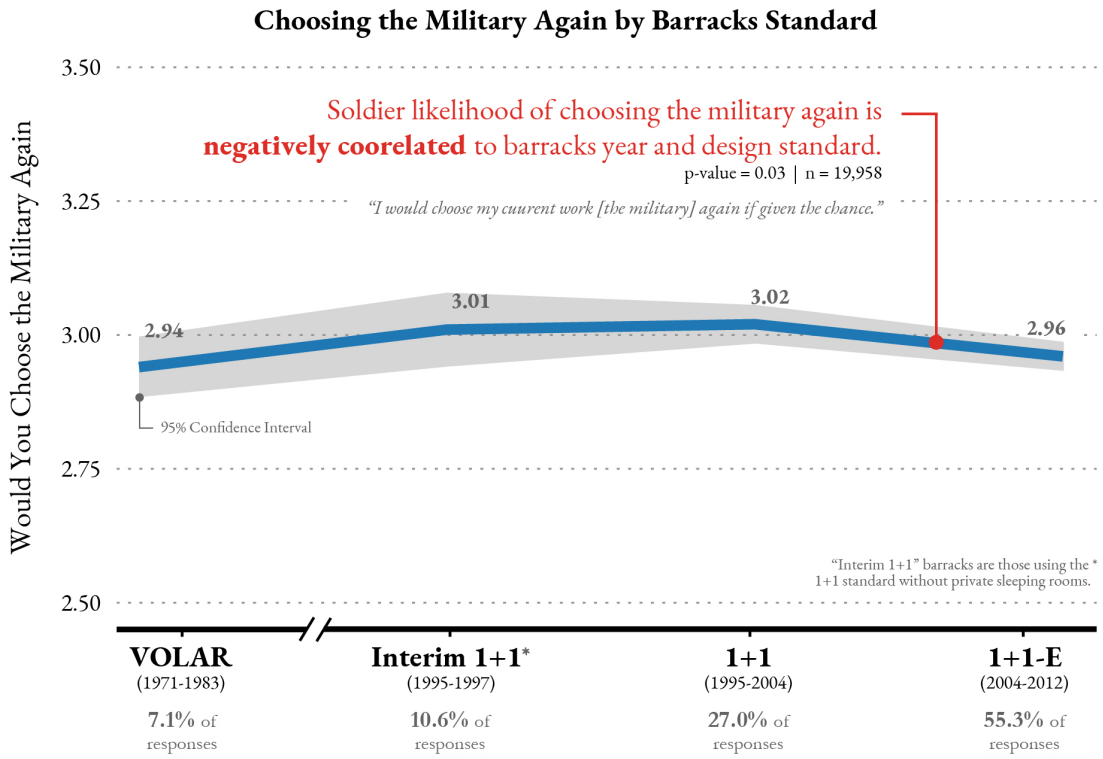


Figure 7.2. Choosing the military again by barracks standard. Correlation table between GAT question and barracks design standard. Data courtesy of the GAT. Graphic created by the author.

The response curve in Figure 7.2 looks eerily similar to the responses of the 828 soldiers at Fort Hood (Figure 3.8). If newer barracks, and newer standards, have any quantifiable effect, the GAT data illustrates that it is negative, not positive.

The next three variables (from our correlation matrix back in Figure 7.1)—the overall square footage of the barracks, the number of residents living in the building, and whether the barracks have private rooms—are neither strong nor significant. And since all of their p-values ("significance") are greater than 0.5, statistically, they are not even particularly close to having a predictable effect.

According to the GAT data at our three sites, whether soldiers would choose the military again is not affected by any of these three barracks variables—another knock against military justifications of new standards for reasons of retention.

In my final check of the GAT data, I looked to see whether isolating a particular career field changes the results. Career specialties—like infantry, cavalry, or support—all have different historical retention rates. To ensure inherent career variability is not inadvertently effecting the findings, I isolated infantry barracks (the largest specialty in our sample—45.2% of all respondents). Figure 7.3 (below) shows the correlation table for infantry soldiers only.

* Correlation is significant at the 0.05 level
** Correlation is significant at the 0.01 level

Correlations for Infantry Barracks Only

		Choose Military Again	Year of Construction	Square Footage	Number of Residents	Private Rooms
Choose Military Again	Pearson Correlation	1	-0.051**	0.003	0.003	-0.009
	Significance	-	0.000	0.775	0.752	0.390
	N	9,190	9,070	9,190	9,190	9,190
Year of Construction	Pearson Correlation	**-0.051****	1	0.140**	0.178**	0.186**
	Significance	**0.000**	-	0.000	0.000	0.000
	N	9,070	9,076	9,076	9,076	9,076
Square Footage	Pearson Correlation	0.003	0.140**	1	0.973**	0.182**
	Significance	0.775	0.000	-	0.000	0.000
	N	9,190	9,076	9,196	9,196	9,196
Number of Residents	Pearson Correlation	0.003	0.178**	0.973**	1	0.057**
	Significance	0.752	0.000	0.000	-	0.004
	N	9,190	9,076	9,196	9,196	9,196
Private Rooms	Pearson Correlation	-0.009	0.186**	0.182**	0.057**	1
	Significance	0.390	0.000	0.000	0.004	-
	N	9,190	9,076	9,196	9,196	9,196

Figure 7.3. Choosing the military again. Correlation table between GAT question and barracks design demographics for infantry barracks only. Data courtesy of the GAT. Graphic created by the author.

Again, the results do not favor the current Army design philosophy. Isolating responses for a single career specialty (in this case, infantry) only strengthens the previous finding. The year of construction became slightly more significant, and slightly more negatively correlated, while all of the other barracks variables continue to sit unrelated.

Retaining Relationships

If a barrack's space, privacy, capacity, size, or design standard has no effect on soldier career outlooks (at least, whether they would "choose the military again" for the GAT data and whether they plan on re-enlisting for the Fort Hood data), then what does affect intentions?

My hypothesis: social relationships. And I am not the only, or first, to make that claim. Representative Ike Skelton of Missouri, a long-time Ranking Member of the House Armed Services Committee, once proclaimed:

> Congress can help with military retention via pay and recognition, but only the military can build and maintain Esprit—that indescribable something—that makes them want to stay.
>
> There is little doubt that improved esprit and morale have a positive effect on retention. I have seen the effects of both in the eyes of the troops on the front lines and witnessed the retention figures. Logistically, cohesion should also have the same effect—building service members into a cohesive family should make them want to stay. Nonetheless, research in this area may be warranted as there is little scientific evidence of a correlation between cohesion and retention.[15]

He believed that it was esprit de corps, morale, and social cohesion that made the difference whether a soldier decided to stay or go.

Dr. Peggy McClure and Walter Broughton, both scientists with the Military Family Institute, conducted some of the most rigorous research on cohesion and retention. While the Institute's research focus is on families (and, thus, not barracks residents), their findings provide a point of departure for our upcoming analysis. In their study, McClure and Broughton asked military members two questions:

1. Do you plan to say in the military until you are eligible for retirement?
2. If you have the choice, how likely is it that you will extend your tour at this base/post?[16]

Then, using a horizontal measure of peer-to-peer cohesion (alpha = 0.79), they looked to see how much these peer social networks affect soldier responses. The results confirm Congressman Skelton's observations—at least in the short-term. While cohesion had no statistically significant effect on retirement consideration—a possible recognition of the enviable transience in military life—it did affect more immediate career decisions. As social cohesion rises, soldiers are more likely to extend their tours—and extend their military service in the near term (Pearson's $r = 0.27$, p-value <

0.01).[17]

Using the GAT data and our six indicators of social health, I found the same positive results (see Figure 7.4 below).

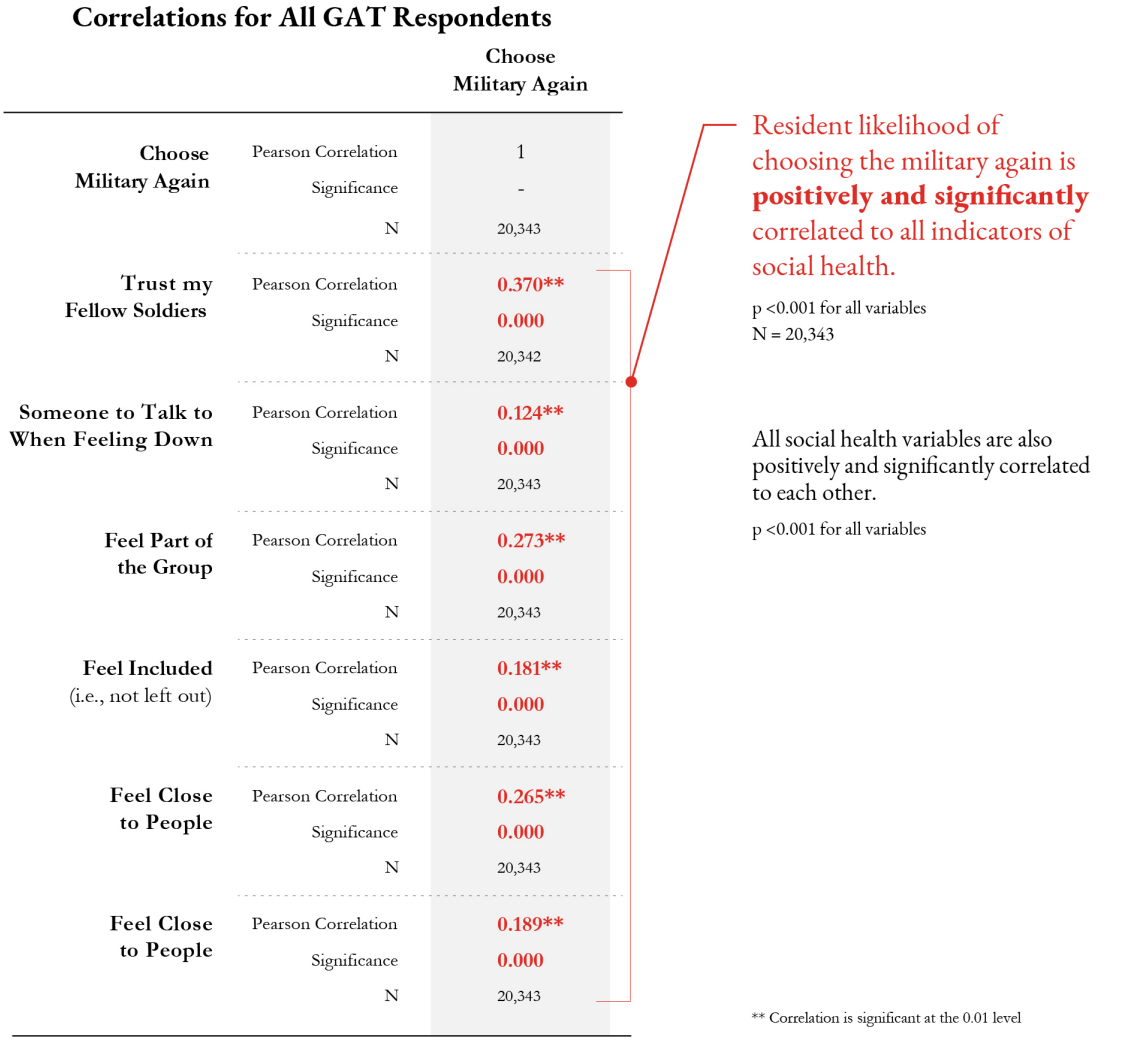


Figure 7.4. Correlation table between whether soldiers would choose the military again and indicators of social health. Data courtesy of the GAT. Graphic created by the author.

The findings are unanimous. Each social variable is statistically significant (p-values < 0.01) and positively correlated. As one indicator of social health rises (say, belonging or "feeling part of the group"), so too does that soldier's likelihood of "choosing the military again."

Across the board, social experience and social health makes the difference. Where a barrack's space, privacy, capacity, size, or design standard has no effect on "choosing the military again," the social environment within a barrack's walls has a significant—and positive—effect.

So, you might be asking yourself, if design standards are not correlated to indicators of retention, does this mean that design doesn't matter?

Actual Retention

The answer to the question above is an emphatic no. Design does matter, just not in the way that the Department of Defense proclaims. The military believes in a design philosophy focused on the individual—increasingly privatizing space and amenities with each successive standard. They are making a mistake. The fundamental error is not philosophical, however. They are rightly looking into barracks to improve quality of life for soldiers. The built environment has tremendous impact on our lives and our military members deserve great places to call home. Instead, the error is methodological. To generate its barracks design strategy, the military used surveys, asking soldiers about their physical buildings believing satisfaction led to retention. The questions were tangible. And as you would expect, responses were equally tangible. Soldiers wanted space, privacy, and amenities.

The soldiers were not lying. They want these things—and as the Fort Hood data suggests, providing them increases individual satisfaction (Figure 3.9). Despite aiming for satisfaction and achieving it, the military made two flaws:

1. Assuming tangible satisfaction increases retention
2. Sacrificing community for the individual

The Fort Hood data shows a strong and convincing argument for the military's success in achieving individual satisfaction. With each successive standard—and year of construction—resident self-reported satisfaction rises. Unfortunately, the implicit claim that rising satisfaction leads to rising retention, is false.

Using actual retention data—not self-report intentions or indicators of career satisfaction—I found that while satisfaction rises in newer barracks, retention rates drop (see Figure 7.5 below).

Correlation Between Retention and Barracks Year

		Actual Retention Rate
Actual Retention Rate	Pearson Correlation	1
	Significance	-
	N	13,490
Barracks Year of Construction	Pearson Correlation	**-0.055****
	Significance	**0.000**
	N	13,490
Barracks Year of Construction (Infantry Barracks Only)	Pearson Correlation	**-0.042****
	Significance	**0.000**
	N	8,348

Retention rates **decrease** in newer barracks.

(i.e., new barracks are statistically **worse** than older barracks at retaining soldiers)

This correlation holds across all barracks, and when controlling for a single occupational specialty (infantry).

** Correlation is significant at the 0.01 level

Figure 7.5. Correlation between 10 years (2008-2017) of actual retention rates and year of construction. Retention data by Unit Identification Code (UIC) courtesy of the Defense Manpower Data Center (DMDC). Graphic created by the author.

The data show that the newer a barracks is, the lower the retention likelihood. This holds true across all of the barracks at our three sites, as well as when isolating a single occupational specialty—the infantry. Most importantly, the "N" are not survey respondents, but actual soldiers making the actual decision to re-enlist or separate. In every other study that I found on architecture and military retention, from Captain Bland's 1990 thesis to the present, authors make claims based on self-reported future projections. While self-reported intentions are the best predictor of future behavior[18], they are still projections and not actions.

Courtesy of the Defense Manpower Data Center (DMDC), I have real retention decisions and not a proxy measure. Each one of the 13,490 data points (the "N" in Figure 7.5) that go into the correlation between retention and a barracks year of construction (or 8,348 for the infantry barracks), are real soldiers. All of those 13,490 soldiers lived in the barracks that we've examined and decided whether or not to re-enlist. Some stayed and some left. What Figure 7.5 shows is that a statistically significant disproportionate number of soldiers separated from newer barracks than from older ones—exactly the opposite of the military claims that justify each new standard they issue.

The question is why? Satisfaction is a good thing. It is a worthwhile design goal and the military is rightly aiming for it. Thus, the error is not in what they provided—space, privacy, and amenities are not inherently negative—but rather, in what they sacrificed to get it. By singularly focusing on satisfaction, they inadvertently eliminated or altered the design characteristics important to the promotion of sociability.

Building on the correlation of new barracks design and retention, Figure 7.6 (below) shows the correlation between a barrack's age and resident social scores (an unweighted aggregated summation across all of our social variables).

Correlation Between Social Health and Barracks Year

		Year of Construction
Year of Construction	Pearson Correlation	1
	Significance	-
	N	9,076
GAT Social Score	Pearson Correlation	**-0.033****
	Significance	**0.001**
	N	9,076

Social health **decreases** in newer barracks.

"GAT Social Score" is an aggregated value across all of our social variables.

** Correlation is significant at the 0.01 level

Figure 7.6. Correlation between aggregate social health and barracks year of construction. Data courtesy of the GAT. Graphic created by the author.

Like retention, there is a statistically significant decrease in soldier social health for those living in the

Army's newest barracks. Across all barracks years—and standards—social health and retention rise and fall together.

Thus, to return to the original question (does design matter), it is the details that matter, and how they encourage or discourage resident social behavior, not whether architects included ten extra square feet for a walk-in closet.

The Defense Manpower Data Center (DMDC) Data

Before going any further, I need to explain how I collected the retention data and what the retention rates show. The Defense Manpower Data Center (DMDC) collects and maintains all military personnel records—and in this case, provides the number of soldiers assigned to each unit, when they arrived in the unit, whether they live in the barracks (by proxy of their rank and marital status—the Army requires all Sergeants and below without spouses or children to live in the barracks), and whether they are still in the military at some designated point in the future. The combination of all four of these elements provides the retention rate that I use for this study.

To get the rate's denominator, I needed to know how many soldiers lived in each barracks—or in other words, how many soldiers had a decision to make. Later, I checked how many of those soldiers chose to re-enlist. But first, to get the baseline number, I used year groups. I collected the number of barracks residents (by rank and marital status) assigned to each of my selected battalions. The DMDC then ran a query on my behalf for each year—January 1st through December 31st—and selected barracks residents between their first and second years of service for each of Unit Identification Codes (UICs) of interest. This time period would ensure that they are at their first permanent duty location and have already completed their initial training. By checking every year, it gave me a cohort of soldiers to re-check and ensured that no soldier would go undetected or inadvertently appear twice.

Then using the Social Security Numbers for all of the soldiers in each cohort, the DMDC re-looked three years after the initial check to see if that soldier was still in the military. A three-year delay ensured that every soldier in the particular cohort had passed the typical re-enlistment point (the four-year mark). To count as "re-enlisted," soldiers did not need to still live in the barracks, belong to the same unit, or even still be in the Army—they simply still needed to be on active-duty and wearing the uniform.

Figure 7.7 (below) provides a graphic representation of the data collection protocol.

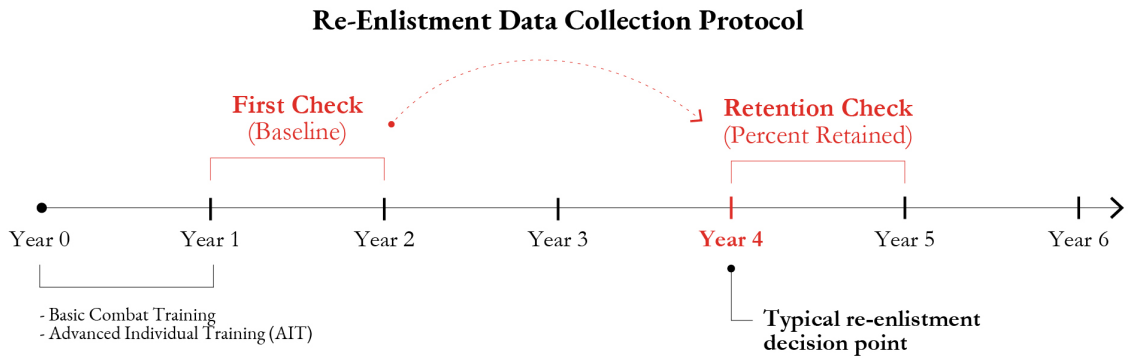


Figure 7.7. Re-enlistment data collection protocol for DMDC data. Graphic created by the author.

To connect individuals to specific barracks buildings, I used UICs. Since the Army maintains a fairly strict "unit integrity" housing policy, I knew that barracks residents of a particular unit lived in a particular building.

This method is not perfect, however. Some soldiers are not given the opportunity to re-enlist, and in my protocol, those are counted the same as soldiers who made the decision to leave the military. For instance, some soldiers are involuntarily separated for disciplinary or medical reasons. While the rate of involuntary separation is not available to me, in my personal military experience, it is a very small minority and I have no reason to suspect it significantly differed across barracks design characteristics.

A Third Link

If design can influence social health (as shown in the previous few chapters) and social health influences indicators of retention (as shown in Figure 7.4), I wanted to know whether the separate connections were two links in a longer chain. Does the same thread that ties balconies to belonging and social support also continue on and tie into actual retention rates?

To answer this question, I used the DMDC retention data and created "dummy" variables to test the effect of three physical design characteristics which proved to influence social health in the previous few chapters. "Dummy" variables quantify non-numeric data into a variable to test for statistical effect. According to Princeton University:

> Social scientists often need to work with categorical variables in which the different values have no real numerical relationship with each other. Examples include variables for race, political affiliation, or marital status... The solution is to use dummy variables.[19]

The three dummy variables that I created are: exterior balconies, exterior social space, and distributed interior social space.

All three are fairly straight-forward. For exterior balconies, I coded any barracks which used

exterior open-air horizontal circulation with the numerical value of one. I also included barracks which had open-air, exterior landings or walkways on each floor. These spaces, even if resident living spaces do not open directly onto them, similarly decrease functional distance and encourage social use. If barracks had neither (like an interior double-loaded corridor design), I coded them as zero. The goal is to determine whether balconies—or landings—correlate to retention on top of their positive social influence.

The second variable that I created is "exterior social space." For this one, I simply coded barracks with outdoor places to sit and gather as the value one, and those without them as zero. I did not insert my own feelings about the quality of these spaces, only if they existed. To provide some distinction, I decided that the places to gather must have some overhead protection from either tree cover or a physical roof. This way, a simple bench or picnic table next to a barracks main entry would not count the same as the fully-articulated courtyards with shaded places to gather.

Lastly, I created the variable "distributed social space." Different from the other two, I did not make this variable binary. Instead, I used three coding categories: no interior social space, one day room or lounge, or more than one day room or lounge—corresponding to the numerical values of zero, one, and two, respectively. To garner a value of two, barracks had to have multiple interior social spaces in different locations. Two lounges (as labeled on their floor plans) right next to each are not "distributed" and, thus, coded as one.

* Correlation is significant at the 0.05 level
** Correlation is significant at the 0.01 level

Correlations for Infantry Barracks

		Actual Retention Rate	Exterior Balconies	Exterior Social Space	Distributed Social Space	Private Rooms
Actual Retention Rate	Pearson Correlation	1	0.041**	0.019	0.032**	-0.005
	Significance	-	0.000	0.084	0.003	0.668
	N	8,348	8,348	8,348	8,348	8,348
Exterior Balconies	Pearson Correlation	0.041**	1	0.371**	0.542**	0.079**
	Significance	0.000	-	0.000	0.000	0.000
	N	8,348	8,348	8,348	8,348	8,348
Exterior Social Space	Pearson Correlation	0.019	0.371**	1	0.592**	-0.271**
	Significance	0.084	0.000	-	0.000	0.000
	N	8,348	8,348	8,348	8,348	8,348
Distributed Social Space	Pearson Correlation	0.032**	0.542**	0.592**	1	-0.396**
	Significance	0.003	0.000	0.000	-	0.000
	N	8,348	8,348	8,348	8,348	8,348
Private Rooms	Pearson Correlation	-0.005	0.079**	-0.271**	-0.396**	1
	Significance	0.668	0.000	0.000	0.000	-
	N	8,348	8,348	8,348	8,348	8,348

Figure 7.8. Correlation table between actual retention rates (infantry barracks) and social health design characteristics. Retention data courtesy of the Defense Manpower Data Center (DMDC). Graphic created by the author.

Using the retention data and my created "dummy" variables, Figure 7.8 (above) shows the correlation between design and the actual rate in which soldiers decide to stay or go. The results are not strong, but they are statistically significant and they align with previous findings. Exterior balconies and distributed interior social space correlate to higher retention. Exterior social space and private rooms do not (although exterior social space is very close to meeting my 95 percent significance threshold—aligning with the findings in the previous chapter).

Conclusion

Throughout this dissertation I argue that the military's "satisfaction as a target" design focus is the wrong strategy for the right concept. Conceptually, the military sees architecture as an important factor in a soldier's quality of life, and a means to influence retention. We need not look further than Rob McDowell, Specialist Franke, or Sergeant Kroll to see that the physical environments we create have a dramatic impact on those who inhabit them.

To influence this "quality of life"—and thus, retention—the military crafted a individualistic design strategy, believing that square footage, walls, and refrigerators are a causal force. They used surveys to uncover soldier desires, and then provided them. With each successive standard, the military believed that the previous one didn't go far enough—and that retention was just around the corner of more space, privacy, and amenities. Unfortunately, in catering to the individual, they neglected the community. They increasingly elminated, shrank, or discounted the places where casual interaction often blossoms into full-grown social bonds.

With the new design standards, satisfaction rose, but social health and retention dropped (Figures 7.5 and 7.6). Soldiers became less likely to "choose the military again" and less likely to actually do it. But please do not mistake my argument. Returning to crammed quarters or spartan barracks is an equally bad (or probably worse) idea. The answer is not to take things away, but rather, to reinstate design characteristics that designers let slip.

Individualism at the expense of community is a fatal flaw. Relationships are the "best part"[20] of Army life, not in-room laundry, larger closets, or bigger bedrooms. Discouraging the former—by eliminating interior and exterior social spaces—to provide the latter is an error of strategy.

CHAPTER VIII:
HEALTH

John Cacioppo, one of the world's leading scientific researchers on loneliness, was the first to tie social connection to sleep. In a 2002 study, he and six other researchers took 64 undergraduate students into a laboratory and measured their sleep duration, efficiency, awakenings, and restlessness. To obtain the study's subject cohort, the researchers first tested and selected the students based on their levels of loneliness, creating equal groups of lonely, middle, and nonlonely participants. After studying the participants in the lab and at home (using what they call a "nightcap" to record the same sleep variables), the researchers found the lonely people experienced lower quality sleep. Specifically, they write:

> [L]onely individuals evinced poorer sleep efficiency and more time awake after sleep onset than nonlonely individuals. These results, which were observed in controlled laboratory conditions and were found to generalize to the home, suggest that lonely individuals may be less resilient than nonlonely individuals in part because they sleep more poorly.[1]

The lonely students awoke more often in the night, were more restless throughout the evening, and garnered less restorative benefit. As the study proclaims:

> The present research demonstrated for the first time that sleep—the quintessential restorative behavior—is poorer in lonely than nonlonely individuals.[2]

According to Cacioppo, even when lonely people sleep for the same duration as their socially connected peers, their sleep quality is greatly diminished.[3]

To test the theory across a larger population, Cacioppo went to the Hutterites—a Christian sect often compared to the Amish or Mennonites for their deep levels of community and connection.[4] The Hutterites have some of the lowest levels of loneliness in the world. And as Dr. Murthy writes:

> Cacioppo and Hawkley had shown that loneliness increases the frequency of microawakenings, those near awakenings that disturb the quality and restfulness of sleep. This relationship between loneliness and microawakenings was demonstrated in the Hutterite community... the frequency of microawakenings in the Hutterite community was the lowest of any community [Dr. Cacioppo] had studied.[5]

Once again, loneliness (or, in this case, its absence) correlated to sleep quality and efficiency.

While the GAT's social conception is broader than loneliness, I set out to see how social health affected physical health for barracks residents—to include their sleep.

Design to Social

For Cacioppo, it was an aspect of social health—loneliness—that correlated to physical health. In this dissertation, I make a similar claim. I argue that it is social health which influences physical health outcomes, not design directly. Instead, design works through social health as an upstream factor, encouraging or discouraging interaction and increasing or decreasing the likelihood of social bonds.

Thus, before presenting the effects of design on physical health, we must check the hypothesized pathway of design to social health and social health to physical health. Figure 8.1 (below) shows the correlation between design elements (as informed by the previous chapters) and resident social health.

* Correlation is significant at the 0.05 level
** Correlation is significant at the 0.01 level

Design-to-Social Health Correlations
Infantry Barracks

		Exterior Balconies	Exterior Social Space	Distributed Social Space	Private Rooms
I trust my fellow soldiers.	Pearson Correlation	**0.031****	0.010	0.004	-0.001
	Significance	**0.003**	0.360	0.672	0.916
	N	9,190	9,190	9,190	9,190
I have someone to talk to when I feel down.	Pearson Correlation	0.013	0.001	0.008	0.006
	Significance	0.218	0.909	0.430	0.595
	N	9,190	9,190	9,190	9,190
How often do you feel part of the group?	Pearson Correlation	**0.036****	**0.022***	0.015	0.002
	Significance	**0.001**	**0.033**	0.146	0.816
	N	9,190	9,190	9,190	9,190
How often do you feel included (i.e., not left out)?	Pearson Correlation	**0.022****	0.007	0.003	0.007
	Significance	**0.039**	0.516	0.776	0.482
	N	9,190	9,190	9,190	9,190
How often do you feel close to people?	Pearson Correlation	**0.024***	0.018	0.011	-0.010
	Significance	**0.020**	0.084	0.287	0.327
	N	9,190	9,190	9,190	9,190
How many people can you always count on when in need?	Pearson Correlation	**0.026***	0.019	0.010	-0.004
	Significance	**0.012**	0.071	0.317	0.666
	N	9,190	9,190	9,190	9,190

Figure 8.1. Design to social health correlations for infantry barracks. Data courtesy of the GAT. Graphic created by the author.

The results are mixed. For "exterior balconies," the correlation is consistent and significant, lending credence to the anecdotal stories of Schofield's balcony-lined "historic quads" or Fort Bragg's "open corners." It also supports Gehl's theory that reducing the burden from inside to outside encourages more frequent "optional" activities, and leads to more "resultant" social activities.[6]

The results for the other design attributes are weak (exterior social space) or non-existent (distributed social space and private rooms).

As one additional check, I mapped the frequency distribution of infantry soldiers living in barracks with each of the four design attributes. Ideally, the distributions should be fairly equal, limiting the chance of highly skewed data by a small sample size (see Figure 8.2 below).

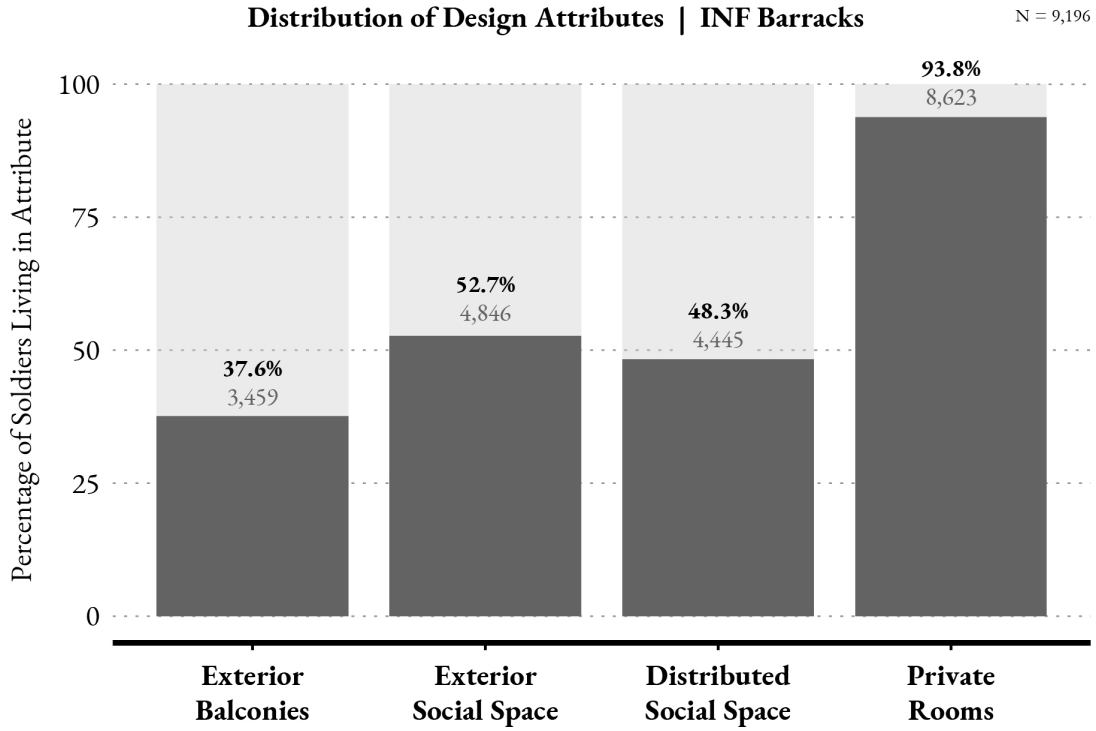


Figure 8.2. Distribution of design attributes across infantry barracks residents. Data courtesy of the GAT. Graphic created by the author.

Three of the four attributes are evenly distributed across respondents. Only private rooms are not. With less than seven percent of all respondents living in shared rooms, any notable results for private rooms must consider this highly skewed distribution.

With the correlations between design to social health established (at least for balcony barracks), I checked to see if social health then affects physical health (see Figure 8.3 below).

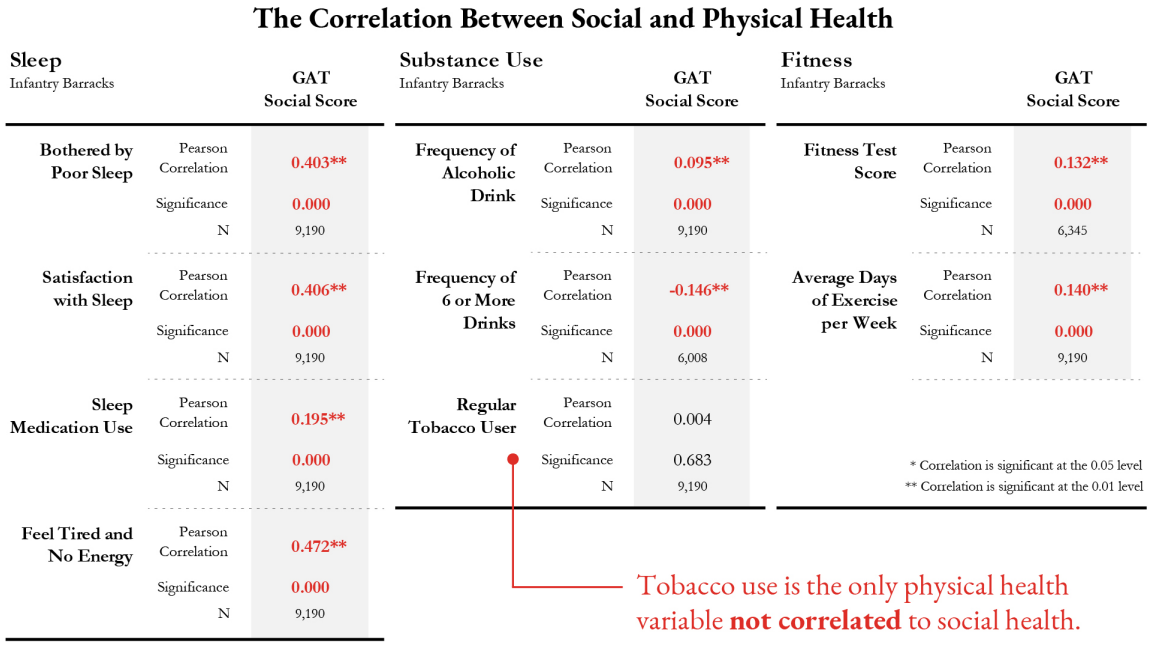


Figure 8.3. Social to physical health correlations for infantry barracks. Data courtesy of the GAT. Graphic created by the author.

The results show a consistent and significant correlation across nearly all variables. Resident tobacco use is the only variable not correlated with social health. This result is surprising. In addition to sleep, tobacco was the other variable that I predicted would be most associated with social health (albeit negatively correlated). According to a report on military tobacco use:

> [S]ocial factors are the strongest predictors of tobacco use; for example, having friends who smoke and view smoking as attractive significantly increases one's own risk of smoking. In addition, by modeling the influence of social networks on smoking behaviors, Christakis and Fowler (2008) found that people seem to act in accordance with and under the collective pressures of their social niche.
>
> Surveys of health behaviors in the military have noted similar findings linking peer influence to tobacco use (DoD, 2006; Nelson et al., 2009).[7]

The GAT data for infantry barracks at my three sites makes this connection less clear. "Social smoking" appears not to influence soldier decisions about whether to light up.

Design to Physical

With research, you never know what the results will yield. Sometimes they conform to your theoretical expectations, and sometimes they don't. Often, the surprises are the most interesting and can lead to new understanding. But the surprises can also be the most puzzling, and it can feel like you just opened the door to a pitch-black room. You don't know what—if anything—you're looking at. This is the case for my research into the effect of design on physical health (see Figure 8.4

below).

* Correlation is significant at the 0.05 level
** Correlation is significant at the 0.01 level

Design-to-Physical Health Correlations
Infantry Barracks

Substance Use		Exterior Balconies	Exterior Social Space	Distributed Social Space	Private Rooms
Bothered by poor sleep	Pearson Correlation	**0.026***	0.010	0.002	0.012
	Significance	**0.012**	0.326	0.854	0.234
	N	9,196	9,196	9,196	9,196
Satisfaction with sleep	Pearson Correlation	0.019	0.004	-0.005	**0.023***
	Significance	0.074	0.377	0.638	**0.030**
	N	9,196	9,196	9,196	9,196
Sleep Medication Use	Pearson Correlation	0.010	0.005	0.009	-0.012
	Significance	0.317	0.632	0.394	0.256
	N	9,196	9,196	9,196	9,196
Feel tired and no energy	Pearson Correlation	**0.022***	0.002	-0.001	0.020
	Significance	**0.033**	0.833	0.941	0.052
	N	9,196	9,196	9,196	9,196
Substance Use					
Frequency of alcoholic drink	Pearson Correlation	0.001	-0.002	-0.007	-0.001
	Significance	0.918	0.866	0.474	0.940
	N	9,196	9,196	9,196	9,196
Frequency of 6 or more drinks	Pearson Correlation	-0.015	-0.006	0.004	-0.021
	Significance	0.242	0.656	0.749	0.112
	N	6,009	6,009	6,009	6,009
Regular Tobacco User	Pearson Correlation	**0.035****	**0.021***	0.015	-0.006
	Significance	**0.001**	**0.045**	0.139	0.546
	N	9,191	9,191	9,191	9,191
Fitness					
Fitness Test Score	Pearson Correlation	0.012	**-0.030***	-0.013	**0.069****
	Significance	0.356	**0.017**	0.300	**0.000**
	N	6,346	6,346	6,346	6,346
Average Days of Exercise per Week	Pearson Correlation	**0.025***	0.016	0.011	0.010
	Significance	**0.017**	0.120	0.288	0.336
	N	9,190	9,190	9,190	9,190

Figure 8.4. Design to physical health correlations for infantry barracks. Data courtesy of the GAT. Graphic created by the author.

The only claim one can make with any theoretical backing from the correlations above is in the

realm of sleep. Residents of balcony barracks (both "true" balconies and open-air horizontal landings) are statistically less likely to be bothered by poor sleep and less likely to feel tired or low energy throughout the day. Additionally, satisfaction with sleep is close to the significance threshold (p-value = 0.074). These results conform to Cacioppo's findings, where reduced social health—loneliness, in his case—led to diminished sleep.

The rest of the results show either no effect or require additional research. Tobacco use is particularly surprising. While the pathway was already broken by social health not correlating to use, the finding of balconies decreasing tobacco consumption is again surprising and not aligned to military tobacco use research.

Conclusion

One particular explanation for the lack of correlation (besides design simply not affecting physical health) comes again from Dr. Cacioppo. He writes:

> We found that the health-related behaviors of lonely young people were no worse than those of socially embedded young people. In terms of alcohol consumption, their behavior was, in fact, more restrained and healthful... lonely young adults were no different from others in their exercise habits, measured either by frequency of activity or by total hours per week... The same pattern held for diet.[8]

According to Cacioppo's research, the physical consequences of diminished social health do not appear until middle-age, where the socially-connected and the lonely begin to dramatically diverge in health.[9]

Do Cacioppo's findings explain my own? Possibly. Possibly not. More research is needed.

CHAPTER IX:
SUICIDE

> Mental health is produced socially: the presence or absence of mental health is above all a social indicator and therefore requires social, as well as individual, solutions.
>
> World Health Organization

I arrived at Fort Bragg on a Monday. It was Veteran's Day, and the base was surprisingly quiet. With no one around, I could freely explore the barracks that I had only previously seen by satellite. I walked their sites, noted their architecture, and cataloged which battalion lived in which barracks. The next day, with the base buzzing, I ventured inside the buildings.

I spoke to anyone who had time to talk. After a few hours of meandering barracks to barracks, I landed in the office of First Sergeant Jesse Oberlin. Like First Sergeant Akers at Schofield, Sergeant Oberlin was enthusiastic, supportive, and experienced.

"At this point, I think I've lived in, or at least seen, everything the Army has," he said, before adding, *"we sure have made a lot of changes over the years."*

When I told him what I was studying—how barracks design influences a soldier's social experience—he became visibly interested, sliding his office chair to the right to get out from behind his computer and making it apparent that he had something to say. After a short pause, he started:

> Do you know what I think our biggest problem is? Soldiers don't talk anymore. Some soldiers never leave their rooms. I call them "barracks rats"—those that just seem to scurry back into their rooms and avoid being seen.
>
> And I only have my experience to go on, but I think the barracks make a difference. Some of those old barracks worked. The quads worked. And still work. They have a way of pulling someone out of their room. And that, right there, is the key to a good unit. Soldiers need to come out and talk to each other.[1]

Just then, a young Private walked in. Earlier, Sergeant Oberlin gave him a task, and he had come back to report its completion. Unfortunately, in my field notes, I never wrote down the Private's name or his task. I got caught up in what came next.

As soon as the Private left, Sergeant Oberlin held up his right index finger, signaling me to hold

off from another question. The silence felt like a minute, but in reality, it was likely no more than a couple of seconds. He then got up from his chair, peeked around his doorframe down the hall, and said, *"Okay, he's gone."* After returning to his chair, he explained:

> Sorry, we had an incident last week, and I didn't want him to hear us. We lost a soldier. And he was the one who discovered the body. You don't always think about the guy who makes the discovery, but it's traumatic. We're trying to keep him busy but still maintain a close eye on him. That's why I'm giving him all these tasks.[2]

Sergeant Oberlin never used the word "suicide," so I asked him more about the incident. He replied:

> It looks like it might be [a suicide], but they just started the investigation, so we don't really know for sure. He was on the ground outside the building when he [pointing to the Private who just left] found him. The cause of death is from the fall, but we're hesitant to use the word "suicide" before they know whether it was an accident or he jumped. They didn't find a suicide note, so we may not know until they finish the investigation.[3]

After another brief pause, he provided me a glimpse into his suspicions, saying:

> If you ask me, I think our earlier discussion is a factor. We're losing far too many soldiers to suicide. When soldiers talk, you notice when someone's feeling down. But when they never leave their rooms, sometimes you miss the signs when someone's struggling.[4]

Reflecting on my visit with First Sergeant Oberlin, I can't help but think back to the story of Sanders and Godding. Specialist Albert Godding pulled the firing pin from Joseph Sanders' weapon, saving his life. Godding intervened because he noticed a change in Sanders' behavior. And he noticed because they interacted—they talked. First Sergeant Oberlin drew the same connection.

Later on the same day at Fort Bragg, I visited a new barracks. Starting as I always did, I went to the Battalion Commander's office to tell them about my study and ask whether I could approach the unit's residents. This time, the Commander was in the middle of a meeting, and I found myself talking to the Executive Officer. While writing down my contact information, my visit was again interrupted. This time by a Captain. He was the Commander of "Charlie" Company, and he came in to make a report. Poking his head in, he said, *"Just wanted to make you aware, Sir, that we sent a soldier to the hospital. He was having a really strong [suicidal] ideation last night, and his roommate brought him in to get some help."*

On the same day, at the same base, I twice came face-to-face with suicide in the barracks.

Prevention Through Connection: The Theory

I am not an epidemiologist, psychologist, or any other variation of a medical professional. I only read what they write. And their writing is unanimous—social health affects emotional and mental health. Dr. Kimberly Van Orden, a psychiatric researcher, and professor at the University of Rochester Medical Center, writes:

> Social isolation is arguably the strongest and most reliable predictor of suicidal ideation, attempts, and lethal suicidal behavior among samples varying in age, nationality, and clinical severity (Conwell, 1997; Dervic, Brent, & Oquendo, 2008; Joiner & Van Orden, 2008; Trout, 1980). Numerous empirical studies have demonstrated associations between lethal suicidal behavior and various facets of social isolation, including loneliness, social withdrawal, living alone and having few social supports, living in nonintact families, losing a spouse through death or divorce, and residing in a single prison cell. In contrast, marriage, children, and a greater number of friends and/or family are associated with decreased risk for lethal suicidal behavior.[5]

In her study of the most strongly correlated preventative factors for suicide, social health stands at the top.

Likewise, in a military context, the preventative power of social health again rises as the leading factor in the fight to ward off suicide. Dr. Matthew Nock, a Harvard professor, dubbed by the New York Times as "one of the most original and influential suicide researchers in the world,"[6] writes:

> The most protective factors tested to date have involved facets of social or familial support. These all are relevant to soldiers, as are other forms of social support, including that from one's unit (e.g., unit cohesion/climate), family (e.g., frequency of contact with spouse), and friends (e.g., use of social networks).
>
> The experience of social support within one's unit may be an especially important protective factor... unit cohesion can buffer against the deleterious effects of stress, the development of PTSD and other psychiatric symptoms, and potentially against the occurrence of suicidal behavior (Brailey, Vasterling, Proctor, Constans, & Friedman, 2007; Halverson et al., 1995).[7]

The science seems clear. Social integration is a preventative force against the self-destruction of suicide.

In just one of the many empirical studies that led to the nearly unanimous scientific opinion, Dr. Alexander Tsai and a team of researchers from the Harvard Medical School followed 51,529 men for twenty-four years. They started in 1986 with a baseline, and every two years, they mailed follow-up questionnaires to the participants to track their medical history, health behaviors, and social integration. Amazingly, of the 51,529 that started, 34,901 (68 percent) finished, responding to each round of the bi-annual survey requests.[8]

The goal of the research was to see how social integration influences the rates of suicide over time. The researchers asked questions on marital status, social network size, frequency of social contact, religious participation, and whether the subjects actively participated in other social groups.[9] They then assigned each participant an aggregated "social integration" score across a 4-point categorical variable for each two-year follow-up—thus, dynamically tracking social integration and suicide over time with the same cohort of participants.

The results are striking. As a person's social integration increases (e.g., when their social networks grow, or they participate in more social groups), their rates of suicide mortality drop (see Figure 9.1 below).

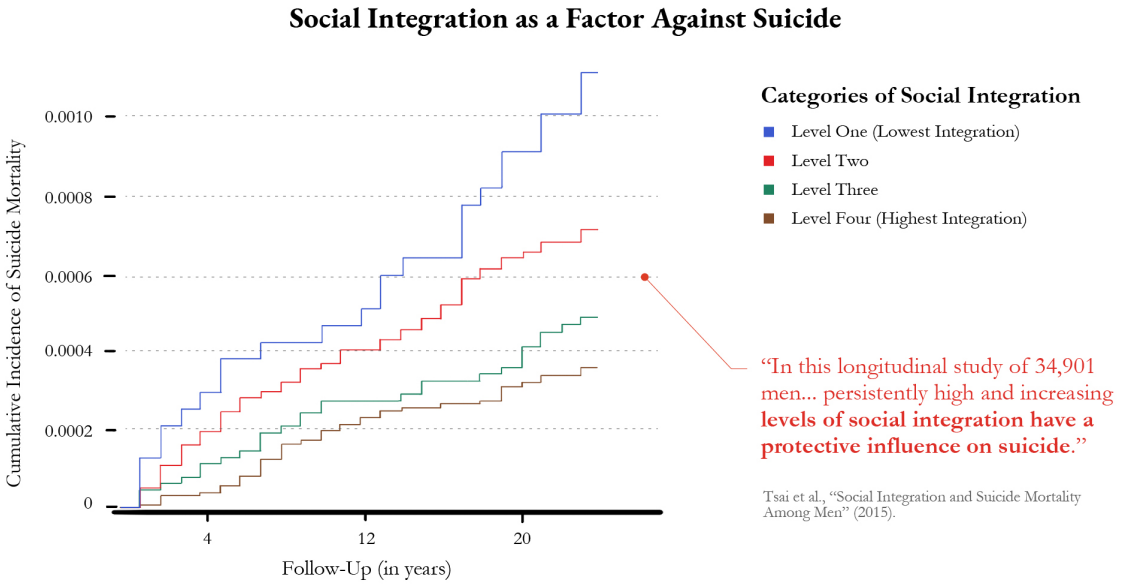


Figure 9.1. Social integration as a factor against suicide. Graphic re-created by the author from Tsai et al., 2015.

As the study's authors write:

> When competing causes of death were accounted for, the cumulative incidence of suicide was highest among the most socially isolated men... The association was statistically significant, large in magnitude, unlikely to be driven by competing mortality risks, and robust to several sensitivity analyses.[10]

Or, in other words, social integration lowers your risk of suicide.

But why?

There are a number of theories. Some are biological, proposing that suicidal behavior originates chemically in the brain, while others point to psychosocial forces. One such psychosocial construct is the "interpersonal theory of suicide." According to this theory, three concepts are central to suicidal behavior: thwarted belongingness, perceived burdensomeness, and the capability to commit the act.

Thwarted belongingness hits directly at my central theme of social connection. As Dr. Van Orden writes:

> We propose that these social connectedness variables are associated with suicide because they are observable indicators that a fundamental human psychological need is unmet; this need is described by Baumeister and Leary (1995) as the "need to belong." According to the theory, when this need is unmet—a state we refer to as thwarted belongingness—a desire for death develops (also referred to in the suicidology and clinical literature as passive suicidal ideation).[11]

According to Baumeister and Leary, the two Wake Forrest psychologists that Dr. Van Orden cites, this "need to belong" has two aspects—interaction and support. The two authors write:

> We proposed two aspects of the need to belong, and both appear to be important. That is, people seem to need frequent, affectively pleasant or positive interactions with the same individuals, and they need these interactions to occur in a framework of long-term, stable caring and concern.
>
> Frequent contacts with nonsupportive, indifferent others can go only so far in promoting one's general well-being and would do little to satisfy the need to belong. Conversely, relationships characterized by strong feelings of attachment, intimacy, or commitment but lacking regular contact will also fail to satisfy the need.[12]

Thus, social ties need to be frequent, interactive, and supportive.

While thwarted belongingness targets social health, perceived burdensomeness targets emotional health. According to the theory, diminished social health alone does not explain suicidal behavior. A second component must factor in. Without some level of internal emotional distress—to include self-hate, self-blame, or low self-esteem—the theory claims that suicide does not happen. Both diminished social and emotional health must be present.

Lastly, the theory adds capability, recognizing that without the physical means to carry out the act, it cannot occur. Figure 9.2 (below) illustrates the relationship between these three variables.

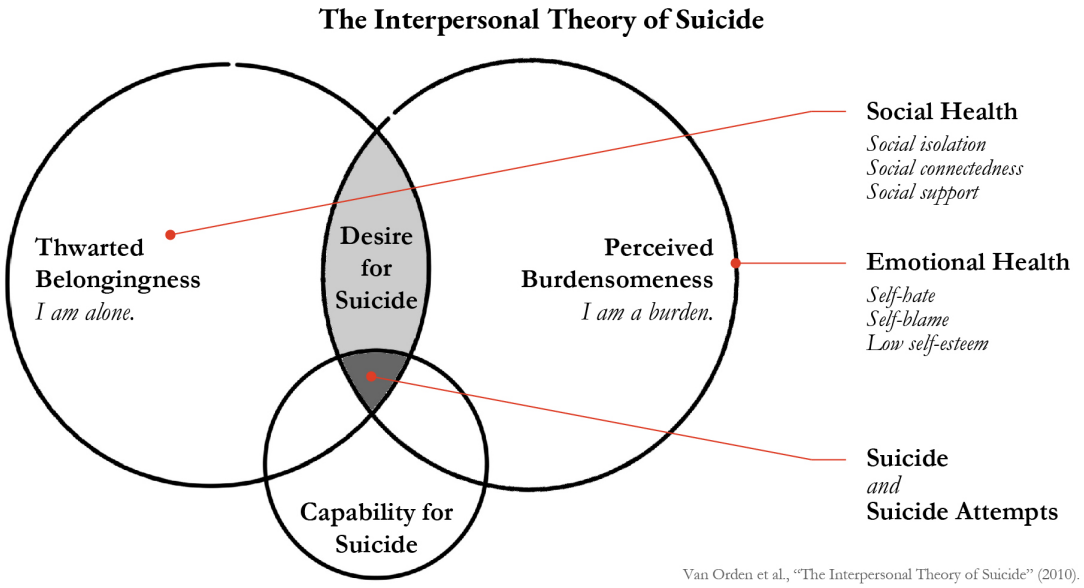


Figure 9.2. The interpersonal theory of suicide. Graphic re-created by the author from Van Orden et al., 2010.

As an architect, my goal is not to explore the psychosocial forces of suicide, but rather, to see whether our physical environments affect our social health—and consequently, suicidal behavior. For that, the interpersonal theory of suicide is a helpful foundation. It provides a structure to explore the architectural attributes correlated with increased social health ("thwarted belongingness") and whether their positive influence extends as a preventative force for emotional and mental health ("perceived burdensomeness").

Separated from their former home town and family social networks, barracks residents—single, junior enlisted soldiers—are particularly at risk for suicide. Dr. Robert Ursano and a team of researchers recently discovered that across all military demographic profiles, the risk of suicide and suicide attempt is highest amongst junior enlisted soldiers at their first duty station. They are more than twice as likely to experience suicidal ideation than those with at least five years in the service.[13]

The interpersonal theory of suicide points to their severed social networks, and potentially thwarted belongingness, as a contributing factor. After my trip to Fort Bragg, I don't need any convincing of the heightened risk. The question is: does design make a difference?

Prevention through Connection: The Results

Before directly assessing the influence of barracks architecture on suicidal behavior, I first tested the theoretical connection between social and emotional health. Without a strong correlation, there is no sense in finishing the rest of the analysis—at least according to my hypothesis.

My claim is a social one. I argue that architecture's direct influence extends only into the social sphere. It can encourage or discourage interaction and increase or decrease the probability of forming social ties. But it works indirectly. Design is one of the many factors which affect social health, but it is social health which influences the other four dimensions of well-being—emotional, spiritual, physical, and mental.

I liken the relationship to preparations for an upcoming exam. Architecture acts as your flashcards—or any other study tool of your choice. As a tool, it can influence your learning, positively or negatively. But the flashcards themselves don't get straight "A's." You do. The flashcards only increase or decrease the likelihood of your academic outcome by affecting your learning.

Similarly, architecture influences your social health—for better or for worse. But it is social health that goes on to get the grades. Stepping out from the analogy, it is social health that acts as the "most reliable predictor of suicidal ideation, attempts, and lethal suicidal behavior."[14]

If social health does not correlate to emotional health, however, then we know the hypothesized pathway—architecture to social health, social health to emotional and mental health—is broken. There is no point in going any further. It would be like knocking on a door when you already know nobody's home. But luckily, just as all of the scientific data predict, someone is home. The correlation is both strong and statistically significant (see Figure 9.3 below).

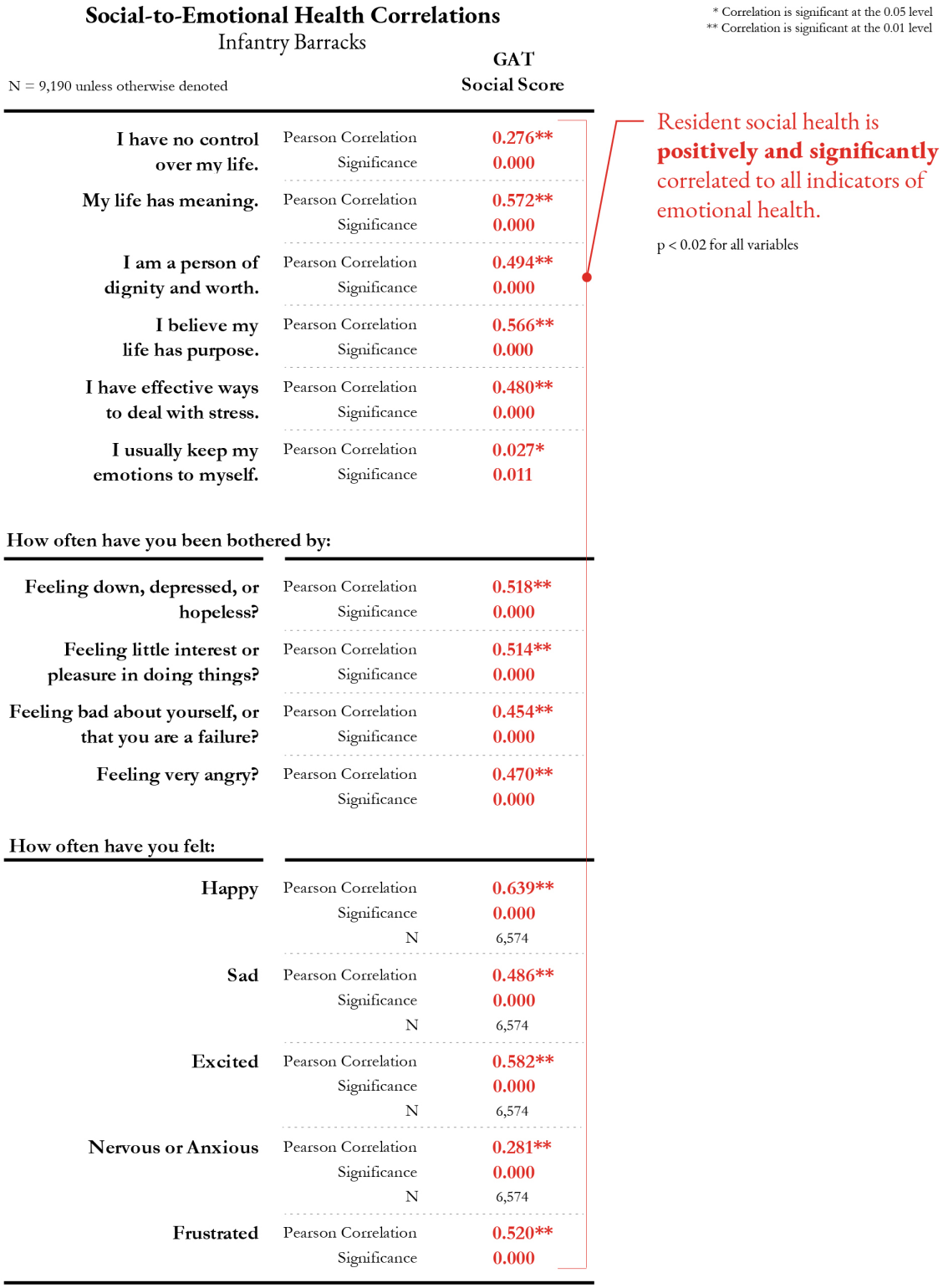


Figure 9.3. Social to emotional health for infantry barracks residents. Data courtesy of the Army's Global Assessment Tool (GAT). Graphic created by the author.

The correlation between social health and emotional health is statistically significant for every

variable. And all but one ("I usually keep my emotions to myself") are significant at the 99 percent level. Isolating GAT survey results for infantry soldiers at my three bases, social health has a direct tie to emotional health.

In Figure 9.3, the "GAT Social Score" column is an unweighted aggregate value of all six social health questions across three areas: social trust, belonging, and social support. The rows correspond to individual emotional health questions on the GAT survey. Where each row intersects with the social score column, the two (or three) numerical values to demonstrate the direction, strength, significance, and in some cases, the number of data points (or surveys), in the correlation between the two items—aggregated resident social health and the response values for that particular emotional health survey question.

Reading down the rows of emotional health data, some survey questions target feelings of self-worth, some ask about self-esteem, some target hopelessness, and some simply ask about common emotional states. They target the theoretical conceptualization of "perceived burdensomeness" as well as more direct measures of depression and control.

The stong statistical correlation across all variables doesn't say anything about design or suicide, however. It only confirms prior theoretical and empirical claims about the influence of social health on emotional and mental health, and provide growing support to the notion of social interaction and social support as a mechanism to positively affect resident well-being.

Do the Flashcards Work?

The interesting architectural question is whether design efforts have an affect. To return to the exam preparation analogy, the flashcards may encourage positive learning, but did the students with those flashcards perform measurably better on the exam?

I explored the influence of architecture through two bi-variate correlation analyses. The first looked to see whether the design attributes linked to improved social health statistically affect emotional health, and the second sought to determine whether design influences suicidal outcomes.

Figure 9.4 (below) shows the correlation between design and emotional health.

* Correlation is significant at the 0.05 level
** Correlation is significant at the 0.01 level

Design-to-Emotional Health Correlations

Infantry Barracks

N = 9,190 unless otherwise denoted

		Exterior Balconies	Exterior Social Space	Distributed Social Space	Private Rooms
I have no control over my life.	Pearson Correlation	**0.026***	0.013	0.012	**0.029****
	Significance	**0.011**	0.196	0.241	**0.005**
My life has meaning.	Pearson Correlation	**0.027****	0.012	0.002	0.001
	Significance	**0.009**	0.254	0.827	0.943
I am a person of dignity and worth.	Pearson Correlation	**0.036****	**0.021***	0.016	0.006
	Significance	**0.001**	**0.043**	0.129	0.545
I believe my life has purpose.	Pearson Correlation	0.013	0.000	-0.008	0.001
	Significance	0.215	0.963	0.421	0.910
I have effective ways to deal with stress.	Pearson Correlation	**0.031****	0.000	-0.003	0.009
	Significance	**0.003**	0.970	0.793	0.392
I usually keep my emotions to myself.	Pearson Correlation	0.010	**0.026***	**0.026***	0.003
	Significance	0.361	**0.011**	**0.011**	0.768
How often have you been bothered by:					
Feeling down, depressed, or hopeless?	Pearson Correlation	**0.025***	0.010	0.007	0.008
	Significance	**0.017**	0.339	0.530	0.456
Feeling little interest or pleasure in doing things?	Pearson Correlation	**0.030****	0.010	0.005	-0.003
	Significance	**0.004**	0.356	0.639	0.810
Feeling bad about yourself, or that you are a failure?	Pearson Correlation	**0.035****	0.016	0.015	0.002
	Significance	**0.001**	0.116	0.153	0.811
Feeling very angry?	Pearson Correlation	**0.030****	0.012	0.008	0.017
	Significance	**0.005**	0.245	0.441	0.102
How often have you felt:					
Happy	Pearson Correlation	0.010	**0.026***	0.015	0.000
	Significance	0.402	**0.036**	0.214	0.970
	N	6,574	6,574	6,574	6,574
Sad	Pearson Correlation	0.010	0.019	0.013	0.010
	Significance	0.407	0.121	0.299	0.441
	N	6,574	6,574	6,574	6,574
Excited	Pearson Correlation	0.021	**0.026***	0.018	-0.017
	Significance	0.087	**0.035**	0.151	0.180
	N	6,574	6,574	6,574	6,574
Nervous or Anxious	Pearson Correlation	**0.026***	0.013	0.008	0.019
	Significance	**0.032**	0.279	0.530	0.125
	N	6,574	6,574	6,574	6,574
Frustrated	Pearson Correlation	**0.026***	0.012	0.005	0.001
	Significance	**0.014**	0.261	0.623	0.893
	N	8,348	8,348	8,348	8,348

Figure 9.4. Design to emotional health for infantry barracks residents. Data courtesy of the Army's Global Assessment Tool (GAT). Graphic created by the author.

The results are telling. From the previous chapter, we discovered that exterior balconies—both true balcony-access barracks and those with exterior landings on each floor—are the strongest predictor of resident social health across any of the design elements studied. They positively correlate to five of the six social health questions at the 95 percent level, and correlated to both aspects of belonging ("How often do you feel part of the group?" and "How often do you feel left out?") at the 99 percent level. No other design element comes close to demonstrating such consistent and statistically significant correlations.

With both the design-to-social and social-to-emotional associations as a back-drop, the design-to-emotional results (Figure 9.4 above) are not surprising. Exterior balconies again show the strongest positive effect on resident well-being, correlating to ten of the fifteen emotional health indicators (67%), with most of those statistically significant at the 99 percent level.

Important to note is that the design elements are not mutually exclusive. They mix. Some barracks have exterior landings (crediting them with "balconies") but do not have interior or exterior social space. Some have all three. Some have none. The combination of design attributes to barracks buildings is a complex web of haves and have nots. This is important as it adds to the robustness of our results. The same balcony residents who are responding positively to their emotional health, are also counted in another column. No barracks have balconies without at least one of the other attributes, only adding to the robust, positive support for balconies.

Finally, we come to suicide. Figure 9.5 (below) shows the number of events—suicides and suicide attempts—across all three installations, highlighting both the outcomes for all barracks residents and isolating the events for infantry soldiers alone.

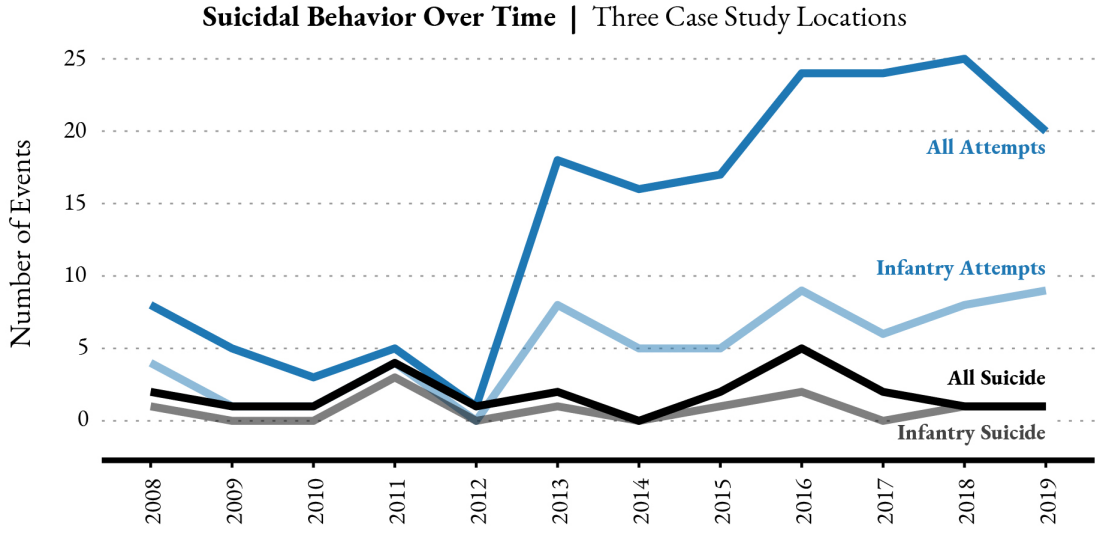


Figure 9.5. Suicidal behavior over time at my three case study installations. Data courtesy of the Department of Defense Suicide Event Report (DoDSER). Graphic created by the author.

The graphic clearly shows a disturbing trend. While lethal suicide has remained fairly consistent over time, suicide attempts have sky-rocketed in the past six years. Compared to the first five years of data (2008-2012), the last six years have averaged more than four-and-a-half times the number of attempts (20.6 attempts per year as opposed to 4.4 attempts per year).

Analyzed across design variables, exterior balconies again demonstrate their positive influence (see Figure 9.6 below).

* Correlation is significant at the 0.05 level
** Correlation is significant at the 0.01 level

Design-to-Suicide Correlations | INF Barracks

		Suicide	Suicide Attempts	Exterior Balconies	Exterior Social Space	Distributed Social Space	Private Rooms
Suicide	Pearson Correlation	1	0.407**	0.024*	-0.001	0.012	0.008
	Significance	-	0.000	0.027	0.914	0.288	0.446
	N	8,348	8,348	8,348	8,348	8,348	8,348
Suicide Attempts	Pearson Correlation	0.407**	1	0.006	0.010	0.013	0.002
	Significance	0.000	-	0.590	0.377	0.248	0.868
	N	8,348	8,348	8,348	8,348	8,348	8,348
Exterior Balconies	Pearson Correlation	**-0.024***	0.006	1	0.696**	0.326**	-0.218**
	Significance	**0.027**	0.590	-	0.000	0.000	0.000
	N	8,348	8,348	8,348	8,348	8,348	8,348
Exterior Social Space	Pearson Correlation	-0.001	0.010	0.696**	1	0.515**	-0.152**
	Significance	0.914	0.377	0.000	-	0.000	0.000
	N	8,348	8,348	8,348	8,348	8,348	8,348
Distributed Social Space	Pearson Correlation	0.012	0.013	0.326**	0.515**	1	-0.396**
	Significance	0.288	0.248	0.000	0.000	-	0.000
	N	8,348	8,348	8,348	8,348	8,348	8,348
Private Rooms	Pearson Correlation	0.008	0.002	-0.218**	-0.152**	-0.396**	1
	Significance	0.446	0.868	0.000	0.000	0.000	-
	N	8,348	8,348	8,348	8,348	8,348	8,348

Figure 9.6. Design to suicidal behavior correlations for infantry barracks residents. Data courtesy of the Department of Defense Suicide Event Report (DoDSER). Graphic created by the author.

Interestingly, suicide attempts do not differ across design variables. Residents of balcony barracks are no more or no less likely to attempt suicide (given our statistical confidence interval) than any other barracks. And no physical feature studied correlates to a decrease (or increase) in attempts. With the data at our three installations, suicide attempts sit independent of design.

Balconies do correlate to fewer completions, however. The data show that residents of exterior balcony barracks are statistically less likely to die by suicide. The correlation is significant at the 95 percent level and negative—thus, as the number of residents in balcony barracks goes up, the probability of suicide goes down. This is a unique and novel finding. Throughout my research, I

couldn't find any other study quantitatively linking architecture to suicide.

Likely, this finding would not shock First Sergeant Akers or First Sergeant Oberlin. Over their combined forty-two years of Army infantry experience, they've seen the influence of barracks design on soldier social networks. They both described the value of social health, and both pointed to balcony barracks as places that draw residents from their rooms—places where soldiers are more likely to interact, talk, and notice.

Conclusion

I leave this chapter right where I started—talking to a soldier at Fort Bragg. This time, I want to re-visit and re-emphasize our earlier discussion with Specialist Franke, the Airborne infantry soldier living in the "open corner" barracks.

As he told me:

> We all hang out on the balconies—on the corners by the elevators. If we didn't have those, I probably wouldn't hang out with anyone. People really don't hang out anywhere else but those balconies. There's people out there all the time and all year-round—in our barracks and the one across the way.

After I asked, *"Why do you think that is?"* he replied:

> One of the big reasons is that it's outside, but covered. A lot of soldiers like to smoke so when people want to hang out, you're going to go where people can do that. People want to hang out where other people are. Being outside is nice too. There's a good view, and it's close to the rooms. That's big. Each floor has their space. It feels like ours. Our company is a lot closer together because we're out there off-duty. Just the other night we brought camp chairs out there and watched the sun go down drinking beers. It's nice to get out of the room for a bit.
>
> I was living in [another] barracks for almost two years before moving here. I've been here for seven months now. I feel way closer to the company here, and I think these balconies play a big part. We hang out together a lot more here.

Specialist Franke's social experience is a near-perfect match for the data. Residents of balcony barracks—like Specialist Franke—are more likely to have higher levels of social health, are more likely to have higher levels of emotional health, and are less likely to die by their own hand. According to the interpersonal theory of suicide, the social belonging described by Specialist Franke is a big reason why.

CONCLUSION

Army barracks have a long and storied history. From the Old Stone Barracks in Plattsburgh, New York, to the 2/1 "Market Style" design of 2012, barracks have continued to serve the same purpose—housing the Army's soldiers. Their form has stayed less consistent than their function, however.

The Army's first standard design for permanent construction—the 1872 Meig's barracks—followed the Old Stone Barracks model. Buildings lined the post's parade ground, and the design was durable, narrow, mixed-use, and protected by a full-length porch on each floor. Company cohesion was the Army's goal—physically and socially. The 1872 design contained both formal social space (the day rooms on the first floor) as well as the informal social porches that I found so helpful in promoting soldier social health.

After a period of spartan mobilization barracks during the First World War, the Army returned to the Old Stone Barracks model. The 1926 design standard (the WDHP barracks) re-established the mixed-use functional arrangement of administrative and communal spaces on the first floor and sleeping areas above. The design also re-attached the exterior social porches, only moving them to the building's rear. Twelve years later, in 1938, the Army needed to mobilize for World War II, and temporary wooden barracks went up en masse. Speed and initial construction cost trumped social considerations, and barracks once again consisted primarily of spartan sleeping rooms.

The Cold War era (1950-1970) returned to permanent construction materials but did not fully return to the historic design template. From the 1950 Hammerhead plan to the 1960 Rolling Pin plan (the last of the era), designers continued to forego the exterior porches and slowly dismantled the mixed-use concept in favor of single-use sleeping buildings.

Perhaps the most significant changes began in 1973 and 1996, however, when the Army moved away from the Draft and a vehicle packed with explosives detonated just outside of the Khobar Towers complex. Throughout this dissertation, I focused exclusively on these two design drivers: the military's aim to improve retention through individual satisfaction, and to ensure security through surveillance. I argue that both shifts resulted in negative consequences for soldier social health, and that social health influences the outcomes of retention, physical well-being, and suicide.

Fear

After the attack on Khobar Towers, the military issued new prescriptive antiterrorism guidance. Two provisions in particular—unobstructed space and flying hazardous debris—changed the barracks. To guard against the backpack bomb, unobstructed space requirements all but forced designers to create landscapes of surveillance; to design a modern-day cordon sanitaire—clear of vegetation, clear of differentiated social space, and clear of nearly all affordances which might encourage Gehl's "optional activities."[1] I claim that removing these spaces separated barracks from their sites, and decreased opportunities for frequent, casual social interaction.

In addition, the standards saw exterior doors as a blast hazard and effectively eliminated outdoor balcony-access barracks with only four words: "avoid exterior hallway configurations."[2] Exterior balconies disappeared, and double-loaded corridors took their place. I claim that the double-loaded corridor design increases the physical and psychological distance from private to public space, makes that transition more cumbersome, and discourages routine interaction.

The loss of usable outdoor space and the elimination of the front door (along with its associated balconies or landings) has social consequences. At Fort Hood, residents of barracks complexes with integrated outdoor common areas rated their barracks as 55 percent more social (Figure 2.13) than those living in barracks set within barren clear zones. And across all three of my case study sites, exterior balconies (and landings) were the most consistent and significant positive force for social health of any design attribute studied (Figure 8.1).

The barracks changes in response to terrorism—creating clear zones and moving to the double-loaded corridor—reflect the problem of designing in isolation. Security experts designed for surveillance, not community. After twenty years of antiterrorism development (even with active architect and planner participation), the military is still realizing the second-order effects of policy provisions. In December of 2018, after noticing the consequences of standoff, the DoD effectively eliminated the requirement.

And as my dissertation shows, unintended social consequences of prohibiting balconies and requiring clear zones continue to negatively impact soldier social health.

Retention

After 1973 and the move to the All-Volunteer Force (AVF), the military looked increasingly at barracks to help with retention. Decentralization replaced consolidation as the design paradigm. Survey after survey went out to the residents, and demands for more space, more privacy, and more amenities came back. In each one of the post-AVF design iterations (the 2012 standard excluded),

an extensive barracks satisfaction survey preceded and informed the design. Architects complied with soldier requests, shifting to a design philosophy which placed increasing emphasis on individualism and tangible satisfaction. The new philosophy moved from shared rooms to private rooms (Figure 3.5), made those private rooms larger (Figure 3.6), and deleted communal social gathering space to re-apportion square footage to the individual (Figure 3.7). With each new issuance, and each added square foot or added in-room amenity, came promises of improved retention and morale.

This desire for retention is driven by a genuine need. The Army must recruit 176,500 soldiers (the Army's 2018 target) out of a nationwide net pool of just 278,893 eligible and interested 17-24-year-olds—a near-impossible challenge. Thus, barracks became part of the retention strategy. While I agree with military and Congressional leaders in their claim that facilities can influence retention, I disagree with the design strategy they chose. I argue that designing for individual satisfaction (through greater privacy, space, and amenities at the expense of community—the current military strategy) does not increase retention. The DoD's central premise is flawed by aiming at the wrong design target. Instead of seeking to boost individual satisfaction, designers would be better served by aiming to increase the probability of resident social interaction. As sociability blossoms, so does health, retention, and incidentally, satisfaction too.

Contrary to the current strategy, a barrack's design standard (at least those issued after 1950) does not influence soldier career intentions. Those in the oldest barracks—with the least amount of privacy, the smallest rooms, and fewest amenities—are statistically just as likely to re-enlist as those in the newest barracks (Figure 3.8).

DoD designers are not completely wrong in their beliefs about satisfaction, however. Space, privacy, and amenities increase soldier satisfaction with their barracks buildings—by as much as 78 percent (Figure 3.9). But they err in believing building level satisfaction also increases retention outcomes. My research finds no correlation—soldiers may be more satisfied, but satisfaction with barracks or even with having private rooms has little bearing on retention. Instead, the only factor statistically correlated to both building satisfaction and re-enlistment is sociability (Figure 3.11 and Figure 3.13). At Fort Hood, soldiers of self-identified socially-active barracks were 15 percent more likely to want to re-enlist (Figure 3.11).

Importantly, sociability not only correlates to retention, but also decreases soldier loneliness by up to 28 percent (Figure 3.12).

Using a probabilistic approach and environment-behavior theory as my foundation, I posit that architecture's influence occurs through the social experience of place (see Figure C.1 below).

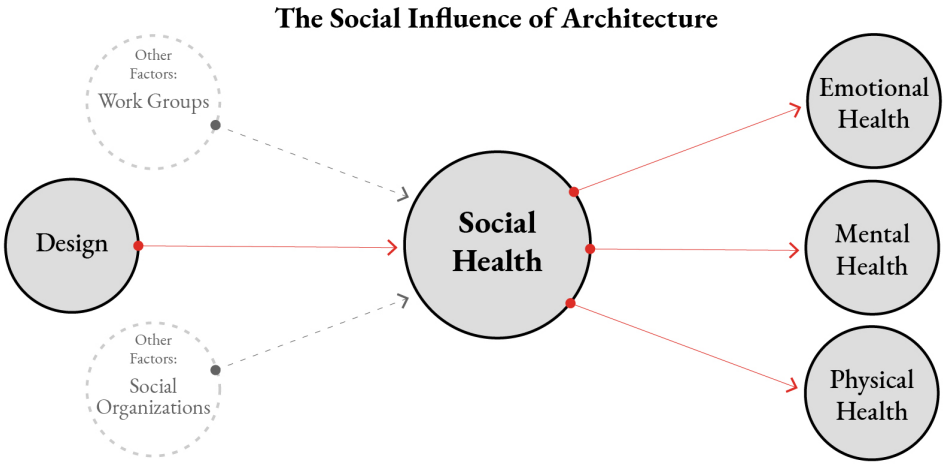


Figure C.1. The social influence of architecture. Graphic created by the author.

Analyzing social, emotional, and physical health survey data, along with official Army re-enlistment and suicide records, I tested the claims in Part One.

Unsocial Security

For design changes linked to antiterrorism requirements (i.e., unobstructed space and the elimination of balcony access), the data show unintended negative social consequences for servicemembers. Infantry soldiers living in barracks designed before the clear zone promoting unobstructed space provisions—like those of JBLM's VOLAR designs or Fort Bragg's articulated courtyards—were statistically more likely to report higher feelings of social belonging (Figure 5.9 and Figure 5.13) than their fellow infantry counterparts housed in newer, post-antiterrorism barracks designs.

The same social benefit holds true for barracks designed with exterior balconies or landings as well. At Schofield Barracks, residents of the historic quads (which have both exterior balconies and interior corridors) report higher feelings of social belonging and social support than those in double-loaded corridor configurations (Figure 5.18).

Soldiers need not have "true" balcony access to reap the benefits, however. Those living in barracks with exterior landings—like Specialist Franke in the "open corner" barracks—also report greater social belonging and social support amongst barracks-mates (Figure 5.23). According to theory and supported by my data, these open corners act in the same manner as the balconies at Schofield Barracks. They provide an in-between zone, an easily accessible space for the residents on each side of each floor, which promotes routine, casual interaction.

An Army of One

The social consequences of barracks design changes linked to retention—private rooms and the

elimination of communal interior social space—are not as directly apparent. Compared to the findings across the two antiterrorism provisions, the GAT survey responses on the social effects of private rooms is far less convincing—for either private rooms or shared rooms.

At each one of my three case study sites, I was confronted with a story about a belief within the Army that shared rooms will increase soldier social interaction and help curtail suicides. The logic is intuitive. Unfortunately, it appears unsubstantiated. I found no positive support for the claim that bedroom door removal or a return to shared rooms will significantly increase soldier social health. Instead, if anything, private rooms seem to provide some probable benefits (Figure 6.5 and Figure 6.9).

As a means to increase individual space without surpassing the Congressionally-mandated per soldier space allotment, barracks designers privatized communal space. Newer standards (particularly the 2004 1+1-E's and 2012 2/1 "Market Syle's") have fewer and fewer common areas. This shift has consequences. Interior social space provides a benefit to soldier social health. Barracks that simply contain communal social areas perform better than those that do not (Figure 6.13), and barracks that distribute social space perform better than those which centralize it (Figure 6.18).

As the GAT data demonstrates, interior social space matters—even in an "Army of One."

Looking into soldier outcomes, the data show serious cracks in the Army's barracks design strategy. Newer barracks actually perform worse than the older ones from a social performance perspective. Residents of the most recent standards are statistically less likely to benefit from social trust, belonging, and social support (Figure 7.6). The social ills of designing for terrorism and individualism extend into soldier outcomes.

Retention

The newer a barracks is, the lower the re-enlistment likelihood (Figure 7.2 and Figure 7.5)—exactly the opposite of Army claims and intentions. This holds true across all of the barracks at all three of my case study sites. Most importantly, this data does not come from the self-reported future intentions of survey respondents, but from actual soldiers making the actual decision to re-enlist or separate. Analyzing retention across barracks, space, privacy, and amenities make no difference to soldier outcomes (Figure 7.1, Figure 7.2, and Figure 7.3). Instead, it is sociability that matters. Resident likelihood of choosing the military again is positively and significantly correlated to all indicators of social health (Figure 7.4)

Retention and social health decrease in new barracks because, in part, DoD designers have abandoned aspects of design that support sociability. If retention is a primary national security objective with a partial strategy in design, then more needs to be done to make more sociable barracks.

Physical Health

For physical health, exterior balconies (and exterior social space to a small degree) correlate to better social health, and social health strongly correlates to physical health (Figure 8.3). While more research is needed on the connection between design and various measures of physical health, socially-encouraging barracks provide significant benefits to sleep. Residents of balcony barracks (both "true" balconies and open-air horizontal landings) are statistically less likely to be bothered by poor sleep and less likely to feel tired or low energy throughout the day (Figure 8.4).

Suicide

Social integration can protect against suicide. Past research (Figure 9.1) provides compelling support to the claim. In my research, I found the same. I discovered that social health is strongly and positively correlated to emotional health (Figure 9.3). Balconies, exterior social space, distributed social space, and private rooms all help. But designers have prioritized private space over the other three design elements, and this is a costly mistake.

And while not strong, there is a statistically significant correlation between barracks with exterior balconies and fewer actual suicides (Figure 9.6).

Figure C.2 (below) summarizes Part Three's findings.

Annual Probability of Suicide, Suicide Attempts, and Re-Enlistment for Pre- versus Post-Antiterrorism Infantry Barracks

Statistically significant ($p < 0.05$) *
Not statistically significant

	Suicide Probability per Year per Battalion[1]	Suicide Attempt Probability per Year per Battalion[2]	Re-Enlistment Percentage per Year[3]
Pre-Antiterrorism Barracks	*2.7%	34.7%	*43.4%
Significance	0.017	0.292	0.048
Post-Antiterrorism Barracks	*7.4%	32.4%	*42.3%
Significance	0.017	0.292	0.048

[1]Probability of a completed suicide per year per battalion using 12 years of data (2008-2019) from 10,018 soldiers in 15 infantry barracks at 3 installations.
[2]Probability of a suicide attempt per battalion per year using 12 years of data (2008-2019) from 10,018 soldiers in 15 infantry barracks at 3 installations.
[3]Re-enlistment percentage per year using 10 years of data (2008-2017) from 8,348 soldiers in 15 infantry barracks at 3 installations.

Significance determined using an independent T-test.

Figure C.2. The annual probabilities for pre versus post-antiterrorism infantry barracks. Graphic created by the author.

Instead of highlighting correlations, Figure C.2 shows probability. It gives the likelihood in any

one given year that an infantry battalion will have a suicide or suicide attempt within its ranks, depending on where that battalion lives. While attempts are not statistically different between pre and post-antiterrorism barracks, deaths are. Battalions assigned to newer, post-antiterrorism barracks (those built after 2004) have a nearly 3-fold increase in the probability of a self-inflicted death within the unit per year. I argue that barracks design changes—primarily attributable to terrorism and retention—negatively affect soldier social health, and decreased social health has mental health consequences.

Figure C.2 also shows the likelihood of re-enlistment for infantry soldiers living pre and post-antiterrorism barracks. Residents of older barracks—those that allowed balconies and placed greater emphasis on communal social space—are more likely to re-enlist. Even a small gain in re-enlistment (like 1.1 percent) is important. The Army's All-Volunteer Force arithmetic has razor-thin margins of error. An additional 1.1 percent equates to nearly 2,000 more soldiers per year deciding to stay in the service and another 2,000 more soldiers that the Army does not need to replace. Retention increases —even small ones—lessen the recruitment burden, allowing the Army to ease financial incentives and select top-tier talent.

• • •

These issues, and their solutions, are social. Designing for safety, space, and amenities are not the Army's errors. These are all good things. Instead, the errors occurred when terrorism and individualism overtook community, when they sacrificed social space for closet space, and when they eliminated convivial balconies for claustrophobic corridors.

If the Army's concern is for retention, emotional health, physical health, or to reduce suicides, then designing for sociability can help. Design can encourage or discourage interaction, and increase or decrease the likelihood of social bonds. These bonds are a powerful force for well-being.

Everywhere I went, and everyone I spoke to, provided an anecdotal glimpse into my eventual findings. At Schofield Barracks, First Sergeant Akers told me that:

> The quads are just better for socializing—and I think that builds a better unit. These guys hang out together. I see them hanging out on the hallway balconies all the time. It forces them to socialize. It forces them to talk to people. When they're not doing that, they're off-post together. Always together.[3]

At Joint Base Lewis-McChord, Specialist Mullen told me:

> There is a 'fratmosphere' to the older barracks. They're more like apartments. People are always hanging out on the balconies and in the common space. Here, people mostly stick to their rooms—no one hangs out. There's no common space. It feels like a prison.[4]

And at Fort Bragg, First Sergeant Oberlin told me:

> Some soldiers never leave their rooms. I call them "barracks rats"—those that just seem to scurry back into their rooms and avoid being seen... [and] I think the barracks make a difference. Some of those old barracks worked. The quads worked. And still work. They have a way of pulling someone out of their room... Soldiers need to come out and talk to each other.[5]

They are all right. Exterior outdoor spaces close to soldier rooms, such as balconies or landings, have a robust and statistically significant effect on soldier social health. And as their social health blossoms, so too does their emotional and physical health. Residents with the distributed outdoor social spaces of balconies or landings are less depressed, less angry, less bothered by poor sleep, have higher self-esteem, have better ways to deal with stress, and are less likely to commit suicide.

John Donne, the sixteenth-century English poet, wrote: "No man is an island." He believed that we are all connected, not isolated entities. His 1623 poem hits directly at this dissertation's central premise: social connection is the window to well-being.

Army architects meticulously design barracks. There is an entire office at the US Army Corps of Engineers to develop, evaluate, and issue standardized barracks plans. Each wall, each door, and each room is labored over, and drawn and re-drawn. The standards look the way they do because of the hours of effort and analysis poured into each design decision. And while I critique some of those decisions, I do not critique their effort or intentions. They are trying to improve the lives of our junior enlisted servicemembers—just like I am with this dissertation. The faults that I see are in the lack of knowledge and research into how design influences interaction and health, not in the lack of compassion or care.

However, if there's anything to take away from the long string of barracks design standards in the past fifty years, it's change. Change provides opportunities to adjust and improve design—and design is vitally important. As Sarah Williams Goldhagen writes:

> Everything around you—from the shape of the room in which you currently sit, to the amount of sunshine filling your home, to the character of the house or apartment where you live, to the width and patterns on the sidewalks or roads that brought you there—is as it is because somebody made a choice. By commission or by default, the built environment is composed, which means that it could have been composed differently. And much of it can be remade, as so much more of it will be created in the coming decades. We have before us an unprecedented opportunity to reshape the world into a better place.[6]

Barracks provide a similar opportunity. We can change—and improve. While I focus on a specific and unique population set, this is not an opportunity exclusive to military barracks. Housing of all types has a profound effect on residents. And while the specific design interventions of this dissertation may not translate outside of military fence lines, the ideas do. Design influences social

interaction and health—for those who wear a uniform and for those who don't.

I end with Sergeant Kroll—the soldier we met in chapter two. As an E-5 (Sergeant), his barracks days are numbered. He'll move out as soon as he gets promoted. When he does, he will have lived in barracks in Georgia, Italy, Guam, and Hawaii. And he will have experienced the socially-inducing balcony-lined courtyard barracks and the socially-discouraging double-loaded towers. When I asked him to reflect on his current barracks (a double-loaded corridor design) against the courtyards of Italy and Guam, he said:

Here, my barracks room feels like my 'hiding hole.' In Italy and Guam, it felt like my home.[7]

We need to build more homes.

APPENDIX:
MY METHODS

In this appendix, I describe some details of my research methods that are not presented elsewhere in the text or notes.

As I pulled off Interstate-5, there was a short line of cars at the gate—stacked one behind the other, all waiting for their turn to enter. A few seconds later, I was at the front of the line. I rolled down my driver-side window, extended my left arm into the open air, and slowly crept forward. I was wearing my military uniform and clutching my official identification card in my outstretched hand—an unconscious move out of habit. I had gone in and out of a military installation nearly every weekday for the past ten years. I knew exactly what the guard needed, and extended my credentials before he had time to ask. The guard was a young Army Specialist—twenty-two years old at the most. The semi-automatic rifle draped across his chest partially hid the bullet-proof vest that he was wearing underneath. Waiving me forward with his left hand, he held a scanner in his right—something eerily similar to what your local grocery clerk uses to scan the items too big for the moving belt. He quickly scanned my card, gave me a quick glance, saluted, and opened his palm as a gesture of approved admittance. I was in—driving on Joint Base Lewis-McChord in Tacoma, Washington. The base was one of my three case study locations, and I was there to examine the barracks.

As I was climbing the stairs to meet my point of contact—the base community planner named Tim Holzig—a lieutenant called out from behind me.

"Hey, sir, what are you doing here?" he asked, obviously surprised.

I turned and immediately recognized him. First Lieutenant Spencer was a former student of mine in a course on how to design temporary deployment facilities from a few years back. I taught military architecture and planning classes for nearly four years before starting my Ph.D., and there was hardly a base that I visited where I didn't recognize someone from that role. He was also on his way up to the third floor, so we briefly discussed my barracks research as we climbed the remaining two flights. After hearing about my study, he said that he could help.

"I can get you access to our building inventory data if you want?" he offered. I accepted before he even finished asking. Inventory data would give me the year, square footage, number of stories, and a few other variables on every barracks on base—precisely what I needed. When we got to the top, he

pointed down the hallway to where his desk was and told me to come by after I met with Mr. Holzig.

"I should have everything you need by then," he said.

Mr. Holzig was equally helpful. We poured over base maps as he pointed out the location of each barracks on base, providing details and stories about all of the recent projects. He set up further meetings for me, making connections on my behalf to others whom he thought that I should speak to. As our meeting concluded, I had one last question.

"How could I go about getting permission to take photos of the barracks?" I asked.

Without missing a beat, he said, *"I know just the guy."* He took out his oversized pad of Post-It notes and wrote down the name, phone number, and building number for the Chief of Public Affairs, Mr. Ned Abbot. *"Tell him that I sent you,"* he finished.

Twenty minutes later, I had a signed memorandum from Mr. Abbot giving me clearance to drive fence line to fence line, taking photographs unescorted of any barracks on base that I wished. *"This isn't exactly standard practice,"* he said, *"but you're military, and we trust you."*

As I write about my methods and reflect on my dissertation, I can't help but think about these first thirty minutes on Joint Base Lewis-McChord and the influence that my positionality played. I live in two different worlds, standing firmly rooted in both academia and the military. I can don the uniform when it's advantageous, and take it off when it's not. I can move in or out of a military installation without a second glance from the guard at the gate. My uniform, my identification card, and the rank on my lapel allowed me to garner data that is likely unattainable for many university researchers.

In addition to building inventories and photographic free-reign, the US Army opened its data archives to me on suicide and soldier physical, emotional, and social health. I did not need to partner with a Department of Defense organization on an officially sanctioned research project. I could self-request the data, and because of my military status, my application review was not as lengthy or intensive (although "not as lengthy" is a relative term, and still took many months). When the data arrived with a critical variable hidden over privacy concerns, the Army completed an "Exception to Policy" memorandum for me, finding a back-door option to expeditiously unhide the variable without going through the normal approval process.

These are just some of the many benefits and shortcuts that I received. These had nothing to do with me as a person and everything to do with me as a military member. It was most often people whom I never met or spoke with who authorized the expedited approvals and access exceptions. My uniform, my military e-mail signature block, and my ability to speak military jargon provided me the privileges of a fellow co-worker, not an outside researcher. And I would be lying if I said that I did not take advantage of the capability to seamlessly bounce between worlds—capitalizing on my position to ask research questions and use research methods that would be much more difficult to

answer for someone without a uniform hanging in their closet, or an identification card to flash the soldier at the gate.

Research Method

In 1972, Oscar Newman published *Defensible Space*, a landmark book on the correlation between design and crime. In the book, Newman argues that architects can decrease the opportunities for crime by designing the physical environment according to four principles: territoriality, natural surveillance, image, and milieu.[1] His central premise is that most criminals behave logically, selecting targets based on a cost-benefit analysis of risk and reward. Thus, deterring crime is about increasing risk by creating a physical environment in which criminals are more likely to be noticed, observed, and caught. Using case studies in a quantitative-dominant, mixed methods manner, he convincingly supports his theory, and the book had a near-immediate impact. "Defensible space theory" exploded in academic research circles, and governments quickly instituted defensible space principles into their housing guidelines.

While the magnitude of adoption and influence of Newman's study may be nearly impossible for any researcher to replicate, his methods are not. His research serves as a methodological model for my dissertation—a quantitative-dominant, multi-site case study of coupled pairs. Instead of comparing Van Dyke and Brownsville or Bronxdale and Highbridge, I compare the barracks at Fort Bragg, Joint Base Lewis-McChord, and Schofield Barracks. I ask three primary questions. First, what are the forces which have shaped the design of military barracks? Second, how does design—the architecture and planning of military barracks—affect resident interaction and social cohesion? And third, how do different levels of cohesion correlate to rates of re-enlistment, health outcomes, and the incidents of suicide for barracks residents?

Each of these three questions uses slightly different methods for different reasons, but like Newman, these variations all fall within a case study approach. Robert Yin, the author of *Case Study Research*, provides this definition:

> A case study is an empirical inquiry that investigates a contemporary phenomenon (the "case") in its real-life context, especially when the boundaries between phenomenon and context may not be clearly evident.[2]

If we tease out some of the most telling pieces of his definition, they are *empirical inquiry* and *contemporary phenomenon within its real-life context*. Thus, case study research is more than just data-gathering in the "field," but accounts for the complex, interwoven dynamics of embedded context. In this way, case studies separate themselves from experimental research, which purposely tries to sever the connection to real-life settings by conducting its experiments in a laboratory, or laboratory-

like, environment to control outside variables. The experimental method also includes some "treatment" or intervention on behalf of the researcher. One example is the 1973 "lost letter" experiment by Leonard Bickman and his colleagues.[3] Their study aimed to determine the variance in helping behavior between residents living in different styles of college dormitories. Abstracted, the experiment is very similar to my research. Both explore the effect of architecture on behavior in similar building typologies. The critical difference is researcher intervention. Experiments insert a treatment to see how people behave—in this case, the "lost letters"—where case studies do not. Additionally, as opposed to an ethnography that focuses on describing or interpreting shared patterns of a cultural group, a case study focuses less on broad understanding and more on in-depth knowledge of its case or cases.

Two key questions confront the case study researcher. The first is whether to conduct a single or multi-case study. According to Yin:

> Consider multiple cases as one would consider multiple experiments—that is, to follow a "replication" design. This is far different from a misleading analogy that incorrectly considers multiple cases to be similar to the multiple respondents in a survey (or to the multiple subjects within an experiment)—that is, to follow a "sampling" design.[4]

For some research questions, like those looking into a highly unique case or those with a longitudinal focus, replication may be impossible or irrelevant to the research question. For others, as is the case for my dissertation, replication can increase research robustness.[5] Replication—by way of multiple sites—adds to the validity of how shared social space, balcony access, and a host of other varying design factors influence social connection in military barracks.

The second question for the case study researcher is the means and manner of collecting evidence. Like Newman, I decided on a mixed-methods design with a quantitative-dominant strategy. Mixed methods research is:

> [A]n approach to knowledge (theory and practice) that attempts to consider multiple viewpoints, perspectives, positions, and standpoints (always including the standpoints of qualitative and quantitative research).[6]

The premise is that combining methods provides the 'checks and balances' to neutralize the weaknesses of any one method and affords the researcher the ability to capitalize on each method's respective strengths.[7] For example, my quantitative survey provides the power of big data, but loses the depth and understanding of the individual. Combining the quantitative survey with qualitative interviews, I learn that not only is Sergeant Kroll dissatisfied with the social atmosphere of his tower barracks according to a standard Likert scale, but that he thinks the lack of central, enclosed social space is the culprit because he no longer has the option of casual evening barbeques like he did at his previous base. Mixing the two methods affords me greater understanding through triangulation. Campbell and Fiske's study of psychological traits—primarily credited with formalizing the practice

of multiple methods—introduced the idea of triangulation.[8] Much like the idea that multiple cases provide validity through replication, mixed methods provide validity through convergent qualitative and quantitative data.

Throughout this dissertation, I've traveled to North Carolina, Washington, and Hawaii. I've compared sets of Army Brigade Combat Team (BCT) barracks at each base. And within each comparison, I've used a combination of qualitative and quantitative methods. In essence, my dissertation is a mixed-methods, multi-site case study.

Research Strategy

On Friday, November 22nd, I walked out of the 82nd Airborne Division Headquarters building on Fort Bragg, North Carolina. I had just met with the Division engineers—the soldiers who manage all of the 82nd Airborne's buildings. They were excited about my research and were eager to help.

"*We'll send out the survey as an Operations Order. That way, it will come straight from the top as a leadership priority, and we'll make sure you get plenty of good data and responses from our soldiers,*" the Colonel told me. True to his word, we crafted the order over the next two weeks, getting it primed for publishing right when soldiers returned from their December holiday leave. On Monday, January 6th, the survey went live as an official 82nd Airborne order.

Unfortunately, what neither the Colonel nor I could have predicted between late November and New Year's Day, was an international incident that caused the 82nd Airborne to recall their soldiers from leave and deploy them to the Middle East within 36 hours. On January 2nd, 6,450 miles away in Baghdad, Iraq, a US Air Force MQ-9 Reaper fired a missile into a convoy of vehicles leaving the Baghdad International Airport, killing ten. Inside one of the destroyed vehicles was Iranian Major General Qassim Suleimani. In anticipation of an armed and potentially dangerous retaliation, the US Army deployed a Brigade Combat Team from Fort Bragg. Those deployed were the very same soldiers that were supposed to take my survey later that week. Unfortunately for me, they would never see it.

In Oscar Newman's *Defensible Space*, the data and responses from the Van Dyke residents lose meaning if not contrasted with those of their neighbors in the Brownsville Houses across the street. And for me, the responses from the lone BCT left at Fort Bragg, lose meaning when not compared to their sister BCT assigned to a completely different style of barracks just down the road. The power of paired samples is in their comparisons. By themselves, they float untethered. Thus, in early January, my research strategy changed directions. The methods that I type here are not the same methods that I presented to my dissertation committee at the beginning of my journey. But they are close. And they are better.

I used three increasingly robust levels of data in this study: personal accounts, published documents, and archived records. The personal accounts and published documents did not change. I still spoke to residents, designers, and military leaders. And I still scoured the document archives for policies, design guidelines, as-built drawings, news articles, and academic works. But instead of my initially planned survey specially crafted for my research questions, I now rely on archived records from an Army-issued survey on five dimensions of soldier health: social, emotional, spiritual, family, and physical.

Throughout this dissertation, I have relied on stories told to me by Department of Defense employees of all types, from enlisted barracks residents to unit leadership to military policy writers to barracks designers. Across all ranks, ages, and locations, everyone that I spoke with was overwhelmingly accomodating and genuinely helpful. To protect their privacy, I have used pseudonyms for everyone that I interviewed. Names included as part of other published works—base news stories or congressional records, for example—retain the same names as listed in those publications. All sources cited in this study are unclassified and publicly accessible.

I do not use interviews as a primary data collection strategy, but rather one that augments and triangulates my more robust quantitative statistical methods. As you read about the experiences or opinions from Sergeant Carroll or Specialist Mullen, those connections happened fortuitously. I did not seek them out. Our paths just happened to cross as I walked through the barracks taking pictures and observing the happenings of everyday life on that day.

When these chance encounters occurred, I realized that my rank as an active-duty officer could influence the power dynamic and responses of junior enlisted soldiers. To address it, I followed the practices of fellow military officer Mark Gillem in his study on the spatial ramifications of geopolitical empire. Concerning the same potential issue of military hierarchy and influence, he writes:

> I tried to deal with this in two ways. First, while obvious, I stressed that I was not in any way acting in a supervisory capacity over those I interviewed. They were free to share with me as much or as little as they felt appropriate. Second, I confirmed my status as an outsider by letting people know I was approaching this from my perspective as a university researcher, not as an Air Force officer. Surprisingly, the mere mention of this put people at ease... It was as if I gave them academic freedom, free from reprisal, to discuss their ideas and concerns.[9]

I expanded on his protocol by adding a direct question for their verbal consent, but found the same easing of apprehension. For the youngest of soldiers that I interviewed—those where the power dynamic is most heightened—these two clauses visibly relaxed any tension of my approach. More often than not, I found that barracks residents were so excited that someone sought them out for their opinion, that they would have freely participated for hours. Specialist Mullen, the tall West Texan from Joint Base Lewis-McChord, was one of those soldiers. I caught him on the way back to

the barracks from a late lunch at the dining hall. About ten minutes into our conversation, his phone alarm went off. He quickly took it out of his pocket, stopped the beeping, and kept on talking. When I asked if he had to go, he responded, *"No, no, that's just my laundry timer. It's done. But I can do that later. This is much more interesting. No one has come and asked my opinion before, and I'd much rather finish our conversation."*[10]

Personal accounts provide a richness and understanding of the social experience in barracks, and give context to the intentions and rationale behind policy writers and designers. But they do not adequately answer any of my research questions alone. To layer in additional support, I employed archival and graphic research of published documents. I collected and reviewed every iteration of barracks standards available, read through all of the congressional testimony and reports on barracks that I could find, and surveyed the architectural drawings for the barracks at my three case study sites. I drafted floor plans, established event timelines, and took photographs. Through testimony, policy, and as-built drawings, I discovered the forces that shaped—and continue to shape—the design of barracks. By laying documents in their historical context, I saw how security policy led to changing standards, and how changing standards impacted the design of built barracks. In document and archival analysis, I found robust support for my first research question, and context to the physical changes to military barracks.

Lastly, I analyzed millions of Army survey records—2,066,688 individual responses to be precise. Like Newman's work, my numerical data and quantitative statistical analysis is the star of the show and my dominant research strategy. In *Defensible Space*, his crime data came from two sources: New York City Housing Authority Reports, which recorded every criminal event and its location within the building, and New York City Police Reports, which he uses to compare crime in context. For my study, I rely on three Department of Defense data archives. First, the Defense Manpower Data Center (DMDC) provides the longitudinal re-enlistment counts and percentages for all of the barracks at my three sites. Second, the Global Assessment Tool (GAT) collects soldier data across five domains of health: social, emotional, spiritual, family, and physical. And third, the Department of Defense Suicide Event Report (DoDSER) data records every suicide and suicide attempt across the military.

Broadly, my quantitative strategy is correlational. I seek to clarify relationship patterns between multiple variables—from physical milieu to social connection, and social connection to health and re-enlistment outcomes. For Oscar Newman, the correlational relationship was milieu and crime. And for William Whyte in *The Social Life of Small Urban Spaces*, it was between physical features and plaza use. As Groat and Wang write:

> In both cases, the researchers wanted to clarify the relationship among a complex set of real-world variables. By variables we mean the range of characteristics (of physical features, of people, of activities, or of meanings) that vary within the circumstance being studied and are also likely

to affect the dynamics of socio-physical interaction.[11]

I used these great works as methodological mentors, gaining relationship insight between variables through statistical analysis. Like them, it is important to recognize that correlational analysis yields correlations, not causations. Whyte's study of New York plaza use only associates sun, water or fountains, trees, proximity to the street, movable chairs, sittable space, and the presence of food options to rates of use. It does not claim that movable chairs cause or generate use, only that it encourages it. Likewise, I do not claim any causality, only correlations.

Taken together, the personal accounts, archival and document research, and quantitative analysis help complete my understanding of the environment-behavior-health connection.

Defining Cases

I would be remiss if I did not at least address the selection rationale for my cases. Carla Yanni, in her most recent book on the history of American college dormitories, *Living on Campus*, writes that:

> There was no way for me to assemble a scientifically perfect selection of cases, and I know that my choices of case studies will be open to debate. Another scholar who selected different examples would have written a different book, but I do not think his or her conclusions would be widely divergent from mine.[12]

I contend that the same is true for this study. I chose Fort Bragg, Joint Base Lewis-McChord, and Schofield Barracks because of their ability to hold potentially intervening variables constant. In each case, I am comparing one Brigade Combat Team against another at the same base. The personnel composition, function, and skillsets between the two BCTs are purposely identical. The Army can plug them in or swap them out without losing capability—and that is the point. You can think of my compared BCTs as two sections of the same college course. By design, they are equal, and any variability is due to inherent personality differences and the complexities of real-life. The Army has ten installations with two or more BCTs assigned to them. I chose three. My selection criteria focused less on geography and more on the design disparity between the barracks where the two BCTs live. As Yanni writes, another researcher could pick an entirely different set, but I do not believe their conclusion would significantly change.

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